72-22

Private Fuel Storage, LLC

P.O. Box C4010, La Crosse, WI 54602-4010
John D. Parkyn, Chairman of the Board

February 18, 1999

Director
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RESPONSE TO EIS REQUEST FOR ADDITIONAL INFORMATION
PRIVATE FUEL STORAGE FACILITY
DOCKET NO. 72-22 / TAC NO. L22462
PRIVATE FUEL STORAGE L.L.C.

Reference: 1) NRC Letter, Young to Parkyn, Request for Additional Information, dated December 18, 1998

Please find enclosed Private Fuel Storage responses to the EIS Request for Additional Information (Reference 1). Certain attachments referenced in the RAI responses are being submitted under separate cover.

The enclosed responses contain non-proprietary information. Proprietary RAI responses are being submitted under separate cover.

If you have any questions regarding this response, please contact me at 608-787-1236 or our Project Director, John Donnell, at 303-741-7009.

Sincerely,

John D. Parkyn, Chairman
Private Fuel Storage L.L.C.

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Enclosures

Change: Encl To Files PDR

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cc: Mr. Bear - Skull Valley Band of Goshutes
Ms. Chancellor, Esq. - State of Utah
Mr. Chowdhury - Center for Nuclear Waste Regulatory Analyses
Mr. Condit - Land and Water Fund of the Rockies
Mr. Delligatti - U.S. NRC
Mr. Donnell - Stone & Webster
Mr. Kennedy, Esq. - Confederated Tribes of the Goshute Reservation
Mr. Northard - Northern States Power Company
Mr. Quintana, Esq. - Skull Valley Band of Goshute Indians
Mr. Silberg, Esq. - Shaw, Pittman, Potts & Trowbridge
Mr. Turk - U.S. Nuclear Regulatory Commission
Mr. Wade - Oak Ridge National Labs
Mr. Walker, Esq. - Land and Water Fund of the Rockies

ENVIRONMENTAL IMPACT STATEMENT

1. TRANSPORTATION

1-1 Provide sufficient information to perform the RADTRAN analysis of the cumulative impacts of spent fuel transportation in the vicinity of the proposed facility during the entire license term, including shipments to and away from the facility. Your response should include the following information:

a. Discuss whether operators of individual reactors in the PFS consortium will ship single or multiple casks, whether cask shipments will be grouped together in more than one shipment at various locations before arriving at Tempe or Low.

b. If shipments will be grouped together at various locations, describe in detail these operations and how they will affect the transportation analysis.

c. Describe Private Fuel Storage, L.L.C. (PFS's) plans for rail shipment to the PFSF to provide information for assessing the impacts of these shipments.

   1. Include in the discussion details of whether PFS will own a locomotive and operate trains over the rail spur into the PFSF or will contract with the Union Pacific (UP) or other carrier to operate over the spur and deliver casks to the site.

   2. If UP or another carrier delivers cars to the PFSF, state whether or not the PFSF will have a mechanism (e.g., a small pusher vehicle) to move individual cars in their switching yard.

   3. Conversely, if heavy haul trucks are used, state whether or not a switch engine (or pusher) will be available at the intermodal transfer site to move and position rail cars.

d. Quantify the average number of rail shipments (trains) per year to the PFSF.

   Include the number of casks on any one train coming into Utah (if this varies, what is the average over the lifetime of the license term).

e. Describe all aspects of the rail shipments over the lifetime of the license term.

f. Provide the physical, chemical, and radiological descriptions for all the materials being shipped (e.g., the average curie levels of all significant radioactive isotopes in the spent fuel at the time of shipment).

g. Provide the average expected dose rate in mrem/hr at a distance of 1 m from the cask surface during the shipment. Also provide the rationale for the estimate.

h. Provide the burnup (in MWd/MT) of the spent fuel in the cask and average cooling time after discharge from the reactor at the time of shipment.

RESPONSE

a. The operators of individual reactors within the PFS consortium are expected to ship both in single and multiple cask shipments over the life of the facility depending upon the needs of the specific reactor facility. These cask shipments will be on single use trains. These trains will proceed directly from the individual reactor site without any other anticipated grouping with other facilities and proceed directly to the PFSF via either Low or Timpie. Should such cask grouping occur in the future, it would consist of a single use train, stopping at a power reactor facility, or a heavy-haul pickup point from a power reactor facility, along the way to attach additional rail cars with loaded casks and would not involve the switching of rail cars with casks between multiple use trains in general switchyards but would only occur on a reactor licensee's site or the heavy-haul access to rail near the licensee's site.

b. There will be no such grouping in the vicinity of the PFSF site as there are no licensed reactor facilities in the immediate proximity to the site. Therefore these groupings should not affect the results of the RADTRAN transportation analysis in the vicinity of the PFSF.

c. Private Fuel Storage plans to ship spent fuel from each reactor site to the PFSF by rail car only. These rail cars will travel in trains containing anywhere from one to six cask cars. The trains will also be provided with a car capable of carrying persons to provide the appropriate oversight and safeguards. The shipments will be single-use trains when containing spent fuel and will proceed directly to the PFSF site without any interruptions other than those necessary for crew changes and refuelings. Casks will be picked up at the utility site and when this arrangement is not possible, PFS will assist utilities in making heavy haul arrangements to the nearest appropriate rail location. Casks coming from the east and south will enter the vicinity of the PFSF on the rail lines through Salt Lake City, Utah and Ogden, Utah. Shipments from the west will generally enter the vicinity of the PFSF on the Union Pacific line coming from the southwest through Tooele, Utah or from the west on the Union Pacific line which approaches Low Junction.

1. PFS will either own the over-the-road locomotives to provide for some of the advanced operating characteristics which may be installed on newer locomotives or lease them. Regardless of ownership, either PFS personnel or Union Pacific personnel will operate trains from the terminal point at Low over the short rail line into the PFSF. The railroad to be built into the site will be owned by Private Fuel Storage and the cars used to carry casks as well as the staff car which travels with each train will be owned by PFS. If over-the-road locomotives are owned by PFS they will also be used for on-site positioning.

2. If PFS does not own the locomotives used for the long-haul transportation, a pusher vehicle will be used to position individual cars in the switching yard. If PFS owns over-the-road locomotives, most likely those same locomotives will be used for car positioning at the PFSF.

3. If heavy haul trucks are used via an inter-modal point, a pusher vehicle to position rail cars will be available at the inter-modal transfer site. This positioning motor vehicle will be owned and provided by PFS.

d. The average number of rail shipments (trains) per year to the PFSF is anticipated to be 50. The average number of casks on trains coming into Utah will be three. The maximum number of cask cars on any one train is anticipated to be six. The shipments outbound from the PFSF will have their frequency and composition determined by the federal facility receiving the fuel. It is assumed that a larger numbers of casks (up to the maximum of twelve) would be included on the average outbound shipment, as sufficient quantity of canisters for shipment will exist at the PFSF and the federal receiving facility would be in a position to off-load a full train.

e. The planned rail shipments will be conducted as follows. PFS will ship empty transportation casks in mixed freight service cask cars to the reactor plants. These casks will contain unused spent fuel canisters with the internals prepared for each reactor. The shipments will be delivered to those plants with rail service on their spur. Heavy haul arrangements will be used as necessary from a rail head to those reactor plants which do not have a direct rail spur into the site. The casks will be loaded by reactor plant personnel and prepared for shipment with support from Private Fuel Storage as needed. The transportation cask are then loaded on the rail car provided by PFS, which is designed to use for general interchange over the railroad shipping. In the event of reactor sites without direct rail access, heavy haul and/or barging will be used to transport the loaded fuel casks to the nearest rail points.

   The trains handling loaded spent fuel casks will be single use unit trains (non-mixed shipments) whose sole function will be to ship spent fuel to the PFSF. The trains could consist of anywhere from one to six cask cars, depending on the needs of the facility and the shipping schedules that are enumerated over

a period of time. The train which will be built to specifications outlined by the American Association of Railroads under its proposed standards for nuclear fuel shipments, will then proceed by a predetermined route (selected by Private Fuel Storage in cooperation with the host railroads, and approved by the NRC (10 CFR 73.37(b)(7)) to the PFS facility. Train speeds are expected to be similar to those transporting standard freight. The single-use trains will be continuously operated (as opposed to being put on sidings and potentially left unattended during crew changes or movement of cars in the makeup of trains). The trains, other than for refueling and crew changes, will continue either through Low to the PFS site railroad or to the inter-modal transfer point.

The rail shipments will be provided with safeguards in accordance with federal regulations. Notifications as prescribed in the 10 CFR 73.37 will be complied with. Once the rail shipments reach the PFSF, the cars will be positioned individually in the canister transfer building at such a point as to permit the facility's crane to remove the shipping cask from the rail car. If the inter-modal point is used, the shipping cask/cradle/impact limiter assembly will be transferred by crane from the rail car to a heavy haul truck. At that point, the rail shipment portion of the transit would terminate. The rail equipment, insofar as cars for the transportation casks, will be owned by PFS and built to the AAR standards. A rail car to transport the security staff responsible for safeguards as part of the train will also be provided by PFS and modeled in accordance with the AAR requirements for integrated train operation while carrying spent fuel. The locomotives may or may not be owned or leased by Private Fuel Storage.

f. The materials being shipped to the PFSF are spent nuclear fuel assemblies from PWR and BWR light water reactors. Included with some of the assemblies are the burnable poison rod control components that are associated with the fuel assemblies. Only spent fuel assemblies and associated components and no greater-than-Class C waste will be shipped to or stored at the PFSF.

Physical descriptions of fuel assemblies (weights and dimensions) that can be shipped to the PFSF are included in PFSF SAR Table 3.1-3, which provides bounding design fuel characteristics. These bounding characteristics include maximum assembly width, length, weight, active fuel length, and maximum number of assemblies per PWR and BWR canisters. Additional details regarding fuel physical parameters is provided in Tables 12.3.1 (PWR Fuel Assembly Characteristics) and 12.3.2 (BWR Fuel Assembly Characteristics) of Holtec International's HI-STORM Storage TSAR, including number of fuel rods, number of control thimbles, fuel pellet diameter, fuel rod pitch, cladding thickness, and clad outer diameter.

Chemical descriptions of the materials being shipped are as follows: The fuel is uranium oxide (UO_2) matrix with primarily Zircaloy cladding, but some

stainless steel cladding, as identified in PFSF SAR Table 3.1-3. The PWR burnable poison rod control components that are associated with the fuel assemblies contain boron carbide and are clad in stainless steel or Zircaloy. The BWR fuel rods contain gadolinium as a burnable poison inside the fuel rods. As discussed in the response to RAI EIS 5-2, it is planned to ship four mixed-oxide fuel assemblies to the PFSF that are currently stored in the San Onofre Unit 1 spent fuel pool.

The curie levels of significant radioisotopes are provided in Table 7.3.1 of the HI-STAR TSAR (Reference 1) for MPC-24 (PWR) and MPC-68 (BWR) canisters. As discussed in Section 7.3.1 of the HI-STAR TSAR, these levels are based on the assumptions that the PWR fuel assemblies are B&W 15X15 with a burnup of 40,000 MWd/MTU, 5 years cooling time and an enrichment of 3.4%; and the BWR fuel assemblies are GE 7X7 with a burnup of 40,000 MWd/MTU, 5 years cooling time and an enrichment of 3.0%. The radionuclide inventories are conservative, since these fuel assemblies are too "hot" to be permitted to ship in the HI-STAR shipping package. As stated in Section 7.3.1 of the HI-STAR TSAR, "The Technical Specifications in Chapter 12 limit the fuel assembly burnup well below 40,000 MWD/MTU for both PWR and BWR fuel at 5 years of cooling time. This ensures that the inventory used in this calculation exceeds that of the fuel authorized for storage in accordance with the Technical Specifications."

Section 4.0 ("Containment") of the TranStor Shipping Cask SAR (Reference 2) does not list all the significant radionuclides, focusing on Kr-85, H-3, and Co-60.

As discussed in Section 7.4 of the PFSF SAR, average spent fuel at the PFSF is considered to be represented by PWR fuel having 35,000 MWd/MTU burnup and 20 years cooling time. The basis for this representative average fuel was previously submitted to the NRC in the response to RAI SAR 7-1 in the first round of RAIs. The DOE OCRWM LWR Radiological Database (Reference 3) identifies an average enrichment of 3.43% for PWR fuel with this burnup. The OCRWM LWR Radiological Database was used to obtain an estimate of the radionuclide inventory of all isotopes that contribute 0.1% or more of the total activity for PWR fuel having 35,000 MWd/MTU burnup, 20 years cooling time, and 3.43% enrichment. While H-3, I-129, Ru-106 and Cs-134 contributed less than 0.1% of the total inventory, they are considered to be significant radionuclides and their activity level was obtained from output of the OCRWM LWR Radiological Database, with the "all isotopes greater than the database cutoff" option selected. The database output is in curies per metric ton initial heavy metal (MTIHM). In order to convert this to the radionuclide inventory in a canister, the values output by the OCRWM LWR Radiological Database are multiplied by 0.469 MTU/assembly (the maximum PWR assembly fuel loading, from Section 5.2.1.1 of Reference 2), and by 24, since both the HI-STAR and

TranStor shipping casks are designed to contain 24 PWR fuel assemblies. The results are listed in the following table:

Isotope	Curies per MTIHM, as Output by the OCRWM LWR Radiological Database	Curies per Canister
H-3	2.694E+02	3.032E+03
CO-60	6.453E+02	7.263E+03
NI-63	3.798E+02	4.275E+03
KR-85	2.661E+03	2.995E+04
SR-90	4.759E+04	5.357E+05
Y-90	4.760E+04	5.358E+05
RU-106	5.490E–01	6.180E+00
I-129	3.328E–02	3.746E-01
CS-134	2.057E+02	2.315E+03
CS-137	6.866E+04	7.728E+05
BA-137M	6.495E+04	7.311E+05
PM-147	6.512E+02	7.330E+03
SM-151	3.640E+02	4.097E+03
EU-154	2.004E+03	2.256E+04
EU-155	4.060E+02	4.570E+03
PU-238	2.722E+03	3.064E+04
PU-239	3.595E+02	4.047E+03
PU-240	5.160E+02	5.808E+03
PU-241	5.221E+04	5.877E+05
AM-241	2.920E+03	3.287E+04
CM-244	1.208E+03	1.360E+04
Total	2.963E+05	3.335E+06

The above table provides the estimated average curie level in the spent fuel, for a canister shipped to the PFSF. It does not include Co-60 in crud plated out on the outside of fuel rods. This quantity can be estimated using the methodology applied in Section 7.3.2 of the HI-STAR TSAR (Reference 1), accounting for decay of Co-60 for the 20 year cooling time estimated for the average fuel shipped to the PFSF.

References

1. Safety Analysis Report for the Holtec International Storage, Transport and Repository Cask System (HI-STAR 100 Cask System), Holtec Report HI-951251, Revision 5, February 1997, NRC Docket No. 71-9261.

2. Safety Analysis Report for the TranStor Shipping Cask System, SNC-95-71SAR, Sierra Nuclear Corporation, Revision 2, June 1997, NRC Docket No. 71-9268.

3. DOE/RW-0184-R1, Characteristics of Potential Repository Wastes, Office of Civilian Radioactive Waste Management (OCRWM), U.S. Department of Energy, July 1992; OCRWM LWR Radiological Database.

g. Dose rates associated with the HI-STAR and TranStor shipping casks were evaluated for normal conditions of transport, assuming the casks contain representative average PFSF fuel, considered to be PWR fuel having 35 GWd/MTU burnup and 20 years cooling time (PFSF SAR Section 7.4, with bases provided in the response to NRC RAI SAR 7-1, in the first round of RAIs). The vendor SARs provide dose rate information on contact with accessible external surfaces of the shipping package/transport vehicle, and 2 meters from the vertical planes represented by the outer lateral surfaces of the transport vehicle, per 10 CFR 71.47. This vendor dose rate information is based on the shipping package containing design basis fuel, which has higher burnup and shorter cooling time than the PFSF representative average spent fuel.

In order to estimate dose rates at 1 meter from the shipping packages assumed to contain representative average PFSF fuel, it was necessary to interpolate between the contact and 2 meter dose rates, then scale the dose rates based on the relative gamma and neutron source strength of the different fuels. Dose rates at the contact and 2 meter points of interest for HI-STAR design basis fuel were taken from Tables 5.4.2, 5.4.3, 5.4.4, 5.4.8 and 5.4.10 of the HI-STAR Shipping Cask SAR (design basis PWR spent fuel having 40 GWd/MTU burnup, 10 year cooling time, and 3.7% enrichment), and from Table 5.5-11 of the TranStor Shipping Cask SAR (design basis PWR spent fuel having 40 GWd/MTU burnup, 8 year cooling time, and 3.02% enrichment). Linear interpolation was used to estimate total dose rates at 1 meter, which is conservative, and the fraction of gamma vs. neutron radiation contribution to the total dose rate was assumed to be the same as that at the contact dose point.

The interpolation was based on actual distances between the contact and "2 meter" dose points used by the different vendors. For instance, Holtec evaluates the side contact dose point on contact with the side of the shipping package, whereas SNC evaluates the dose on contact with the personnel barrier, whose radius is the same as that of the impact limiters. Both vendors evaluate axial contact dose rates on the axial surfaces of the top and bottom impact limiters. However, for the 2 meters from the transport vehicle dose points, SNC considers that the front and back edges of the transport vehicle correspond to the ends of the impact limiters, whereas Holtec considers the edges of the transport vehicle to be 6 ft from the ends of the impact limiters.

Gamma and neutron scaling factors were used to scale from the HI-STAR and TranStor representative design basis fuels identified above to the PFSF representative average fuel, applying the source scaling methodology described in Section 5.4.1 of the TranStor Storage Cask SAR. Gamma and neutron source strengths for the fuels being compared were determined from the DOE's OCRWM LWR Radiological Database (Reference 1).

Averaging the dose rates estimated for the HI-STAR and TranStor shipping casks (essentially assuming an equal number of shipments in each type of cask) results in the following dose rate estimates at 1 meter from a shipping cask transporting PFSF representative average fuel:

Shipping Package Dose Point Location	Total Dose Rate (mrem/hr)
Side, 1 meter from Cask Outer Surface	7.7
Top, 1 meter from Top Impact Limiter	1.2
Bottom, 1 meter from Bottom Impact Limiter	13.6

<u>Reference</u>

1. DOE/RW-0184-R1, Characteristics of Potential Repository Wastes, Office of Civilian Radioactive Waste Management (OCRWM), U.S. Department of Energy, July 1992; OCRWM LWR Radiological Database.

h. PFS does not have a firm schedule that lays out the year in which specific fuel assemblies might be shipped from specific nuclear power plants. This will be determined by the individual utilities based on their spent fuel storage needs at that time. Thus, in order to provide an estimate of the burnup and average cooling time of spent fuel that might be shipped in any given year, PFS is providing an estimate based on two scenarios.

The first assumes that approximately 500 MTU of spent fuel is shipped from member reactor sites annually as presented in Attachment 1-1 h1. Assuming that spent fuel shipments begin in 2002, an estimate of average burnups shipped annually and the average cooling time is provided. Beginning in approximately 2020, it may be necessary to ship less than 500 MTU per year in order to maintain the minimum cooling time of 10 years after discharge from the reactor that is required by the currently planned cask designs. It is assumed that reactors may increase burnups up to 70,000 MWd/MTU at some point in the future and the cask designs will be modified to accommodate shipment of such fuel prior to the need to ship such fuel.

The second assumes that approximately 1,000 MTU of spent fuel is shipped from member reactor sites annually as presented in Attachment 1-1 h2. Assuming that spent fuel shipments begin in 2002, an estimate of average burnups shipped annually and the average cooling time is provided. Beginning in approximately 2007, it may be necessary to ship less than 1,000 MTU per year in order to maintain the minimum cooling time of 10 years after discharge from the reactor that is required by the currently planned cask designs. It is assumed that reactors may increase burnups up to 70,000 MWd/MTU at some point in the future and the cask designs will be modified to accommodate shipment of such fuel prior to the need to ship such fuel.

While quantities of spent fuel in excess of 1,000 MTU could be shipped annually if additional reactors planned to ship spent fuel to the PFS ISFSI, the range of burnups and cooling times provided in the attachments should provide an average bounding estimate for such a scenario.

ATTACHMENT 1-1 h1

Expected Shipment Year	Annual MTU	MTU Wt'd Disch Date	MTU Wt'd Burnup	MTU Wt'd Cooling Yrs
	------------------	500 MTU / Year	--------------------	
2002	489.6	1975.08	19,714	26.9
2003	509.6	1979.58	26,357	23.4
2004	503.9	1982.35	26,948	21.7
2005	492.8	1984.55	27,309	20.5
2006	519.4	1986.54	28,082	19.5
2007	487.5	1988.38	28,504	18.6
2008	498.0	1990.05	31,574	18.0
2009	482.0	1991.60	34,273	17.4
2010	520.0	1993.10	34,401	16.9
2011	518.1	1994.73	39,802	16.3
2012	481.2	1996.32	42,382	15.7
2013	498.5	1997.93	44,383	15.1
2014	517.9	1999.57	44,673	14.4
2015	491.3	2001.17	47,071	13.8
2016	474.2	2002.98	48,070	13.0
2017	505.8	2004.82	48,535	12.2
2018	520.7	2006.81	50,082	11.2
2019	490.1	2008.89	50,495	10.1
2020	493.2	2010.73	50,806	9.3
2021	495.9	2012.50	52,730	8.5
2022	499.7	2013.90	50,774	8.1
2023	509.2	2016.00	52,799	7.0
2024	492.7	2018.25	51,281	5.8
2025	516.0	2021.55	53,963	3.5
2026	550.3	2026.71	51,478	-0.7

Beginning in 2020, it may become necessary to ship less than 500 MTU per year in order to maintain the minimum cooling time of 10 years after discharge from the reactor. In 2020 and subsequent years the average discharge burnup for the remaining 3,557 MTU of spent fuel is estimated to range between 50,800 and 70,000 MWD/MTU.

ATTACHMENT 1-1 h2

Expected Shipment Year	Annual MTU	MTU Wt'd Disch Date	MTU Wt'd Burnup	MTU Wt'd Cooling Yrs
	----------	1,000 MTU / Year	----------	
2002	999.2	1977.37	23,102	24.6
2003	996.7	1983.44	27,127	19.6
2004	1006.9	1987.43	28,286	16.6
2005	980.0	1990.81	32,902	14.2
2006	1038.1	1993.91	37,097	12.1
2007	979.7	1997.14	43,400	9.9
2008	1009.2	2000.35	45,840	7.7
2009	980.0	2003.93	48,310	5.1
2010	1010.8	2007.82	50,282	2.2
2011	989.1	2011.62	51,771	-0.6
2012	1009.0	2014.96	51,796	-3.0
2013	1008.7	2019.94	52,653	-6.9
2014	550.3	2026.71	51,478	-12.7

Beginning in 2007, it may become necessary to ship less than 1,000 MTU per year in order to maintain the minimum cooling time of 10 years after discharge from the reactor. In 2007 and subsequent years the average discharge burnup for the remaining 7,537 MTU of spent fuel is estimated to range between 43,000 and 70,000 MWD/MTU.

ENVIRONMENTAL IMPACT STATEMENT

1. TRANSPORTATION

1-2 Describe the proposed rail and highway vehicles that would be used to transport the storage casks to the site.

Provide the number of these vehicles to be utilized, the turning radius of the vehicle, the parking location of the vehicle when not in use, and the location of the vehicle maintenance activities.

RESPONSE

A discussion of the proposed rail and highway vehicles are presented in PFSF SAR Section 4.5.4.2, "Shipping Cask Heavy Haul Tractor/Trailer," and Section 4.5.5.2, "Shipping Cask Rail Car." A figure of the proposed heavy haul tractor/trailer is shown on SAR Figure 4.5-4. A diagram of the proposed rail car is shown on SAR Figure 4.5-5.

As noted in PFSF ER Section 3.3, the number of shipping casks transported to the site is expected to be between 100 and 200 casks per year. Assuming 200 casks per year, the site would receive on average four casks per week. To handle this volume, a minimum of 2 heavy haul tractor/trailer units would be used if the casks were transported by highway from the ITP to the PFSF. All transportation casks will be transported across the country via rail car to the ITP or Low Junction. A minimum of 2 fleets would be used to continue to the site from the mainline if the casks were transported using the rail line. Each fleet would consist of 3 to 6 rail cars.

Based on vendor information from three of the largest trailer manufacturers for this type of trailer, the heavy haul trailers range from 150 ft to 180 ft in length and are typically 12 ft wide. The trailers use up to 100 tires to distribute the weight within typical highway limits. However, use of these trailers usually requires permitting due to the overall weight and length. The trailers are articulated, that is they can pivot in several places and include steerable axles to accommodate tight radius turning. The turning radius ranges 75 ft to 150 ft, depending on whether steerable dollies are used. The tractor/trailers will usually be stored in either the Canister Transfer Building truck bay or in the intermodal transfer point enclosure in preparation for their next assigned task. Both buildings are designed to fully enclose the tractor/trailer unit. Maintenance activities will be conducted at the Operation and Maintenance Building, except such maintenance duties that are complex enough in nature that they require off-site contracted major maintenance. It is anticipated that contract facilities within the area would be used for such items as engine overhaul, etc.

The rail cars will either be heavy duty 145 ton flatbed cars with 3 axle-trucks or depressed center flatbed cars with double bolsters (two sets of 2-axle trucks) similar to those used by the Department of Defense for their spent fuel shipments. The radius of the track for rail cars is dependent on various factors such as car length. The final design is not complete on the rail car, so the turning radius of the cask car has not been determined. However, the car would be somewhat short (probably not exceeding 50' in length) and the turning radius would be fairly tight. However, direct rail transportation to the PFSF has been designed using 10 degree curves (574 ft radius), which is typical in the industry. The rail cars, which typically will be in transit to pickup more spent fuel, will be stored on the railroad storage siding at the PFSF when not in use (See PFSF SAR Figure 1.2-1). If the intermodal transfer point is utilized, parking for the cars when not in use would either be provided at the intermodal transfer point or at leased space somewhere in the vicinity. Routine maintenance will be performed at the PFSF or the intermodal transfer point, depending on the case. Major overhauls and maintenance would have to be in a privately operated railroad equipment servicing shop approved for such activities and inspections.

ENVIRONMENTAL IMPACT STATEMENT

1. TRANSPORTATION

1-3 Provide a copy of PFS's comprehensive Plan of Development (POD) for the railroad spur and transfer site, requested by BLM to facilitate its review of PFS's rail spur right of way application.

RESPONSE

PODs (drafts) for the PFS rail line and intermodal transfer point (ITP) are provided in the Attachment package provided under a separate cover (Attachment 1-3 (a) and (b)). As expressed by the BLM at a meeting with PFS held on January 21, 1999 to discuss the development of the PODs, the POD evolves over a period of months to ensure that it contains all the information needed by BLM to complete their review. Therefore, draft PODs are being submitted in advance of the completion of certain surveys, analyses and designs that are necessary to finalize the POD, in order to apprise BLM of current developments of PFS's proposed projects. PFS will address omitted subject matter in subsequent revisions to the PODs. In addition, other matters discussed in the PODs may be refined, amended or expanded upon in subsequent POD revisions.

ENVIRONMENTAL IMPACT STATEMENT

2. UTILITIES AND INFRASTRUCTURE

2-1 Describe the site utility service (i.e., electric, gas, telephone, water, waste).

a. Include a discussion of electrical power distribution, power line construction, electric utility and telephone lines, switching station, pipelines for water and natural gas, backup electric generation facilities, and sewage treatment facilities.

b. Include figures/maps indicating the location of such lines and facilities.

This information is needed to complete the EIS assessment of the impacts of facility operation on local utilities and of construction impacts on the areas where these will be located.

