TREATMENT PLAN FOR THE SKULL VALLEY SEGMENT OF THE HASTINGS CUTOFF TRAIL, TOOELE COUNTY, UTAH

Cultural Resources Report 5131-01-9916

by

Daniel K. Newsome and Alan R. Schroedl

DRAFT

Submitted to

Bureau of Land Management
Pony Express Resource Area
2370 South 2300 West
West Valley City, Utah 84119

on behalf of

Stone & Webster Engineering Corporation
7677 E. Berry Avenue
Englewood, Colorado 80111-2137

Submitted by

P-III Associates, Inc.
2759 South 300 West
Salt Lake City, Utah 84115-2932

August, 1999

P-III ASSOCIATES, INC.

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Introduction

In 1845, a lawyer from Ohio by the name of Lansford W. Hastings wrote a book entitled *Emigrants' Guide to Oregon and California,* in which he introduced a new route to California. The established emigrant route to California followed the Oregon Trail to Fort Hall, where it then diverged south and west through Nevada to California. The route Hastings proposed extended westward from Fort Bridger, via the southern shore of the Great Salt Lake, to the Humboldt River, thus bypassing Fort Hall.

Although Hastings' "cutoff" was indeed more direct than the Fort Hall route, it was by no means as easy as he envisioned, nor did it prove to be a time saver. The section of his trail across the Great Salt Lake Desert was particularly difficult for many emigrants, including the Donner-Reed Party (Morgan 1986). The problems that the Donner-Reed Party encountered on the salt flats in early September of 1846 were a major factor contributing to their ultimate disaster in the Sierra Nevada later that year (DeLafosse 1994).

In spite of the publicized troubles of the Donner-Reed Party, many travelers continued to use the Hastings Cutoff. Scores of Mormon emigrants entered the Salt Lake Valley via the Hastings route, and during the late 1840s and early 1850s, gold-seekers en route to California used the cutoff at a rate of several hundred per day (Korns and Morgan 1994). As alternate routes west were opened, however, use of the cutoff declined dramatically. Nevertheless, the route apparently continued to be used by a few miners and ranchers well into the 1870s (DeLafosse 1994).

Few events in the history of the United States hold as much fascination as the western migrations of the mid-1800s. Indeed, the misfortunes of groups like the Donner-Reed Party, the settling of the Great Salt Lake Valley by Mormon pioneers, and the rush of gold-seekers to California are generally recognized as some of the most significant episodes in western history (Korns and Morgan 1994:1). Diaries and other historical accounts provide insights into what it may have been like traveling the Hastings Cutoff 150 years ago. However, a more thorough appreciation of the emigrant experience requires witnessing firsthand the landscape and trail that the pioneers traveled (DeLafosse 1994; Korns and Morgan 1994).

Unfortunately, the hands of time and various development projects have obliterated many segments of the Hastings Cutoff. Evidence of the cutoff from the Wyoming border to the Salt Lake Valley has been erased by road construction, and all traces of the trail through the Salt Lake and Tooele valleys have been obliterated by urbanization and agricultural development. On the other hand, the segment of the cutoff across Skull Valley retains a high degree of physical integrity, and is one of the most extensive, intact, and highly visible sections of the trail in Utah (DeLafosse 1994). As such, the Skull Valley segment of the Hastings Cutoff is capable of providing an overall impression of its association with significant historical events and people, and represents an important link to better understanding the emigrant experience in the Great Basin.

The Private Fuel Storage Project proposes to store spent nuclear fuel in dry storage casks on the Goshute Indian Reservation in Skull Valley. The project would involve the construction of either the Intermodal Transfer Point west of Timpie Junction, between Interstate 80 and the Union Pacific Railroad; or the Low Transportation Corridor from the Low Interchange on Interstate 80 southward to the Goshute Indian Reservation. The Private Fuel Storage Facility would be constructed on the Goshute Indian Reservation.

One of these three facilities, the Low Transportation Corridor, would bisect the Hastings Cutoff in Section 22, T. 2S, R. 9W. Because the trail segment is eligible for inclusion in the National Register of Historic Places (NRHP) and cannot be avoided by the development, a data recovery program is required to comply with all applicable federal regulations, policies, and procedures before the project proceeds. This report presents a treatment plan that can be implemented to preserve the significant historical data of the Hastings Cutoff in Skull Valley.

Legal Requirements and Context

Existing federal laws, regulations, policies, and procedures regarding cultural resources on public land, including the Antiquities Act of 1906 (Public Law 59-209), the National Environmental Policy Act of 1969 (Public Law 91-190), the National Historic Preservation Act of 1966 (Public Law 89-665 as amended), the Archeological and Historical Preservation Act of 1974 (Public Law 93-291), and the Archeological Resources Protection Act of 1979 (Public Law 96-95), require that measures be taken to protect significant cultural resources from potential impacts and that the effects of any impacts be mitigated before an undertaking is granted federal approval to proceed. The primary purpose of these laws is the identification, protection, and preservation of historic and prehistoric properties and materials. The principal law that applies to this project is the National Historic Preservation Act (NHPA), and more specifically, Section 106 of the act. The primary goal of this data recovery program is to comply with the requirements of Section 106 of the NHPA such that cultural resource clearance can be granted and the project can proceed.

Section 106 of the NHPA requires mitigation of impacts to significant cultural properties before expenditure of federal funds or issuance of federal permits for any undertaking is granted. Significant properties are those that are eligible for inclusion in the NRHP under the criteria listed in 36CFR60.4. The Hastings Cutoff is considered eligible under Criteria A and B of 36CFR60.4 (United States Department of the Interior 1991:2). These are listed below:

> The quality of significance to American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures,

and objects that possess integrity of location, design, setting, material, workmanship, feeling, and association. And specifically sites:

(A) that are associated with events that have made a significant contribution to the broad patterns of our history; or . . .

(B) that are associated with the lives of persons significant in our past.

Impacts, including the destruction and damage of all or part of a property, such as those proposed for the Hastings Cutoff, can be mitigated through the completion of a data recovery program undertaken in accordance with all applicable professional standards and guidelines, as outlined in 36CFR800 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, that preserves the value of the property. A data recovery program that complies with these requirements and standards will result in a determination of "no adverse effect" by the appropriate regulatory agencies (i.e., the Bureau of Land Management [BLM] and the Utah State Historic Preservation Office) and the project will be allowed to proceed.

As indicated above, significant historic properties must be considered and treated in accordance with Advisory Council on Historic Preservation regulations (36CFR800). Plans for recovering significant data before disturbance must also be tailored to the specific cultural properties and the specific reasons why a property is considered significant. For example, data recovery on elements of a site that contribute to the site's significance under Criteria A and B may be different than for those elements of a site eligible under Criterion D. Mitigation of impacts to historic properties or portions of historic properties determined eligible under Criteria A and B focus predominantly on the collection of archival data with on-site fieldwork being limited to such things as site recording and photography. The mitigation of impacts to historic properties or portions of historic properties determined eligible under Criterion D generally involves the collection of archival data but also much more extensive fieldwork focused on collecting data that can be used to complement and illustrate the historical information. The specific treatment plan that will be undertaken to mitigate the impacts to the Hastings Cutoff, significant under Criteria A and B of 36CFR60.4, and sufficient to comply with the requirements of Section 106 of the NHPA are discussed in the next section.

Proposed Data Recovery for the Hastings Cutoff

The Hastings Cutoff cannot be avoided by the construction of the Low Transportation Corridor. Consequently, the impacts to the trail stemming from the proposed development may be mitigated through implementation of the following procedures.

Only a very small section of the trail within the right-of-way would be directly impacted. Although it is necessary to document only that portion of the trail to be directly impacted and sections immediately adjacent to the project corridor, a more adequate measure would be to thoroughly document the entire length of the trail through Skull Valley with black-and-white photographs. All photographs will be documented on a formal photographic log.

The photographic documentation will be accompanied by historical documentation of the historic trail. However, because fairly extensive and detailed historical literature already exists on the Hastings Cutoff, the historical documentation will consist of a comprehensive overview and bibliographic compilation of archival material that pertain to the history of the cutoff.

Technical Report

The photographic and historical documentation should be sufficient to mitigate the proposed impacts to the significant historic trail. The results of the data recovery will be presented in a technical report that will contain all appropriate documentation, archival information, photographs, and a synthesis of the results. This document will meet the legal requirements mandated by the various laws, procedures, and policies regarding cultural resources. The report will be submitted to the appropriate state and federal agencies.

Scheduling

P-III Associates anticipates that the data recovery efforts could be initiated within 30 days after approval of the treatment plan. Completion of the archival research may require examining collections housed at the Utah State Historic Society, the University of Utah Marriott Library, and possibly other locations. Several trips to the project area may also be required to photograph the trail and assess its current condition throughout Skull Valley. P-III Associates anticipates that the archival research and fieldwork could be completed within 30 days after the start of the project, depending on weather.