RESPONSE

a. Site utilities for the PFSF are discussed in Section 4.3 of the PFSF Safety Analysis Report. The following discussion provides a brief overview of the subject areas:

<u>Electrical Systems (SAR Section 4.3.2)</u>

Normal electrical power will be provided to the PFSF via an existing 12.5 kV offsite distribution power line, which runs parallel to Skull Valley Road. A new electrical line will be constructed parallel to the site access road to furnish 12.5 kV to a 480 volt site transformer located at the site. The line will be run on new wooden power poles that will be installed by Utah Power & Light. Electrical power onsite downstream of the utility meter will be run underground and installed by contractors. The lines will either be underground service cable laid and buried in trenches or run in plastic conduit that is pored in underground concrete ductbanks.

Step down transformers will be used to provide 480 and 120/240 volt services as required. No switching stations will be necessary. The normal power will be provided for lighting, general utilities, security system, HVAC loads, crane loads, and miscellaneous equipment.

A 480 volt emergency backup diesel-generator will supply backup power in the event normal power is lost. The diesel-generator is sized at 150 KW. The diesel generator will be located in the Security and Health Physics Building. The emergency power will be limited to the security system, emergency

lighting loads, storage cask temperature monitoring system, and the site communications system. The diesel generator will be able to provide continuous operation for a minimum 24 hour period. As noted in Section 9.1.3 of the Environmental Report, operation of the diesel-generator, which is small and will only operate occasionally, will not trigger Federal air regulation requirements.

An Uninterruptible Power Source (UPS) will be used to provide power to the security systems until the diesel starts and comes up to speed. The UPS system will also be located in the Security and Health Physics Building. The UPS system will be a 120 volt, single phase system with integral batteries and battery charger. The UPS system will be able to provide a minimum of 1 hour operation without replacing or recharging batteries.

<u>Gas Utilities (ER Section 9.1.3)</u>

Propane will be used to provide fuel to all gas heating units located in the PFSF buildings rather than natural gas due to the remote location of the site. The propane will be supplied from an 8,000 gallon tank. Since the amount of propane used will be less than 10,000 lbs., no threshold levels that would invoke compliance with hazardous and toxic chemical regulations will be exceeded. The system will be installed in accordance with NFPA requirements. Outdoor piping between the tanks and the buildings will be located below ground and coated or wrapped.

<u>Telephone Service (SAR Section 4.3.7)</u>

Telephone service will be provided in all the buildings at the site. The main telephone panel will be located in the administration building and will provide for 25 telephone lines. The service will be provided from the existing underground service located along the Skull Valley Road and will be routed underground parallel to the site access road. The telephone service will be used to provide normal communication to and from the site, emergency communications with local authorities, and on-site voice paging.

<u>Water Supply Systems (SAR Section 4.3.5)(ER Section 4.2.4)</u>

A water supply system will be provided at the PFSF to provide water for normal facility services and operation and maintenance functions. Water will be supplied from wells drilled on-site. In the event wells will not provide an adequate yield, additional water will be piped from the Reservation's existing supply. The water distribution piping and plumbing within the buildings will be provided in accordance with the Uniform Plumbing Code.

Potable water needs during operation of the PFSF are approximately 1500 gallons per day, similar to a light industrial facility with a 24-hour-a-day

contingent of security personnel. Highest water demand is associated with a larger daytime work-force as well as operation of the concrete batching plant. Surface storage tanks will be erected for potable water, emergency fire water, and for the batching plant, since it is unlikely that water wells drilled into the main valley aquifer will yield adequate quantities of water for these purposes on demand.

Waste Systems (SAR Section 4.3.6)

A sanitary drainage system will be provided at the PFSF in accordance with the Uniform Plumbing Code to transmit waste from the buildings to a septic system. The drainage lines will be installed underground and sloped to facilitate drainage.

Two septic tank and drain field systems will be provided to collect and process sanitary waste water from the facility. The systems will be located near the Security and Health Physics Building for the storage facility and near the Administration Building for the Balance of Facility. The systems will be sized for the maximum number of personnel expected on site during normal operating periods. The septic system is expected to process less than 5,000 gallons per day.

b. All the systems described above, with the exception of the Telephone Service and Electrical supply lines, are located inside or near the PFSF buildings and have no connection to offsite sources.

As stated above, telephone service will be provided from the existing underground service located along Skull Valley Road. The new line will be routed underground, parallel to the site access road, and within the area currently discussed in ER Section 4.1.2 that will be disturbed for construction of the access road. Drawings that show the detailed design of the telephone service line routing have not been developed. It is anticipated that the existing service line along Skull Valley Road is adequate to accept the additional telephone lines required by the PFSF.

As stated above, normal electrical power will be provided to the PFSF via an existing 12.5 kV offsite distribution power line, which runs parallel to Skull Valley Road. A new electrical line will be constructed parallel to the site access road and within the area currently discussed in ER Section 4.1.2 that will be disturbed for construction of the access road. Drawings that show the detailed design of the new electrical line routing have not been developed. It is anticipated that the existing distribution power line along Skull Valley Road is adequate to accept the additional electrical loads required by the PFSF.

ENVIRONMENTAL IMPACT STATEMENT

2. UTILITIES AND INFRASTRUCTURE

2-2 Provide information on the anticipated average daily electricity consumption for the proposed facility.

RESPONSE

PFS calculates the total maximum incoming power requirement to be 1500 kVA. Assuming realistic power needs and accounting for 24 hours of operation, the average daily power consumption is estimated to be approximately 16,000 KWH.

ENVIRONMENTAL IMPACT STATEMENT

2. UTILITIES AND INFRASTRUCTURE

2-3. Clarify information provided in Figure 2.1-2, "Site Access Road Location Plan," that supports the EIS surface water analysis, as follows:

There are features shown in ER Figure 2.1-2 that are outside the security fences and perimeter road extending east and west from the retention basin to the north corners and south for 900 or more feet. It is not clear whether or not these features are berms or ditches. Describe what these features are and the function they serve.

RESPONSE

The features in question are the lines that indicate the toe of the slope where PFSF's raised bench and perimeter embankment, upon which the perimeter road and fencing are located, slopes down and interfaces with the existing grade. A perimeter drainage ditch will also be provided, where necessary, at the toe of the embankment slope to direct surface drainage away from the site.

ENVIRONMENTAL IMPACT STATEMENT

2. UTILITIES AND INFRASTRUCTURE

2-4. Provide the locations, dimensions, emissions, and possible effects on the surrounding area of the batch plant and the asphalt plant in sufficient detail to support the EIS.

RESPONSE

Based on estimated quantities of required concrete and information from local concrete suppliers, the batch plant would be sized for a maximum capacity of 75 yd^3 per hour. The batch plant and material storage for this capacity would require a footprint area of approximately 300-ft. x 300-ft., or approximately 2 acres. The specific location for the batch plant on the PFSF site would be determined during the construction planning phase of the project, but it will likely be sited in the construction laydown area planned south of the storage area. The batch plant location would be provided with controls, e.g., perimeter berm and drainage retention, to mitigate any environmental effects on the immediate area.

Communications with local a supplier indicates that the estimated quantity of asphalt paving does not justify locating a plant on site. However, for conservatism, the air quality impacts of a site-situated asphalt facility is included in ER Section 4.1.3 and discussed further below. The environmental impacts of construction traffic, which includes conservative input estimates for supply of all anticipated construction materials, is included in ER Sections 4.1.2 and 4.1.7.

Estimates are provided in ER Section 4.1.3 for fugitive dust emissions (PM-10) from the concrete and asphalt batch plants as well as for gaseous criteria pollutant emissions (SO_2, NO_x, CO, VOC) from the asphalt batch plant dryer burner. The emission factors used for these estimates are taken from the 5th edition of EPA's AP-42 document (EPA 1995) assuming reasonable levels of emissions control using DEQ requirements as guidelines.

The plant wide controlled PM-10 emission factor (E) for concrete batching is taken from Section 11.12, Table 11.12-3 of AP-42 and is expressed as 0.12 pound per cubic yard of concrete produced. It is assumed that 125,300 cubic yards of concrete are produced in one year yielding 7.5 tons of PM-10 emissions per year or 0.6 ton per month.

The emission factors (E) for the asphalt batch plant are taken from AP-42 Section 11.1, Tables 11.1-2 and 11.1-7 and are expressed in terms of pounds of pollutant per ton of asphalt produced as follows:

$E(PM\text{-}10)$ = 0.061 lb/ton (assumes oil fired dryer with fabric filter),
$E(NO_x)$ = 0.17 lb/ton (assumes oil fired dryer),
$E(SO_2)$ = 0.24 lb/ton (assumes oil fired dryer),
E(CO) = 0.069 lb/ton (assumes oil fired dryer),
E(VOC) = 0.046 lb/ton (assumes oil fired dryer).

The emissions estimate assumes that 11,500 cubic yards of asphalt are produced in one year and that the density of asphalt is approximately 1 ton per cubic yard resulting in the production of 11,500 tons of asphalt. This results in the following asphalt batch plant emissions:

PM-10	=	(0.35 ton/yr)/12 =	0.03 ton/month
NO_x	=	(0.98 ton/yr)/12 =	0.08 ton/month
SO_2	=	(1.38 ton/yr)12 =	0.12 ton/month
CO	=	(0.40 ton/yr)/12 =	0.03 ton/month
VOC	=	(0.26 ton/yr)/12 =	0.02 ton/month

The potential impact of the concrete and asphalt batch plant pollutant emissions on ambient concentrations in public areas has also been preliminarily assessed using the EPA SCREEN3 screening level dispersion model (EPA 1995a). This model calculates 1-hour ground level concentrations of pollutants emitted from both point and area sources as a function of downwind distance utilizing either a standard matrix of meteorological conditions designed to produce worst case impacts or user input meteorological conditions. Worst case impacts are used in this case.

Emissions from the concrete and asphalt batch plants are treated as point sources. Ambient pollutant concentrations are calculated at two locations where the general public could be impacted: the closest point from the facility to Skull Valley Road (approximately 2 miles); and at the nearest residences at the Skull Valley Band of Goshute village (approximately 3.5 miles from the site). One-hour concentrations calculated by SCREEN3 are adjusted to 3-, 8-, and 24-hour average concentrations using the factors 0.9, 0.7, and 0.4, respectively. The annual average adjustment factor used is 0.05.

The concrete batch plant PM-10 emissions are assumed to be released from a height of 20 feet above ground level. The asphalt batch plant dryer burner emissions are assumed to be released from a small stack 10 feet above ground level with an exit diameter of 0.5 feet, an exit temperature of 260 °F, and an exit velocity of 33 feet per second.

Based on the annual pollutant emissions and an assumed 2,200 hours per year of operation of the batch plants, the following impacts are obtained at Skull Valley Road and the nearest residence:

	Skull Valley Road	Nearest Residence
Concrete Batch Plant		
PM-10:		
24-hour	40 $\mu g/m^3$	22 $\mu g/m^3$
Annual Avg	5 $\mu g/m^3$	3 $\mu g/m^3$
Asphalt Batch Plant		
NO_x:		
Annual Avg	0.5 $\mu g/m^3$	0.3 $\mu g/m^3$
CO:		
1-hour	4.0 $\mu g/m^3$	2.3 $\mu g/m^3$
8-hour	2.8 $\mu g/m^3$	1.6 $\mu g/m^3$
SO_2:		
3-hour	12.0 $\mu g/m^3$	6.8 $\mu g/m^3$
24-hour	5.3 $\mu g/m^3$	3.0 $\mu g/m^3$
Annual Avg	0.7 $\mu g/m^3$	0.4 $\mu g/m^3$
PM-10:		
24-hour	1.6 $\mu g/m^3$	0.9 $\mu g/m^3$
Annual Avg	0.2 $\mu g/m^3$	0.1 $\mu g/m^3$

As discussed in ER Section 4.1.3, the results of the screening level impact analysis are presented in Table 4.1-5 of the ER and indicate that the estimated pollutant concentrations at Skull Valley Road and at the nearest residences are all within the ambient air quality standards.

References: U. S. Environmental Protection Agency, "Compilation of Air Pollutant Emission Factors, Volume 1.I: Stationary Point and Area Sources", 5th Edition, AP-42, (Sections 11.1 and 11.12), 1995.

U. S. Environmental Protection Agency, "SCREEN3 User's Guide". EPA Publication No. EPA-454/B-95-004, October 1995a.

ENVIRONMENTAL IMPACT STATEMENT

3. DECOMMISSIONING

The EIS must assess the potential environmental impacts of decommissioning. The following RAI items are identified in accordance with 10 CFR 51.41, 51.45, 51.53(d), 51.60(a), 51.60(b)(4), 51.61, 51.71, 51.80(b)(1), 72.98(b), 72.100(a), and 72.130.

3-1 a. If the concrete pads are removed following the cessation of operations, provide the number of truckloads required to remove the concrete storage pads to a landfill, and the general location thereof.

b. Describe the future of the buildings associated with the PFSF.

The disposition of the facility after decommissioning is not specified, although it is suggested that the site might be retained for future industrial activities.

RESPONSE

a. A Preliminary Decommissioning Plan is provided in Appendix B of the License Application. As discussed in this plan, the concrete storage pads will only be used to support the storage casks and it is not anticipated that they will become activated or contaminated. Although the possibility of such an occurrence is remote, it is addressed for decommissioning purposes by assuming up to 10 percent of the storage pad area will require surface decontamination. The maximum number of storage pads is 500, with each having an area of 64 ft by 30 ft, for a total area of 960,000 square feet. Ten percent of this area is 96,000 square feet, which takes no credit for the area protected by the bottom of each storage cask. As stated in the response to safety RAI No. 1, question LA 1-6, the surface decontamination of 10 percent of the storage pad area would generate approximately 290 c.f. of low level waste.

Section 4.6.4 of the ER discusses two alternatives for the storage pads; 1) following characterization of the storage pads, any necessary decontamination, and release of the storage pads for unrestricted use, storage pads can be excavated, cut into smaller sections, and trucked off-site for disposal at a local landfill or 2) the storage pads could be left in place and the storage area covered with soil and replanted with native vegetation. The preferred alternative for decommissioning of the concrete storage pads is to leave them in place and cover the cask storage area with soil and replant with native vegetation.

In the event the entire removal of the pads is performed, this would involve removal of 106,667 CY of material [(64-ft X 30-ft X 3-ft) X 500 pads = 106,667 CY]. Using a 20 CY truck and a factor of 0.9 to allow for void spaces, yields approximately 5,926 truckloads [106,667/(20 X 0.9) = 5,926]. Since decommissioning will occur many years into the future, location of a suitable landfill cannot be determined at this time.

b. The radiological aspects of decommissioning are explained in the license application. The question therefore is presumably directed at non-radiological aspects of decommissioning as they might impact measurement of the environmental impacts.

The future of the buildings to be constructed by PFS, which are four in number in the site layout, are to be determined by the Skull Valley Band of Goshutes. PFS is obligated (and is collecting sufficient advanced funding) to remove these buildings if the tribe does not foresee uses for them. If the tribe chooses to retain any or all of the buildings once any radiological decommissioning is completed, they have the right to receive a transfer from Private Fuel Storage in an "in tact" condition. It is the sole discretion of the tribe as to what future industrial uses they might propose for the buildings and what any impact of such usage would be.

ENVIRONMENTAL IMPACT STATEMENT

RESOURCES NEEDED FOR CONSTRUCTION

4-1. Assess the potential off-site environmental impacts associated with obtaining aggregate and soil.

It is expected that the proposed facility would use large amounts of crushed aggregate. The assessment should include the sources and quantities needed and the plans for excavated and excess soil (e.g., location placement on site or off site, the areas that would be covered by soil, and disturbed area restoration).

RESPONSE

Specific sources for concrete aggregate, crushed rock, asphalt, and backfill soil materials will be determined during the construction phase of the project. However, local concrete, aggregate, and earthwork suppliers in the area have been contacted to determine the availability of required materials.

These suppliers indicate that sufficient materials are present in the area to satisfy project requirements. The material would be obtained from privately operating pits/quarries located in the Tooele Valley or elsewhere in Tooele County. These already active source pits/quarries would have reclamation plans and air quality credits for crushing equipment in place.

The list below provides quantity estimates for required imported materials in cubic yards (CY) or in tons.

- Construction Phase I – Approximate 19 month period
  - Concrete – 55,000 CY with transported components of
    - Small Aggregate – 21,000 CY
    - Large Aggregate – 29,000 CY
  - Crushed Rock Grading
    - Access Road Base – 22,000 CY
    - Storage and Buildings Area Grading – 53,000 CY
  - Fill Materials
    - 135,500 CY
  - Asphalt Paving
    - 16,500 tons

Construction Phase II – Approximate 10 year period

- Concrete – 125,000 CY with transported components of
  - Small Aggregate – 47,500 CY
  - Large Aggregate – 66,500 CY
- Crushed Rock Grading
  - Storage Area Grading – 30,500 CY
- Fill Materials
  - 23,000 CY

Construction Phase III – Approximate 10 year period

- Concrete –157,000 yd^3 with transported components of
  - Small Aggregate – 59,500 CY
  - Large Aggregate – 83,000 CY
- Crushed Rock Grading
  - Storage Area Grading – 53,500 CY
- Fill Materials
  - 71,000 CY

The excess soil produced during construction is mainly generated from stripping the top "organic" layer from the entire site and subsequent individual excavations for storage pad construction. The latter being an ongoing effort during the three construction phases. The specific plans for disposal of excess material have not as yet been determined. It may be disposed of on-site; however, if the material is to be disposed of off-site, the excess material transport has been included in ER Sections 4.1.2 and 4.1.7 to determine environmental effects of truck traffic.

The excess "spoil" material may be used for reclamation of the source pits/quarries. This methodology would reduce the above-mentioned environmental effects of traffic, since the study was based on estimates of trucks not being utilized as multi-purpose, i.e., the trucks were assumed to be empty one way.

An alternate plan for the excess soil material is to use it to create a landscape or partial visual screen berm between the site and Skull Valley Road. The berm would be located inside the owner controlled area, east of the restricted area, and generally trend north-south, the direction of natural valley drainage. The berm would be lengthened (or heightened), as the operation/construction progressed through Phases II and III and additional "spoil" material became available. The berm would be planted with native vegetation. During the decommissioning phase, the berm material may be used for covering the cask storage area, as described in ER Section 4.6.4.

ENVIRONMENTAL IMPACT STATEMENT

5. NEED FOR THE FACILITY

5-1 Justify and describe in detail each PFS member utility's need for the PFSF based on the four reasons listed in ER Section 1.2.

RESPONSE

This information was provided to the NRC in a letter from Parkyn to Director, Office of Nuclear Material Safety and Safeguards, dated March 18, 1998. This letter detailed the reasons for involvement in PFS by each of the individual utilities and what contingency plans they were developing in the event that PFS was unavailable. The four reasons indicated in ER Section 1.2 are best paraphrased as "economics", "decommissioning capability", "state restrictions", and "assurance of continued operations".

Economics - Each of the utilities made a conscientious decision to proceed with PFS based on the economics issue since it provides a lower cost alternative than the other options that are available. Most of the utilities have no capability remaining to re-rack within their existing pools. On-site dry storage, with its higher costs of running a single-use site as opposed to a shared site is the only other option readily available. The cost of constructing and operating the site for one facility as opposed to multiple facilities was discussed in EIS RAI, question 5-2 (b), and therefore the need for the PFS site to reduce economic expenditures for alternatives, particularly after the end-of-plant operating life and shutdown, is summarized there.

Decommissioning Capability - Each of the PFS members that have fuel on-site (20 units) will reach the end of their operating license prior to the capability of the Department of Energy's facility to remove all accumulated fuel from the individual sites. The time required for the Department of Energy removal causes an impediment to decommissioning in each of these cases. The existing three reactors that are shutdown need to remove fuel from site to complete decommissioning. As closure at the end of an operating period through decommissioning is an established principle of the NRC license, the clear existence of this need is a strong motivator to construct and operate a single site that would be dedicated solely to spent fuel oversight.

Assurance of Continued Operations - Several utilities expressed a need for the PFSF to continue to operate for the time specified in their operating license. Consolidated Edison at Indian Point #2 pointed out the potential of being unable to make appropriate arrangements for on-site storage of its' spent nuclear fuel, which would curtail the operation of Indian Point #2. California Edison indicated a need at San Onofre Units #2 and #3 to have the PFSF available to ensure full-

core reserve and continued operation throughout its' license. American Electric Power indicated a need for its' Cook Nuclear Plants (Units #1 and #2) to use the PFSF to ensure full-core off-load and operation capability until the end of its license. Illinois Power indicated a need to have PFSF available in order to continue operation and avoid the costs of either additional wet spent fuel storage rack capacity or the construction of on-site dry storage. GPU Nuclear indicated that they need to have PFSF available for the continuing operation of Oyster Creek, whose spent fuel pool has reached full status and whose dry storage facility is not available, or shut the plant down. In the event that the plant is shut down for other reasons, they indicated a need to have PFSF available to promptly comply with the decommissioning needs. Northern States Power indicated a need to have the PFSF available to be capable of operating Prairie Island Units #1 and #2 beyond a date in which fuel storage is lost. Due to current state law, Northern States Power is limited to the use of a set number of casks or other equivalent for on-site storage. Southern Nuclear, which operates six reactors, indicated a need to have the PFSF to operate any of its' units to the end of their license. Failing to provide the PFSF would require multiple expansions of on-site capability.

State or Local Restrictions - Minnesota has already imposed restrictions on further expansion of expended fuel storage capability at Northern States Power's Prairie Island facility.

ENVIRONMENTAL IMPACT STATEMENT

5. NEED FOR THE FACILITY

5-2 For each of the PFS member utilities, provide the current and anticipated spent fuel storage data.

a. State the storage capacity needed or projected for the nuclear power plants owned by each of the eight member utilities.

b. If the estimated storage needs do not account for the total 40,000 metric tons of uranium of spent fuel capacity specified in the license application, provide a detailed rationale as to why the facility is being designed to accommodate 40,000 metric tons of storage.

c. Provide an estimate of the amount of mixed-oxide fuel to be stored at the PFSF, identify which utility owns this mixed-oxide fuel, and provide the utility's history of use and possession of this fuel.

RESPONSE

a. The storage capacity for the nuclear power plants owned by each of the eight member utilities is as follows:

Utility	MTUs
American Electric Power (Indiana Michigan)	1858
Consolidated Edison	795
Genoa FuelTech (Dairyland Power Cooperative)	38
GPU Nuclear	645
Illinois Power	498
Northern States Power	1554
Southern California Edison	1872
Southern Nuclear	5803

b. The total spent nuclear fuel estimated to be generated by PFS member nuclear power plants that may be shipped to the PFS Independent Spent Fuel Storage Installation (ISFSI) is approximately 13,000 MTU of spent nuclear fuel. While all of the remaining capacity may not be used, a 40,000 MTU facility would make additional spent fuel storage capacity available for other nuclear power plants that are projected to require additional storage capacity

while operating and for acceptance of spent fuel from shutdown nuclear power plants. While additional nuclear power plants have not joined PFS to date, the larger facility capacity could accommodate utilization of PFS's cost effective storage by additional nuclear power plants instead of building additional at-reactor storage capacity or continuing to store spent fuel at shutdown nuclear power plant sites.

A total of 86,000 MTU of spent fuel is projected to be discharged from U.S. nuclear power plants through the end of their 40-year operating licenses. PFS assumes that a DOE repository would be available by 2015 to begin spent fuel acceptance from commercial nuclear power plants. If DOE does not begin spent fuel acceptance until 2015, it is projected that approximately 21,500 MTU of additional storage capacity in excess of current pool capacity would be required at operating nuclear power plants nationwide. In addition, by 2015 there would be an estimated 27,000 MTU of spent fuel in storage at shutdown nuclear power plants nationwide. In a scenario in which DOE does not begin spent fuel acceptance until 2015, nuclear power plants would have to store spent fuel at nuclear power plant sites for an average of 23 years after shutdown for decommissioning. For older shutdown nuclear power plants this number would be as high as 41 years of at-reactor spent fuel storage unless there is an interim storage facility to which spent fuel can be shipped. 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 spent fuel at nuclear power plant sites until a DOE repository is available.

Assuming a 40,000 MTU storage facility begins operation in 2002 and is utilized by all commercial nuclear power plants prior to spent fuel being accepted by DOE in 2015, approximately 6,300 MTU of additional storage capacity would be required at operating nuclear power plants nationwide. Under a 2002 PFS ISFSI scenario, spent fuel would be stored at nuclear power plants nationwide for an average of 11 years following plant shutdown for decommissioning.

Table 1 compares the additional storage requirements and the post-shutdown storage time for a 2002 40,000 MTU interim storage facility with a No Action Alternative in which a repository does not begin operation until 2015. Based on additional spent fuel storage costs that range from $91,000 per MTU to $162,000 per MTU and post-shutdown O&M costs that range from $3 million to $8 million per year per reactor site[1], there is a potential to reduce system wide at-reactor storage costs by $4 to $8 billion if an interim storage facility is available in 2002. The net savings would be $1 to $5 billion when the cost of a 40,000 MTU interim storage facility is factored in to the equation, estimated by PFS to be approximately $3 billion.

Table 1
Potential Industry Wide Savings Associated With a 2002 40,000 MTU ISF Compared to a No-Action Alternative

	2002 ISF 2015 Repository	No ISF 2015 Repository
Additional Storage Operating Reactors (MTU)	7,800	23,000
Average Years of Post-Shutdown Storage	11	23
Additional Storage Cost At Operating Reactor Sites at an Estimated $91,000 - $162,000 per MTU ($Millions)[i]	$710 - 1,264	$2,093 - $2,726
Post-Shutdown O&M Cost $3M to $8M per year per site**[1] **Assuming 73 reactor sites ($Millions)	$2,409 - $6,424 (years * # sites * $/year)	$5,037-$13,432 (years * # sites * $/year)
Total Projected Costs ($Millions)	$3,119 - $7,688	$7,130 - $16,158
Potential At-Reactors Savings Associated with 2002 ISF ($Millions)	$4,011 - $8,470	

In testimony before the House Energy and Power Subcommittee on February 10, 1999, NRC Chairman Shirley Ann Jackson stated, "We believe that centralized interim storage of spent fuel in dry cask cask storage systems offers several beneficial features." Chairman Jackson cited benefits such as more centralized inspection and surveillance by federal regulators, and operational and programmatic efficiency.[2]

The estimated range of unit costs for at-reactor storage and post-shutdown spent fuel storage are consistent with recent market prices for dry storage and current estimates of annual O&M costs. These estimates are higher than the estimated unit costs used in the analysis, "Utility At-Reactor Spent Fuel Storage Costs for the Private Fuel Storage Facility Cost Benefit Analysis", ERI-2025-9701, prepared by Energy Resources International, Inc., December 1997, due to changes in dry storage market prices.

c. It is planned that four mixed-oxide fuel assemblies will be stored at the PFS facility. These assemblies are owned by the Southern California Edison and the San Diego Gas & Electric companies. The four assemblies were loaded into San Onofre Nuclear Generating Station Unit 1 for cycles 2 and 3 (operation 1970-1973) as part of the Edison Electric Institute's plutonium recycle demonstration program. They have been stored in the SONGS Unit 1 spent fuel pool since they were removed from the reactor.

References:

[1] *"How Spent Nuclear Fuel and Low- and High-Level Waste Will be Disposed and At What Price"*, Eileen M. Supko, Energy Resources International, Inc, presented at INFOCAST Conference, January 25-27, 1999, Washington, DC

[2] "*NRC's Jackson Endorses Interim Nuclear Waste Storage*", Dow Jones Newswire, February 10, 1999

ENVIRONMENTAL IMPACT STATEMENT

6. ALTERNATIVES

6-1 a. Provide sufficient information to support the EIS alternatives analysis of building the facility on the adjacent Skull Valley Reservation site.