Synthesis of the archival documentation and all other fieldwork data will begin after completion of the fieldwork. Preparation of a technical report is expected to be completed within 30 days after completion of the fieldwork.

Organizational Qualifications, Personnel, and Facilities

This section presents P-III Associates' qualifications as cultural resource consultants to conduct the data recovery program for the section of the Hastings Cutoff in Skull Valley. We have extensive experience working on historic sites, including extensive experience doing data recovery programs for historic resources. Our staff is experienced in all aspects of archival research and photo-documentation, and has the specialized expertise necessary to undertake this project and produce a technical report.

P-III Associates, Inc., currently holds Utah State BLM Cultural Resource Use Permit 98UT54616. Supervisory staff members proposed to complete this project are currently identified on this permit. P-III Associates' senior staff members meet or exceed the personnel requirements set forth in the Secretary of Interior's Professional Qualifications Standards (48 Fed. Reg. 44738-39).

In addition, P-III Associates subscribes to the Code of Ethics, Standards of Performance, and Institutional Standards adopted by the Society of Professional Archaeologists (SOPA) on May 5, 1976, regarding the identification, recovery, and preservation of archeological and anthropological data, and the standards prescribed by the Antiquities Act of 1906 and the Archeological Resources Protection Act of 1979. Our staff strives for the highest professional standards and is well qualified to conduct the proposed data recovery activities on behalf of Stone & Webster Engineering Corporation. The specifics of our past experience, our personnel, and our facilities are presented below.

Organizational Qualifications

P-III Associates, Inc., a cultural resource consulting firm originally formed in 1980, is composed of professional archeologists, historians, ethnohistorians, and other specialists who are dedicated to providing quality cultural resource services to government agencies and private organizations. P-III Associates offers a wide range of specialized cultural resource services and can perform all of the various services that will be required for implementation of this data recovery program.

Since its creation, P-III Associates has completed more than 50 major research projects and numerous smaller cultural resource management projects. P-III Associates has worked on historic projects in Nevada, Utah, Wyoming, and Colorado, including inventories, assessments, National Register evaluations, data recovery, and the development of public interpretation and management programs. This past experience has given P-III Associates the field, laboratory, and management experience necessary to conduct the proposed data recovery and mitigation activities.

Personnel

P-III Associates has a core staff of full- and part-time professional cultural resource and technical support specialists. All of the staff are highly trained professionals, many with advanced degrees; collectively, they have expertise and experience in a wide range of geographic areas and multidisciplinary specialties. Several have held cultural resource positions with government agencies before coming to work for P-III Associates. This experience has made them sensitive to Federal agency needs and requirements, and intimately familiar with the laws governing cultural resources.

Principal Investigator

Dr. Alan R. Schroedl, President of P-III Associates, will serve as the Principal Investigator, coordinating administrative details and overseeing the data recovery project to ensure quality work and timely completion. He has served as the Principal Investigator on numerous projects involving historic resources including several involving historic trails.

Historical Archeologist

Mr. Daniel K. Newsome will be the Historical Archeologist for this project. He will be responsible for all data recovery aspects of the project including archival research and report preparation. Mr. Newsome has an M.A. degree from Oregon State University in Applied Anthropology with an emphasis in Historic Archeology. Mr. Newsome has supervised numerous historic projects for P-III Associates in Utah, Nevada, and Colorado.

Facilities and Equipment

P-III Associates' headquarters are located in Salt Lake City, Utah. Our complex includes more than 7000 ft^2 of office and storage space as well as exterior storage and parking areas. Our facilities include staff offices; clerical, accounting, and reception areas; and a variety of staff facilities such as a lunch room and conference room. In addition, we have several specialized facilities including a library, a drafting and cartography section, a multimedia section that includes a computer graphics laboratory and a photo and video laboratory, and two analysis laboratories.

Office Facilities

The office accommodations are divided into offices for the senior staff and work areas for the support technicians. Twenty computers located throughout our building provide desktop computing and network access to all staff members. Our network is serviced by a central high-speed file server with 6.7 gigabytes of storage. The file server also provides interface access to other remote servers and the World Wide Web.

Our clerical and accounting areas include a complete array of standard office equipment including IBM Selectric typewriters, Hewlett Packard fax machines operating on dedicated telephone lines, Olympus transcribers and dictaphones, report binding equipment, calculators, 486 and Pentium desktop computers, computer printers, a Canon NP4540 RDF photocopier with variable mode reduction/enlargement and 20-bin sorting and collating abilities, and a Canon GP55 30-page-per-minute network printer/copier.

Library

Our library now houses over 8000 books, journals, and reprints. P-III Associates regularly receives over 80 different national and international professional periodicals and technical journals relating to archeology, history, and historic preservation. Our collection, which emphasizes the western United States, particularly Arizona, Colorado, Idaho, Nevada, New Mexico, Wyoming, and Utah, is completely computerized for immediate access by author, title, keyword, or subject. In addition, each member of the senior staff maintains a personal, professional library pertaining to his or her particular areas of expertise (e.g., statistics, ceramic analysis, lithic analysis, Navajo culture, the Anasazi, the Archaic period, human osteology, ethnobotany, etc.) and geographical specialization.

The staff also has access to two other research facilities and libraries in the immediate area including the Archaeological Center and the Marriott Library at the University of Utah and the Harold B. Lee Library and the Peoples and Cultures Library at Brigham Young University. Volumes not available in our library or in one of these facilities are generally obtained through interlibrary loan. We also use the collections at state and federal agencies in the vicinity of our current projects.

Drafting and Cartography Section

Our drafting and cartography section maintains a computerized drafting station with a 120-MHz Pentium desktop computer, a Summasketch digitizing tablet, a 21-in, high-resolution color monitor, and a 1200-DPI Lexmark postscript laser printer. Computer-generated maps and technical illustrations are created with Intellidraw, Street Atlas, Surfer for Windows, Canvas, Visio Technical, ABC Snap Graphics, and Corel Draw. This system also generates 3D topographic models and animations with Vistapro and Truespace. GIS capabilities are provided with access to Arcview and Maptitude.

We also have two traditional, fully equipped drafting stations complete with light tables, triangles, t-squares, templates, drafting pens, grid locators, and other supplies. These stations have all the supplies and equipment necessary for hand preparing illustrations, charts, maps, etc. Our current cartographic collection includes more than 2000 topographic, geographic, and various specialized maps from western North America and foreign countries.

Multimedia Section

Our multimedia section prepares interactive multimedia presentations for the World Wide Web and CD-ROM distribution and also creates graphic illustrations for our technical report series. This section includes a Computer Graphics and Photo and Video Laboratory. Specific capabilities of this division include single frame and video stream capture, nonlinear video editing, 3D modeling and animation, audio capture and editing, midi orchestration, and Web and CD-ROM authoring.

Digital and analog audio are captured with hard disk recording software and traditional analog tape decks, with various mono and stereo microphones. Audio manipulation including Digital Signal Processing is conducted with Sound Forge and Cakewalk Pro Audio. Original music scores and midi sequences are prepared with

Cakewalk Pro Audio. Yamaha SY55 and SY99 synthesizers are used for midi recording, sequencing, and playback with 16-track, 64-note polyphony. An AV Summit Box with a Kurzweil K2000 ROM is also used for midi playback.

Multimedia authoring is completed with Authorware, Director, and Frontpage. Extreme 3D, Poser, Vista Pro, and Truespace are used for 3D animation and graphics. A variety of images, sound files, 3D models, and more than 2000 fonts are available on our CD-ROM library for authoring and presentation purposes. One-off masters of Archival CD-ROMs and CD-ROM presentations are prepared with mastering software on a Pinnacle Micro recordable CD-ROM drive.

Computer Graphics Laboratory

The computer graphics laboratory includes a high-speed, 166-MHz Pentium computer graphics station with a 21-in, high-resolution color monitor. Additional hardware associated with this computer station includes a digitizing tablet, a Nikon LZ Coolscan slide and negative scanner, an 8X CD ROM drive, and a Microtek 1200-DPI flatbed color scanner. The computer graphics lab is capable of black-and-white and color photo scanning and retouching, 3D illustration, modeling, and animation. Software currently implemented on this system includes ArtScan, Photoshop, various Photoshop plugins, Corel Draw, X-Res, Powerpoint, Canvas, and Fauve Matisse.

Photo and Video Laboratory

P-III Associates' photo and video laboratory is used to prepare multimedia presentations, photograph artifacts for publications, and maintain photo-documentation of projects. Still photographs, both negative-based and single frame digital video, are prepared in this lab.

Equipment for still photographs includes a complete array of 35-mm Nikon photographic equipment: two FE2s, eight N8008 bodies, one N90 body, two waterproof Nikon Action Touches, two SB24 flashes, two SB25 flashes, appropriate sync cords, as well as a dozen Nikon wide-angle, normal, zoom, telephoto, and macro autofocus lenses (24 mm, 28 mm, 35-70 mm, 35-80 mm, 28-85 mm, 50 mm, 85 mm, 105 mm, 70-210 mm, 180 mm, and 80-200 mm). Artifact photography is accomplished with these cameras and lenses using a Nikon MF 21 databack. The photo laboratory is also stocked with several tripods including two Bogen fluid head tripods for still and video photography.

Video photographic equipment includes an Olympus VX 405, full-size, VHS video camera; a JVC 707 SVHS-C video camera; and a Panasonic AG-3P 3-chip CCD SVHS-C video camera. All three are capable of 400 lines of resolution. A JVC editing system including a HRS10000 and JVC HRSC1000 are used for postproduction video editing. Computerized nonlinear digital editing is conducted with Elastic Reality and Razor In Sync.

Digitized video image capture is accomplished using the AG-3P video camera on a Bencher copy stand with a desktop system and a Sony Trinitron monitor. Digital images are captured for report and multimedia preparation and archival storage on CD-ROM.

Analysis Laboratories

Our laboratories are equipped for processing, conserving, weighing, measuring, and analyzing perishable and nonperishable artifacts. We have more than 1200 ft^3 of shelf space to store artifacts during analysis and report preparation. We have all the necessary laboratory instrumentation for conducting in-house flotation analysis and analyzing specific characteristics of soil/sediment samples. As needed, P-III Associates subcontracts the services of various specialists to conduct magnetometer and resistivity surveys, pollen analysis, obsidian sourcing and hydration, various dating procedures (i.e., radiocarbon, archeomagnetic, tree-ring, and thermoluminescence), blood residue analysis, etc.

Our laboratory is equipped with all the standard equipment including artifact washing sinks, washing and drying racks, cataloging and labeling equipment, chairs, sorting and work tables, lights, scales, calipers, a digital pH meter, Olympus 4-40x binocular stereo microscopes, shortwave and longwave ultraviolet lamps, and conservation materials.

P-III Associates maintains extensive comparative collections. We have lithic source collections from several western states, a faunal collection emphasizing large ungulates, an ethnobotanical seed collection, and a comparative ceramic collection emphasizing Anasazi pottery types.

Washing, conservation, treatment, and cataloging of artifactual material is conducted by our staff in our laboratory and processing area. We maintain various supplies and acid-free storage containers for use in artifact conservation.

Communications and Computer Equipment

Our communication system consists of a Premier ESP 1224 telephone system with 16 stations with external ports for remote server and internet access. Our computer network consists of 20 desktop computer stations on a Windows 95 peer-to-peer network. Our communications and computer systems are integrated allowing interoffice E-mail, on-line file sharing, on-line use of six network printers, as well as direct on-line computer faxing and telephone voice mail. In addition, remote site computer processing is conducted with three fax modems including one 28.8 high-speed modem. Field communications are maintained with one NEC and two Motorola cellular telephone systems. A Pentium-class laptop computer is used for field data processing.

Our computer network has more than 6 gigabytes of storage on-line and unlimited off-line storage with removable hard drives. A variety of utilities and diagnostics software are available on-line including Netscape, Explorer, LapLink, WinFax Pro, Norton Utilities, Norton Navigator, First Aid 95, WinProbe, and Checkit Pro-Analyst.

Desktop Publishing Equipment

Several Pentium computer systems on our network are used for desktop publishing and word processing applications. Software implemented includes Word, WordPerfect, Bookshelf, American Heritage Dictionary, Word for Word, Page Plus, Printmaster Gold, Corel Ventura, and Adobe Acrobat. A variety of on-line CD-ROM reference disks are available on the network including Microsoft Bookshelf, Infopedia, and Multipedia. These on-line sources include more than 20 standard business, science, health, geography, history, and lexical reference works along with several foreign language dictionaries.

Reports are produced in-house using all of our graphics and computer facilities and printed on a digital Canon GP55 30-page-per-minute printer/copier. Draft printing is done on the network system using an Okidata 610 laser printer, two Hewlett Packard 4 Plus laser printers, a Hewlett Packard 5 laser printer, or a NEC 5500 dot matrix printer.

Database Management and Statistics Computers

Several of our computers on the network are assigned for data storage, data analysis, and data manipulation. Software implemented on these systems includes Excel, Mathcad, Deltagraph, QuattroPro, SPSS for Windows, NTSYS-PC, Tools for Quantitative Archeology, Reflex, DBase IV, Paradox for Windows, and Microsoft Access. Form layout programs for data entry include Delrina Form Flow and Easy Form. Time management programs include Polaris Packrat, Ecco Simplicity, and Timeline.

Security System

P-III Associates has an Ademco 4140 hardwired intruder, fire, and smoke detection system which is monitored 24 hours a day by Peak Alarm Company. This security and safety system is regularly inspected by the South Salt Lake City Police and Fire departments. In addition, police patrols are made at P-III Associates' complex and all staff members are trained in office security and safety procedures. Access to the building is restricted. Medeco high-security access keys are assigned individually to designated personnel, and the access keys cannot be duplicated without an accompanying key identification card. Personnel check in/out are monitored by both the Administrative Assistant and the security monitoring company.

Field Equipment

P-III Associates has a full complement of field equipment necessary to execute archeological and historical field projects. We have 2- and 4-wheel-drive vehicles, survey and excavation kits, photographic equipment, transits and other surveying instruments, portable drafting facilities, camping and cooking gear, and other necessary field and safety equipment. Our current field equipment inventory is sufficiently large to simultaneously outfit 3 separate 10-person excavation crews in addition to survey crews.

For mapping and other field recording, we have the following items available for use, plus many other miscellaneous items: a Pentax PCS-1 Total Station system with an SC5 handheld computer, a Trimble Navigation GPS (Global Positioning System) Scout, Brunton pocket transits and tripods, Suunto and Silva compasses, Schneider and Burger transits and tripods, stadia rods, plumb bobs, line levels, chaining pins, 3-, 30- and 50-m Lufkin and Kesson tapes, Munsell soil and rock color charts, waterproof map tubes, portable drawing boards, clip boards, triangles, protractors, and rulers.

Tools in our inventory include wheel barrows, shovels (flat and round nose in various sizes), brooms, rakes, mattocks, axes, picks, trowels, chain saws, hand saws, mauls, clippers, wire brushes, files, whisk brooms, paint brushes, dental picks, spoons, dust pans, scoops, 5-gallon buckets, and one-quarter-inch and one-eighth-inch hand and shaker screens. We also have spray bottles, hudson spray cans, jerry cans, pack frames, tool chests, equipment bags, waterproof note storage chests, tarps, ladders, ropes, climbing gear, hydraulic jacks, and safety equipment such as first aid kits, dust masks, hard hats, safety vests, safety glasses, traffic cones, etc.

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1994 *West from Fort Bridger: The Pioneering of the Immigrant Trails Across Utah, 1846-1850.* Rev. ed. Originally published 1951. Utah State university Press, Logan.

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1986 *The Great Salt Lake.* Originally published 1947. University of Nebraska Press, Lincoln.

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1991 *How to Apply the National Register Criteria for Evaluation.* Rev. ed. National Register Bulletin No. 15. National Park Service, Interagency Resources Division, Washington D.C.

ENVIRONMENTAL IMPACT STATEMENT

3. AFFECTED ENVIRONMENT

3-11 Discuss any known traditional cultural properties (TCPs) and any ethnobiological resources (i.e., plants and animal resources that have economic or religious significance) within the vicinity of the site, ITF, and rail line corridor.

RESPONSE

As noted in the earlier round of RAI responses (EIS RAI No.1, question 12-3), the Skull Valley Band of Goshute Indians' ancestral land is in Tooele Valley rather than Skull Valley where the reservation and the leased site are located. There are no known Traditional Cultural Properties in Skull Valley. Although historically other Native American tribes have probably passed through the area, there are no known cultural properties from these migrations through Skull Valley. Members of the Confederated Tribes, a separate federally recognized tribe located in western Utah, continue to have family ties with members of the Skull Valley Band. The ancestral roots of the Confederated Tribes, like the Band, are in Tooele Valley and do not change the lack of cultural properties within Skull Valley.

The Band and its members have a cultural association with and respect for all "mother earth". However, traditional Band practices are individual in nature and are not associated with a specific location on the reservation property or other locations in Skull Valley. The Band believes that planned economic development, such as the proposed storage facility, which has been thoroughly studied by the Band, is compatible with their respect of "mother earth". An earlier example of economic development coexisting with the surrounding environment on the reservation is the Tekoi Rocket Motor Test Facility.

There is a lack of surface water on much of the reservation property and in the general area of the reservation. Traditional plants of value to the Band, such as sage and cedar, that grow, if any, are in an inferior condition to be used by the Band members. Acceptable plants are found in the Stansbury Mountains but not lower in the valley where the PFSF site area, the ITP, or the Low Corridor rail line are located. The availability and quality of such plants is far greater and more accessible in Tooele Valley than in Skull Valley. The availability and quality of traditional plants in Skull Valley would also directly apply to members of the Confederated Tribes in their visits to Skull Valley. There are no known uses of traditional plants by other Native American tribes within Skull Valley. As a result, the development of the PFSF, Low Corridor rail line, or Intermodal Transfer Point in Skull Valley will have no significant effect on the traditional Band practices or ethnobiological resources.