The ER identifies two alternative site locations for the PFSF on the Skull Valley Reservation. Because no site-specific information is provided for the alternate site, other than a general statement that the two sites are similar, provide a description of the characteristics of the alternative site.

b. Include information on geology and soils, ecology, ground water, surface water, and any other subjects, as appropriate. In addition, provide a discussion on the differences between the preferred site and the alternate site, and why the preferred site was selected.

RESPONSE

An environmental assessment was performed to investigate the two alternative PFSF site locations on the Skull Valley Reservation. The assessment led to the selection of the preferred site from the areas offered by the Skull Valley Band of Goshute for consideration. The two sites were evaluated for geography/ demography, ecology, meteorology, hydrology, geology, historic/ archeological/ cultural, noise, and radiological criteria. Site characteristics determined from field work and contacts with resource agencies are presented for each resource area for both sites in the Stone & Webster report, 'Phase I – Preliminary Environmental Assessment Report', dated 12/96. A copy of this report is included in the Attachment package provided under a separate cover (Attachment 6-1).

The results of the field investigations revealed only minor features favoring the selection of one site over the other. Site A (the northernmost site) was concluded to be preferable mostly based on radiological issues. Site A is at a greater distance from the nearest residence and Hickman Knolls (considered a potential overlook of the site outside of the owner controlled area), thus resulting in a lower potential dose to the public.

ENVIRONMENTAL IMPACT STATEMENT

6. ALTERNATIVES

6-2 a. Provide sufficient information to evaluate the comparative environmental costs and benefits of the Fremont County site alternative.

b. Provide additional information on the Fremont County Site Alternative.

Include information on air quality, geology, ecology, ground water, surface water, socioeconomics and any other appropriate subjects to describe the site and develop a comparative assessment of impacts for this alternative.

c. Document the reasons why the Skull Valley site was selected over the Fremont County site. The level of detail of the response should correspond with the potential significance of the impacts.

RESPONSE

a. Field investigations were performed of the volunteered siting areas, which included a comparative assessment of the environmental cost and benefits. Three major categories of criteria were used for the 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 issued for wetlands, dredge/fill operations, endangered species act, and building. The results of these investigations for the Skull Valley and Fremont County sites are included in the proprietary report, 'Field Investigation Evaluation Report'.

b. The proprietary Field Investigation Report contains Fremont County Site information used for the comparative assessment.

c. The Utah site was chosen using information gathered through a Site Selection Questionnaire (See application, Table 8.1-2) which was utilized to gather information from owners/promoters of candidate sites along with the information developed in the proprietary Field Investigation Report. In addition to the factual data gathered, qualitative and quantitative factors were considered in making the final selection of the Utah site.

Additional information is provided in the proprietary response for this RAI.

ENVIRONMENTAL IMPACT STATEMENT

6. ALTERNATIVES

6-3 Provide sufficient information to support the EIS alternatives analysis, including expanding storage at each of the PFS consortium members' reactor sites (including pool expansion or dry cask ISFSIs).

a. Provide a list of reactor sites indicating the amount of storage currently available and projections as to when the storage capacity would be exhausted.

b. Explain which of the PFS consortium members' reactors would need to shut down prior to the end of their useful life if the no-action alternative were selected.

c. Provide the PFS consortium members' rationale for storage at the PFS ISFSI rather than pursuing other spent fuel technologies (pool expansion or dry cask storage) at the reactor sites, including information on the costs/benefits, any differences compared to the proposed action in impacts to natural resources, differences in transportation, and any other relevant considerations.

RESPONSE

a. The amount of storage capacity currently available is as follows (Data published by the Nuclear Regulatory Commission current as of November 4, 1998).

Utility	Reactor	Spaces Remaining
Consolidated Edison	Indian Point #1	Shut-down, fuel on-site
Consolidated Edison	Indian Point #2	457
Southern California Edison	San Onofre Unit #1	Shut-down, fuel on-site[1]
Southern California Edison	San Onofre Unit #2	672
Southern California Edison	San Onofre Unit #3	624
Genoa FuelTech (Dairyland Power Cooperative)	La Crosse Boiling Water Reactor	Shut-down, fuel on-site
American Electric Power	D. C. Cook Unit #1	1598 (shared)
American Electric Power	D. C. Cook Unit #2	

Illinois Power	Clinton	1381
GPU Nuclear	Oyster Creek	180
GPU Nuclear	TMI	583
Northern States Power	Monticello	1115
Northern States Power	Prairie Island Unit #1	125 (shared)
Northern States Power	Prairie Island Unit #2	
Southern Nuclear	Farley Unit #1	527
Southern Nuclear	Farley Unit #2	641
Southern Nuclear	Hatch Unit #1	1062 (shared)
Southern Nuclear	Hatch Unit #2	
Southern Nuclear	Vogel Unit #1	2392 (shared)
Southern Nuclear	Vogel Unit #2	
[1] Pool full; additional unit #1 assemblies being stored on an interim basis in Unit #2 and Unit #3 fuel pools and in space leased at the General Electric Morris Facility through 2002.		

The dates in which storage capacity would be exhausted were reported to the U.S. Nuclear Regulatory Commission in a letter to the Director of the Office of Nuclear Material Safety and Safeguards from John Parkyn, Chairman PFS dated May 18, 1998. The storage capacity projected full-core off-load states for each unit as identified in the letter are:

D. C. Cook Unit #1 - 2010
D. C. Cook Unit #2 - 2010
Indian Point Unit #2 - 2005
Oyster Creek - full core off-load lost 1996
TMI - 2009
Clinton - 2005
Monticello - 2006
Prairie Island Unit #1 - 2007
Prairie Island Unit #2 - 2007
San Onofre Unit #2 - 2006
San Onofre Unit #3 - 2006
Hatch Unit #1 - 2000
Hatch Unit #2 - 2000
Vogel Unit #1 - 2015
Vogel Unit #2 - 2015
Farley - Unit #1 - 2006
Farley Unit #2 – 2010

b. At least three of the PFS member reactors have limited spent fuel storage capacity that cannot be expanded due to state political constraints (Prairie Island 1 and 2) or may not be able to be expanded using existing dry storage technologies due to site constraints (Indian Point 2). Other facilities that have not added dry storage and have exhausted in-pool storage expansion alternatives may experience either political or site constraints that could prohibit dry storage and thus require shutdown of the nuclear power plants prior to the end of their useful lives.

c. PFS members have and are pursuing at-reactor spent fuel storage technologies to provide spent fuel storage capacity until the PFS ISFSI is available, as described in the letter from Parkyn, PFS to Director, Office of Nuclear Material Safety and Safeguards, NRC, dated May 18, 1998.

   PFS members have reracked spent fuel storage pools and some have implemented dry storage or have plans to implement dry storage at reactor sites if needed, as discussed in the above letter. However, at least three of the PFS member reactors have limited spent fuel storage capacity that cannot be expanded due to state political constraints (Prairie Island 1 and 2) or may not be able to be expanded using existing dry storage technologies due to site constraints (Indian Point 2). In addition, PFS members own three shutdown nuclear power plants (Indian Point 1, LaCrosse, and San Onofre 1) which will have to store spent fuel at the reactor sites for an estimated 30 to 40 years if spent fuel cannot be shipped off-site until 2015 or later.

   The attached table provides an estimate of the projected additional storage requirements at PFS member reactor sites and the estimated post-shutdown storage time required assuming a 2002 PFS ISFSI and the No-Action alternative, a 2015 repository. Since it is difficult to project future at-reactor storage costs, a range of costs for dry storage are provided from $91,000 per MTU to $162,000 per MTU.[1] The $91,000 per MTU estimate is considered a low range and actual costs are projected to be higher than this estimate for individual utilities. A range of annual O&M costs for post-shutdown spent fuel storage are also provided ranging from $3 million per year to $8 million per year.[1]

   Under the 2002 PFS ISFSI alternative, total at-reactor storage costs for PFS members are estimated to range from $524 million to $1.4 billion. Under the 2015 No Action Alternative, total at-reactor storage costs for PFS members are estimated to range from $1.0 billion to $2.5 billion. This represents a potential savings in at-reactor storage costs for PFS members of $523 million to $1.1 billion. It should be noted that one of the most important aspects of the availability of the PFS ISFSI in 2002 is the reduced post-shutdown storage period for spent fuel at reactor sites. This is particularly significant for those reactors that are currently shutdown.

Fourteen (14) of the PFS member reactors at nine (9) sites are projected to require additional storage capacity if the PFS ISFSI is not available and spent fuel acceptance by DOE does not start until 2015 at a repository. If the PFS ISFSI is available in 2002, only five (5) reactors at three (3) sites (Prairie Island, Oyster Creek, and Hatch) are projected to require additional storage capacity. Of these three sites, dry storage capacity has already been constructed or is under construction. Thus no additional dry storage facilities would need to be constructed beyond the three currently in operation or under construction if the PFS ISFSI is available by 2002.

The additional six at-reactor dry storage facilities that would have to be constructed under the No Action Alternative would result in site-specific impacts associated with construction and operation additional storage capacity. PFS members have not specifically quantified the impacts associated with the No Action Alternative. These impacts would include increased radiological doses to workers and the public at all nine sites due to increased dry storage at both the existing facilities and the facilities added under the No Action Alternative, impacts on natural resources associated with construction of additional facilities, etc.

The estimated range of unit costs for at-reactor storage and post-shutdown spent fuel storage are consistent with recent market prices for dry storage and current estimates of annual O&M costs. These estimates are higher than the estimated unit costs used in the analysis, "Utility At-Reactor Spent Fuel Storage Costs for the Private Fuel Storage Facility Cost Benefit Analysis", ERI-2025-9701, prepared by Energy Resources International, Inc., December 1997, due to changes in dry storage market prices.

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[1] Supko, Eileen M., Energy Resources International, Inc., *How Spent Nuclear Fuel and Low- and High-Level Waste Will Be Disposed and At What Price,* Presented at the INFOCAST Conference, Nuclear Power Plants, Coming to Grips with Your License Expiration Options – Sell, Decommission, or Renew Your License, January 25-27, 1999, Washington, D.C.

COSTS/BENEFITS

EIS RAI, Question 6-3 c.

Capacity: 12,000 MTU, Receipt/Shipping Rate 1,200 MTU per year, 20 year license

Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Estimated Range of Additional Storage Costs ($Millions)		Estimated Range of Post Shutdown Storage Costs ($ Millions)		Estimated Range of Total Storage Costs ($ Millions)	
	2015 Repository							
			$91,000/MTU	$162,000/MTU	$3 M/year/site	$8M/year/site		
CLINTON 1	275	9	25.0	44.6	27.0	72	52.0	116.6
COOK 1 & 2	189	16	17.2	30.6	48.0	128	65.2	158.6
FARLEY 1 & 2	118	13	10.7	19.1	39.0	104	49.7	123.1
HATCH 1 & 2	735	16	66.9	119.1	48.0	128	114.9	247.1
INDIAN PT 1	0	41	0.0	0.0	123.0	328	123.0	328.0
INDIAN PT 2	133	18	12.1	21.5	54.0	144	66.1	165.5
LACROSSE	0	32	0.0	0.0	96.0	256	96.0	256.0
MONTICELLO	0	19	0.0	0.0	57.0	152	57.0	152.0
OYSTER CRK 1	60	25	5.5	9.7	75.0	200	80.5	209.7
PRAIRIE ISL 1 & 2	465	18	42.3	75.3	54.0	144	96.3	219.3
SAN ONOFRE 1	0	30	0.0	0.0	90.0	240	90.0	240.0
SAN ONOFRE 2& 3	398	13	36.2	64.5	39.0	104	75.2	168.5
VOGTLE 1 & 2	456	7	41.5	73.9	21.0	56	62.5	129.9
TOTAL	2829		257.4	458.3	771	2056	1028.4	2514.3

Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Estimated Range of Additional Storage Costs ($Millions)		Estimated Range of Post Shutdown Storage Costs ($ Millions)		Estimated Range of Total Storage Costs ($ Millions)	
	2002 ISF, 2015 Repository							
			$91,000/MTU	$162,000/MTU	$3 M/year/site	$8M/year/site		
CLINTON 1	0	10	0.0	0.0	30.0	80	30.0	80.0
COOK 1 & 2	0	10	0.0	0.0	30.0	80	30.0	80.0
FARLEY 1 & 2	0	10	0.0	0.0	30.0	80	30.0	80.0
HATCH 1 & 2	193	10	17.6	31.3	30.0	80	47.6	111.3
INDIAN PT 1	0	28	0.0	0.0	84.0	224	84.0	224.0
INDIAN PT 2	0	18	0.0	0.0	54.0	144	54.0	144.0
LACROSSE	0	15	0.0	0.0	45.0	120	45.0	120.0
MONTICELLO	0	10	0.0	0.0	30.0	80	30.0	80.0
OYSTER CRK 1	60	10	5.5	9.7	30.0	80	35.5	89.7
PRAIRIE ISL 1 & 2	198	10	18.0	32.1	30.0	80	48.0	112.1
SAN ONOFRE 1	0	10	0.0	0.0	30.0	80	30.0	80.0
SAN ONOFRE 2& 3	0	10	0.0	0.0	30.0	80	30.0	80.0
VOGTLE 1 & 2	0	10	0.0	0.0	30.0	80	30.0	80.0
TOTAL	451		41.0	73.1	483	1288	524.0	1361.1

ENVIRONMENTAL IMPACT STATEMENT

7. AIR QUALITY

7-1 a. Provide a list of assumptions, methods, and estimates of air quality impacts for construction of the rail spur.

b. State whether or not the locomotive mentioned on SAR page 3.3-9 would be dedicated to the facility to move on-site cars around.

c. Identify the fuel the locomotive would use.

d. Discuss the plans for limiting the locomotive fuel tank size to prevent the possibility of fires.

e. Discuss the emissions which would be expected from the locomotive.

Response:

a) Emissions of particulate matter with an aerodynamic diameter less than or equal to a nominal 10 microns (PM-10) are estimated for activities related to the construction of the Low Corridor Railroad Line including: clearing/grubbing; vehicular traffic on unpaved roads; wind erosion from temporary topsoil piles; material handling; bulldozing; compacting; scraping and grading. Emissions of total particulate matter (PM), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC) are also estimated from construction vehicle operation and locomotive use. Calculations of concentrations of these pollutants in ambient air are not meaningful as there are no sensitive receptors in the vicinity of the rail corridor that can be impacted by these emissions.

Estimates of air pollutant emissions due to construction activities are determined on the basis of estimated material handling (e.g., cubic yards of topsoil and cut moved) and reasonable assumptions regarding construction equipment mileage and hours of operation during the construction period. PM-10 emissions estimates are provided for fugitive dust caused by clearing/grubbing; vehicular traffic on unpaved roads; wind erosion from temporary topsoil piles; material handling; bulldozing; compacting; scraping and grading. Applicable gaseous criteria pollutant emissions from equipment use (NO_x, CO, PM, and VOC) are also provided. Most of the construction activities are conservatively assumed to be occurring simultaneously during any given construction month for purposes of ensuring conservatism in these emissions estimates.

The emission factors used in the estimates for construction activities are taken from the 5th edition of EPA's AP-42 document (EPA, 1995 and 1998)

assuming reasonable levels of emissions control as needed to satisfy Utah Department of Environmental Quality (UDEQ) requirements.

On-road dump truck exhaust emissions are based on emission factors taken from the pending 5th edition of EPA's AP-42 document (EPA, 1998). These factors apply to heavy duty diesel powered vehicles (HDDV) operated at high altitudes (~5,550 ft MSL) for model year 1996 or later at the federal test method speed of 19.6 mph. Non-road construction equipment exhaust emission factors are taken from EPA's Nonroad Emissions Model (EPA, 1998a). The locomotive emission factors used are conservatively based on 1997 estimates provided by the Internet Web site DieselNet (http://www.dieselnet.com). The construction equipment exhaust emission factors (E) used in this calculation are as follows:

On-Road Dump Truck Exhaust (grams/mile @ 19.6 mph):

$E(NO_x) = 6.5$
$E(CO) = 17.2$
$E(VOC) = 4.7$
E(PM) = N/A

Non-Road Construction Equipment Exhaust (grams/bhp-hr):

	Graders	Scrapers	Dozers	Roller
$E(NO_x)$ =	9.5	8.6	10.4	9.2
E(CO) =	2.4	3.9	1.8	3.9
E(VOC) =	1.0	0.47	0.56	0.74
E(PM) =	0.76	0.96	0.50	0.94

Locomotive Operation (grams/bhp-hr):

$E(NO_x) = 13.5$
$E(CO) = 1.5$
$E(VOC) = 0.5$
$E(PM) = 0.34$

The assumptions used in these emissions calculations are as follows:

1. Earthwork activities make use of 10 wheeled tractor scrapers (22 cubic yards per load) moving 1,103,200 cubic yards of cut over a 12-month period with the scrapers operating 21 days per month. This will result in the 10 scrapers making 20 loaded and unloaded trips per day with each trip assumed to be one mile. Therefore, the scraper vehicle miles traveled both loaded and unloaded will be: 10 scrapers x 20 trips/day x 1 mile/trip x 21 days/month x 12 month/year = 50,400 miles per year. A Caterpillar Model 623B scrapper is used which weighs 36 tons empty and 61 tons full,

2. The trucks delivering subballast to the construction area make 39 trips per day, 21 days per month, 12 months per year. The length of each trip down the rail corridor is based on the assumption that the length of rail line constructed (32 miles) is evenly divided by the 12-month construction period. Therefore, the distance of a one way trip for the first month is (32 miles/12) or 2.67 miles, 5.34 miles for the second month, 32 miles for the 12^{th} month, etc. The resulting one way mileage for the trucks is then 170,352 miles per year. The trucks are assumed to weigh 25 tons empty and 50 tons full,

3. Graders (300 bhp) are used for a total mileage of 1,000 miles during the 12 months of construction which corresponds to 4 graders traveling up and down the length of the rail line 4 times,

4. Fugitive PM-10 emissions from unpaved roads, bulldozing, compacting, grading, and scrapping are controlled at an efficiency of 50 percent using watering,

5. 85,000 cubic yards of topsoil and 1,103,200 cubic yards of cut are handled in one year for purposes of estimating fugitive PM-10 emissions from dropping of material. It is also assumed that one cubic yard of topsoil/cut contains one ton of material. No controls are assumed. The mean wind speed used is 8.8 mph based on long term Salt Lake City data (NOAA, 1991) as indicated in ER Section 2.4.2,

6. For wind erosion estimating purposes, there will be the equivalent of one pile of exposed soil at any given time with a surface area of 2,500 square meters. In addition, there are 21 disturbances per month and watering controls the PM-10 emissions by 50 percent,

7. Bulldozing and compacting operations take place 4,032 hours per year which corresponds to two bulldozers and compactors operating 8 hours per day, 21 days per month, 12 months per year. A conservative break horsepower (bhp) of 300 is assumed for both the bulldozers and rollers (i.e., compactors),

8. Construction vehicle pollutant emissions are based on the total mileage of trucks delivering subballast, bulldozer, and grader operations which is 462,664 total vehicle miles per year,

9. Locomotive use (1,500 bhp) for the installation of the ballast, ties, and rail will result in 2,016 hours of locomotive operation (8 hours per day, 21 days per month, 12 months per year).

The calculated annual pollutant emissions are divided by 12 to obtain monthly values as shown below:

Activity	Pollutant	Emission Rate (tons/month)	Basis
Clearing/Construction • clearing/grubbing • vehicular traffic on unpaved roads • material handling/ batch/continuous drop • wind erosion from piles • bulldozing/ compacting • grading • scraping	PM-10	268 tons/12 = 22.3	Assumptions 1-7
Construction Vehicle Operation	NO_x CO VOC PM	60.4 tons/12 = 5.03 28.4 tons/12 = 2.37 20.8 tons/12 = 1.73 5.47 tons/12 = 0.46	Assumption 8
Locomotive Operation	NO_x CO HC PM	45.0 tons/12 = 3.75 5.00 tons/12 = 0.42 1.67 tons/12 = 0.14 1.13 tons/12 = 0.09	Assumption 9

References:

- U. S. Environmental Protection Agency, "Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources", 5th Edition, AP-42, (Sections 11.9 and 13.2), 1995 and 1998.
- U. S. Environmental Protection Agency, " Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources", pending 5th Edition, AP-42, (Appendix H), last updated April, 1998.
- National Oceanic and Atmospheric Administration, National Environmental Satellite, Data, and Information Service, National Climatic Data Center, 1992, Local Climatological Data, Annual Summary with Comparative Data for 1991: Salt Lake City, Utah.
- U. S. Environmental Protection Agency, "Draft User's Guide for the National Nonroad Emissions Model, Draft Version". Prepared by ENVIRON International Corporation for U. S. Environmental Protection Agency, National Vehicle and Fuel Emissions Laboratory, Ann Arbor, MI, June, 1998.

b) The locomotive mentioned on SAR page 3.3-9 will be a small switchyard type locomotive. It will be used intermittently for moving individual railroad cars around the PFSF. This locomotive will be dedicated to the facility.

c) The small switchyard locomotive and the locomotives, which will deliver spent fuel casks to the facility, will use diesel fuel.

d) There currently are no plans to limit the fuel tank size on the small switchyard locomotive. As discussed in SAR Section 8.2.5.1, for rail delivery/retrieval of shipping casks, the train locomotives are required by administrative procedure to stay out of the Canister Transfer Building. The design of the building and its surroundings will assure that any diesel fuel spilled outside the building will not flow into the building, which could create a fire hazard. SAR Section 3.3.6 will be revised to be consistent with SAR Section 8.2.5.1.

e) The emissions estimates for the line-haul locomotives used for cask transport to the PFSF facility are provided in ER Section 4.4.3 which considers the number of locomotives used over the course of a year along with the total mileage covered, locomotive speed and appropriate air pollutant emission factors.

The annual air pollutant emissions from the small switchyard locomotive are estimated in the same manner as those from the line-haul locomotives but using emission factors for switch locomotives. These emission factors are also based on current estimates (1997) provided by the Internet Web site DieselNet (http://www.dieselnet.com). EPA standards for locomotives with remanufactured engines were not applied since these engines are not likely to be used in the Low Corridor rail system.

The air pollutants for which emissions estimates are provided include hyrdocarbons (HC), carbon monoxide (CO), nitrogen oxides (NO_x), and particulate matter (PM). The emission factors used in this estimate are expressed as grams per break horsepower per hour (g/bhp-hr) and are summarized below:

HC	CO	NO_x	PM
1.1	2.4	19.8	0.41

Annual switch locomotive operation is estimated to be 520 hours corresponding to 2 hours per day, 5 days per week, and 52 weeks per year. Therefore, assuming a 1,500 bhp locomotive engine, the annual air pollutant emissions in tons per year resulting from switch locomotive operation are as follows:

HC	CO	NO_x	PM
1.0	2.1	17.0	0.4

ENVIRONMENTAL IMPACT STATEMENT

7. AIR QUALITY

7-2 Provide a list of assumptions, methods, and estimates of air quality impacts for the construction of the intermodal transfer building.

Assumptions would include information such as items a–d listed in RAI item 7-1.

The applicant must provide sufficient information to support the EIS air quality analysis for the truck transportation option.

RESPONSE

Emissions of particulate matter with an aerodynamic diameter less than or equal to a nominal 10 microns (PM-10) are estimated for construction activities including: clearing/excavation; vehicular traffic on unpaved roads; wind erosion from temporary topsoil piles; material handling; bulldozing; compacting; and grading. Emissions of total particulate matter (PM), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC) are also estimated from construction vehicle operation. Calculations of concentrations of these pollutants in ambient air are not meaningful as there are no sensitive receptors in the vicinity of the facility to be impacted by these emissions.

Estimates of air pollutant emissions due to construction activities are determined on the basis of estimated material handling (e.g., cubic yards of topsoil moved) and reasonable assumptions regarding construction equipment mileage and hours of operation during the construction period. Emissions estimates are provided for fugitive dust (PM-10) caused by clearing/ excavation; vehicular traffic on unpaved roads; wind erosion from temporary topsoil piles; material handling; bulldozing; compacting; and grading. Applicable gaseous criteria pollutant emissions from equipment use (NO_x, CO, PM, and VOC) are also provided. Most of the construction activities are conservatively assumed to be occurring simultaneously during any given construction month for purposes of these emissions estimates.

The emission factors used in the estimates for construction activities are taken from the 5th edition of EPA's AP-42 document assuming reasonable levels of emissions control as needed to satisfy Utah Department of Environmental Quality (UDEQ) requirements.

On-road truck exhaust emissions are based on emission factors taken from the pending 5th edition of EPA's AP-42 document (EPA, 1998). These factors apply to heavy duty diesel powered vehicles (HDDV) operated at high altitudes (~5,550 ft MSL) for model year 1996 or later at the federal test method speed of 19.6 mph. Non-road construction equipment exhaust emission factors are taken from EPA's Nonroad Emissions Model (EPA, 1998). The construction equipment exhaust emission factors used in this calculation are as follows:

On-Road Dump Truck Exhaust (grams/mile @ 19.6 mph):

$E(NO_x) = 6.5$
E(CO) = 17.2
E(VOC) = 4.7
E(PM) = N/A

Non-Road Construction Equipment Exhaust (grams/bhp-hr):

	Bulldozers	Roller	Loader
$E(NO_x)$ =	10.4	9.2	10.4
E(CO) =	1.8	3.9	7.9
E(VOC) =	0.56	0.74	2.2
E(PM) =	0.50	0.94	1.35

The assumptions used in these emissions calculations are as follows:

1. Construction activities result in 40 dump truck trips per day for a period of 43 days to handle 17,200 cubic yards of backfill for the mat foundation, access road, site, and rail sidings. Each truck trip is 0.1mile on unpaved surface to account for the 400-ft access road and site area. This results in a total of 172 dump truck miles during the construction period. Concrete trucks will be required to make 78 truck trips per day for 9 work days traveling 0.1mile per trip on unpaved surface for the mat foundation and miscellaneous items. This results in a total of 70 concrete truck miles during the construction period. Asphalt trucks will make 40 trips per day over 7 work days traveling 0.1 mile per trip as well for the site and access road. This results in a total of 28 asphalt truck miles during the construction period. Also, one front end loader is traveling at an average speed of 5 mph, 10 hours per day for 30 days for a total of 1,500 miles during construction. A conservative break horsepower (bhp) of 300 is assumed for front end loaders,

2. The dump and asphalt trucks weigh 25 tons empty and 50 tons full. The concrete truck weighs 25 tons empty and 40 tons full while the front end weighs 10 tons,

3. Fugitive PM-10 emissions from unpaved roads are controlled at an efficiency of 50 percent using watering,

4. 10,000 tons of soil (topsoil + excavated soil) and 17,000 tons of backfill are handled in one year for purposes of estimating fugitive PM-10 emissions from dropping of material. No emissions controls are used. Mean wind speed used is 8.8 mph based on long term Salt Lake City data (NOAA, 1991),

5. For wind erosion estimating purposes, the piles of soil (topsoil + excavated soil) have a surface area of 800 square meters based on a volume of 10,000 cubic yards, there are 21 disturbances per month, and watering controls the PM-10 emissions by 50 percent,

6. Bulldozing operations take place 600 hours per year which corresponds to two bulldozers operating 10 hours per day for a total of 30 days. Compacting operations take place for a total of 300 hours during the construction period. Bulldozers and compactors have an average speed of 5 mph. A conservative break horsepower of 300 is applied for both the bulldozers and rollers (compactors),

7. Construction vehicle pollutant emissions are based on the total mileage of trucks hauling backfill, concrete, and asphalt as well as bulldozer and front end loader operations (6,270 miles).