ACTION

The ER will be updated to include the above discussion.

ENVIRONMENTAL IMPACT STATEMENT

3. AFFECTED ENVIRONMENT

3-12 Provide data on radiological levels in groundwater, vegetation, and mammalian flesh near the proposed storage site and rail line. If the data are from sources other than direct samples taken at the site and rail line locations, then provide justification that explains why the data are representative of the radiological levels at the proposed site.

RESPONSE

PFS assessed background radiological characteristics of the PFSF site by means of a survey of area gamma radiation levels and samples of the surface soil. ER Section 2.10 presents the results of this background assessment, including identification of all naturally occurring and manmade nuclides that were found in the soil at the PFSF site at levels above minimum detectable limits using gamma spectroscopy analysis, and the range of concentrations analyzed for these nuclides. PFS has not conducted surveys to determine concentrations of radionuclides in vegetation, mammal flesh or groundwater. As noted in this section, "there is no surface water in the PFSF site area, and consequently no water samples were taken. Also, no radiological samples of the vegetation were obtained."

ER Section 2.10 concludes that the concentrations of radionuclides in the soil that were measured above detectable limits at the PFSF site "are in general agreement with a similar survey performed for the nearby Envirocare site at Clive, Utah, about 24 miles northwest of the PFSF (USNRC, 1993)." This reference is to the NRC's Final Environmental Impact Statement (NUREG-1476, 1993) for construction and operation of the Envirocare facility (Docket No. 40-8989) that handles and disposes of radioactive wastes. The Envirocare facility is located approximately 13 miles west of the northern portion of the Low Rail Corridor, across the Cedar Mountains in the neighboring valley (Ripple Valley). Both Skull Valley and Ripple Valley are high desert environments with vegetation characterized by desert shrubs and grasses adapted to low precipitation and highly alkaline soils. Wildlife in Skull Valley is also similar to wildlife found in Ripple Valley where the Envirocare facility is located, characterized by species typical of the desert shrub/saltbush habitat type in the Intermountain Sagebrush Province (ER Section 2.3.1.2). Since the background radioactive nuclides and radioactivity concentrations in the soil are similar at the two nearby sites, and since vegetation and animal species found near the Envirocare facility are essentially the same as those that inhabit the PFSF site and the Low Rail Corridor, it is considered that background concentrations of radioactivity in vegetation and mammal flesh at the PFSF site and along the Low Rail Corridor will be similar to background levels measured at Envirocare. ER Section 2.10 states:

> "An indication of radiation levels in area vegetation is noted in USNRC, 1993, which reports the following average concentrations: 5.4 pCi/kg for uranium, 6.0 pCi/kg for Th-230, 3.1 pCi/kg for Ra-226, 198.0 pCi/kg for Pb-210, and 48.0 pCi/kg for Po-210."

The NRC's Final Environmental Impact Statement (NUREG-1476, 1993) for construction and operation of the Envirocare facility identifies the following average background radioactivity concentrations in mammal (rabbit) flesh: 0.5 pCi/kg for U-238, 0.5 pCi/kg for Th-230, 0.6 pCi/kg for Ra-226, 4.0 pCi/kg for Pb-210, and 8.0 pCi/kg for Po-210.

Radioactivity levels in groundwater at the Envirocare facility are probably not representative of those at the PFSF site. As bedrock weathers, it releases radionuclides such as uranium, thorium and radon into the groundwater. The bedrock (granite or basalt) in Ripple Valley could have different radioactivity concentrations than bedrock in Skull Valley, and there could be a significant difference in groundwater radioactivity concentrations between the two sites. In order to characterize radioactivity concentrations in the groundwater near the PFSF site, water samples will be drawn from the groundwater monitoring well that is located at the site of the Canister Transfer Building and analyzed for radioactivity levels. Radioactivity levels in groundwater north-northwest of the PFSF site, representative of the Low Rail Corridor, will also be determined. This groundwater sampling and analysis will be included in the PFSF preoperational radiological environmental monitoring program, discussed in the following paragraph.

Although PFS considers that background radioactivity levels in vegetation and mammal flesh in the vicinity of the Envirocare facility near Clive Utah are representative of the background radioactivity levels near the PFSF site and along the Low Rail Corridor, PFS will nonetheless establish a preoperational radiological environmental baseline at the PFSF site. The baseline will sample for radioactivity levels in soil, groundwater, vegetation, and the flesh of non-migratory mammals. The background radioactivity levels at the PFSF site will therefore be established prior to the beginning of PFSF operation. An ongoing monitoring program is not necessary since the storage facility utilizes dry storage casks and does not have an effluent stream which could affect the environment.

ACTION

The ER will be updated to explain why background radioactivity concentrations in vegetation and mammal flesh at the Envirocare facility near Clive are representative of those at the PFSF site and along the Low Rail Corridor. In addition, the ER will be updated to include the commitment to establish a preoperational radiological environmental baseline at the PFSF site that will include determination of background radioactivity levels in soil, vegetation, mammal flesh, and groundwater.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-1 Describe briefly any known minerals resources at the Wyoming site or along transportation routes.

RESPONSE

The Wyoming site and local transportation route from the mainline railroad lies within the Wind River Coal Basin, an area underlain by thin layers of sub-bituminous grade coal (Groff and Jones, 1986). Coal has been mined mainly along the edges of the basin where the coal-bearing layers are at or near the surface. The nearest exposure of rocks known to be coal bearing is at least 8 miles to the north of the site. No mines or prospects have been identified at this location (Groff and Jones, 1986). Coal could be expected to occur at some unknown depth beneath the Wyoming site. However, it is very unlikely that it could be mined economically in the near future with today's technology and still compete with abundant near-surface reserves found elsewhere.

The Wind River Basin also contains oil and natural gas at several locations. The nearest known location is about 5 miles to the east of the site at the small, abandoned Shoshoni gas field (De Bruin and Hostetler, 1991). Two abandoned exploratory or wildcat wells appear to have been drilled approximately 0.75 miles northwest of the site. De Bruin (1993) includes the site area within the present productive limit of the Tertiary age, Fort Union Formation gas play. The potential for oil or gas beneath the site would have to be considered unknown at this time.

The "Metallic and Industrial Minerals of Wyoming" map (Harris et al., 1985) indicates no past or present mining activity at or near the Wyoming site. A small uranium prospect is located about 2.5 miles northwest of the site near the active rail line west of Bonneville. Feldspar has been mined in the past in the nearby Owl Creek Mountains and processed at the plant just north of the site. The plant is presently used to process and ship trona that is mined at several locations out of the area.

In summary, there are presently no known mineral resources at the Wyoming site or along the transportation corridor.

References:

De Bruin, R.H., 1993, Overview of the oil and gas geology of Wyoming, in Snoke, A.W., Steidtmann, J.R., and Roberts, S.M., editors, Geology of Wyoming, Geological Survey of Wyoming Memoir No. 5, p. 836-873.

De Bruin, R.H., and S.D. Hostetler, 1991, Oil and gas fields map of the Wind River Basin, Wyoming, Geological Survey of Wyoming Map Series 37, scale 1:318,600.

Groff, K.M., and R.W. Jones, 1986, Extent of coal-bearing rocks and locations of coal mines in the Wind River coal basin, Wyoming, Geological Survey of Wyoming Open-file Report 86-10, scale 1:250,000.

Harris, R.E., W.D. Hausel, and J.E. Meyer, 1985, Metallic and industrial minerals map of Wyoming, Geological Survey of Wyoming Map Series 14, scale 1:500,000.

ACTION

The ER will be updated to include the above information on mineral resources for the Wyoming site.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-2 Discuss the expected uses or disposal of excess “spoil” material resulting from construction activity at the proposed site, the rail line, and ITF.

The February 18, 1999, RAI response provided a number of potential uses for excess material resulting from the construction of the site but did not identify one as the most likely use. In addition, the RAI response did not discuss potential uses of excess material generated from construction of the rail line or ITF.

RESPONSE

The quantity estimates from the current design indicate that construction of the ITP will only generate excess material resulting from stripping operations. This quantity, approx. 9,300 cubic yards, would be used as slope dressing at the ITP. The roadway embankment would be “over built” i.e. its slope would be flatter than the proposed 2 horizontal to 1 vertical. The stripped material would contain organic material and therefore would promote the growth of vegetation on the slope. This would increase the stability of the slope and decrease the potential for erosion.

The rail line will generate excess material from stripping operations, approx. 125,000 cubic yards (40' x 169,127' x 0.5'). This material will be used to stabilize side slopes. Assuming a length of slope of 11.2' (for a 5' high embankment) and a length of 169,127 feet and both a left and right embankment, the depth of “excess” soil works out to be less than one foot (10.5"). The rail line as currently designed will also generate approx. 131,000 cubic yards of excess common fill. As the design is refined during final design, this quantity will be reduced. Any remaining excess material will be used as embankment material. No material will be disposed of off site.

The construction of the PFSF site only generates material during stripping operations. The 86,000 cubic yards of material produced will be used to construct the PMF berm and used as slope dressing on the access roads and perimeter roads. Again, this will help stabilize the slopes by promoting the growth of vegetation and increase the stability of the slopes by flattening them. No material will be disposed of off site.

References: Calculation 0599602 - SY – 5, Revision 1, issued 10/15/99

ACTION

The ER will be updated to include the above information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-3 Describe briefly the available quantities of aggregate, crushed rock, and other mineral resources available in Skull Valley and the adequacy of this supply to support known or reasonably foreseeable construction projects ongoing or planned for Skull Valley, including PFSF.

RESPONSE

As stated in the response to EIS RAI No. 2, Question 2-2, PFS does not intend to obtain any required imported construction materials from Federal or Tribal lands, but plans to obtain materials from private, commercial sources in and around the Tooele Valley area.

PFS has performed a study to identify aggregate sources located in and near Skull Valley in Tooele County, Utah. The study identified sources of aggregate that could be used for construction of railroad beds, roads, bases for building foundations, and aggregate for concrete.

The study concluded that there are sufficient sources of aggregates that are both economical and logistically reasonable for use to support the PFSF project. The table below provides the types of material and quantities available from each of the most likely sources.

Materials and Locations					
Type of Material	**Site 1**	**Site 2**	**Site 3**	**Site 5**	**Site 6**
Sand	200,000 tons	150,000 tons	200,000 tons	NA	NA
Crushed Rock(1")	300,000 tons	250,000 tons	300,000 tons	NA	NA
Small Road Base (≤ 1")	200,000 tons	150,000 tons	200,000 tons	NA	NA
Large Road Base (approx. 1.5")	200,000 tons	150,000 tons	200,000 tons	NA	NA
Structural Fill Material (1 ½ " minus)	200,000 tons	150,000 tons	200,000 tons	NA	NA
Common Fill	200,000 tons	150,000 tons	200,000 tons	NA	NA
Sub-Ballast	200,000 tons	150,000 tons	200,000 tons	NA	NA
Ballast	NA	NA	NA	400,000 tons	400,000 tons

Site 1: The Stansbury West Pit, approximately 17 miles North of the PFSF
Site 2: The Hickman Knolls Pit, approximately 6 miles West of the PFSF

Site 3: The Willow Creek Pit, approximately 48 miles North-East of the PFSF

Site 4: The Corral Canyon Quarry, approximately 38 miles North-NorthEast of the PFSF

Site 5: The Marble Head Quarry, approximately 35 miles North of the PFSF

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

The available quantities shown above are well in excess of the required quantities shown in response to EIS RAI No. 2, Question 2-1.

As stated in the response to EIS RAI No. 2, Question 3-8, PFS is not aware of any private projects planned for implementation in Skull Valley which would require use of these same materials.

ACTION

The ER will be updated to include the above information on sources and quantities of construction material.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-4 Describe the projected water source and use for the construction and operation of the rail line and the ITF and for any necessary improvements of Skull Valley Road.

The February 18,1999, RAI response provides groundwater needs for construction and operation of the proposed facility. However, the RAI did not discuss the water needs for the construction and operation of the proposed rail line or ITF.

RESPONSE

Low Corridor rail line-construction

The majority of water usage during construction of the rail line will primarily be for wetting haul roads to minimize fugitive dust emissions and water for soil compaction. The required quantity of water is estimated as follows:

- Earthwork volume = 885,000 CY (net cut from calculation 0599602-SY-12, Rev 0)
- Assume total required water volume = 12% by weight of the earthwork volume (5% for soil compaction + 7% for dust control)
- Total water volume = 885,000 CY ($27 ft^3$/CY) (100 lbs/ft^3) (0.12) (0.1198 gal/lb) = 34.4 E6 gallons
- Assume earthwork takes 8 months @ 26 days/month or 208 days
- Daily water consumption = 34.4 E6 gal/208 days ≈165,000 gal/day

This quantity of water, suitable for construction, is available from private water sources located within 15 miles of Timpie and Low, Utah. Alternate or additional water sources that may become available during the course of the project will be considered by PFS.

Additional water usage will be required for concrete for the culverts on the rail line. The quantity of water required for this concrete is minimal in terms of the project requirements. Drinking water for construction personnel will be supplied in bottles/containers purchased from local commercial suppliers.

Low Corridor rail line-operation

Water usage during operation of the rail line will be exclusively for personnel drinking water, which will be supplied in drinking water bottles/containers from the PFSF.

ITP Construction

Water for construction of the Intermodal Transfer Point (ITP) will be required for the concrete for the gantry crane enclosure foundation as well as for dust control and soil compaction. The water requirements for construction are estimated as follows:

Soil compaction and dust control

- Earthwork volume = 21,815 CY (net cut from calculation 0599602-SY-5, Rev1)
- Assume total required water volume = 12% by weight of the earthwork volume (5% for soil compaction + 7% for dust control)
- Total water volume = 21,815 CY (27ft^3/CY) (100 lbs/ft^3) (0.12) (0.1198 gal/lb) = 847,000 gallons
- Assume earthwork takes one month @ 26 days/month or 26 days
- Daily water consumption = 847,000 gal/26 days ≈ 32,600 gal/day

Concrete

- Concrete volume = 1,778 CY (from calculation 0599602-SY-5, Rev 1)
- Water required for concrete = 34 gal/CY (1,778 CY) = 60,452 gal
- Assume concrete takes one month @ 26 days/month or 26 days
- Daily water consumption = 60,452 gal/26 days = 2,325 gal/day

The total daily water consumption is 32,600 + 2,325 = 34,925 gal/day. This quantity of water, suitable for construction, is available from private water sources located within 15 miles of Timpie and Low, Utah. Alternate or additional sources that may become available during the course of the project will be considered by PFS.

Water for the concrete will be obtained from the PFSF site where the concrete is mixed at the on-site batch plant. Drinking water for construction personnel will be supplied in bottles/containers purchased from local commercial suppliers.

ITP Operation

Water requirements at the ITP during operation will be for drinking water and water for the restroom. These requirements will be minimal since the ITP is only intermittently staffed. Water will be supplied from an on-site storage tank and distribution system. The tank will be periodically refilled by a local commercial drinking water supplier.

Skull Valley Road

There are no improvements planned for Skull Valley Road and therefore no requirements for water.

PFSF Construction

Water for construction of the PFSF will be required for soil compaction, soil cement, concrete, dust control, and worker use. The water consumption reported previously in response to EIS RAI No. 1, Question 9-4, did not include the water required for soil compaction, soil cement, or for dust control. The additional water requirements for construction are estimated as follows:

Soil Compaction

- Earthwork volume = 128,000 CY (fill from calculation 0599602-SY-5, Rev1)
- Assume total required water volume for soil compaction = 5% by weight of the earthwork fill volume
- Total water volume = 128,000 CY ($27 ft^3/CY$) ($100 lbs/ft^3$) (0.05) (0.1198 gal/lb) = 2.1 E6 gallons
- Assume earthwork occurs both months of Period 1, 5 months of Period 2, and 2 months of Period 2 for a total of 9 months @ 26 days/month or 234 days
- Daily water consumption = 2.1 E6 gal/234 days ≈ 9,000 gal/day

Dust Control

- Earthwork volume = 210,000 CY (fill + stripping from calculation 0599602-SY-5, Rev1)

- Assume total required water volume for dust control = 7% by weight of the earthwork fill and stripping volume

- Total water volume = 210,000 CY (27ft^3/CY) (100 lbs/ft^3) (0.07) (0.1198 gal/lb) = 4.75 E6 gallons

- Assume dust control occurs for the duration of construction and is averaged over 18 months @ 26 days/month or 468 days

- Daily water consumption = 4.75 E6 gal/468 days ≈ <u>10,000 gal/day</u>

Soil Cement

- Volume = 410,000 CY (soil cement volume for entire pad emplacement area from calculation 0599602-SY-5, Rev 1)

- Assume total required water volume for soil cement mixture = 15% by weight of the soil cement volume

- Total water volume = 410,000 CY (27ft^3/CY) (115 lbs/ft^3) (0.15) (0.1198 gal/lb) = 22.9 E6 gallons

- Assume placement of the soil cement takes place during the first 6 weeks for Phase 1 construction (SE quadrant), 6 weeks for Phase 2 construction (SW quadrant) and 12 weeks for Phase 3 (Northern half of the pad emplacement area). Assume 6 days/week.