The calculated annual pollutant emissions are summarized below:

Activity	Pollutant	Emission Rate (tons/year)	Basis
Clearing/Construction • clearing/excavation • vehicular traffic on unpaved roads • material handling/ batch/continuous drop • wind erosion from piles • bulldozing/compacting	PM-10	1.70 tons	Assumption 1-6
Construction Vehicle Operation	NO_x CO VOC PM	4.01 tons 1.53 tons 0.40 tons 0.33 tons	Assumption 7

Section 4.3.3 of the ER will be revised to agree with the above calculated emissions for the Intermodal Transfer Point.

References:

U. S. Environmental Protection Agency, "Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources", 5th Edition, AP-42, (Sections 11.9 and 13.2), 1995 and 1998.

U. S. Environmental Protection Agency, " Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources", pending 5th Edition, AP-42, (Appendix H), last updated April, 1998.

National Oceanic and Atmospheric Administration, National Environmental Satellite, Data, and Information Service, National Climatic Data Center, 1992, Local Climatological Data, Annual Summary with Comparative Data for 1991: Salt Lake City, Utah.

U. S. Environmental Protection Agency, "Draft User's Guide for the National Nonroad Emissions Model, Draft Version". Prepared by ENVIRON International Corporation for U. S. Environmental Protection Agency, National Vehicle and Fuel Emissions Laboratory, Ann Arbor, MI, June, 1998.

ENVIRONMENTAL IMPACT STATEMENT

7. AIR QUALITY

7-3 Provide air quality data for the PFSF site, if available. Alternatively, explain why the use of data in Table 2.4-9 of the ER is appropriate for the PFSF site. To the extent that such data are not available or predictive of site air quality conditions, provide information for the generating facilities, including:

a. The geographical coordinates and emissions rates of facilities that may contribute to air quality impacts in the affected area.

b. Specifics of the releases from these facilities.

Include stack height, stack inside diameter, exit velocity, exit temperature, and dimensions of adjacent buildings if the stack is less than Good Engineering Practice stack height.

RESPONSE

There are no air quality monitoring data available in the immediate vicinity of the PFSF site. The air quality monitoring data presented in ER Table 2.4-9 are based on available ambient air quality monitoring data collected by the Utah Department of Environmental Quality (DEQ) in the Wasatch Front Intrastate Air Quality Control Region (AQCR). Table 1 is included with this response providing the three most recent years (1995 – 1997) of available monitoring data obtained from the Utah Air Monitoring Center.

As indicated in Table 1, the SO_2 and PM-10 data are collected at Grantsville in Tooele County, which is located approximately 20 miles northeast of the PFSF site. The CO and NO_2 data are from Cottonwood in Salt Lake County which is located approximately 50 miles east-northeast of the PFSF site. The ozone data presented in the table are collected at Herriman in Salt Lake County, approximately 37 miles east-northeast of the PFSF site.

The data from these monitors are used to determine the status of the AQCR relative to the Ambient Air Quality Standards (AAQS) and to aid in planning control strategies. The monitors are often placed in areas where the impacts of point and area sources are likely to be the highest. As an example, CO monitors are typically placed in urban areas where the impact of vehicular traffic will be most felt. As such, it is highly likely that the pollutant concentrations from these monitors are higher than those that would be expected at the PFSF site due to its remote location relative to significant sources of air pollution. Therefore, these concentrations are likely to be conservative relative the actual air quality of the PFSF site.

The significant point sources of air pollution within 50 kilometers of the PFSF site have been identified using a 1995 emission inventory for Tooele County available from the Utah DEQ Division of Air Quality web page. The annual criteria pollutant emissions from these point sources and their locations relative to the PFSF are provided in the attached Table 2.

The detailed stack parameters for these sources are not readily available. However, the distances of these sources from the PFSF site support the conclusion that the available monitoring data from the UDEQ provide conservative values of the criteria pollutants as caused by the significant point sources in the region.

Table 1

Ambient Air Quality Monitoring Data for
Wasatch Front Intrastate AQCR

Pollutant	Averaging Interval	Second Highest Observed Value (ppmv) 1995	1996	1997	AAQS
SO_2[1]	Annual	0.001	0.001	0.001	0.03
	24-hr	0.003	0.002	0.003	0.14
	3-hr	0.008	0.004	0.005	0.50
PM-10[2]	Annual	23.0	21.0	17.0	50
	24-hr	49.0	50.0	32.0	150
CO[3]	8-hr	5.0	6.0	5.4	9.0
	1-hr	9.0	9.0	8.5	35.0
O_3[4]	1-hr	0.096	0.112	0.097	0.12
NO_2[5]	Annual	0.023	0.025	0.025	0.053

Notes:

1. SO_2 data are from Grantsville, Tooele County
2. PM-10 data are from Grantsville, Tooele County. Concentrations are in units of $\mu g/m^3$
3. CO monitoring data from Cottonwood, Salt Lake County
4. Ozone monitoring data from Herriman, Salt Lake County
5. NO_2 monitoring data from Cottonwood, Salt Lake County

Table 2

1995 Point Source Criteria Pollutant Emissions within
50 Kilometers of the PFSF Site

Point Source	Distance from PFSF (km)	Direction from PFSF (degrees)	Tons per Year PM10	SO_2	NO_2	VOC	CO
A. P. Green Refractories, Inc. Silica Stone Quarry	24.485	65.2	10.8	0.23	3.56	0.25	0.79
Aptus, Inc., Hazardous Waste Storage/Incineration	43.975	336.4	2.28	2.33	78.5	4.76	7.81
AKZO Nobel Salt, Inc., Timpie Salt Processing Plant	42.407	11.6	28.9	2.05	26.7	3.14	8.10
Barrick Resources (USA), Inc., Mercur Mine	47.918	98.3	144.9	17.8	166.8	10.9	57.6
Bolinder Companies, Inc.;							
Bauer Pit	34.497	72.9	3.26	1.67	15.1	1.07	3.55
Erda Pit	48.719	55.1	0.57	0.76	4.76	0.25	1.16
Rocky Ridge Pit	39.341	60.0	0.05	0.00	0.00	0.00	0.00
Chemical Lime Company, Grantsville Plant	38.413	27.2	60.9	0.40	138.3	1.92	81.7
Deseret Chemical Depot, South Area	37.796	98.1	94.8	23.0	43.4	2.44	27.0
Dugway Proving Ground	27.172	217.2	679.4	26.1	39.7	308.4	29.3
Envirocare of Utah, Inc., Radioactive Material Disposal Site	46.554	319.6	7.13	3.43	34.4	2.38	13.3
Morton International, Morton Salt Division	39.443	29.4	42.1	2.40	30.9	2.09	13.9
Pacific West, LLC, Erda Pit	48.763	54.4	0.93	0.54	5.67	16.9	1.71
Tooele Army Depot, North Area	37.485	62.0	22.5	6.66	8.92	1.13	7.68
USPCI, Clive Hazardous Waste Incinerator, Tooele	48.812	317.5	19.4	9.26	108.3	3.86	13.1

ENVIRONMENTAL IMPACT STATEMENT

7. AIR QUALITY

7-4. Provide an update to Table 6.1-2 of the ER to reflect meteorological data for a twelve month period. Describe the effect, if any, this data has on the meteorological discussion in Chapter 2 of the ER.

RESPONSE

Table 6.1-2 of the ER has been updated to include the entire period of record for the on-site meteorological database, which is December 19, 1996 to December 29, 1998. This table is included with this response.

In addition, the meteorological discussion in ER Section 2.4.2, Local Meteorology, has been updated to include some discussion of the PFSF site meteorological data. The accompanying tables for this section have also been updated to include PFSF site data. The updated sections are included with this response.

Table 6.1-2

Summary of Hourly Average On-Site Meteorological Data[1]

Parameter	12/96	01/97	02/97	03/97	04/97	05/97	06/97
Wind Speed (mph)							
- avg	12.1	8.9	8.4	9.4	9.7	7.9	10.1
- max	26.9	32.8	28.9	32.0	32.9	23.5	32.8
Wind Direction (deg)							
- scalar avg	142.8	139.9	103.2	144.0	64.1	122.0	145.5
Temperature (^{o}F)							
- avg	36.7	27.6	29.8	40.1	42.9	58.4	67.2
- max	59.4	57.1	55.8	74.9	76.2	94.5	93.4
- min	10.9	-7.0	6.7	6.4	10.6	21.2	36.5
Relative Humidity (%)							
- avg	62.3	77.4	72.7	55.7	59.3	50.1	45.9
- max	95.5	98.4	97.5	96.9	96.8	94.0	97.6
- min	25.8	38.4	25.0	8.3	12.4	6.9	5.2
Solar Radiation (W/m^{2})							
- avg	55.5	78.3	134.8	196.6	228.6	279.7	278.1
- max	533.2	536.1	717.0	823.0	897.0	977.0	988.0
Barometric Pressure (mb)							
- avg	857.1	861.5	862.2	861.9	858.0	860.0	856.4
- max	870.5	875.6	872.5	874.9	866.3	866.2	865.3
- min	844.9	846.4	839.7	849.7	845.1	851.9	848.3
Precipitation (inches)							
- total	0.20	0.60	0.44	0.06	1.06	0.60	2.80

1. Period of record is December 19, 1996 to December 29, 1998

Table 6.1-2 cont

Summary of Hourly Average On-Site Meteorological Data[1]

Parameter	07/97	08/97	09/97	10/97	11/97	12/97	1997
	Month/Year						
Wind Speed (mph)							
- avg	8.5	9.9	8.9	9.8	6.7	7.6	8.8
- max	30.0	25.5	28.5	32.5	28.4	29.4	32.9
Wind Direction (deg)							
- scalar avg	160.3	154.9	157.1	153.0	144.9	138.0	145.3
Temperature (°F)							
- avg	71.7	75.3	63.5	47.9	36.7	21.0	48.6
- max	99.3	96.6	91.4	84.6	66.6	49.0	99.3
- min	36.5	49.2	30.3	18.6	9.2	-4.7	-7.0
Relative Humidity (%)							
- avg	39.5	39.6	56.6	55.3	72.6	80.8	58.7
- max	96.5	98.1	98.4	96.5	97.8	98.0	98.4
- min	3.9	8.9	10.5	11.1	18.1	33.3	3.9
Solar Radiation (W/m^2)							
- avg	287.9	256.5	193.4	153.4	97.8	83.4	189.4
- max	958.0	914.0	817.0	756.0	556.2	481.7	988.0
Barometric Pressure (mb)							
- avg	860.9	861.1	861.5	860.8	861.2	864.7	860.9
- max	866.4	868.5	870.1	874.4	873.2	881.8	881.1
- min	851.5	850.1	850.2	844.4	841.4	845.3	839.7
Precipitation (inches)							
- total	0.53	0.78	1.12	0.44	0.34	0.72	9.49

1. Period of record is December 19, 1996 to December 29, 1998

Table 6.1-2 cont

Summary of Hourly Average On-Site Meteorological Data[1]

Parameter	01/98	02/98	03/98	04/98	05/98	06/98
			Month/Year			
Wind Speed (mph)						
- avg	8.7	9.7	8.4	9.4	10.5	8.5
- max	28.6	32.0	29.7	32.5	33.1	27.7
Wind Direction (deg)						
- scalar avg	143.1	141.4	132.4	145.8	154.0	135.0
Temperature (°F)						
- avg	33.8	33.7	37.9	43.9	54.1	59.4
- max	55.8	54.1	75.3	78.1	79.4	95.9
- min	4.3	4.7	1.3	21.5	26.0	36.0
Relative Humidity (%)						
- avg	71.0	75.8	66.9	63.7	54.7	57.5
- max	97.5	97.9	97.2	96.7	96.7	96.9
- min	20.4	32.8	17.8	15.2	10.9	7.2
Solar Radiation (W/m$^{2)}$						
- avg	86.4	104.4	175.4	223.5	251.3	268.2
- max	539.3	707.0	799.0	930.0	1025.0	987.0
Barometric Pressure (mb)						
- avg	859.0	856.0	857.7	858.6	856.7	858.4
- max	867.9	867.7	870.4	869.6	865.0	865.7
- min	845.8	841.5	839.4	842.2	846.1	848.6
Precipitation (inches)						
- total	0.23	0.52	0.67	0.80	0.83	3.52

1. Period of record is December 19, 1996 to December 29, 1998

Table 6.1-2 cont

Summary of Hourly Average On-Site Meteorological Data[1]

Parameter	07/98	08/98	09/98	10/98	11/98	12/98	1998
			Month/Year				
Wind Speed (mph)							
- avg	8.5	8.3	7.5	7.3	8.1	7.2	8.5
- max	27.5	25.9	22.7	24.6	28.2	27.1	33.1
Wind Direction (deg)							
- scalar avg	155.0	143.8	145.7	135.5	146.4	146.2	144.8
Temperature (°F)							
- avg	75.7	74.0	63.3	46.1	39.3	24.3	49.0
- max	103.4	97.6	92.6	77.4	64.9	62.0	103.4
- min	47.1	41.0	32.9	18.0	15.4	-13.1	-13.1
Relative Humidity (%)							
- avg	40.4	39.4	56.7	64.9	62.3	70.2	60.1
- max	100.1	96.3	98.9	99.5	98.2	96.9	100.1
- min	5.8	8.0	8.3	8.2	15.5	25.9	5.8
Solar Radiation (W/m^2)							
- avg	287.1	260.7	183.3	141.9	98.4	90.7	182.1
- max	993.0	935.0	803.0	714.0	656.8	548.3	1025.0
Barometric Pressure (mb)							
- avg	861.2	863.1	859.9	861.9	861.3	866.3	860.0
- max	867.5	869.8	864.3	869.5	873.0	879.4	879.4
- min	854.3	855.6	853.4	850.4	848.9	848.2	839.4
Precipitation (inches)							
- total	1.92	0.42	0.79	1.04	0.05	0.03	10.82

1. Period of record is December 19, 1996 to December 29, 1998

2.4.2 LOCAL METEOROLOGY

2.4.2.1 Data Sources

The meteorology of the Skull Valley site can be partially characterized using long-term meteorological data collected by the National Weather Service at the SLCIA (NOAA, 1992). This climatological data set is the most comprehensive available for this area. The SLCIA is located approximately 50 miles northeast of the site at an elevation of approximately 4,220 feet AMSL. With the PFSF site being located at an elevation of approximately 4,470 feet AMSL, meteorological data collected at SLCIA can be considered representative of the general climate of the site but need to be supplemented with data more representative of local conditions.

The valley location of the PFSF site has an influence on the local meteorology relative to that of SLCIA with the Stansbury and Oquirrh Mountains rising to elevations of above 10,000 feet AMSL in between the two locations. The location of the Great Salt Lake to the north of Skull Valley as opposed to west and northwest of SLCIA likely causes some meteorological differences between the two locations. Therefore, meteorological data collected in Skull Valley are also needed to characterize the local conditions. Monthly average temperature and precipitation data collected at various locations in Skull Valley are available from a book published by the Utah Climate Center (Ashcroft et al., 1993). The data collected at Dugway, located approximately 12 miles south of the PFSF site at an elevation of 4,340 feet AMSL, have the longest period of record (1950 - 1992) and appear to be the most reliable. Other useful data were collected at Iosepa South Ranch during the period 1951 - 1958 which is located about 12 miles north of the PFSF site at an elevation of 4,415 feet AMSL.

The on-site meteorological monitoring program, described in detail in Section 6.1.1, provides hourly average data on wind speed, wind direction, temperature, relative humidity, precipitation, barometric pressure, and solar radiation for characterization of the local meteorology since many of these parameters are not available from other sources. The on-site data were collected for the period December 19, 1996 through December 29, 1998 and are summarized in Table 6.1-2.

The tower is located approximately 2 miles southeast of the PFSF site at the closest location where AC power and a telephone line are available and is suitable for "on-site" data collection from a meteorological representativeness perspective. The tower location is in the same topographic setting as the proposed site with the Stansbury Mountains to the east and northeast being sufficiently distant from both

locations as to cause insignificant differences in meteorological observations between the two locations. Both sites are essentially the same distance from the Great Salt Lake and the Wasatch Mountains to the east. Given that the intent of the meteorological data collection program is to characterize the local meteorology and not for radiological dispersion calculations, this location provides representative data.

2.4.2.1.1 <u>Precipitation</u>

Normal monthly precipitation tends to be concentrated in the winter and spring months with the larger amounts occurring between December and May and the least amounts in the summer and early fall. The annual average rainfall rate at Salt Lake City is 15.3 inches per year with a record 24-hour rainfall of 2.4 inches. Precipitation occurs an average of 90 days per year (0.01 inches or more). Precipitation data collected in Skull Valley indicates a range of annual precipitation from 7 to 12 inches per year with increasing amounts at higher elevations in the Stansbury Mountains, maximizing at Deseret Peak with approximately 40 inches per year (Hood and Waddell, 1968). A 43-year record (1950 - 1992) of precipitation data at Dugway indicates a normal annual precipitation rate of 8.2 inches per year. An 8-year record (1951 - 1958) at Iosepa South Ranch indicates an average annual precipitation rate of 9.6 inches per year. The PFSF site data indicate annual precipitation amounts of 9.5 and 10.8 inches, respectively for the years 1997 and 1998. Therefore, the valley location of the PFSF site tends toward the lowest precipitation amounts in the area. Monthly precipitation amounts for Salt Lake City and Skull Valley locations are summarized in Table 2.4-3.

The long term average annual snowfall (1963 - 1992) at Salt Lake City is 57.6 inches per year occurring mostly between November and April and ranging from a low of 30.2 inches in 1979 - 1980 to 110.8 inches in 1973 - 1974. The maximum recorded monthly snowfall is 41.9 inches in March, 1977 along with a maximum 24-hour snowfall of 18.4 inches in October, 1984. Information on snowfall amounts at Dugway and Iosepa South Ranch indicates normal annual snowfalls of 16.0 and 21.3 inches, respectively with maximum monthly amounts of 21.2 and 17.7 inches. The record daily snowfalls at Dugway and Iosepa South Ranch are 9.0 and 8.0 inches each.

2.4.2.1.2 <u>Temperature</u>

The average daily maximum temperature at Salt Lake City in July is 93.2° F and mean maximum temperatures at Dugway and Iosepa South Ranch exceed 90° F during July and August. Winters are moderately cold with an average monthly temperature of 28.6° F in January at Salt Lake City along with a daily minimum temperature of 19.7° F. Similar winter temperatures are experienced in Skull Valley with average monthly values in the high 20s in December and January. The average number of days with temperatures reaching 32° F or below at Salt

Lake City is 125 days with the first freeze normally occurring in October and the last freeze occurring in April. The annual average temperatures at Salt Lake City is approximately 52° F for the period 1951 - 1980 with Skull Valley average temperatures ranging from 49 to 51° F. Normal monthly, daily maximum, and daily minimum temperatures for the period 1951 to 1980 for Salt Lake City, 1950 to 1992 for Dugway, and 1951 to 1958 for Iosepa South Ranch are provided in Table 2.4-4. Average monthly temperatures are also provided for the 2-year PFSF site database.

2.4.2.1.3 Wind Direction and Speed

Winds at Salt Lake City are moderate and are fairly uniform over the year with the highest average speed (9.7 mph) occurring in August and the lightest average wind speed (7.4 mph) occurring in December. The long term mean wind speed for the year is 8.8 mph. The prevailing wind direction at Salt Lake City is from the southeast or south-southeast throughout the year. The winds at the PFSF site based on the 2-year monitoring program are very similar to those of Salt Lake City. They are fairly uniform over the year with the highest monthly average speed (9.6 mph) occurring in April and the lightest monthly average wind speed (7.4 mph) occurring in November and December. The 2-year average wind speed at the PFSF site is 8.7 mph.

Mean wind speeds by month for a 62-year period of record and prevailing wind directions by month for Salt Lake City are provided in Table 2.4-5 along with the 2-year average values for the PFSF site. Long term wind information is not available specifically for the Skull Valley.

2.4.2.1.4 Humidity, Fog, Thunderstorms

On an annual average basis, relative humidities at Salt Lake City range from a high of 67 percent in the early morning hours to 43 percent in the afternoon. On a seasonal basis, the highest relative humidities tend occur in late fall and winter while summer relative humidities are generally the smallest. The same seasonal pattern applies to the PSFS site relative humidity values which are summarized on a monthly average basis along with those for Salt Lake City in Table 2.4-6. The Salt Lake City data are the averages of four time-of-day values from NOAA, 1992 while the PFSF site values are based on hourly averages.

Heavy fog with visibility below 0.25 mile at Salt Lake City is not a frequently occurring phenomenon with an average annual frequency of 11.6 days per year but does normally occur 2 to 4 times per month during winter.

Salt Lake City also has a mean of 36.7 thunderstorm days per year and approximately 5 to 8 thunderstorm days per month from May through August.

Table 2.4-3

Normal Monthly Precipitation for Salt Lake City, Dugway, Iosepa South Ranch and PFSF Site

	Precipitation (inches)			
Month	Salt Lake City[1]	Dugway[2]	Iosepa Ranch[3]	PFSF Site[4]
January	1.35	0.46	0.97	0.42
February	1.33	0.57	0.59	0.48
March	1.72	0.84	1.05	0.37
April	2.21	0.81	1.44	0.93
May	1.47	1.06	1.26	0.72
June	0.97	0.53	0.64	3.16
July	0.72	0.57	0.47	1.23
August	0.92	0.61	0.63	0.60
September	0.89	0.72	0.15	0.96
October	1.14	0.81	0.65	0.74
November	1.22	0.58	0.82	0.20
December	1.37	0.59	0.98	0.38
Annual	15.31	8.15	9.64	10.16

Notes:

1. Period of record for Salt Lake City is 1951 - 1980

2. Period of record for Dugway is 1950 - 1992

3. Period of record for Iosepa South Ranch is 1951 – 1958

4. Period of record for PFSF Site is 12/96 – 12/98

Table 2.4-4

Normal Monthly Temperatures for Salt Lake City, Dugway, and Iosepa South Ranch

Month	Daily Maximum (°F)			Daily Minimum (°F)			Average (°F)			
	SLC	Dugway	Iosepa	SLC	Dugway	Iosepa	SLC	Dugway	Iosepa	PFSF
January37	37	42	20	15	17		28.5	25.7	29.2	30.7
February	44	45	46	24	23	20	34.0	34.0	33.3	31.8
March	52	53	53	30	29	25	41.0	40.9	38.9	39.0
April	61	63	64	37	35	31	49.0	49.0	47.8	43.4
May	72	73	76	45	44	38	58.5	58.6	56.9	56.3
June	83	85	86	53	53	45	68.0	69.0	65.5	63.3
July	93	94	95	62	62	52	77.5	78.2	73.5	73.7
August	90	91	93	60	59	53	75.0	75.3	72.9	74.7
September	80	80	86	50	48	41	65.0	64.1	63.5	63.4
October	67	66	71	39	36	32	53.0	51.0	51.6	47.0
November	50	51	52	29	27	22	39.5	38.6	36.9	38.0
December	39	38	43	22	17	17	30.5	27.7	30.2	22.7

Table 2.4-5

Mean Wind Speeds and Prevailing Directions for Salt Lake City[1] and PFSF Site[2]

Month	Wind Speed (mph)		Prevailing Direction	
	Salt Lake City	PFSF Site	Salt Lake City	PFSF Site
January	7.6	8.8	SSE	SE
February	8.2	9.1	SE	ESE
March	9.4	8.9	SSE	SE
April	9.6	9.6	SE	ESE
May	9.5	9.2	SE	SE
June	9.4	9.3	SSE	SE
July	9.6	8.5	SSE	SSE
August	9.7	9.1	SSE	SSE
September	9.1	8.2	SE	SSE
October	8.5	8.6	SE	SE
November	8.0	7.4	SSE	SE
December	7.4	7.4	SSE	SE

1. Period of record is 1951 – 1980
2. Period of record is 12/96 – 12/98

Table 2.4-5A

Average Relative Humidity for Salt Lake City[1] and PFSF Site[2]

Month	Relative Humidity (percent)	
	Salt Lake City	PFSF Site
January	74.3	74.2
February	69.3	74.3
March	59.0	61.3
April	52.8	61.5
May	48.5	52.4
June	41.3	51.7
July	35.8	40.0
August	38.0	39.5
September	44.8	56.7
October	54.0	60.1
November	66.0	67.5
December	74.5	75.5

1. Average of the four time-of-day relative humidity values for a 32-year period of record
2. Period of record is 12/96 – 12/98

ENVIRONMENTAL IMPACT STATEMENT

8. GEOLOGY AND HYDROLOGY

8-1 a. Provide a quantitative estimate of the extent to which construction and operational groundwater use will affect the groundwater resources and off-site groundwater users (current and reasonably foreseeable future users) in the Skull Valley area, including Dugway Proving Grounds, surrounding ranches, etc.

The estimate should be based on the amount of water withdrawn on site, recharge capacity of the aquifer, locations and elevations of off-site wells, and water needs of other water users.

b. Analyze the cumulative impacts of all users on the groundwater resources, which should be sufficient to support an EIS groundwater hydrology analysis.

RESPONSE

a. The maximum anticipated withdrawal rate for the proposed PFSF water well will be approximately 8500 gal/day (6 gpm or 9.5 ac-ft/yr) during the first nine months of operation and will decrease thereafter. Over a 20-year period (year 2002 through 2021), the average withdrawal rate from the well will be approximately 3850 gal/day (2.7 gpm or 4.3 ac-ft/yr). It should be noted that six existing wells within five miles of the site have water rights ranging from approximately 11 to 1600 ac-ft/yr. This information and additional details on these wells are included in the response to the previous safety RAI No.1, SAR Question 2-3.

Radius of Influence for Proposed PFSF Water Well

Based on the results of a short-duration *constant head test* that was recently performed on a 2-inch diameter well installed at the PFSF site, the permeability of the soils near the measured groundwater surface is estimated to be approximately 5.1 x 10^{-5} cm/sec. The well is screened from 142 to 152 feet below the ground surface, in a dense, uniform, sandy silt to silty sand material. The sand pack around the well screen extends from 125.5 to 157 feet below ground surface. The top of groundwater was measured to be approximately 124.5 feet below ground surface. The calculated permeability compares favorably with a regional study of the adjacent Bonneville Region (Bedinger et al., 1990) that indicated that the fine-grained *basin fill* deposits had a permeability of approximately 2.3 x 10^{-5} cm/sec.

Approximations of radius of influence (R) for the PFSF water well can be made based on estimated aquifer parameters. In an ideal aquifer, without recharge, R is a function of the transmissivity, the storage coefficient, and the duration of pumping. By adapting the Jacob formula, R can be estimated to within an order of magnitude (neglecting recharge) by use of the following equation (Powers, 1992; Heath, 1998):

$$R = (Tt / 7200S)^{0.5}$$

where,

R = radius of influence (feet)
T = transmissivity (ft^2/day)
t = pumping time (minutes)
S = storage coefficient (dimensionless)

The above equation is intended for confined aquifers, but results obtained for water table aquifers are reasonable, provided the drawdown is not a large percentage of the original saturated thickness. In applying the equation, it is apparent that R computed for a typical confined aquifer (S = 0.001) will be approximately 10 times greater than that in a water table aquifer (S = 0.1) with the same transmissivity and pumping times.

Transmissivity for that portion of the aquifer affected by pumping is estimated by multiplying the aquifer permeability of 0.143 ft/day (i.e., 5.1×10^{-5} cm/sec) by the assumed screen length of the PFSF water well (approximately 100 feet); the resulting transmissivity would be equal to 14.3 ft^2/day. The pumping time over a 22-year period would equate to approximately 1.15×10^7 minutes. By allowing the storage coefficient (S) to vary from 0.1 to 0.001, the radius of influence is found to vary from approximately 480 to 4800 feet (the higher number is considered to be a worst case scenario). Considering that the nearest well is approximately 9,500 feet away, operation of the PFSF water well will have no adverse impacts to private or Reservation groundwater users.

b. Past measurements of water levels in wells in Skull Valley indicate that, as a whole, the withdrawal of water from wells has not appreciably altered the natural balance (Hood and Waddell, 1968). Limited well records indicate that water levels fluctuated no more than five feet from an average mean. Only in the immediate vicinity of the Town of Dugway (16 miles from the PFSF), where water has been pumped for public supply, have water levels declined appreciably in response to pumping, indicating changes in aquifer storage (Hood and Waddell, 1968).

References

Bedinger, M.S., Sargent, K.A. and Langer, W.H., 1990, Studies of Geology and Hydrology in the Basin and Range Province, Southwestern United States, for Isolation of High-Level Radioactive Waste - Characterization of the Bonneville Region, Utah and Nevada, U.S. Geological Survey Professional Paper 1370-G, 38 pp.

Heath, R.C., 1998, Basic Groundwater Hydrology, U.S. Geological Survey Water Supply Paper 2220, 86 pp.

Hood, J.W. and Waddell, K.M., 1968, Hydrologic reconnaissance of Skull Valley, Tooele County, Utah, Technical Publication 18, State of Utah Department of Natural Resources, 57 pp.

Powers, J.P., 1992, Construction Dewatering: New Methods and Applications, 2nd edition, Wiley Series of Practical Construction Guides, John Wiley & Sons, Inc., New York, 528 pp.

ENVIRONMENTAL IMPACT STATEMENT

8. GEOLOGY AND HYDROLOGY

8-2 Provide any additional information concerning seismic and hydrologic conditions of the site and its immediate vicinity available from the U.S. Geological Survey.

RESPONSE

We have researched the available files of the USGS and have made personal inquiries with USGS personnel familiar with Skull Valley. There have been no papers published recently by the USGS and no studies of Skull Valley are in-progress in the area of seismicity or hydrology. Thus, there is no additional information available from USGS concerning seismic and hydrologic conditions of the site and its immediate vicinity.

Additional significant studies in the area of seismicity have been performed recently by the PFSF Project. The results of these studies are included in the responses to safety RAI No. 1, SAR Questions 2-5 and 2-7. Additional hydrological analyses are included as the response to EIS RAI, Question 8-1.

ENVIRONMENTAL IMPACT STATEMENT

8. GEOLOGY AND HYDROLOGY

8-3 a. Explain why the probable maximum flood (PMF) calculation in the license application identifies a drainage area of 26 miles, rather than a larger area (e.g., 240 square miles) and discuss the potential effects of runoff.

b. Indicate where the proposed natural drainage system is located.

c. Provide the basis for the statement on page 4.5-1 that localized aquifer drawdown from facility water use "is not expected to have any effects on adjacent water users."

RESPONSE

a. The PFSF flooding analysis is described in SAR Section 2.4. The watershed basins or drainage areas used in the analysis are shown in SAR Figure 2.4-1. Watershed basin I is approximately 26 square miles in area and comprised of three subbasins that form a discrete drainage system which concentrates and flows to the north on the east side of the PFSF site. The southern boundary of watershed basin I was established based on a field walkdown that identified a subtle saddle or ridge that appeared to segregate the basin as shown on SAR Figure 2.4-1. A flooding calculation (Reference 1) was prepared to determine the 100-year and Probable Maximum Flood (PMF) flow quantities and floodway elevations to confirm the PFSF site is flood-dry. Results of the flooding calculation are summarized in SAR Section 2.4.2.

In response to the question above, the flooding calculation and reference maps were reviewed to confirm the size and configuration of the drainage basins. Since the observed saddle is not clearly distinguishable on the USGS topographic maps, the analysis was redone to include a larger and more conservative drainage area.

A new calculation (Reference 2) was generated that considers a drainage area of approximately 270 square miles as shown on Attachment A of this response. The resulting floodway is shown on Attachment B of this response. A summary of the results of the calculation considering the larger drainage area is as follows:

Drainage basis area

270 square miles (See Attachment A)

Calculated 100-Year Flow (Q_{100})

The 100-year flow is estimated by using the following two methods:

1. USGS Regression Equations developed for the State of Utah:

   Q_{100}=2,317 cfs

2. FHWA 7-parameter regression equation:

   Q_{100}=2,428 cfs

Conservatively, a flow of Q_{100}=2,430 cfs was used to determine the flood level at the floodway to the east of PFSF site.

Calculated Probable Maximum Flood (PMF) Flow (Q_{PMF})

The values of PMP (Probable Maximum Precipitation) are estimated based on NOAA Report 49. The Soil Conservation Service (SCS) dimensionless unit hydrograph is then applied to calculate the magnitude of PMF.

The time of concentration (Tc) is estimated by using the Hathaway equations:

Hathaway Equation: Tc = 18.31 hr

The PMF for the general storm and the local storm were evaluated separately. The general storm PMF is greater than that of the local storm, consequently, it is adopted for the flow analysis.

Q_{PMF}= 53,000 cfs. (General storm PMF)

Floodwater Elevation near the PFSF Site

Based on the existing natural topography, the flood levels at the north-east corner of the PFSF site, which is the closest point to the floodway as shown on Attachment B, are calculated to be:

H_{100} = 4451.9 ft.
H_{pmf} = 4455.7 ft.

The site grade elevation at the northeast corner of the site is approximately 4460 ft. and consequently the site is not within the flood plain. The site perimeter road further protects the site from flooding, since it is constructed to an elevation of 4462 ft. at the northeast corner of the site.

Flood Elevation at the Access Road

Based on the existing natural topography, the flood level at the proposed access road is calculated to be:

100-year flood	4496.5 ft.
PMF flood	4500.5 ft. (east bank of floodway) to 4477.4 ft. (west bank)

In conclusion, considering the larger and more conservative drainage basin of 270 square miles, the predicted water levels for both the 100-year flood and PMF are still below the site elevation and the site is not subject to flooding.

The calculated flows have increased due to the larger area, but not proportionally. The Q_{100} has increased from 2,247 cfs (Reference 1) to 2,430 cfs and the Q_{pmf} has increased from 34,577 cfs (Reference 1) to 53,000 cfs. These new and higher values can and will be accommodated in the design of the access road. It should be noted the design of the access road includes providing culverts to pass the Q_{100} beneath the road, whereas the Q_{pmf} would overtop the road surface.

b. Attachment A shows the natural drainage area.

c. See response to EIS RAI, Question 8-1 a.

ATTACHMENTS

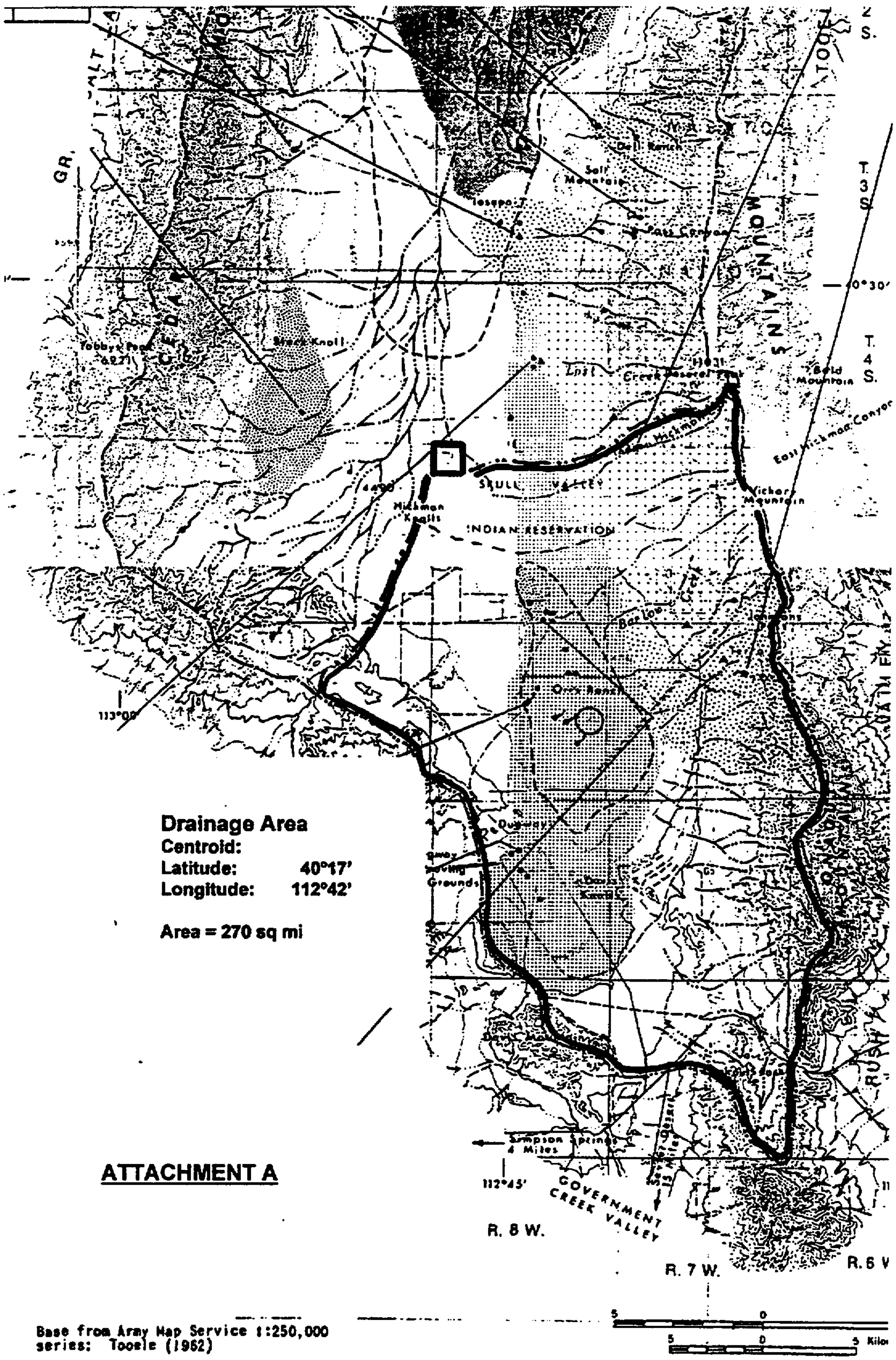
A. Watershed Map (Page 5 of 6)

B. Floodway Boundary (Page 6 of 6)

REFERENCES

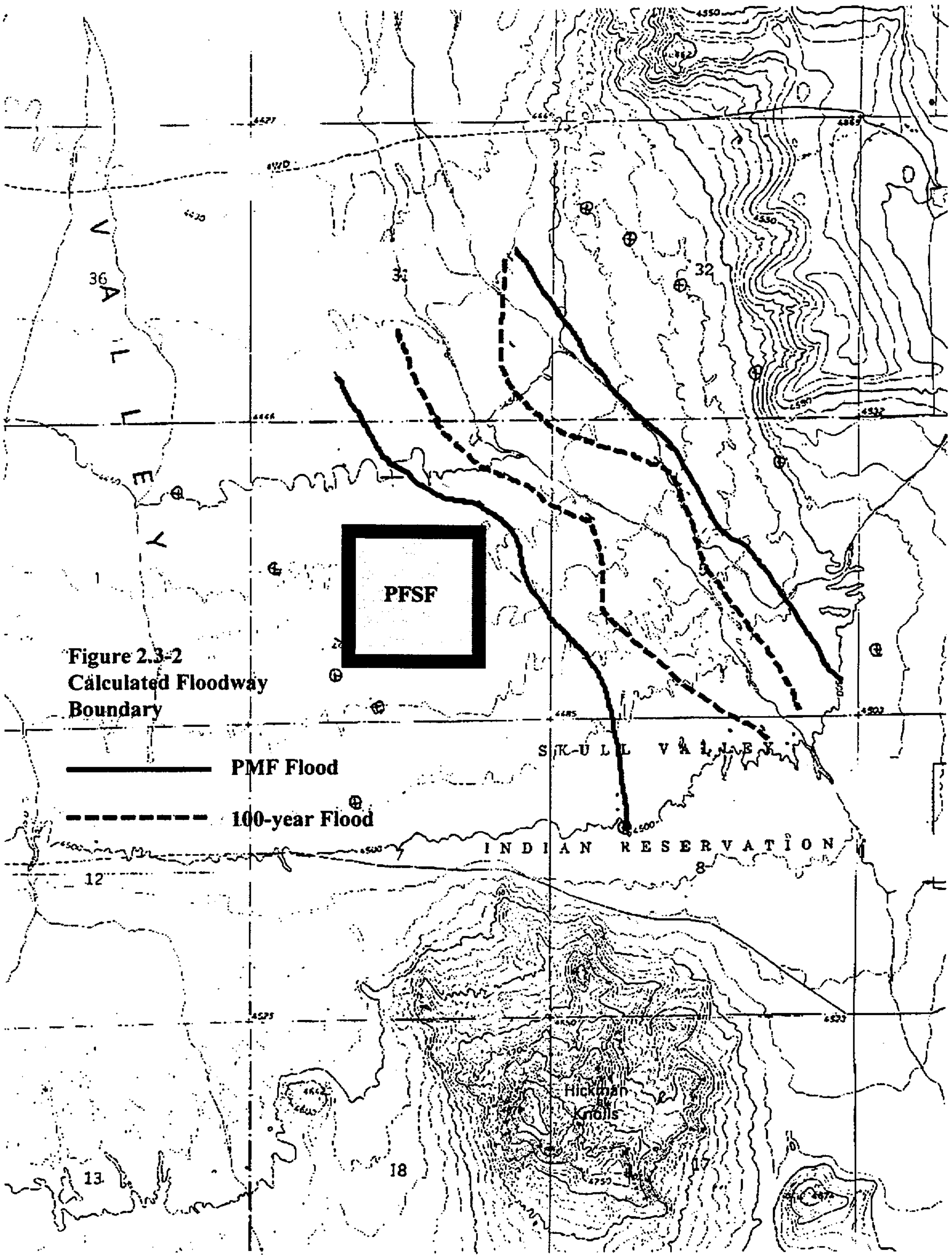
1. Calculation No. 05996.01-G(B)-02-1, The PMF and the 100-yr Flooding Flow at the Access Road Crossing and the PFSF Site, prepared by Stone & Webster.

2. Calculation No. 0599602-G(B)-12-0, PFSF Flood Analysis with Larger Drainage Basin, prepared by Stone & Webster (attached to PFS letter, Parkyn to Delligatti, Submittal of RAI Calculations / Reports, dated 2/11/99).



Base from Army Map Service 1:250,000 series: Tooele (1962)

CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT
DATUM IS MEAN SEA LEVEL



ATTACHMENT B
EXTENT OF FLOODWAY

ENVIRONMENTAL IMPACT STATEMENT

9. LAND AND WATER USE

9-1 Describe the current use of the proposed site and its immediate surroundings. The response should include the following information:

a. Estimated recreational use and visits to Skull Valley.

b. Estimated number of hiker and skier visits to Mount Deseret.

RESPONSE

a. The estimated recreational use in Skull Valley does not exceed 3,000 visitor days per year. The Bureau of Land Management's (BLM's) estimate for total recreation use in the entire Pony Express Resource Area (PERA) is 218,870 visitors per year. A majority of the area encompassed by the PERA, however, extends well beyond Skull Valley and includes land beyond the 50-mile radius of the PFSF site. There are no major recreation areas within Skull Valley. The largest designated recreation use in the Skull Valley portion of the PERA is off-highway vehicle (OHV) use. The BLM does not have a specific estimate of the amount of OHV vehicle use in Skull Valley but includes it in the overall dispersed recreation use for the entire PERA. One of the most popular OHV use areas is the Knolls, which is not in Skull Valley. BLM reports recreational use of 17,577 visitor days at the Knolls in 1997; use in 1998 is estimated at 9-12,000 visitor days. OHV use in Skull Valley would be significantly less than in the Knolls because, unlike the Knolls area, there is a large percentage of private land in Skull Valley that inhibits OHV use. Use in Skull Valley is also seasonally limited to designated routes from December 1st to April 15th and to existing roads and trails from April 16th to November 30th (Personal communication between S. Conant, SWEC, and L. Kirkman, BLM, May 22, 1997 and S. Conant, SWEC, and Britta Nelson, BLM, January 19, 1999).

The only designated visitor facility in Skull Valley is the BLM's Horseshoe Springs. BLM estimates visitor use at 500 to 1,000 visitors per year (Personal communication between S. Conant, SWEC, and L. Kirkman, BLM, May 22, 1997). This estimate includes camping at Horseshoe Knoll, an undeveloped campsite across Skull Valley Road from Horseshoe Springs. Horseshoe Springs is located 15 miles north of the PFSF site. The facility, described in the ER Chapter 2, p. 2.2-3, has parking for 10 to 20 vehicles, an information kiosk, and a short, unmarked hiking trail that winds between the two ponds that are the central feature of the site.

b. Mount Deseret, approximately 9 miles northeast of the PFSF, is the central feature of the 25,000-acre Deseret Peak Wilderness located within the

Stansbury Mountain unit of the Wasatch-Cache National Forest. The Forest Service manages the area for primitive recreational use at dispersed locations. Developed recreational facilities and motorized vehicle use is prohibited in wilderness areas. Recreational activity in the Deseret Peak Wilderness includes hiking, hunting and horseback riding. Overnight camping by groups of more than 10 persons, and camping in one location for a period of more than three days is prohibited. The number of annual recreational visits to the Deseret Peak Wilderness is estimated at 18,000.

Six campgrounds are located along South Willow Canyon Road in the Stansbury Mountain unit of the Wasatch-Cache National Forest to the east of the boundary to the Deseret Peak Wilderness. South Willow Canyon Road and the campgrounds are located approximately 10 miles northeast of the PFSF, in line with Mount Deseret Peak. The campgrounds contain a total of 32 campsites and are open from May to October. According to the National Forest Service, there are approximately 17,000 visits annually within the six campgrounds. Also within the Stansbury Mountains, two trail heads (Medina Flat and O.P. Miller) attract an estimated 9,500 visits per year. (Telephone conversation between S. Conant, S&W, and Jack Vanderberg, Acting Recreation Manager, Wasatch-Cache National Forest, January 21, 1999).

ENVIRONMENTAL IMPACT STATEMENT

9. LAND AND WATER USE

9-2 a. Provide local planning documents for the county and any specific land use plans for the area surrounding the proposed site and transportation corridor.

These plans should provide information that describes the existing environment and whether the proposed site and transportation corridor would be consistent with the area's planned development.

b. Provide any plans for economic development by the Skull Valley Band of Goshute Indians, as well as any other planning documents related to the county's future development, such as comprehensive plans and population projections. This information will support the EIS cumulative impact analysis concerning land use.

Information should be sufficient to support the EIS assessment of impacts of the proposed project on land use in general and on other developments currently being planned in the area.

RESPONSE

a. A copy of the Tooele County General Plan (11/95), is included in the Attachment package provided under a separate cover (Attachment 9-2). This is the only known planning document for the area of interest

b. General information concerning the economic development by the Skull Valley Band of Goshute Indians is addressed by Leon Bear, Chairman, Executive Committee, Skull Valley Band of Goshute included in the enclosed letter following the RAI responses.

ENVIRONMENTAL IMPACT STATEMENT

9. LAND AND WATER USE

9-3 Report the current zoning of the Low corridor rail spur and Intermodal Transfer Point properties and the zoning that would be needed for the proposed project alternatives (i.e., rail spur or intermodal options).

Paragraph one on page 9.4-1 of ER Revision 1, states that a zoning change will be required for the Low corridor rail spur or Intermodal Transfer Point.

RESPONSE

All of the property that is required for the Low corridor rail line or intermodal transfer point is situated within land owned by BLM except for land adjacent to the mainline, which is owned by Union Pacific Railroad. Based on a review of applicable laws for the state of Utah, the Tooele County Zoning Ordinance does not apply to federal lands such as the land administered by the BLM and therefore does not apply. The Union Pacific right-of-way is currently zoned for industrial uses. The addition of rail sidings at Low for the rail line or at the intermodal transfer point that are within the UP right-of-way are allowed by the zone designation.

Section 9.4-1 and 2.2.2 of the Environmental Report will be revised to reflect this information.

ENVIRONMENTAL IMPACT STATEMENT

9. LAND AND WATER USE

9-4 a. Describe current water use and projections for new water use (e.g., irrigation and drinking water) in Skull Valley.

b. Describe projected water use for all phases of the project, including construction, operation, and decommissioning.

c. Support the conclusion in the ER that the area water supply would not be adversely impacted by the proposed project (include water use considerations for construction, operation, and decommissioning of the proposed facility).

RESPONSE

a. Land ownership in Skull Valley is split between private landowners along the Skull Valley Road and the Federal Government for the expansive general areas of the valley. The Bureau of Land Management (BLM) has long-standing grazing allotments with the Castlerock Land and Livestock, L.C., the significant private landowner in Skull Valley for their cattle ranching enterprise from the north end of the valley to south of the Skull Valley Band of Goshute Reservation. Water use in the valley is therefore limited to servicing human consumptive needs, limited irrigation for cattle feedstock along Skull Valley Road, and drinking water for the livestock itself over the grazing areas. The opportunity for expansion of existing uses in the valley is limited due to the lack of accessible private land in the valley or for the same reason along the Skull Valley Road corridor. According to the Tooele County General Plan (November 1995), little growth is anticipated for Skull Valley and the residents also indicated a desire of no growth. Consultations with BLM on existing land use have indicated their concern of possible overgrazing in the valley at the present time. All of these factors indicate that current water use is likely to stand for the foreseeable future with little if any increase.

b. As stated in the ER, Section 4.5, Resources Committed, "Water needs during construction and operation of the PFSF are very modest. Beginning the third year of construction and subsequently during operation over the life of the facility, the estimated water needs average approximately 3600 gallons/day. The highest water demand is associated with the larger daytime work force as well as operation of the concrete batch plant which is estimated at 8500 gallons/day during the first year of construction and about 5300 gallons/day during the second year of construction." Water needs during decommissioning will decrease from that of long term operations (3600 gpd) due to the completion of the construction phase of the project and will approach the human consumption value of approximately 2500 gallons/ day. It should be noted that 3600 gallons

/day is approximately 2.5 gallons per minute or 4.0 ac-ft/yr. Six existing wells within five miles of the site have water rights ranging from approximately 11 to 1600 ac-ft/yr. This information and additional details on these wells where included in the response to the previous safety RAI No.1, SAR Question 2-3.

c. As shown above in (b), water consumption at the PFSF during construction and operation of the PFSF is very modest with an average rate over a 20 year period being 3850 gal/day. The calculated radius of influence of the well for the site that is determined in RAI 8-1 has a maximum radius of 4800 feet based on 3850 gal/day. Since the nearest existing well from the site is located approximately 9500 feet away, the wells in the area will not be adversely impacted by the proposed PFSF well. In addition, well records of Skull Valley indicate that water levels from the wells have fluctuated no more than five feet from an average mean from pumping except for the immediate vicinity of the Town of Dugway where water has been pumped for public supply (Hood and Waddell, 1968). It is also noted that, if needed, water will be obtained directly from the Band's existing reservoir on the reservation.

References:

Gillies Stransky Brems Smith Architects, et al., November 1995, Tooele County General Plan, (Attachment 9-2.1)

Hood, J.W. and Waddell, K.M., 1968, Hydrologic reconnaissance of Skull Valley, Tooele County, Utah, Technical Publication 18, State of Utah Department of Natural Resources, 57 pp.

ENVIRONMENTAL IMPACT STATEMENT

10. ECOLOGICAL RESOURCES

10-1 a. Provide a copy of the Stone & Webster Engineering Corporation 1997 reference, including the photographs and video tape taken during project site visits in June and October 1996 and February 1997.

b. Provide the written results and documentation from surveys performed either by or for the applicant in May and June 1998.

c. For Low, Utah, provide maps equivalent to those provided for the Rowley Junction site (e.g., ER Figures 2.3-8 and 2.3-9).

Context should include area beyond the 0.5 mile buffer zone, as was done in the maps in the ER for the corridors, by including information on the surrounding area (i.e., how they are situated relative to principal land features of the general area).

d. Provide the additional ecological information on the Low corridor from the Utah Division of Wildlife Resources (UDWR) that is mentioned on page 2.3-31, last sentence of Section 2.3.3.

e. Provide a map showing the locations of the springs listed in Section 2.3.2.3 of ER Revision 1.

f. Regarding the Horseshoe Knolls overlook and campground located across the road from Horseshoe Springs, explain the extent to which this is a developed recreational area (include a discussion of how much the area is used).

g. Provide survey results of the 1996 and 1997 United States Forest Service (USFS) surveys for spotted bats.

On the last paragraph of page 2.3-18 of ER Revision 1, there is mention of 1996 and 1997 surveys for spotted bats. Evidently, these surveys were planned to be carried out by the USFS. Provide the results of both the 1996 and 1997 surveys, if available.

h. Provide the location and a map of the large mudflat at the base of the Stansbury Mountains.

In the last sentence of the second paragraph on page 2.6-3 of ER Revision 1, it is noted that a large mudflat fed by springs is present along the base of the Stansbury Mountains. Discuss whether animal species

dependent on these mudflat areas may also use other surrounding parts of Skull Valley, including the project site and the railroad spur corridor.

i. Provide the results of the comprehensive wildlife survey described in paragraph 4.4-3 of ER Revision 1. The survey should include the Skull Valley pocket gopher and other appropriate animals.

In the third paragraph on page 4.4-3 of ER Revision 1, it is stated that "a comprehensive wildlife survey should be conducted."

RESPONSE

a. Copies of photos from site visits in February 1997, and June 1996, as well as the videotapes of the site visit of February 1997, are included with the attachment package sent under separate cover (Attachment EIS RAI 10-1 a).

b. A copy of the following report is included with the attachment package sent under separate cover (Attachment EIS RAI 10-1 b).

'Survey For Federal and State Threatened, Endangered, and BLM and State Sensitive Animal Species Conducted In May and June 1998'

c. Stone and Webster letter to UDWR, dated July 27, 1998 requested data and maps on natural resources, including rare natural features, land cover types, and unique vegetation/habitat for the new rail line corridor and Low, Utah. In their January 6, 1999 letter, UDWR only provided information on high interest wildlife species. Therefore maps similar to ER Figures 2.3-8 and 2.3-9 are not available at this time from the State of Utah UDWR. The January 6, 1999 UDWR information is included with the attachment package sent under separate cover (Attachment EIS RAI 10-1 c).

As discussed in ER Sections 2.3.3, the ecological resources found at Low and along the Low Corridor are generally very similar to those found at the PFSF and the Skull Valley Road transportation corridor, which are described in ER Sections 2.3.1 and 2.3.2, respectfully.

d. In their January 6, 1999 letter, UDWR provided information on high interest wildlife species including two federally listed species known to occur near the Low corridor. As previously discussed in the ER, peregrine falcons are known to nest at Timpie Springs and the bald eagle is known to winter in Rush Valley, approximately 20 miles east of Skull Valley.

State listed sensitive species that are known to occur in the Skull Valley are the bobolink (Dolichonyx oryzivorus), burrowing owl (*Athene cunicularia*), caspian tern (*Sterna caspia*), common yellowthroat (*Geothlyis trichas*),

ferruginous hawk (*Buteo regalis*), long-billed curlew (*Numenius americanus*), short-eared owl (*Asio flammeus*), and Swainson's hawk (*Buteo swaisoni*).

Species that occur in Skull Valley and are of conservation concern by UDWR's Utah Natural Heritage Program or resource management agencies such as BLM or the US Forest Service, but are not federally or state listed are: Pohl milkvetch (*Astragalus lentiginous pohlii*), small spring parsley (*Cymopterus acaulis* var. *parvus*), Skull Valley pocket gopher (*Thomomys bottae robustus*), and sandhill crane (*Grus canadensis*).