- Phase 1 Daily water consumption = (22.9 E6 gal/4)/36 days ≈ <u>159,000 gal/day</u>

- Phase 2 Daily water consumption = (22.9 E6 gal/4)/36 days ≈ <u>159,000 gal/day</u>

- Phase 3 Daily water consumption = (22.9 E6 gal/2)/72days ≈ <u>159,000 gal/day</u>

Concrete

- Volume of water during Phase 1, Period 2 for concrete to construct Canister Transfer Building, Security & Health Physics Building Foundation, and half of SE quadrant storage pads (from calculation 0599602-P-002, Rev 3) = 6000 gal/day

- Volume of water during Phase 1, Period 3 for concrete to construct Administration and Operations & Maintenance Building Foundation, and half of SE quadrant storage pads (from calculation 0599602-P-002, Rev 3) = 2800 gal/day

- Volume of water during Phase 2 for concrete to construct SW quadrant storage pads and 100 storage casks per year (from calculation 0599602-P-002, Rev 3) = 1600 gal/day

- Volume of water during Phase 3 for concrete to construct north quadrant storage pads and 100 storage casks per year (from calculation 0599602-P-002, Rev 3) = 2100 gal/day

Worker Use

- Volume of water for worker use during construction (from calculation 0599602-P-002, Rev 3) = 2500 gal/day

- Volume of water for worker use during operation (from calculation 0599602-P-002, Rev 3) = 2000 gal/day

<u>SUMMARY OF PFSF CONSTRUCTION WATER REQUIREMENTS</u>

Phase 1, Period 1

- First 6 weeks (soil compaction + soil cement + dust control + worker use) = 9,000 gal/day + 159,000 gal/day + 10,000 gal/day + 2,500 gal/day = **180,500 gal/day**

- Remainder of 2 month period (soil compaction + dust control + worker use) = 9,000 gal/day + 10,000 gal/day + 2,500 gal/day = **21,500 gal/day**

Phase 1, Period 2

- First 5 months (soil compaction + concrete + dust control + worker use) = 9,000 gal/day + 6,000 gal/day + 10,000 gal/day + 2,500 gal/day = **27,500 gal/day**

- Remainder of 7 month period (concrete + dust control + worker use) = 6,000 gal/day + 10,000 gal/day + 2,500 gal/day = **18,500 gal/day**

Phase 1, Period 3

- First 2 months (soil compaction + dust control + worker use) = 9,000 gal/day + 10,000 gal/day + 2,500 gal/day = **21,500 gal/day**

- Remainder of 9 month period (concrete + dust control + worker use) = 2,800 gal/day + 10,000 + 2,500 gal/day = **15,300 gal/day**

Phase 2 (construction and operation)

- First six weeks (soil compaction + soil cement + dust control + worker use) = 9,000 gal/day + 159,000 gal/day + 10,000 gal/day + 2,500 gal/day = **180,500 gal/day**

- Remainder of 10 year period (concrete + worker use) = 1,600 gal/day + 2,000 gal/day = **3,600 gal/day**

Phase 3 (construction and operation)

- First 12 weeks (soil compaction + soil cement + dust control + worker use) = 9,000 gal/day + 159,000 gal/day + 10,000 gal/day + 2,500 gal/day = **180,500 gal/day**

- Remainder of 10 year period (concrete + worker use) = 2,100 gal/day + 2,000 gal/day = **4,100 gal/day**

Water for worker use and for concrete will be obtained from on site wells. The remaining quantity of water, suitable for construction, is available from private water sources located within 15 miles of Timpie and Low, Utah. Alternate or additional water sources that may become available during the course of the project will be considered by PFS.

ACTION

The ER will be updated to include the above information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-5 Provide an estimate of the distance of the Wyoming site to the nearest resident and the nearest well.

RESPONSE

Water well records obtained from the State of Wyoming in 1996 indicate the presence of domestic water wells approximately 4500 ft southwest and 4500 ft northwest from the center of the proposed site area, located near Shoshoni, WY. Photographs taken at the site during the initial evaluation indicate residential buildings at both these locations. These locations would both be on the theoretical downstream flowpath from the proposed storage site.

For comparison purposes, the nearest residence with a domestic well in Skull Valley, UT is approximately 2.5 miles southeast from the center of the proposed PFSF site. This location is in the upstream flow direction from the PFSF. There are no domestic water wells, in the downstream flowpath (lower elevations near center of valley) from the site, between the PFSF and Interstate 80.

ACTION

The ER will be updated to include the above information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-6 Provide up-to-date pollutant emission data (i.e., data for criteria pollutants and other air toxics) for nearby emission sources in Tooele County.

The February 18, 1999, RAI response provided good data, however, the data were from 1995 and did not include the Magcorp facility and the Tekoi Rocket Motor Test facility. In addition, the Deseret Depot did not begin operation until 1996 and the SO_2 data provided may not accurately reflect SO_2 levels as a result of operation. The response should also include pollutant emission data for any facilities known to be planned for this portion of Tooele County during the projected lifetime of the PFSF.

RESPONSE

The air pollution emission inventory for significant point sources located within 60 kilometers of the PFSF site has been updated using the latest available database (1998) for Tooele County provided by the Utah Department of Environmental Quality (DEQ), Division of Air Quality. Annual criteria and hazardous air pollutant emissions for each source for the calendar year 1998 , as supplied by the DEQ, are provided in an Excel spreadsheet labeled "EMISSION.XLS" on the attached diskette. In addition, the annual criteria air pollutant emissions from these point sources and their locations relative to the PFSF site are summarized in the attached Table 2.4-11. Changes in facility names since the previous submittal of this table have been noted.

There are currently no known facilities planned for construction in this portion of Tooele County that would be sources of air pollution.

ACTION

The ER will be updated to include the above information and the attached Table 2.4-11.

Table 2.4-11

1998 Point Source Criteria Pollutant Emissions within
60 Kilometers of the PFSF Site

Point Source	Distance from PFSF (km)	Direction from PFSF (degrees)	Tons per Year PM-10	SO_2	NO_x	VOC	CO
A. P. Green Refractories, Inc. Silica Stone Quarry	26.399	76.2	3.49	0.01	0.12	0.01	0.03
Barrick Resources (USA), Inc., Mercur Mine	51.999	102.1	No inventory needed due to limited activity				
Cargill Inc., Salt Division (formerly AKZO Nobel Salt) Timpie Salt Processing Plant	39.437	17.7	28.1	3.34	48.2	3.15	10.8
Chemical Lime Company, Grantsville Plant	37.100	30.6	87.9	2.48	127.0	3.81	81.0
Deseret Chemical Depot, South Area	41.893	102.8	8.48	20.1	73.1	3.73	10.8
etroit Diesel Remanufacturing (formerly Tooele Army Depot, North Area)	37.485	62.0	0.60	0.43	8.86	62.3	3.57
Dugway Proving Ground	28.712	206.9	687.9	14.1	16.5	20.5	3.93
Envirocare of Utah, Inc., Radioactive Material Disposal Site	41.313	310.3	41.2	8.93	88.4	6.07	34.6
Magnesium Corp. of America Rowley Plant	56.226	6.3	1313	40.9	780.5	251.4	124.6
Morton International, Morton Salt Division	38.000	36.9	No inventory reported				
Safety-Kleen (formerly Aptus, Inc.) Aragonite Hazardous Waste Storage/Incineration	39.002	338.7	2.64	2.40	101.6	2.31	19.1

Table 2.4-11 cont

Point Source	Distance from PFSF (km)	Direction from PFSF (degrees)	Tons per Year PM10	SO_2	NO_x	VOC	CO
Safety-Kleen, Clive Hazardous Waste Incinerator	43.573	317.3	0.44	0.42	5.80	1.42	2.16
Staker Paving (formerly Bolinder Co.)							
Bauer Pit	36.924	80.3	2.14	1.10	6.85	1.50	3.52
Erda Pit	49.546	61.2	6.66	15.2	12.2	3.08	4.78
Rocky Ridge Pit	40.661	67.3	No inventory reported				
Tekoi Rocket Motor Test Facility	4.023	158.0	[Waiting for EPA Region 8 Input]				
USPCI - Grassy Mountain Landfill Facility	57.380	323.3	24.2	0.94	12.3	3.62	64.6

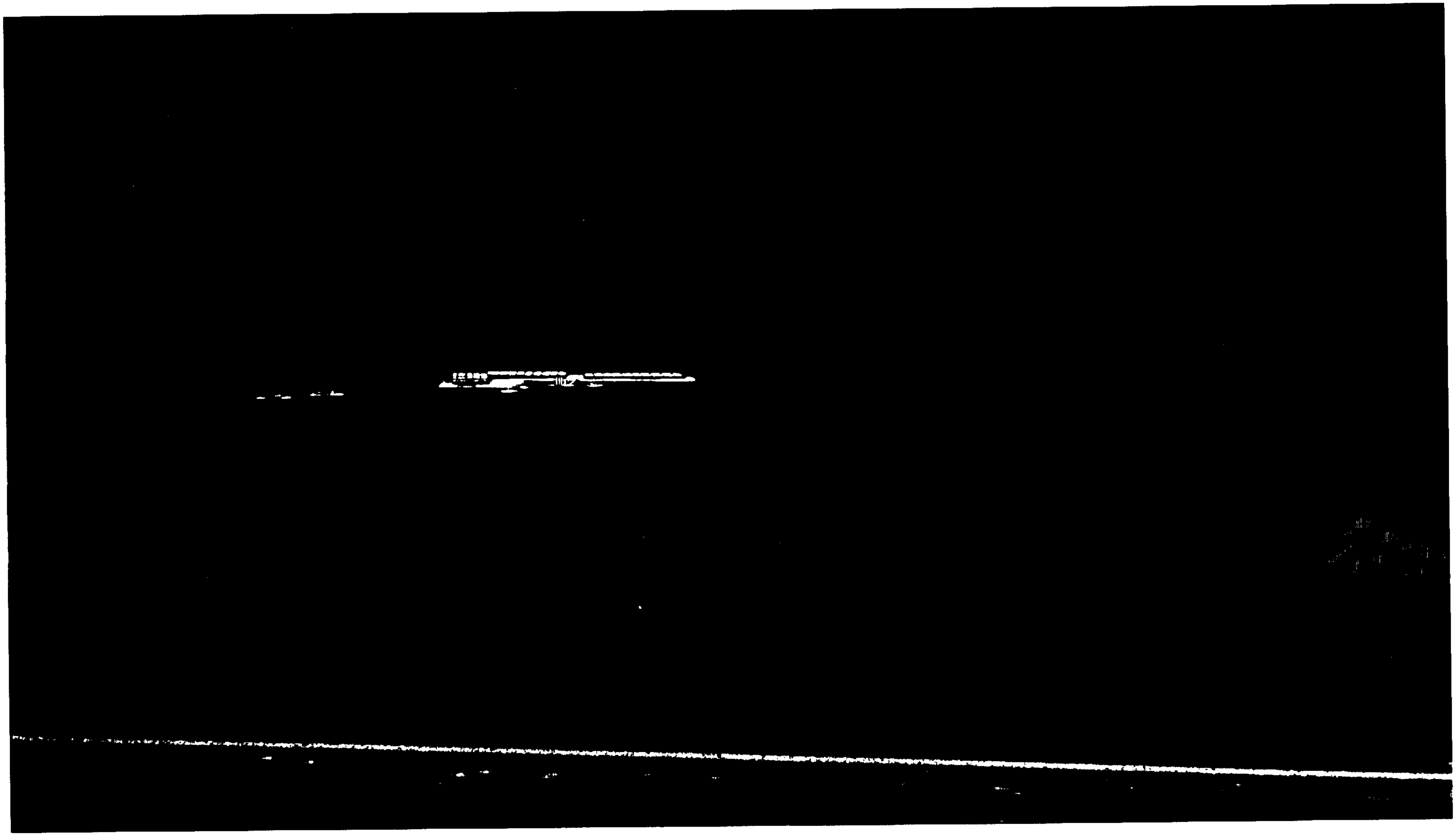

Figure 16
PFS Facility from Skull Valley Road

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-30 Provide a projection of the number of reactors and reactor sites that will need additional storage capacity if PFS is not available and the Federal government does not start SNF acceptance at a geological repository until 2010.

The February 18, 1999, RAI response provided similar information, however, the data were based on the DOE repository beginning fuel acceptance in 2015 instead of 2010.

RESPONSE

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. However, as requested, PFS is providing a projection of the additional storage requirements assuming that DOE begins SNF acceptance in 2010.

If DOE begins spent fuel acceptance in 2010, it is projected that approximately 18,000 MTU of additional storage capacity in excess of current pool capacity would be required at 89 currently operating nuclear power plants (58 reactor sites) nationwide. In addition, by 2010 there would be an estimated 6,800 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 2010, nuclear power plants would have to store spent fuel at nuclear power plant sites for an average of 18 years after shutdown for decommissioning. For older shutdown nuclear power plants this number would be as high as 36 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.

ACTION

The ER will be revised to include this information.

ENVIRONMENTAL IMPACT STATEMENT

5. COST-BENEFIT ANALYSIS

Section 51.45(c) requires the environmental report to consider the economical, technical, and other benefits and costs of the proposed action and alternatives.

5-1 Provide an analysis of the avoided costs assuming a geological repository opens in 2010.

The analysis should be done for three different throughput values (operating capacity): (1) assuming only PFS member utilities; (2) maximum storage capacity [40,000MTU]; and (3) an expected value. Provide the avoided cost for the expected value assuming a geological repository opens in 2015. The analysis should be provided in the same format as that in the February 18, 1999, RAI response 15-2, table 15-2(a), and the results should be provided in both undiscounted and discounted values. A discount rate of 7 percent, the current discount rate required by the Office of Management and Budget Circular A-94, should be used.

RESPONSE

For reasons as stated in Attachment 1, PFS has used a discount rate of 3.8 percent for this response. The avoided costs are also calculated using a 7 percent discount rate and the summary results are shown in the Attachment 2 Table for comparison purposes. Tables 3.1, 3.2 and 3.3 of Attachment 3 contain backup information.

a. Analysis for 2010 Repository

Table 5.1-1a provides a projection of the costs for at-reactor spent fuel storage for a 2002 Private Fuel Storage (PFS) facility assuming that a repository begins operation in 2010. This analysis assumed that only PFS members would use the facility. Table 5.1-1b provides a projection of the costs for the PFS members for the 2010 No Action Alternative. Projected at-reactor storage costs for PFS members are estimated to be $1.0 billion (constant 1999$). Under the 2010 No Action Alternative, total at-reactor storage costs for PFS members are estimated to be $2.1 billion. Assuming a 3.8% real discount rate, PFS member costs for a 2002 facility are approximately $601 million (NPV 3.8%) and for the 2010 No Action Alternative, approximately $1.1 billion (NPV 3.8%). This represents a potential savings in at-reactor storage costs of $1.0 billion (constant 1999$) or $0.5 billion (NPV 3.8%). After subtracting the PFS Facility costs of $999.3 million (constant 1999$) and $ 604.9 million (NPV 3.8%), the net avoided costs are $30.4 million (constant 1999$) and minus $ 97.3 million (NPV 3.8%).

Table 5.1-1a

Case 11	2002 PFSF, PFS Only, 6,600 MTU Capacity, 40 Years, 2010 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
CLINTON 1	0	10	$ -	$ 80	$ 80
COOK	0	10	$ -	$ 80	$ 80
FARLEY	0	10	$ -	$ 80	$ 80
HATCH	145	10	$ 33	$ 80	$ 113
INDIAN PT 1	0	28	$ -	$ 17	$ 17
INDIAN PT 2	0	10	$ -	$ 80	$ 80
LACROSSE	0	17	$ -	$ 136	$ 136
MONTICELLO	0	10	$ -	$ 80	$ 80
OYSTER CRK 1	60	10	$ 18	$ 80	$ 98
PRAIRIE ISL	198	10	$ 38	$ 80	$ 118
SAN ONOFRE 1	0	14	$ -	$ 8	$ 8
SAN ONOFRE	0	10	$ -	$ 80	$ 80
VOGTLE	0	10	$ -	$ 80	$ 80
Total Cost (Constant 1999$)			$ 88	$ 961	$ 1,049
Total Cost (NPV @3.8%)			$ 82	$ 519	$ 601

Table 5.1-1b

Case 12	No PFSF, 2010 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
CLINTON 1	222	12	$ 43	$ 96	$ 139
COOK	2	18	$ 13	$ 144	$ 157
FARLEY	29	16	$ 18	$ 128	$ 146
HATCH	608	18	$ 74	$ 144	$ 218
INDIAN PT 1	0	36	$ -	$ 22	$ 22
INDIAN PT 2	99	20	$ 34	$ 160	$ 194
LACROSSE	0	29	$ -	$ 232	$ 232
MONTICELLO	8	21	$ 20	$ 168	$ 188
OYSTER CRK 1	60	25	$ 18	$ 200	$ 218
PRAIRIE ISL	374	20	$ 54	$ 160	$ 214
SAN ONOFRE 1	0	28	$ -	$ 17	$ 17
SAN ONOFRE	329	15	$ 48	$ 120	$ 168
VOGTLE	378	11	$ 80	$ 88	$ 168
Total Cost (Constant 1999$)			$ 401	$ 1,678	$ 2,079
Total Cost (NPV @3.8%)			$ 297	$ 811	$ 1,108

Table 5.1-2a provides a projection of the costs for at-reactor spent fuel storage for a 2002 PFS facility with the maximum capacity of 38,000 MTU assuming that a repository begins operation in 2010. Due to the facility throughput rates assumed in this analysis, the maximum rate of 40,000 MTU was not achieved. Table 5.1-2b provides a projection of at-reactor storage costs for the 2010 No Action Alternative. Projected at-reactor storage costs for all reactors are estimated to be $8.1 billion (constant 1999$). Under the 2010 No Action Alternative, total at-reactor storage costs for all reactors are estimated to be $13.2 billion. Assuming a 3.8% real discount rate, at-reactors storage costs for a 2002 facility are approximately $4.5 billion (NPV 3.8%) and for the 2010 No Action Alternative, approximately $6.8 billion (NPV 3.8%). This represents a potential savings in at-reactor storage costs of $5.1 billion (constant 1999$) or $2.3 billion (NPV 3.8%). After subtracting the PFS Facility costs of $2.411 billion (constant 1999$) and $ 1.534 billion (NPV 3.8%), the net avoided costs are $2.709 billion (constant 1999$) and $ 757.1million (NPV 3.8%).