Additional high interest species identified by the state as occurring in Skull Valley include: the great horned owl (*Bubo virginianus*), golden eagle (*Aquila chrysaetos*), mourning dove (*Zenaida macroura*), northern harrier (*Circus cyaneus*), prairie falcon (*Falco mexicanus*), ring necked pheasant (*Phasianus colchicus*), red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), and chukar (*Alectoris chukar*). The UDWR maps showing the locations of areas valuable to the pronghorn, mule deer, and chukar are included with the attachment package sent under separate cover (Attachment EIS RAI 10-1 d).

In addition to the above species, UDWR states that there are additional species that are not known to occur near the Low Corridor, but could possibly occur. They are the least chub (*Iotichthys phlegethontis*), Columbia spotted frog (*Rana luteiventris*), milk snake (*Lampropeltis triangulum*), Townsend's big-eared bat (*Plecotus townsendii*), Brazilian free-tailed bat (*Tadarida brasiliensis*), ringtail (*Bassariscus astutus*), sage grouse (*Centrocercus urophasianus*), and Lewis' woodpecker (*Melanerpes lewis*).

e. The locations of the springs and lake are indicated on the following USGS 7.5 minute and 30x60 Quadrangles:

SPRING/LAKE	QUADRANGLE TITLE	TOWNSHIP/RANGE; SECTION/S
Big Spring	Timpie	T1S/R7W; Sections 8,9
Burnt Spring	Tooele	T2S/R7W, Section 6
Muskrat Spring	Timpie	T2S/R8W; Section 13
Horseshoe Springs	Salt Mountain	T2S/R8W; Section 26
Salt Mountain Springs	Salt Mountain	T3S/R8W; Sections 10,15 (Near Kanaka Lake)
Kanaka Lake	Salt Mountain	T3S/R8W; Section 16

Copies of the USGS Quadrangles are included with the attachment package sent under separate cover (Attachment EIS RAI 10-1 e).

f. Horseshoe Knolls is located across Skull Valley Road from the Horseshoe Springs. It is described by the BLM as an undeveloped camping area. There are no restrooms, running water, designated campsites, or other amenities provided by the BLM at the site. The area is one of an estimated 7 to 9 similar areas located throughout the Pony Express Resource Area to which the BLM directs groups and other casual users in order to confine recreation user impacts to specific areas. It is typically used by community organizations, such as the Boy Scouts, or by other groups such as motorcyclists or target shooters. Because it is an undeveloped camping area, the BLM does not maintain site specific visitor use figures. The number of visitors estimated for the area is included in recreation use figures for Horseshoe Springs. Annual visitor use at Horseshoe Springs is estimated at 500 to 1,000 visitor days (personal communication between S. Conant, SWEC, and L. Kirkman, BLM, May 22, 1997, and S. Conant, SWEC, and Britta Nelson, BLM, January 19, 1999).

g. The Salt Lake District of the USFS was contacted to obtain the survey results. As of the time of this response, we have not yet receive those results.

h. The location of the mudflat is shown on the Regional Location map, currently provided in the ER as Figure 2.1-1. Mudflat areas provide habitat for a variety of shorebirds and amphibians. In Skull Valley, the areas that remain wet the longest, thereby providing the best and most enduring habitat, are at the northern areas closest to the Salt Lake along the center of Skull Valley. In many cases, wildlife, such as amphibians, that utilize mudflats remain within these areas. However, some shorebirds, such as the long billed curlew, will nest in upland areas adjacent to the mudflats.

   The PFSF site is located greater than 10 miles away from the nearest mudflat area and is not likely to be used by wildlife found in the mudflats. At its closest, the railroad corridor is about a mile to the west of mudflats. It is possible that wildlife, primarily shorebirds could use these upland areas as well. However, most of the railroad line is removed from the mudflats to preclude the presence of mudflat species.

i. The wildlife survey mentioned in the third paragraph of Section 4.4.2 has not yet been performed. The survey discussed in Section 4.4.2 is in addition to surveys already performed. The intention is to conduct this additional survey just prior to construction to make sure nothing has changed since the initial survey. Both surveys are equivalent. As stated in ER Section 4.4.2, a survey just prior to construction, will allow for mitigation plans such as construction timing restrictions or establishment of alternative nest (or den) site locations in consultation with the BLM, UDWR, and FWS to offset the loss of these sites due to construction and improve habitat for local populations.

ENVIRONMENTAL IMPACT STATEMENT

10. ECOLOGICAL RESOURCES

10-2 a. Provide raptor data for Skull Valley.

Raptors (i.e. birds of prey including eagles, hawks, and owls) are one of the most important wildlife groups to be considered in the EIS ecological analysis.

b. Provide the locations and a map of the nest locations of burrowing owls and Swainson's, red-tailed, and ferrigunous hawks in Skull Valley.

RESPONSE

The report, 'Survey for Federal and State Threatened, Endangered, and BLM and State Sensitive Animal Species Conducted in May and June 1998', contains raptor data and nest locations. A copy of the report is provided with the attachment package sent under separate cover (Attachment EIS RAI 10-1 b).

ER Figure 2.3-7 also provides raptor nest locations provided by UDWR.

ENVIRONMENTAL IMPACT STATEMENT

10. ECOLOGICAL RESOURCES

10-3 Provide any recent wildlife survey information from the Bureau of Land Management, Bureau of Indian Affairs, Utah Division of Wildlife Resources (UDWR), and the Skull Valley Band of Goshutes relevant to the proposed project. Include the information from UDWR which is listed as pending on page 2.3-31, Section 2.3.3, of ER Revision 1.

RESPONSE

Regarding the UDWR information that is listed as pending on ER page 2.3-31, see response to EIS RAI, Question 10-1 d. We do not have any additional recent wildlife survey information from the Bureau of Land Management, Bureau of Indian Affairs, or the Skull Valley Band of Goshute.

ENVIRONMENTAL IMPACT STATEMENT

10. ECOLOGICAL RESOURCES

10-4 Provide information on all plant or animal species found in Skull Valley which are proposed candidate species for designation as either threatened or endangered pursuant to the Endangered Species Act (ESA), that have not already been discussed in the ER or referenced information.

The ER discusses at least one candidate bird species (the mountain plover) in Section 2.3.1.4.2, but there is no mention of candidate or proposed plant species in Section 2.3.1.4.1.

Candidate species are the pool of species from which future listings are normally drawn. Although only species listed by the U.S. Fish and Wildlife Service (FWS) as threatened or endangered receive the full protection of the ESA, the FWS encourages federal agencies to consider the presence of candidate species in planning proposed actions.

RESPONSE

According to the United States Fish and Wildlife Service the only candidate plant or animal species that could potentially occur in Skull Valley are the mountain plover and the spotted frog (FWS, Utah Field Office letters dated February 10, 1997, February 27, 1997, and July 31, 1998). These species are discussed in Section 2.3.1.4.2 and in Appendix 2B of the ER.

ENVIRONMENTAL IMPACT STATEMENT

10. ECOLOGICAL RESOURCES

10-5 a. Provide information on protection measures recommended by the State of Utah for species that are identified by the state as "high interest".

b. Clarify the distinction between Utah's designations of "high interest" and "species of special concern" in terms of whether they receive different levels of protection. Provide sufficient information to support the EIS analysis of state-listed species.

RESPONSE

a. According to the Utah Division of Wildlife Resources (UDWR), "high interest species" are defined as all game species; any economically important species; and any species of special aesthetic, scientific, or educational significance including those deemed as being sensitive, which would include all federally listed threatened or endangered species. High interest species include those species which are not particularly rare, but are considered especially important to the public, UDWR, or other resource management agencies (UDWR letters dated March 27, 1997 and January 6, 1998)

Species are not provided any protection based on their being identified as "high interest" species. Some high interest species are, however, protected because of other classifications, such as federally threatened or endangered.

b. As discussed above, "high interest species" are not provided any protection based on that classification. According to the State of Utah, Sensitive Species List (February 1998), "species of special concern" are defined as any wildlife species or subspecies that has experienced a substantial decrease in population, distribution and/or habitat availability, or occurs in limited areas and/or numbers due to a restricted or specialized habitat, or has both a declining population and a limited range; a management program, including protection or enhancement, is needed for these species.

Utah Code 63-34-14, Species Protection Account, states that, "... "species protection" means an action to protect any plant or animal species identified as sensitive by the state or as threatened or endangered under the Endangered Species Act of 1973, U.S.C. 16 Sec. 1531 et seq". Since species of special concern are a part of the Utah Sensitive Species List, they are protected under this statute.

ENVIRONMENTAL IMPACT STATEMENT

10. ECOLOGICAL RESOURCES

10-6 a. Support the statement of page 2.3-12 of ER Revision 1 (attributed to a letter A. Stephenson to S. Davis) that the Pohl's milkvetch "is endemic to Rush and Skull Valleys, although previously it has never been recorded."

Provide a map showing the nearest known locations of these species to the proposed PFSF site.

b. Provide information for the big saltbrush in ER Table 2.3-2 similar to that provided for other species.

Big saltbrush is not included in Table 2.3-2 of ER Revision 1, although it is discussed in the text.

c. Explain the reasons for not including small spring parsley in the survey for high interest species.

Page 4.1-4 of the ER indicated that a survey for high interest plant species before construction would include the small spring parsley. However, this plant is not mentioned in ER Revision 1, which only mentions surveys for Pohl's milkvetch.

This information is needed in sufficient detail to support the EIS rare plant analysis.

RESPONSE

a. The referenced statement was made by BLM, the Salt Lake District Office, in their letter dated February 20, 1997, to Stone & Webster.

Also, the Utah Division of Wildlife Resources states, in their March 27, 1997 letter to Stone & Webster, that the nearest known Pohl's milkvetch population to the project area is located in Township 4 South, Range 8 West, Section 6.

During the 1998 rare plant survey, a population was located south of the PFSF site on an abandoned road to Hickman Knolls in SE 4, SW 4, Section 9, Township 5 South, Range 8 West. Maps that show these locations are provided with the attachment package sent under separate cover (Attachment EIS RAI 10-6).

b. The requested information on Big Saltbush is as follows:

Name of Species	BLM	FS	UDWR	USFWS	Likely to Occur in Riparian/ Wetland Areas Only	Preferred Habitat
Big saltbush (*Atriplex lentiformis*)			G5/S2			Washes, stream and canal banks, and roadsides.

c. The rare plant species survey conducted in May 1998 included looking for the small spring parsley. This species was not located in the project area. It is found on sandy areas and sand dunes in salt desert shrub, sagebrush, and pinyon-juniper communities. No suitable habitat was located in the project area and there are no previously located occurrences in the project area.

ENVIRONMENTAL IMPACT STATEMENT

10. ECOLOGICAL RESOURCES

10-7 a. Describe the potential impact of promoting additional non-native vegetation over native vegetation in areas disturbed by construction and operation.

b. Provide information and references on natural vs. active revegetation in the region after construction, as mentioned on page 4.1-3 of ER Revision 1.

c. Provide an evaluation of the potential impacts to the native and non-native plant habitats in Skull Valley as the result of fires.

Since much non-native vegetation is found in the area (e.g. cheatgrass), allowing areas disturbed during construction and operation to revegetate "naturally" could result in an adverse impact of promoting additional non-native vegetation rather than native vegetation growing there. The probability of this occurring cannot be determined without more information on regional revegetation patterns after construction.

RESPONSE

a. Although it is stated on page 4.1-3 of the ER that temporarily disturbed areas would be allowed to revegetate naturally, it has since been determined that PFS will have to actively revegetate this small (24 acre) area with native species in order to deter the invasion of non-native vegetation. As discussed in the ER and the report on the results of the Rare Plant Inventory, the most commonly occurring species are invasive annuals such as cheatgrass (*Bromus tectorum*), which are not native to this area. These invasive species are likely to take advantage of disturbance to any areas of native vegetation within the project area, and could establish populations in these areas. Revegetating these areas with native vegetation will discourage non-native vegetation from expanding further into the project area. This section of the ER will be revised accordingly.

b. As noted above, since initial submittal of the ER, it has been decided to revegetate disturbed areas with native species to discourage non-native vegetation such as cheatgrass from becoming further established within the project area. Following construction, areas that have been temporarily disturbed will be actively seeded and replanted with appropriate native species.

c. The abundance of invasive annuals and conspicuous absence of native plant species in Skull Valley reflects the past history and repeated cycles of overgrazing, drought, and fire (Cottom 1976, Rogers 1982, Billings 1990, Christensen and Hutchinson as cited in BLM 1990).

Sparks et al (1990) conducted a study of changes in vegetation in Skull Valley and how those changes relate to land use and native vegetation types. The study concluded that unrestricted livestock grazing, coupled with wildfires, triggered the conversion to dominance by annuals. It further noted that the greatest changes occurred in former sagebrush and shadscale dominated vegetation on bench, foothill, and baja sites where livestock grazing and fires have been most concentrated. Areas at higher elevations, and rugged topography where there has been less grazing and fires, have had less conversion to cheatgrass. When fires occurred at higher elevations where there was no grazing, native vegetation recovered with little invasion. In addition, Greasewood, saltgrass, and playa sites saw little change in plant species composition over the historical period studied. The results of the study suggest that a combination of both livestock overgrazing and wildfires are probably required for the conversion from native species to invasive annuals.

References

- Billings, W. D. 1990. *Bromus tectorum*, a biotic cause of ecosystem impoverishment in the Great Basin. Pages 301-322 in Woodwell, GM (ed.): The earth in transition – patterns and processes of biotic impoverishment. Cambridge University Press, Cambridge, UK.
- BLM (Bureau of Land Management), 1990. Stansbury Mountains Habitat Management Plan. Salt Lake District, BLM, U.S. Department of the Interior, Salt Lake City, UT. May 1, 1990.
- Cotton, W. P. 1976. The impact of man on the flora of the Bonneville Basin. Department of Geography Research Paper No. 76-1. University of Utah, Salt Lake City, Utah.
- Rogers, G. F. 1982. Then and now: a photographic history of vegetation change in central Great Basin desert. University of Utah Press, Salt Lake City.
- Sparks, S.R., N.E. West, E.B. Allen, 1990. Changes in Vegetation and Land Use at Two Townships in Skull Valley, Western Utah, in Proceeding – Symposium on Cheatgrass Invasion, Shrub Die-Off, and Other Aspects of Shrub Biology and Management, Las Vegas, NV. April 5-7, 1989. USDA-Forest Service Intermountain Research Station, Ogden, UT. General Technical Report INT-276.

ENVIRONMENTAL IMPACT STATEMENT

10. ECOLOGICAL RESOURCES

10-8 a. Analyze the extent to which the proposed facility would attract wildlife to the facility (e.g., use of buildings, light poles, or cask vents for perching or nesting, attraction of predators to the lights, attraction of wildlife to the vicinity of the casks during winter for warmth, or other wildlife uses of the facility).

b. Document what the potential radiological doses to wildlife could be and discuss the potential impact of such doses to individuals and populations.

An issue raised during the scoping meeting concerned animals possibly being close to the casks for long periods of time and, thereby, being exposed to potentially unacceptable long-term doses of radiation. Provide sufficient information on which to base an EIS analysis of this potential ecological impact.

RESPONSE

a. Avian species are likely to be attracted to the casks, buildings, and light posts for perching and potential nesting because of the limited perching/nesting sites available in the valley. In addition, the exterior surfaces of the casks are at above-ambient temperatures, which will be attractive to birds, small mammals, and reptiles, during the winter.

However, the area within the nuisance fence will not provide attractive habitat since it will be devoid of vegetation and composed of compacted crushed rock and concrete. There will be no shelter available to prey species, such as small mammals and reptiles, to protect them from predators. Cask air inlet ducts located at the bottoms of the casks might provide some shelter; however both inlet and outlet ducts will be covered by screens with ¼" or finer mesh spacing to prohibit entry.

During the early stages of the project, construction activities would be likely to keep many species, especially raptors, away from the area. However, as casks are installed and activity moves to a different area, wildlife could move into the established areas.

Nevertheless, if left undeterred wildlife may exist inside the fenced areas of the PFSF and around the casks. Therefore to restrict habitation, PFS will monitor any wildlife activity on-site and will take measures to prevent habitation. Animal deterrent devices will be employed to keep all wildlife from being within the area for any length of time. A chain link fence, 8 ft high and embedded 1 ft into the

ground, will be installed around the perimeter of the storage pads to prevent large wildlife such as deer antelope, coyotes, fox, rabbits, etc. from entering the area. If birds are found to be perching and/or nesting around or on the casks, deterrent devices such as cones or spikes will be installed to prevent this from happening. Small mammals and reptiles will also be kept from remaining in the cask area, using traps if necessary. Furthermore, the entire area will be surveyed frequently by facility workers. If any permanent signs of wildlife are found, actions will be taken immediately to remove the animals.

b. The following discussion evaluates external radiation dose from the storage casks to animals in the vicinity of the PFSF. Doses to animals from radioactivity released to the environment are not evaluated since (unlike nuclear power plants) there are no radioactive liquid or gaseous effluents released from the PFSF. As stated in PFSF SAR Section 7.6.3, "The canisters are high integrity vessels sealed by welding and breach of a canister is not a credible event. Since there will be no liquid or gaseous effluents released from the PFSF, there will be no doses attributable to effluents in the areas surrounding the PFSF."

Based on the response to EIS RAI 10-8 (a), measures will be taken at the PFSF to assure that wildlife will not spend significant amounts of time inside the fenced area. Therefore, doses to animals are only considered outside the nuisance fence.

Effects of Ionizing Radiation on Wildlife

Regarding the effects of ionizing radiation on wildlife, Reference 1, page 65 under the section entitled "Effects: Ionizing Radiations", states the following:

> "Overall, the lowest dose rate at which harmful effects of chronic irradiation have been reliably observed in sensitive species is about 1 Gy/year. This value for acute radiation exposures is about 0.01 Gy."
>
> "In general, the primitive organisms are the most radioresistant taxonomic groups and the more advanced complex organisms - such as mammals - are the most radiosensitive (Fig. 7). The early effects of exposure to ionizing radiation result primarily from cell death; cells that frequently undergo mitosis are the most radiosensitive, and cells that do not divide are the most radioresistant. Thus, embryos and fetuses are particularly susceptible to ionizing radiation, and very young animals are consistently more radiosensitive than adults (McLean 1973; Hobbs and McClellan 1986)."

The 1 Gray/year threshold of harmful effects stated in Reference 1 is equal to 100 rad/year.

Regarding the effects of chronic radiation on mammals, Reference 2, Section 2.2.2.2 (which precedes publication of Reference 1 by about two years) concludes the following:

> "Overall it may be concluded that a dose rate of ≈ 10 $mGy \cdot d^{-1}$ 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. The laboratory studies tend to indicate a slightly higher threshold, but this may be due to other stresses being fewer or less severe than those experienced by natural populations."

10 mGy/day is equal to 1000 mrad/day, or 1 rad/day.

Regarding the effects of chronic radiation on birds, Section 2.2.2.3 of Reference 2 states the following:

> "Studies of chronic irradiation of bird populations are inherently more difficult because of bird's mobility: hence relatively little work has been done in this area. A few investigators (e.g. [111, 112]) have studied the nesting success of passerine birds in irradiated ecosystems. In these studies, exposure rates of 21 $R \cdot d^{-1}$ (0.2 $Gy \cdot d^{-1}$) caused embryonic mortality. In contrast, the breeding success of swallows and wrens exposed to 18-160 $\mu C \cdot kg^{-1} \cdot d^{-1}$ (≈0.7 - 6 $mGy \cdot d^{-1}$) appeared essentially normal [113]. However, large dose rates (1 $Gy \cdot d^{-1}$) reduced hatching success [99]. Longevity was not investigated in these studies. The minimum chronic exposure level at which effects on reproduction or mortality would become manifest does not seem to be well established."

The ≈0.7 to 6 mGy/day for which breeding success of swallows and wrens appeared normal equates to 70 to 600 mrad/day. The upper limit of 600 mrad/day equates to:

(600 mrad/day) (365 days/year) (1 rad / 1000 mrad) = 219 rad/yr

Section 2.2.2.4 of Reference 2 discusses reptiles, relating the effects of a study of chronic radiation exposure of ≈2 rad/day on different species of lizards. The study concluded that there were no significant differences in sex ratios, age distributions, or life spans between irradiated and control iguanid lizards, but after one or two years females of two other lizard species occupying the same enclosure became sterile. Reference 2 includes discussion of possible reasons for the differences, but does not provide a minimum chronic exposure level for adverse effects of ionizing radiation to lizard populations.

Based on the above information, this response to the NRC's request for information regarding effects of radiation from the PFSF on wildlife uses the 1 Gray/year value from Reference 1 (which is a more recent publication than Reference 2), the "lowest dose rate at which harmful effects of chronic irradiation have been reliably observed in sensitive species" as the criteria for acceptability at the PFSF. As stated above, this equates to an annual dose of 100 Rad.

Calculated Doses in the Vicinity of Storage Casks at the PFSF

Animals could find reasonably good habitat beyond the perimeter road that runs along the outside of the nuisance fence and surrounds the PFSF. Dose rates at the security fence produced by the PFSF cask array assumed to contain 4,000 casks have been calculated and are discussed in PFSF SAR Section 7.3.3.5. Holtec's analysis of 4,000 HI-STORM casks estimated dose rates at the north security fence (maximum dose rates) of 1.19 mrem/hr. SNC's analysis of 4,000 TranStor casks estimated dose rates at the north security fence of 0.455 mrem/hr. For reasons discussed in Section 7.3.3.5 of the PFSF SAR, the dose rates calculated by the vendors from the array of 4,000 casks are considered to be conservative. As shown in PFSF SAR Figure 1.2-1, the nuisance fence is 20 ft from the security fence; there is a 10 ft wide strip of land between the nuisance fence and the perimeter road; and the perimeter road is 20 ft wide (also surfaced with compacted crushed rock). Therefore, the distance from the security fence to the outside of the perimeter road is 50 ft. It is conservative to consider doses to animals at the security fence.

Assuming an animal is continuously present at the security fence, and assuming the maximum dose rate at this fence calculated by Holtec and SNC, the annual dose would be:

Dose = (1.19 mrem/hr) (8,760 hrs/yr) (1 rem/1000 mrem) = 10.4 rem

In order to consider the effects of radiation on wildlife, appropriate units of radiation dose are rads. The dose in rads is lower than the rem dose (if some of the dose is from neutrons), since quality factors having values greater than or equal to unity are used to multiply the rad dose (energy deposited) to arrive at the rem dose (damage effects on soft body tissue). While the quality factor for gamma radiation is 1 (Table 1004(b).1 of 10 CFR 20), quality factors for neutron radiation vary from 2 for low energy neutrons up to 11 for higher energy neutrons up to 20 MeV (Table 1004(b).2 of 10 CFR 20). However, it is conservative to assume that the dose in rads is equal to the dose in rem. An annual dose of 10.4 rads is below the 100 rad/year PFSF criteria, and harmful effects would not be expected even in sensitive species (Reference 1).

References

1. Biological Report 26, Radiation Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review, National Biological Service, U.S. Department of the Interior, December, 1994.

2. International Atomic Energy Agency, Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Protection Standards. Technical Reports Series No. 332. International Atomic Energy Agency; Vienna, Austria, 1992.

ENVIRONMENTAL IMPACT STATEMENT

10 ECOLOGICAL RESOURCES

10-9 Provide information concerning potential impacts to wetlands due to the construction and operation of the proposed Intermodal Transfer Point.

After visual inspection of the proposed Intermodal Transfer Point at Timpie, Utah, it appears that the proposed location may be located in the area that is flooded periodically.

Information should be sufficient to support the EIS wetlands analysis.

RESPONSE

The entire proposed Intermodal Transfer Point at Timpie, Utah is located within an elevated area that shows no signs of periodic flooding. There are lower elevation areas to both sides of the proposed site, however, they will not be impacted. The Intermodal Transfer point would be built within the upland area and connect immediately to the frontage road without affecting the nearby mudflat areas.

ENVIRONMENTAL IMPACT STATEMENT

11. SOCIOECONOMIC EFFECTS

11-1 Assess the effects the lease payments would have on the community of Skull Valley Band members living on the reservation; on potential social, educational, and economic development of the reservation; and the welfare of the Band members who live in other communities.

This information is needed to complete the socioeconomic analysis for the EIS.

RESPONSE

This RAI is addressed by Leon Bear, Chairman, Executive Committee, Skull Valley Band of Goshute in the enclosed letter following the RAI responses.

ENVIRONMENTAL IMPACT STATEMENT

11. SOCIOECONOMIC EFFECTS

11-2 For the following items, include a discussion of significant differences, if any, between members who live on the reservation and those who live in communities off the reservation.

Describe the education, income levels, location, health, etc. of the Skull Valley Band, including any characteristics that would distinguish the Band members from the general population, including the following:

a. Explain the extent to which Band members who live off the reservation return to the reservation for regular visits, cultural and/or religious activities, or have other connections to the reservation land.

b. Explain whether those members living off the reservation would be likely to move to the reservation if there were equivalent or other economic opportunities on the reservation or whether residents of the reservation would be likely to leave if the construction of the facility is approved. This information is needed to ascertain whether lease payments would be likely to result in inducing people to move onto the reservation or to leave it.

c. Provide any available information on criteria or restrictions that the Band applies in deciding whether to allow persons to reside and/or operate a business on the reservation.

To perform its independent evaluation as required by 10 CFR 51.41, the staff needs specific information about the socioeconomic conditions of the Skull Valley Band of Goshutes.

RESPONSE

This RAI is addressed by Leon Bear, Chairman, Executive Committee, Skull Valley Band of Goshute in the enclosed letter following the RAI responses.

ENVIRONMENTAL IMPACT STATEMENT

11. SOCIOECONOMIC EFFECTS

11-3 Provide sufficient information to support the EIS assessment of impacts on local schools from the construction and operation workforce moving into the area.

a. Describe the school systems (school by school) for Tooele County and for the English Village on Dugway Proving Grounds and any plans or need for future expansion to meet projected enrollments.

b. Discuss which schools are likely to be affected by in-movers due to construction and operating labor force-for instance, the distribution of school children of other workers in the area (e.g., the rocket testing facility), and describe the nature and extent of those impacts.

RESPONSE

a. The Tooele District contains 18 public schools, 8 of which are located in Tooele, and 2 of which are located in Dugway as follows:

School Name	Grades	Town
Dugway High	07-12	Dugway
Dugway School	KG-06	Dugway
East School	KG-06	Tooele
Harris School	KG-06	Tooele
Oquirrh Hills School	UG	Tooele
Tooele Central School	KG-06	Tooele
Tooele High	09-12	Tooele
Tooele Jr. High	07-08	Tooele
Tooele Valley High	09-12	Tooele
West School	KG-06	Tooele

PFS is not aware of any Tooele County plans for future school expansion.

b. The U.S. census counted approximately 560 laborers employed in the construction trades in Tooele County in 1996. (U.S. Census, 1996 County Business Patterns for Tooele, UT). In Salt Lake County, almost 26,000 laborers were employed in the construction trades in the same year. (U.S. Census, 1996 County Business Patterns for Salt Lake, UT).

As presented in PFSF ER Section 4.1.1, 'Effects on Geography, Land Use, and Demography', the highest number of workers during peak construction activity is estimated at only 130 persons (the workforce is less during operation). This number of workers is very small compared

with the available resources representing less than ½ percent of the total skilled construction labor pool that exists within Tooele County and the Salt Lake City metropolitan area. Therefore the existing area labor pool is expected to be able to meet the construction needs of the PFS construction work without requiring an influx of new workers specifically for this project. Consequently, no significant in-migration of families or project-induced growth that would cause the need for school expansion is anticipated.

ENVIRONMENTAL IMPACT STATEMENT

11. SOCIOECONOMIC EFFECTS

11-4 Provide recent traffic counts for routes to and from the proposed facility.

The Average Daily Traffic Count for Skull Valley Road is given in ER (page 2.8-1). Additional traffic counts or other usage data should be provided for roads that could be used during constructions or operation and commuting and trucking to and from the PFSF site, Including I-80, SR 199, SR 138, SR 112, and SR 36.

RESPONSE

The following table provides traffic counts for other roads in the area.

Route	Location of Count	Average Daily Traffic (1997)
I-80	Rowley Interchange (at Skull Valley Road)	8,495
I-80	Delle Interchange (7 miles west of Skull Valley Road)	8,000
I-80	Stansbury Interchange (7 miles east of Skull Valley Road)	9,014
SR 199	Dugway Proving Ground East Gate	725
SR 199	Terra	915
SR 138	Junction with I-80 at Stansbury	1,260
SR 112	Junction with SR 138	6,245
SR 36	Junction with SR 199	1,715

Source: Ron Phillips, Utah Department of Transportation, Data Analysis Section

ENVIRONMENTAL IMPACT STATEMENT

11. SOCIOECONOMIC EFFECTS

11-5 Discuss provisions, if any, that would be implemented under the truck transport option to manage traffic flow and minimize risk of accidents.

The effects of construction and operation on traffic are addressed in ER Section 4.1.7. However, there is no discussion of the special problems posed by the truck transport option involving the possible use of 150-foot-long or other wide-turn radius vehicles that might be used to transport casks. Assess the potential traffic problems posed by truck transport of spent fuel to and from the facility.

RESPONSE

The answer to this question was included in PFSF ER Section 4.3.7 in Rev. 1. Subject portions are noted as follows:

Effects of Noise and Traffic

"It is expected that 2-4 round trips per week will be required for the heavy haul transportation of casks along the 26-mile segment of the existing ITP frontage and Skull Valley Roads.

As discussed in section 4.1.7.1, the current level of service (LOS) on Skull Valley Road is level A. The heavy haul tractor/trailers will be moving at a slower rate of speed (estimated at 20 mph) than the posted limit of 55 miles per hour, requiring other traffic to reduce travel speed or make additional passing maneuvers. Due to the infrequent number of round trips per week (2-4) and the ample opportunity for passing maneuvers afforded along Skull Valley Road, the heavy haul transportation of casks along the 26-mile segment of the existing ITP frontage and Skull Valley Roads will have minimal impact on traffic and will not lower the LOS. There will be no affect on emergency response time for public safety vehicles."

In addition, the tractor/trailer will have a flashing warning beacon and be escorted by a lead and/or trail escort vehicle(s). The state oversize/overweight load permit issued for the transport may also require other provisions. A discussion of the heavy haul trailers (length, width, and turning radius) is provided in the response to EIS RAI, question 1-2.

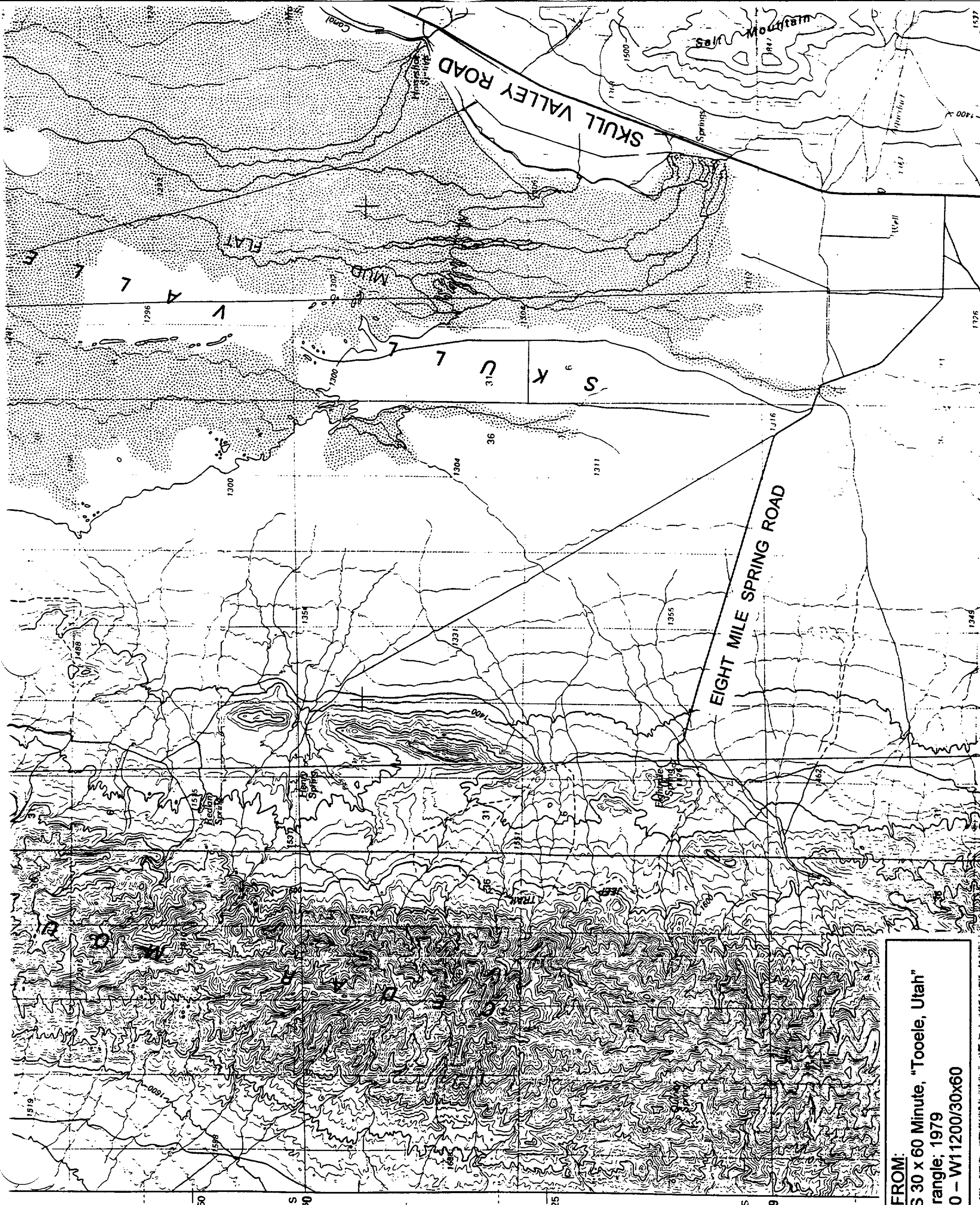
ENVIRONMENTAL IMPACT STATEMENT

11. SOCIOECONOMIC EFFECTS

11-6. Provide a map depicting the location of Eight Mile Spring Road, mentioned on ER page 4.4-8. Because this road is said to be used by many people, its location is important in assessing the potential traffic impacts of the proposed project.

RESPONSE

Eight Mile Springs Road is shown on the attached map photocopied from USGS 30 x 60 minute Quadrangle, "Tooele, Utah". It is also shown on USGS 7.5 minute Quadrangles titled, "Salt Mountain, Hastings Pass, and Quincy Spring". The intersection of Eight Mile Spring Road and Skull Valley Road is located on Quadrangle "Salt Mountain" at T3S/R8W, Section 21.



CUT FROM:
USGS 30 x 60 Minute, "Tooele, Utah"
Quadrangle, 1979
N4030 – W11200/30x60

ENVIRONMENTAL IMPACT STATEMENT

11. SOCIOECONOMIC EFFECTS

11-7 Assess the social and economic impacts to the residents of Skull Valley who are not Band members.

a. Describe and quantify the employment of (1) Band members and (2) non-Band members, in ranching and agricultural activities, at the Alliant Techsystems static rocket engine test facility, the Pony Express store, and any other places of employment. Report the extent to which people employed in these and other enterprises in Skull Valley live in the valley or commute from other communities.

b. Report the extent to which residents of Skull Valley are employed in other communities.

RESPONSE

a. This RAI is addressed by Leon Bear, Chairman, Executive Committee, Skull Valley Band of Goshute in the enclosed letter following the RAI responses.

b. Statistics are not available to determine the extent to which residents of Skull Valley are employed in other communities. Census figures for Census Tract 1306, which includes Skull Valley as well as Dugway-Wendover Division, identified a total of 3668 residents, 1020 of whom "work in the place of residence" (1990 US Census). Assuming that most of these 1020 workers are family heads of household, the balance of workers employee outside of their communities would be very small.

ENVIRONMENTAL IMPACT STATEMENT

12. CULTURAL RESOURCES

12-1 Provide any documentation, including copies of communications (formal or informal), regarding cultural resources that have occurred between the applicant and the Utah State Historic Preservation Office and/or the Skull Valley Band of Goshutes, that was used to reach the conclusion in the ER that "no impact on known historic, architectural, or cultural features will occur as a result of facility construction."

Sufficient documentation and/or consultation, pursuant to Section 106 of the National Historic Preservation Act, must be provided for the staff to determine whether all areas of potential effect (e.g., the project site, the Skull Valley road right-of-way that may be affected by road widening, the Intermodal Transfer Point at Timpie, and the rail spur from Low to the site) have been addressed.

RESPONSE

SHPO correspondence concerning this project is included with the Attachment package sent under separate cover (Attachment EIS RAI 12-1).

ENVIRONMENTAL IMPACT STATEMENT

12. CULTURAL RESOURCES

12-2 a. Provide information contained in existing Class I, II, or III survey reports or generated from new site surveys pertaining to prehistoric and historic occupations and uses that have occurred in the area. Include information that identifies what prehistoric or historic sites and traditional properties remain from those occupations and uses.

b. Provide copies of any cultural resource surveys (Class I, II, or III) that have been made of the areas of potential effect (including the rail line and Intermodal Transfer Point), and any areas within 10 miles of the site.

c. Provide the results of the Class III surveys for historic properties and traditional cultural properties.

If these surveys have not been completed, provide a schedule for completion of these surveys. All surveys should be completed in accordance with the guidelines of the Skull Valley Band of Goshutes, the Utah State Historic Preservation Office, BIA, BLM, and, to the extent applicable, the National Park Service (NPS Cultural Resources Bulletin 38).

d. Clarify that a Class III survey will be conducted for the Low corridor rail spur.

RESPONSE

a. A Class I survey was conducted for two study areas: 1) A ¼ mile radius around the intermodal transfer point; and 2) a ½ mile wide corridor centered on the proposed Low corridor railroad line. The survey included a comprehensive file search at the Utah Division of State History (UDSH), Antiquities Section, as well as an IMACS computer database search that covered areas in the Cedar Range, its benches, and the flats in Skull Valley.

The file search conducted at the UDSH identified no previously recorded sites in either of the two study areas and only 22 sites were found within the larger geographic area included in the IMACS search. None of the sites occur below 4690 feet above sea level and most are located at or near springs or along drainages. No sites were located in the intermodal transfer point study area. One site, 42To731, lies within ¼ mile of the

proposed rail line, but will not be impacted by construction or operation as it lies on the northern side of Interstate 80.

In addition to the archaeological sites, the Class I inventory identified two historic trails, the Hastings Trail and the Donner-Reed trail, that cross the proposed railroad corridor. According to the Class I report, while both trails are significant and eligible for inclusion in the NRHP, it is likely, given its proximity to Interstate 80, that the Hastings Trail has already been severely impacted in the area of the railroad corridor. The Donner-Reed Trail, however, may be less disturbed in the area where it is crossed by the proposed corridor.

Given that all of the archaeological sites occurred at higher elevations and no springs or permanent water sources are located within the study areas, the Class I Survey report concludes that there is only a low probability of encountering archaeological or historical sites in the proposed railroad corridor or intermodal transfer point. Given the low site potential, the archaeological consultants did not feel that a Class II survey would be beneficial. They do recommend, however, that a Class III inventory should be completed prior to construction, in all areas that will be affected by ground-disturbing activities. The BLM, Salt Lake District Office concurred with these recommendations in a letter to Stone and Webster dated May 8, 1998.

b. Only the Class I survey is complete at this time. A copy of the Class I survey is included with the Attachment package sent under separate cover (Attachment EIS RAI 12-2 b).

c. The Class III survey has not yet been performed, nor has it been scheduled. It will be completed, however, prior to any construction activities, in consultation with the Utah SHPO and the Skull Valley Band of Goshutes, and in accordance with all applicable laws and regulations.

d. See response to 12-2 (c) above.

12. CULTURAL RESOURCES

12-3 Assess the effects of the proposed PFSF construction and operation on traditional Skull Valley Goshute practices.

a. Describe these traditional lifestyles and practices and the importance in maintaining these lifestyles for the Skull Valley Band.

b. Provide evidence that known traditional practitioners (or the traditional leaders of the Skull Valley Band) have been consulted to acquire this information.

The information should include types of plants that are used and the traditional gathering sites for these plants; animals that are hunted and the locations of traditional hunting sites; and ceremonies that are performed and the locations of traditional ceremonial sites. Other traditional practices (and the areas in which they occur) also should be identified.

RESPONSE

This RAI is addressed by Leon Bear, Chairman, Executive Committee, Skull Valley Band of Goshute in the enclosed letter.

ENVIRONMENTAL IMPACT STATEMENT

13. ENVIRONMENTAL JUSTICE

13-1 a. Describe the leadership and governance of the Skull Valley Band of Goshute Indians.

b. Explain how the reservation of the Skull Valley Band of Goshute Indians meets the screening factors described in the ER of the criteria for selection of candidate sites of a "willing jurisdiction," and "public acceptability." To the extent applicable, provide the response of the Skull Valley Band to the Site Selection Questionnaire (ER Table 8.1-2).

RESPONSE

This RAI is addressed by Leon Bear, Chairman, Executive Committee, Skull Valley Band of Goshute in the enclosed letter.

ENVIRONMENTAL IMPACT STATEMENT

13. ENVIRONMENTAL JUSTICE

13-2 a. Describe the frequency with which the activities discussed in the RAI item 12-3 occur and the extent to which men, women, and/or children participate in them.

b. Describe consumption rates of locally harvested plants and animals by Skull Valley Goshute men, women, and children.

Provide sufficient information to determine whether the proposed action in conjunction with traditional activities and/or food consumption patterns could lead to adverse health impacts to the residents of the reservation and other Skull Valley Band members.

RESPONSE

This RAI is addressed by Leon Bear, Chairman, Executive Committee, Skull Valley Band of Goshute in the enclosed letter.

ENVIRONMENTAL IMPACT STATEMENT

13. ENVIRONMENTAL JUSTICE

13-3 Provide a copy of Land View III (Utah state disk).

RESPONSE

In the meeting held in the offices of the Nuclear Regulatory Commission in Rockville, Maryland January 6 and 7, 1999, it was agreed that PFS does not need to supply the requested copy of Land View III.

ENVIRONMENTAL IMPACT STATEMENT

14. AESTHETIC RESOURCES

14-1 a. Provide sketches or artist renderings of the facility at full development (i.e., 4000 casks) in the context of the site and its background, the railroad spur from Low to the reservation, and the truck routes from the UP Railroad.

These representations should include any associated development (e.g., railroad tracks, transfer point facilities, utility lines and poles, light poles, renderings of both Hi-Star and TranStor casks, the effects of site illumination, and access routes, as appropriate).

b. Provide photographs of the site from vantage points where people are most likely to view the site and the proposed facility (e.g., the point where Skull Valley Road meets the site access road, the nearest point on Skull Valley Road where the facility would be in full view, locations in the Skull Valley Indian Reservation village, the top of Deseret Peak, a representative location in the Cedar Mountains, and nearby BLM land).

RESPONSE

a.& b. Artist's concepts of the PFSF in Skull Valley, the Low Corridor Rail Line, and the Intermodal Transfer Facility at full development are presented on Figures 1 through 15 in Attachment 14-1. Attachment 14-1 can be located in the Attachment package provided under a separate cover.

The various vantage points, locations and elevations, selected for these figures provide the requested perspectives for viewing the PFSF from Skull Valley Road, the top of Deseret Peak, or a representative location in the Cedar Mountains, and nearby BLM land, in addition to various road and rail points view from rail siding to the PFSF.

Below is a list of the figures, with appropriate names:

Figure 1 - Aerial view, Low Corridor Rail Siding.

Figure 2 - Looking west, Low Corridor Rail Siding.

Figure 3 - Looking east, Low Corridor Rail Siding and Rail Line.

Figure 4 - Looking northwest, Low Corridor Rail Line along Cedar Mountains.

Figure 5 - Looking south, route of Low Corridor Rail Line through Skull Valley.

Figure 6 -	General orientation of Skull Valley and the Goshute Indian Reservation.
Figure 7 -	Looking south, PFSF facility, Access Road and Rail Line.
Figure 8 -	Looking east, PFSF site, Reservation boundaries.
Figure 9 -	Looking north, PFSF facility, Rail Line and Access Road.
Figure 10 -	Looking west, aerial view showing Skull Valley Road and PFSF
Figure 11 -	Looking southwest, aerial view showing PFSF site with Access Road and Rail Line.
Figure 12 -	Ground level daytime view from Skull Valley Road showing PFSF facility 2.5 miles to the west.
Figure 13 -	Ground level nighttime view from Skull Valley Road showing PFSF illuminated facility 2.5 miles to the west.
Figure 14 -	Artist's concept of operational PFSF facility on the Skull Valley Goshute Reservation.
Figure 15 -	Looking east, Intermodal Transfer facility.

ENVIRONMENTAL IMPACT STATEMENT

14. AESTHETIC RESOURCES

14-2 Analyze the visual impacts of the facility at night, identifying vantage points where the light from the site may be seen, the likelihood that people would be observing the site from those vantage points at night, and an assessment of the significance of such visual impacts on people at those vantage points.

Because the facility would be strongly lighted in an otherwise unlighted area, nighttime views from surrounding viewpoints may be more affected than daylight views. These are pertinent considerations for the EIS aesthetic analysis.

RESPONSE

As stated in ER Chapter 4, the primary visual impact of the facility will occur to vehicle occupants passing by the facility on the Skull Valley Road approximately 1.5 miles to the east. Figure 13, included (as Attachment 14-1 a) in the Attachment package provided under a separate cover, shows how the facility might appear at night as viewed from the Skull Valley Road. Direct glare from the facility itself is screened from view by existing terrain, at road level, at points 3.5 miles south of the main entrance road and 1.5 miles north of the main entrance road, however some skyglow (light scattered by particles in the atmosphere around the facility) will be evident. Skyglow is generally lower in areas with low humidity and fewer airborne pollutants, conditions which are usually present at the PFSF.

Nearby Visual Impacts

Lighting design features of the facility are described in detail in response 14-3. Lighting fixtures were selected which minimize horizontal and above horizontal glare from the lighting elements. Shading and reflector techniques are employed to minimize wasted light and lighting elements (high pressure sodium) are selected to achieve lighting efficiencies. Because the Skull Valley Road grade is approximately 130 feet above the facility grade, and 120 foot lighting poles are utilized for facility lighting, direct glare from the lighting fixtures is eliminated. Passersby would view reflected light from the facility buildings, concrete pads and storage casks. Reflected light is much more diffuse than direct light and less annoying to people, especially over the long distances involved (greater than 2.5. miles).

Vehicular traffic on the Skull Valley Road is much less at night than during the daytime hours. Most normal traffic on the road is from local residents commuting to/from work, and U.S. Army/Dugway Proving Ground day shift workers commuting to/from from Interstate-80 (ref. PFSF ER Section 4.2.2). As a result of the facility design features described and the low nighttime traffic expected in the immediate area of the facility, minimal visual impact is expected.

Distant Visual Impacts

The facility will be apparent at night from various distant vantage points. Four specific areas will be addressed: The Skull Valley Band of Goshute village, the Deseret Peak recreation area in the Stansbury Mountains, the Cedar Mountains, and from Interstate-80 at the north end of Skull Valley.

The facility will be located approximately 3.5 miles W-NW of the Skull Valley Band of Goshute Indian village. Most of the tribal households are located in a 1 block cluster around the Tribal Community Center. The facility would be readily seen by village residents, but because of the distance and the limited height of the facility structures, would not present an obtrusive profile. The grade elevation of the village is approximately 250 feet higher than the facility grade, and, as in the case of viewers on Skull Valley Road, village residents would not see direct glare from the facility lighting fixtures. Skyglow at a distance of 3.5 miles would not be expected to interfere with any nighttime activities in the village, such as stargazing, etc.

The Deseret Peak Wilderness is located within the Stansbury Mountain Unit of the Wasatch-Cache National Forest, approximately 9 miles east of the facility. Annual recreation visits to the Deseret Peak Wilderness is estimated at 18,000 (see response to EIS RAI, question 9-1). Elevations in the Deseret Peak Wilderness range from 900 to 6,500 feet above the facility grade. Access to the area is from the eastern side of the Stansbury Mountains. Overnight camping is limited to less than groups of ten and to less than 3 days. No permanent camping facilities are located on the western side of the Stansbury Mountain ridge line, and it is unlikely that any individuals would hike to the top of Deseret Peak during nighttime hours due to the hostile environment and for safety reasons. Nighttime views of the facility from this area would therefore be extremely infrequent, and, due to the distance and elevations involved, not overly obtrusive.

Recreational visits to the Cedar Mountains, approximately 7 miles west of the facility, have been estimated to be less than 3,000 visitor days. Most of those trips are by off-highway vehicles, which typically travel during daylight hours. Elevations in the Cedar Mountains area range from 300 to 2,400 feet above the facility grade. While some occasional overnight camping in the Cedar Mountains does occur, there are no established camping areas in the region within view of the facility. Due to the infrequent use of the area after dark as well as the

distance and elevations involved, the nighttime views of the facility are not expected to be obtrusive.

Direct views of the facility from Interstate-80 at the north end of Skull Valley are generally shielded by topographical features and the low elevation of the freeway as compared to the site. Some skyglow may be faintly visible in the distance on extremely clear nights, but nearby lighted structures (such as Akzo Salt and facilities at Delle) and homesteads will dominate the landscape. Given the great distances involved and the lighting features employed at the facility, nighttime views of the facility are not expected to be obtrusive.

ENVIRONMENTAL IMPACT STATEMENT

14. AESTHETIC RESOURCES

14-3 Describe, in detail, the lighting system that would be installed and the rationale behind its design.

The ER indicates that lighting for the restricted area (RA) of the facility would be provided by 1000-watt high-pressure sodium vapor lamps on 120-foot tall light poles (ER, Section 4.2-8). Indicate whether any shades will be placed on the lights or whether the lights will be directional so as to reduce their visibility from off-site locations. Provide a calculation of the luminous flux (lumens/m^2) of the exterior surfaces of the facility that result from this artificial lighting which may be visible from pertinent off-site locations.

RESPONSE

The following describes the purpose of the PFSF lighting system and the lighting levels (lumens/m^2) away from the facility.

The design objectives of the lighting system are to provide sufficient lighting for:

- Security of the site.
- Safety of personnel and canisters.
- CCTV to distinguish shapes, objects and movement.
- Human eye observation.
- Lighting coverage of entire site per 10 CFR 73.51 requirements.
- Minimize shadows around and under canisters.
- Lighting of perimeter, double security fences and the area immediately outside of this fence. These areas are the most critical for CCTV observation.

Note: Poles for site lighting cannot be located in close proximity to security fences thus eliminating a means to breach the security of the site. This results in the lighting for the perimeter, double security fences and the area immediately outside of this fence being more visible since they are aimed out to and past the Restricted Area perimeter fence. This is minimized as much as possible during final, fine-tuning of the lighting installation.

<u>Lighting Design:</u>

The facility lighting system will consist of 130' mast lighting with 1000W HPS symmetrical patterned fixtures. These fixtures were chosen for efficiency and

economy (they provide the greatest light distribution with the least number of fixtures).

Additional perimeter fence lighting is provided by 1000W and 400W HPS floodlights (with asymmetrical patterns) mounted at 130' for the 1000W fixtures and 40' for the 400W fixtures.

In three locations, 40' poles with a single luminare were placed to provide lighting for roadway and parking facilities. These are 400W HPS fixtures and are aimed low in an effort to eliminate, horizontal glare (brightness) from the fixture.

The lighting system uses the Holophane "Dark Skies" luminaire with "ELB" Low Brightness reflector, which further reduces glare or brightness up to 50% over non-ELB fixtures. These fixtures reduce any brightness or glare above the horizontal plane at the light fixture thereby minimizing their visibility from off-site locations. The lighting system will maintain a minimum lighting distribution of 0.2 foot-candles throughout the Restricted Area (RA).

A calculation (using the "Dark Skies" lighting fixtures) has been prepared to determine the amount of light that extends beyond the RA from both direct and reflected sources. The following assumptions were used in the calculation:

- All storage casks are 19'-3" tall x 11'-6" diameter with exterior surfaces painted white.
- The storage casks will be stored on concrete surfaces (light gray in color).
- The area within the RA fence boundary, not covered by concrete is gravel (light in color).
- The area between the inner and outer RA fences will be asphalt pavement (generally dark in color).

Other than very clear nights (devoid of any suspended, airborne particulate, fog, and low clouds), an illuminated site will be visible from great distances (possibly 10-20 miles). The visibility is directly proportional to the topography of the surrounding land and density of any airborne particulate, fog or low hanging clouds. In any of these cases, reflected light will be diffused and scattered in all directions, similar to a single MV or HPS yard light that can be seen for many miles depending on terrain.

The light (lumen) distributions were extended to show the calculated horizontal and vertical foot-candles between RA fence and 1000-ft beyond.

The following summarizes the results of the calculation utilizing the Holophane "Dark Skies" Luminaire with "ELB" reflector, 130 ft high mast poles with 1000W HPS fixtures, and 40' poles with 400W HPS fixtures providing supplemental lighting along the south fence line:

- Horizontal foot-candle values (see attached sketch)

  No light extends beyond the 1000 ft line on the west, north and 80% of the east boundaries. The south boundary shows 0.010 foot-candle (0.10764 lumens/ m^2) at 1000 ft and a short span on the east boundary, adjacent to the buildings, parking area, and access road shows 0.010 footcandle (0.10764 lumens/ m^2) at 1000 ft.

  At 500 ft, the north, west, and about 50% of the east boundaries show 0.010 foot-candle (0.10764 lumens/ m^2). The south boundary shows 0.03 foot-candles (0.32292 lumens/ m^2).

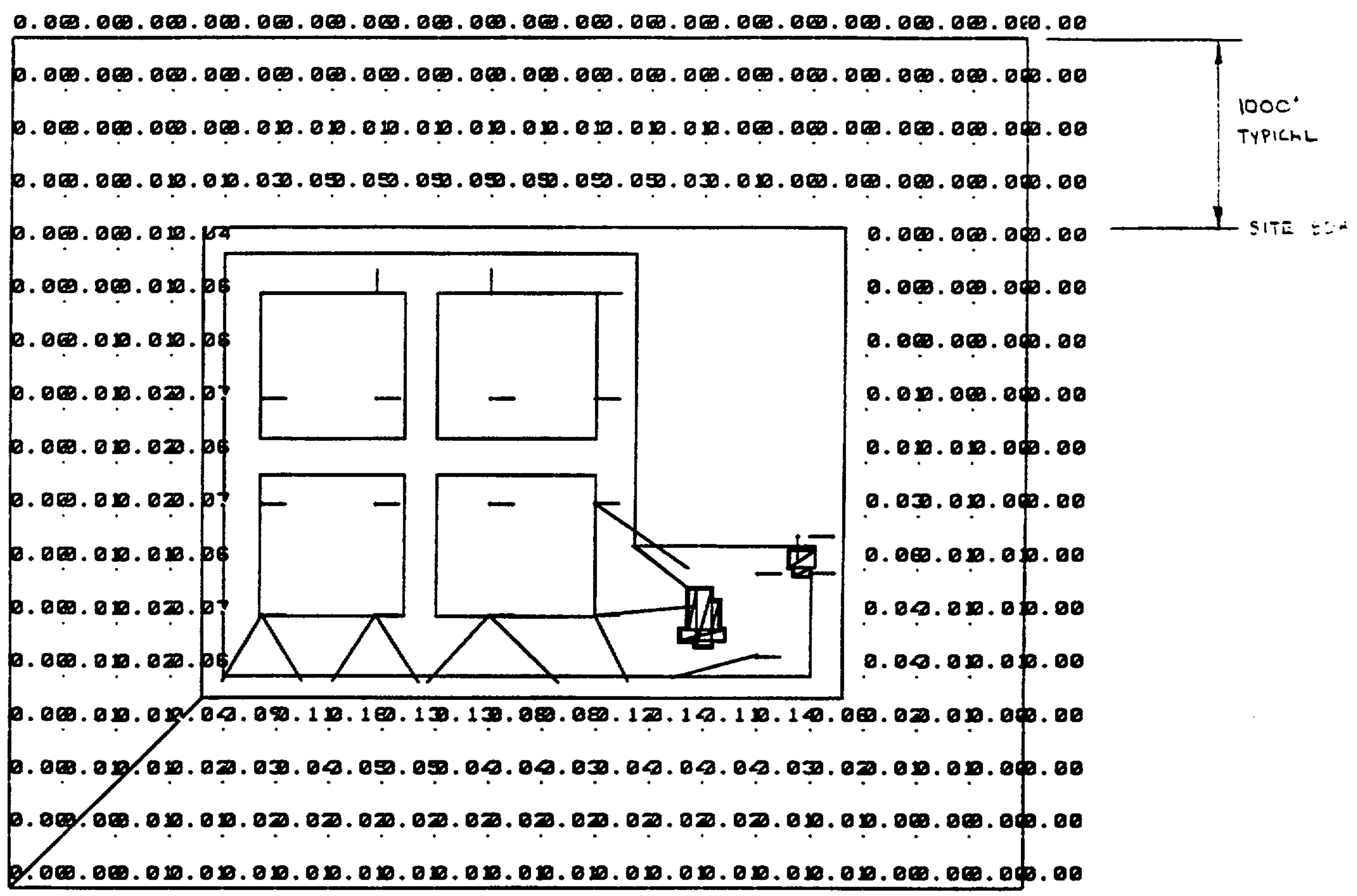
  At 200 ft, the north boundary shows 0.05 foot-candle (0.5382 lumens/ m^2), the west boundary 0.06 foot-candle (0.64584 lumens/ m^2), the east boundary 0.01 (0.10764 lumens/ m^2) to 0.04 foot-candle (0.43056 lumens/ m^2) and the south boundary 0.04 (0.43056 lumens/ m^2) to 0.14 foot-candle (1.50696 lumens/ m^2).

- Vertical foot-candle values for all boundary areas out to 1000 ft are 0.00 to 0.01 (0.10764 lumens/ m^2).

CALA/Pro
Holophane Corporation

Page: 1

Project: Private Fuel Storage Facility-HPS-ELB
Location: Utah
Section:
Date: January 15, 1999
Run: 28487



AREA 2 COMMENT: Spill Light Out to 1000' from sight

US-Eng

Avg:0.02 Min:0.00 Max:0.16 Avg/Min:96.47 Max/Min:876.82

CJ8

TOTAL Ill. LIGHTMETER:Perpendicular AREA:2 PTS O.C.:250.00

UI:7

LIGHT DISTRIBUTIONS

EIS RAI, Question 14-3

ENVIRONMENTAL IMPACT STATEMENT

15. COST/BENEFIT ANALYSIS

15-1 Provide detailed cost components and assumptions that have gone into the ER's cost/benefit assessment and affect the project's economic analysis.

The cost information and assumptions should include a breakdown of costs and avoided costs by current and/or alternative waste storage sites. They should also identify costs and avoided costs that have been included in the cost/benefit analysis in sufficient detail that the reasonableness of these costs and avoided costs can be determined.

RESPONSE

The basis for the detailed cost components and assumptions that went into the ER's cost/benefit assessment are contained in the PFS Business Plan and the ERI report, 'Utility At-Reactor Spent Fuel Storage Costs for the Private Fuel Storage Facility Cost-Benefit Analysis'. Both of these documents were submitted to the NRC (Shaw Pittman letter to Mark Delligatti, dated 12/18/98).

These documents and responses to RAIs 6-3 / 15-2 provide the available cost information associate with current and alternative waste storage sites to support the project's economic analysis.

ENVIRONMENTAL IMPACT STATEMENT

15. COST/BENEFIT ANALYSIS

15-2 a. Provide information on any reasonable cost-effective courses of action that PFS consortium members would pursue if they could not store their existing and future waste at the PFSF.

This information should include the reasonable individual costs and environmental effects that would likely result and the upper and lower range of potential effects, to illuminate the uncertainties associated with the analyses.

b. In the event that the projected costs for non-member utilities which are expected to ship spent fuel to the PFSF site differ significantly from those of consortium members, provide that information.

RESPONSE

a. PFS members have and are pursuing at-reactor spent fuel storage technologies to provide spent fuel storage capacity until the PFS ISFSI is available as described in the letter from PFS to NRC, dated May 18, 1998.

PFS members have reracked spent fuel storage pools and some have implemented dry storage or have plans to implement dry storage at reactor sites if needed, as discussed in the above letter. However, at least three of the PFS member reactors have limited spent fuel storage capacity that cannot be expanded due to state political constraints (Prairie Island 1 and 2) or may not be able to be expanded using existing dry storage technologies due to site constraints (Indian Point 2). In addition, PFS members own three shutdown nuclear power plants (Indian Point 1, LaCrosse, and San Onofre 1) which will have to store spent fuel at the reactor sites for an estimated 30 to 40 years if spent fuel cannot be shipped off-site until 2015 or later.

The attached table provides an estimate of the projected additional storage requirements at PFS member reactor sites and the estimated post-shutdown storage time required assuming a 2002 PFS ISFSI and the No-Action alternative, a 2015 repository. Since it is difficult to project future at-reactor storage costs, a range of costs for dry storage are provided from $91,000 per MTU to $162,000 per MTU.[i] The $91,000 per MTU estimate is considered a low range and actual costs are projected to be higher than this estimate for individual utilities. A range of annual O&M costs for post-shutdown spent fuel storage are also provided ranging from $3 million per year to $8 million per year.[1]

Under the 2002 PFS ISFSI alternative, total at-reactor storage costs for PFS members are estimated to range from $524 million to $1.4 billion. Under the 2015 No Action Alternative, total at-reactor storage costs for PFS members are estimated to range from $1.0 billion to $2.5 billion. This represents a potential savings in at-reactor storage costs for PFS members of $523 million to $1.1 billion. It should be noted that one of the most important aspects of the availability of the PFS ISFSI in 2002 is the reduced post-shutdown storage period for spent fuel at reactor sites. This is particularly significant for those reactors that are currently shutdown.

Fourteen of the PFS member reactors at nine sites are projected to require additional storage capacity if the PFS ISFSI is not available and spent fuel acceptance by DOE does not start until 2015 at a repository. If the PFS ISFSI is available in 2002, only five (5) reactors at three (3) sites (Prairie Island, Oyster Creek, and Hatch) are projected to require additional storage capacity. Of these three sites, dry storage capacity has already been constructed or is under construction. Thus no additional dry storage facilities would need to be constructed beyond the three currently in operation or under construction if the PFS ISFSI is available by 2002.

The additional six at-reactor dry storage facilities that would have to be constructed under the No Action Alternative would result in site-specific impacts associated with construction and operation additional storage capacity. PFS members have not specifically quantified the impacts associated with the No Action Alternative. These impacts would include increased radiological doses to workers and the public at all nine sites due to increased dry storage at both the existing facilities and the facilities added under the No Action Alternative, impacts on natural resources associated with construction of additional facilities, etc.

The estimated range of unit costs for at-reactor storage and post-shutdown spent fuel storage are consistent with recent market prices for dry storage and current estimates of annual O&M costs. These estimates are higher than the estimated unit costs used in the analysis, "Utility At-Reactor Spent Fuel Storage Costs for the Private Fuel Storage Facility Cost Benefit Analysis", ERI-2025-9701, prepared by Energy Resources International, Inc., December 1997, due to changes in dry storage market prices.

In testimony before the House Energy and Power Subcommittee on February 10, 1999, NRC Chairman Shirley Ann Jackson stated, "We believe that centralized interim storage of spent fuel in dry cask storage systems offers several beneficial features." Chairman Jackson cited benefits such as more centralized inspection and surveillance by federal regulators, and operational and programmatic efficiency.[ii]

b. The anticipated costs for non-member utilities is 25% greater than that for a member utility.

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[1] Supko, Eileen M., Energy Resources International, Inc., *How Spent Nuclear Fuel and Low- and High-Level Waste Will Be Disposed and At What Price,* Presented at the INFOCAST Conference, Nuclear Power Plants, Coming to Grips with Your License Expiration Options – Sell, Decommission, or Renew Your License, January 25-27, 1999, Washington, D.C.

[2] "*NRC's Jackson Endorses Interim Nuclear Waste Storage*", Dow Jones Newswire, February 10, 1999

EIS RAI 15-2 (a) TABLE

Capacity: 12,000 MTU, Receipt/Shipping Rate 1,200 MTU per year, 20 year license

	No ISF, 2015 Repository							
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Estimated Range of Additional Storage Costs ($Millions)		Estimated Range of Post Shutdown Storage Costs ($ Millions)		Estimated Range of Total Storage Costs ($ Millions)	
			$91,000/MTU	$162,000/MTU	$3 M/year/site	$8M/year/site		
CLINTON 1	275	9	25.0	44.6	27.0	72	52.0	116.6
COOK 1 & 2	189	16	17.2	30.6	48.0	128	65.2	158.6
FARLEY 1 & 2	118	13	10.7	19.1	39.0	104	49.7	123.1
HATCH 1 & 2	735	16	66.9	119.1	48.0	128	114.9	247.1
INDIAN PT 1	0	41	0.0	0.0	123.0	328	123.0	328.0
INDIAN PT 2	133	18	12.1	21.5	54.0	144	66.1	165.5
LACROSSE	0	32	0.0	0.0	96.0	256	96.0	256.0
MONTICELLO	0	19	0.0	0.0	57.0	152	57.0	152.0
OYSTER CRK 1	60	25	5.5	9.7	75.0	200	80.5	209.7
PRAIRIE ISL 1 & 2	465	18	42.3	75.3	54.0	144	96.3	219.3
SAN ONOFRE 1	0	30	0.0	0.0	90.0	240	90.0	240.0
SAN ONOFRE 2& 3	398	13	36.2	64.5	39.0	104	75.2	168.5
VOGTLE 1 & 2	456	7	41.5	73.9	21.0	56	62.5	129.9
TOTAL	2829		257.4	458.3	771	2056	1028.4	2514.3

	2002 ISF, 2015 Repository							
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Estimated Range of Additional Storage Costs ($Millions)		Estimated Range of Post Shutdown Storage Costs ($ Millions)		Estimated Range of Total Storage Costs ($ Millions)	
			$91,000/MTU	$162,000/MTU	$3 M/year/site	$8M/year/site		
CLINTON 1	0	10	0.0	0.0	30.0	80	30.0	80.0
COOK 1 & 2	0	10	0.0	0.0	30.0	80	30.0	80.0
FARLEY 1 & 2	0	10	0.0	0.0	30.0	80	30.0	80.0
HATCH 1 & 2	193	10	17.6	31.3	30.0	80	47.6	111.3
INDIAN PT 1	0	28	0.0	0.0	84.0	224	84.0	224.0
INDIAN PT 2	0	18	0.0	0.0	54.0	144	54.0	144.0
LACROSSE	0	15	0.0	0.0	45.0	120	45.0	120.0
MONTICELLO	0	10	0.0	0.0	30.0	80	30.0	80.0
OYSTER CRK 1	60	10	5.5	9.7	30.0	80	35.5	89.7
PRAIRIE ISL 1 & 2	198	10	18.0	32.1	30.0	80	48.0	112.1
SAN ONOFRE 1	0	10	0.0	0.0	30.0	80	30.0	80.0
SAN ONOFRE 2& 3	0	10	0.0	0.0	30.0	80	30.0	80.0
VOGTLE 1 & 2	0	10	0.0	0.0	30.0	80	30.0	80.0
TOTAL	451		41.0	73.1	483	1288	524.0	1361.1

ENVIRONMENTAL IMPACT STATEMENT

15. COST/BENEFIT ANALYSIS

15-3 Compare the costs for the proposed site with the costs of building and operating a similar facility at an alternative location. The comparison should include transportation costs and the costs of leasing land for the facility.

RESPONSE

The alternative site considered (Fremont County site – see response to RAI 6-2) generated similar costs for construction.

Additional information is provided in the proprietary response for this RAI.

ENVIRONMENTAL IMPACT STATEMENT

15. COST / BENEFIT ANALYSIS

15-4 Provide information on the amount of income generated for the Skull Valley Band and/or its members by existing economic activities in Skull Valley, and the extent to which such income-producing activities may be lost if the PFS application is approved.

RESPONSE

This RAI is addressed by Leon Bear, Chairman, Executive Committee, Skull Valley Band of Goshute in the enclosed letter.

ENVIRONMENTAL IMPACT STATEMENT

15. COST/BENEFIT ANALYSIS

15-5 a. Provide details on what economic development projects, if any, could result from development of the rail spur.

b. Clarify whether the rail spur would be used only by the PFSF or whether it would also be used by other entities.

In the third paragraph on page 7.2-3 of the ER, indirect benefits from the construction of the rail spur are mentioned, including further Band economic development projects.

RESPONSE

a. The Band leadership, together with members of the Skull Valley Band, may pursue further economic development projects, that are dependent on rail shipping. These projects could include a wide variety of activities, such as those manufacturing activities that would benefit from rail capability for delivery of raw materials and shipment of finished products. The use of the rail line by the tribe for specific economic development projects would depend on those decisions by the Skull Valley Band of Goshute.

b. At this time it is anticipated that the rail line would only be used by Private Fuel Storage for transporting spent fuel to the site and for associated operational materials, eg, storage casks. Interest in the existence of the rail line by neighboring ranchers has been indicated, however no specific contractual arrangement denoting any specific intended use has been created. Should other entities request use of the railroad, such use would have to be evaluated by Private Fuel Storage to ensure no detrimental impact on the facility or on the environment.

ENVIRONMENTAL IMPACT STATEMENT

16. ENVIRONMENTAL EFFECT OF ACCIDENTS

16-1 Assess the probabilities and consequences of an airplane crash at the PFSF (including meteorological considerations) and any appropriate mitigating measures that could minimize the likelihood of such an accident.

This information will support the EIS accident analysis.

RESPONSE

The probability of an airplane crash at the PFSF is discussed in SAR Section 2.2. The applicable portion of Section 2.2 is repeated below:

> "Michael Army Air Field is located on the Dugway Proving Ground, 15 miles south-southwest of the PFSF. This military airfield has a 13,125 foot runway, and can accommodate all operative aircraft in the Department of Defense inventory. The airspace over the Dugway Proving Ground is restricted. Military airway IR-420 passes over the PFSF site area. The methods of NUREG-0800 Section 3.5.1.6 were used to estimate the probability of an aircraft impacting the PFSF from this airway, using the equation:
>
> $P = C \times N \times A / w$, where
>
> P = probability per year of an aircraft crashing into the PFSF
> C = in-flight crash rate per mile
> N = number of flights per year along the airway
> A = effective area of the PFSF in square miles
> w = width of airway in miles
>
> NUREG-0800 states the in-flight crash rate as 4 E-10 per mile. Information provided by the Dugway Proving Ground states that there are approximately 414 flights annually at this airfield. The effective area of the facility (restricted area) is 99 acres x 1.562 E-3 mi^2/acre = 0.1546 mi^2. The width of the airway is 5 nautical miles (NM) according to the FAA flight map, or 5NM x 1.15 NM/mile = 5.75 miles. The probability of an aircraft impacting the PFSF is therefore 4.45 E-9 per year. This is an extremely low probability of occurrence, below the NUREG-0800 guideline of 1 E-7 per year, and is not considered a credible event. With this low probability of occurrence and the fact that the Michael Army Air Field is located 15 miles away, the PFSF is not designed to withstand the direct impact of an aircraft crash."

As discussed above, an aircraft impacting the PFSF has an extremely low probability of occurrence and is not considered a credible event. Therefore, the consequences of such an event are not required to be assessed.

ENVIRONMENTAL IMPACT STATEMENT

17. ENVIRONMENTAL MONITORING

17-1 a. Explain what routine monitoring will be performed at the site during normal operation to verify that leakage of radionuclides from the casks to the atmosphere does not exceed expected values. If no monitoring is planned, provide the rationale and justification why such monitoring should not be required.

b. Explain what routine monitoring will be performed at the retention pond during normal operation to verify that concentrations of radiological and non-radiological contaminants do not exceed expected values. If no monitoring is planned, provide rationale and justification why such monitoring should not be required.

RESPONSE

a. As discussed in PFSF SAR Sections 4.2.1.5.5 and 4.2.2.5.5, the canister vessels and their closures are fully welded. The canister confinement barrier has no bolted closures or mechanical seals. The canister closures have redundant welds that are tested by liquid penetrant or magnetic particle inspection to verify their integrity. Canister welds are also hydrostatically tested and closure welds are helium leak tested at the nuclear power plants where fuel loading is performed, providing added assurance of weld integrity. Analysis and leak tests demonstrate that the canister retains its structural and leak-tight integrity under all conditions, consequently leakage of radioactive material from the canister is not credible, ie, there is no release of radioactive material to the environment.

The following NRC guidance supports the position that monitoring for leakage of radionuclides is not required. Since the canister is entirely welded with a redundant closure system, no direct monitoring of the closure is required. Section 7.0.V.2 of NUREG-1536 states: "The NRC staff has found that casks closed entirely by welding do not require seal monitoring." Section 7.0.V.4 of NUREG-1536 states that for normal conditions: "If the confinement boundary is welded ..., the staff accepts that no discernible undetected leakage is credible. Hence, the dose at the controlled area boundary from atmospheric release is negligible." Also, Section 11.4.2.1 of NUREG-1567 (draft report for comment) states: "The NRC has accepted that storage confinement casks of acceptable design and construction that are sealed by welding do not require monitoring for possible radiation release. This is consistent with not monitoring other welded joints in the confinement system following fabrication and acceptance testing. Monitoring capability and/or surveillance for

potential radioactive material release should be proposed for storage casks that do not have welded closure seals."

Nevertheless, TLDs will be located along the perimeter of the RA and along the OCA boundary fence and they provide a passive means of continuously monitoring radiation levels at these boundaries (See SAR Section 7.6.1 and ER Section 6.2). While the primary purpose of the TLDs is to monitor the direct radiation emanating from the storage casks, they do provide a means for detecting a potential radionuclide release.

b. Regarding the retention pond, ER Section 4.2.4 states the following (See Figure 2.1-2 of the ER for the location of the retention pond):

> "The RA will be constructed to collect and drain storm-water to a retention pond at the north edge of the RA. The pond is free-draining and sized to accommodate a 100-year storm event. Water that may collect here will dissipate by evaporation and percolation into the subsoils."

Storm-water that drains into the retention pond is not expected to be radiologically contaminated for the following reasons:

- the canisters are sealed by welding that precludes leakage of the canisters,
- measures are applied at the originating nuclear power plants when fuel is loaded into the canisters to prevent contamination of the canister outer surfaces,
- the canisters are not permitted to be transported to the PFSF unless surveys determine that they are free of surface contamination,
- a contamination survey of the canister is again performed after the canister is received at the PFSF to ensure that the canister is not contaminated,
- following loading of canisters into storage casks at the PFSF, contamination surveys are performed on the surfaces of the storage casks to verify they are free of contamination.

Also, monitoring of contaminants in the retention pond is not required under current National Pollutant Discharge Elimination System (NPDES) storm water regulations since the storm-water flows into an on-site retention pond with no possibility of discharge to the waters of the United States. A NPDES storm water permit, with its associated monitoring and reporting requirements, is not applicable to PFSF operations and it is not planned to sample for non-radiological contaminants.

Nevertheless, PFS considers it prudent to obtain samples of water from the retention pond to verify that storm-water runoff is contamination free.

Precipitation in Skull Valley ranges from 7 to 12 inches per year. Most of the relatively small volume of water in the cask storage area produced by a typical rainstorm will probably settle into the 1 ft thick compacted gravel surface surrounding the storage pads and not drain to the retention pond. Only during a substantial rain event would water be expected to drain from the cask storage area to the retention pond. In addition, it is considered likely that the only time sufficient freestanding water would be available in the retention pond for sampling purposes would be after a substantial rain event. PFS will obtain a sample of water from the retention pond following a rain that is sufficient to collect freestanding water and analyze the sample.

ENVIRONMENTAL IMPACT STATEMENT

17. ENVIRONMENTAL MONITORING

17-2 Provide current information on PFS's permit applications and their current approval status for those agencies other than NRC listed in ER Chapter 9. Include the dates of correspondence between PFS and the appropriate authorities and the timing for permit approvals.

This information will support the EIS analysis and/or recommendations concerning environmental monitoring and regulatory compliance

RESPONSE

Environmental Permits and Plans for the PFSF construction and operation are in various stages of preparation as discussed below:

- NPDES Permit Authorizing Storm Water Discharges Associated with Construction Activity

  An NPDES permit is required under Clean Water Act (CWA) enabling regulations for all construction activities that disturb five or more acres of soil and could result in point source discharges of storm water from the construction site to waters of the United States. EPA Region VIII has a General Permit that is available for qualifying construction activity on Indian Lands in Utah. Prior to initiating construction, coverage under this General Permit will be secured from EPA Region VIII. The process for securing such coverage involves filing a Notice of Intent (NOI) with EPA Region VIII at least 48 hours prior to the initiation of construction activity. Part of the application process requires all applicants to prepare a comprehensive Storm Water Pollution Prevention Plan (SWPPP), prior to NOI submittal. This Plan will address potential impacts to endangered species, outline erosion and sediment controls, discuss soil stabilization practices and structural controls, and identify other best management practices to be employed during construction to protect offsite waters from adverse impacts from construction related storm water runoff. A draft of this SWPPP is currently under preparation.

- Spill Prevention Control and Countermeasures (SPCC) Plan for Diesel Fuel

  PFSF will likely have a total above-ground diesel fuel storage in excess of 1,320 gallons (threshold for certain EPA regulations). Although no permit application process or formal agency approvals are required, applicable

enabling regulations may require an SPCC Plan. During the construction phase of the PFSF, an evaluation will be initiated to determine if the facility meets the exemption criteria under 40 CFR 112.3(b). If such criteria is not met, then an SPCC Plan will be developed and maintained onsite.

- Drinking Water

  No drinking water or groundwater permits, registrations, or applications are expected to be required for the construction and operation of the PFSF since it is planned that the potable water supply will come from the Skull Valley Band of Goshute.

- Underground Injection Control (UIC) Registration of Septic Tank/Leach Fields

  Sanitary waste septic tank/leach fields with a design capacity to serve 20 or more people are classified as Class V injection wells under the 40 CFR 144, Underground Injection Control (UIC) enabling regulations. Section 144.26(a) identifies simple registration information to be provided to the EPA Regional Director before initiation of injection of fluids into a new Class V injection well. Since the two PFSF septic tank/leach fields will qualify as Class V injection wells, a UIC inventory form will be filed with EPA prior to placing these septic tank/leach field systems into service.

- Construction Emissions Control Plan (CECP) to Manage Fugitive Dust Impacts

  Throughout PFSF operation, no exceedances of Clean Air Act (CAA) Title I, III, and V permitting thresholds are expected. A draft of a CECP, for managing fugitive dust during PFSF construction activities has been developed, and will be incorporated into the previously identified SWPPP. This CECP does not require filing with or approval by Federal and State agencies.

- Pollution Prevention and Solid Waste Management

  It is anticipated that PFSF will not generate sufficient quantities of RCRA regulated hazardous wastes (i.e., less than 100 kg/month) that will require it to be classified as a small quantity generator. However, in order to properly manage and track offsite disposal of its de minimus quantities of generated RCRA wastes, PFSF may still file for a RCRA ID number.

Details concerning the Environmental Permits and Plans for construction and operation of the Low Corridor Railroad and the ITP follow:

- NPDES Permit Authorizing Storm Water Discharges Associated with Construction Activity

  An NPDES permit is required under Clean Water Act (CWA) enabling regulations for all construction activities that disturb 5 of more acres of soil and could result in point source discharges of storm water from the construction site to waters of the United States. UDEQ has a General Permit that is available for qualifying construction activity on all lands other than Indian Lands in Utah. Prior to initiating construction, overage under this General Permit will be secured from UDEQ. The process for securing such coverage involves filing a Notice of Intent (NOI) with UDEQ at least 48 hours prior to the initiation of construction activity. Part of the application process requires all applicants to prepare a comprehensive Storm Water Pollution Prevention Plan (SWPPP), prior to NOI submittal. This Plan will address potential impacts to endangered species, outline erosion and sediment controls, discuss soil stabilization practices and structural controls, and identify other best management practices to be employed during construction to protect offsite waters from adverse impacts from construction related storm water runoff. A draft of this SWPPP is currently under preparation.

- Stream Alteration Permit for Low Corridor

  An individual, or general 404 Permit, and 401 Water Quality Certification, may be required from the Army Corps of Engineers (COE) and UDEQ prior to the construction of the Low Corridor railroad, which will use a combination of bridges and culverts to cross 56 arroyos. It is anticipated that filing a Joint Application for a Stream Alteration Permit with the Utah State Engineer, to satisfy CWA Section 401 Water Quality certification, is required. In addition, satisfying certain requirements necessary to obtain coverage under the COE General Permit #40 (i.e., CWA Section 404 permit) for dredge and fill activities associated with crossing 56 arroyos may also be necessary.

- Drinking Water and Groundwater Protection

  No drinking water or groundwater permits, registrations, or applications are required for the construction and operation of the Low Corridor and ITP.

- Construction Emissions Control Plan to Manage Fugitive Dust Impacts

  A CECP is required, without approval, under UDEQ regulations (i.e., R307-12.3), for control of fugitive dust generated by construction activities by any person engaging in clearing, leveling, earth moving, excavation or movement

of trucks where ¼ acre or more is disturbed. A draft of this CECP has been developed and when finalized, will be filed with UDEQ prior to initiating construction activities.

- Pollution Prevention and Solid Waste Management

  No permits, registrations or applications are required for the construction of the Low Corridor and ITP.

Meetings and correspondence:

A productive meeting with representatives of EPA Region VIII was held on February 9, 1999 to review the proposed environmental permits and plans and to establish a timetable for applicable permit/plan preparation and submittal. General agreement was received that the permitting assessment was on target, and additional meetings with Region VIII staff are planned to ensure that the appropriate environmental permits are secured in a timely manner. Similar meetings with UDEQ to discuss the Low Corridor and ITP permits and plans have not yet been scheduled.

The NPDES General Permit application filings authorizing the discharge of storm water runoff during the construction of the PFSF, ITP and Low Corridor are not required to be submitted to EPA or the Utah DEQ until 48-hours prior to initiation of construction activities. Since the planned PFSF, ITP and Low Corridor construction start date is September 2000, filing of these permits is not anticipated until early 2000. No regulatory agency approval is normally required for coverage under an NPDES General Permit for construction activity – coverage is automatically received 48-hours after filing.

Other environmental permits/registrations that may be required during the construction phase of the project (e.g., Corps of Engineers Section 404 permit and RCRA ID number) should be filed in late 1999 or early 2000. Obtaining a RCRA ID number would take about a month for the agency to process. Agency approval of any applicable 404 permits and 401 water quality certifications is anticipated at least one or two months in advance of the construction schedule.

Several of the other environmental plans/registrations identified herein do not require state or federal agency approval, or are not required to be prepared until the PFSF begins operations (e.g., the UIC registration and SPCC Plan development).