This analysis assumed that the PFS facility would operate as an interim spent fuel storage facility for all reactor sites and that a geological repository would be operational in 2010. For purpose of modeling this scenario, it was assumed that spent fuel acceptance priority was based on fuel age. It is expected that the costs for at-reactor storage for the 2002 PFS scenario would be even lower if spent fuel acceptance was modeled based on an individual reactor's need for storage capacity, thus increasing the benefits.

Table 5.1-2a

Case 13	2002 PFSF, 38,000 MTU, 40 Year Operation, 2010 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
ARK NUCLEAR	207	10	$ 40	$ 80	$ 120
B VALLEY	0	11	$ -	$ 88	$ 88
BIG ROCK 1	0	16	$ -	$ 128	$ 128
BRAIDWOOD	0	11	$ -	$ 88	$ 88
BROWNS FERRY	0	10	$ -	$ 80	$ 80
BRUNSWICK	155	10	$ 39	$ 80	$ 119
BYRON	0	11	$ -	$ 88	$ 88
CALLAWAY 1	20	11	$ 22	$ 88	$ 110
CALVERT CLF	268	10	$ 51	$ 80	$ 131
CATAWBA	0	12	$ -	$ 96	$ 96
CLINTON 1	89	12	$ 32	$ 96	$ 128
COMANCHE PK	0	6	$ -	$ 48	$ 48
COOK	0	10	$ -	$ 80	$ 80
COOPER STN	43	8	$ 21	$ 64	$ 85
CRYSTAL RVR 3	0	10	$ -	$ 80	$ 80
DAVIS BESSE 1	146	10	$ 34	$ 80	$ 114
DIABLO CNYN	30	11	$ 23	$ 88	$ 111
DRESDEN 1	0	26	$ -	$ 16	$ 16
DRESDEN	0	9	$ -	$ 72	$ 72
DUANE ARNOLD	0	8	$ -	$ 64	$ 64
FARLEY	0	11	$ -	$ 88	$ 88
FERMI 2	184	11	$ 43	$ 88	$ 131
FITZPATRICK	30	8	$ 20	$ 64	$ 84
FORT CALHOUN	0	7	$ -	$ 56	$ 56
GINNA	5	10	$ 24	$ 80	$ 104
GRAND GULF 1	152	11	$ 36	$ 88	$ 124
HADDAM NECK	0	18	$ -	$ 144	$ 144
HARRIS 1	0	12	$ -	$ 96	$ 96
HATCH	255	11	$ 43	$ 88	$ 131
HOPE CRK 1	7	12	$ 21	$ 96	$ 117
HUMBOLDT BAY	0	26	$ -	$ 208	$ 208
INDIAN PT 1	0	28	$ -	$ 17	$ 17
INDIAN PT 2	0	7	$ -	$ 56	$ 56
INDIAN PT 3	0	10	$ -	$ 80	$ 80
KEWAUNEE	20	7	$ 19	$ 56	$ 75
LACROSSE	0	22	$ -	$ 176	$ 176
LASALLE	0	11	$ -	$ 88	$ 88
LIMERICK	92	9	$ 32	$ 72	$ 104
MAINE YANKEE	0	17	$ -	$ 136	$ 136
MCGUIRE	0	11	$ -	$ 88	$ 88
MILLSTONE	167	12	$ 42	$ 96	$ 138

Table 5.1-2a (continued)

Case 13	2002 PFSF, 38,000 MTU, 40 Year Operation, 2010 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
MONTICELLO	0	9	$ -	$ 72	$ 72
NINE MILE PT	244	12	$ 47	$ 96	$ 143
NORTH ANNA	233	11	$ 44	$ 88	$ 132
OCONEE	447	9	$ 84	$ 72	$ 156
OYSTER CRK 1	60	16	$ 18	$ 128	$ 146
PALISADES	147	9	$ 33	$ 72	$ 105
PALO VERDE	210	11	$ 42	$ 88	$ 130
PEACH BOTTOM	51	9	$ 32	$ 72	$ 104
PERRY 1	0	12	$ -	$ 96	$ 96
PILGRIM 1	0	8	$ -	$ 64	$ 64
POINT BEACH	169	8	$ 34	$ 64	$ 98
PRAIRIE ISL	200	9	$ 38	$ 72	$ 110
QUAD CITIES	0	8	$ -	$ 64	$ 64
RANCHO SECO 1	0	21	$ -	$ 168	$ 168
RIVER BEND 1	34	12	$ 23	$ 96	$ 119
ROBINSON 2	99	9	$ 45	$ 72	$ 117
SALEM	0	11	$ -	$ 88	$ 88
SAN ONOFRE 1	0	20	$ -	$ 12	$ 12
SAN ONOFRE	41	11	$ 24	$ 88	$ 112
SEABROOK 1	0	9	$ -	$ 72	$ 72
SEQUOYAH	5	11	$ 20	$ 88	$ 108
SOUTH TEXAS	0	10	$ -	$ 80	$ 80
ST LUCIE	79	11	$ 29	$ 88	$ 117
SUMMER 1	0	11	$ -	$ 88	$ 88
SURRY	359	7	$ 71	$ 56	$ 127
SUSQUEHANNA	415	11	$ 62	$ 88	$ 150
TMI 1	0	9	$ -	$ 72	$ 72
TROJAN	0	19	$ -	$ 152	$ 152
TURKEY PT	0	7	$ -	$ 56	$ 56
VOGTLE	94	10	$ 37	$ 80	$ 117
VT YANKEE	13	8	$ 26	$ 64	$ 90
WASH NUCLEAR 2	165	12	$ 39	$ 96	$ 135
WATERFORD 3	158	12	$ 39	$ 96	$ 135
WATTS BAR 1	0	5	$ -	$ 40	$ 40
WOLF CREEK 1	22	12	$ 22	$ 96	$ 118
YANKEE-ROWE 1	0	20	$ -	$ 160	$ 160
ZION	0	17	$ -	$ 136	$ 136
Total Cost (Constant 1999$)			$ 1,346	$ 6,724	$ 8,071
Total Cost (NPV @3.8%)			$ 1,122	$ 3,367	$ 4,489

Table 5.1-2b

Case 14	No PFSF, 2010 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
ARK NUCLEAR 1	468	18	$ 62	$ 144	$ 206
B VALLEY 2	46	12	$ 14	$ 96	$ 110
BIG ROCK 1	0	25	$ -	$ 200	$ 200
BRAIDWOOD 2	177	11	$ 35	$ 88	$ 123
BROWNS FERRY 3	79	19	$ 21	$ 152	$ 173
BRUNSWICK 2	388	19	$ 74	$ 152	$ 226
BYRON 2	105	12	$ 29	$ 96	$ 125
CALLAWAY 1	204	14	$ 38	$ 112	$ 150
CALVERT CLF 2	510	19	$ 74	$ 152	$ 226
CATAWBA 2	0	13	$ -	$ 104	$ 104
CLINTON 1	222	12	$ 43	$ 96	$ 139
COMANCHE PK 2	0	7	$ -	$ 56	$ 56
COOK 2	2	18	$ 13	$ 144	$ 157
COOPER STN	128	20	$ 34	$ 160	$ 194
CRYSTAL RVR 3	0	18	$ -	$ 144	$ 144
DAVIS BESSE 1	300	18	$ 47	$ 144	$ 191
DIABLO CNYN 2	323	13	$ 48	$ 104	$ 152
DRESDEN 1	0	34	$ -	$ 20	$ 20
DRESDEN 3	200	21	$ 33	$ 168	$ 201
DUANE ARNOLD	77	20	$ 23	$ 160	$ 183
FARLEY 2	29	16	$ 18	$ 128	$ 146
FERMI 2	334	11	$ 56	$ 88	$ 144
FITZPATRICK	181	20	$ 32	$ 160	$ 192
FORT CALHOUN	1	20	$ 20	$ 160	$ 180
GINNA	76	21	$ 32	$ 168	$ 200
GRAND GULF 1	349	14	$ 53	$ 112	$ 165
HADDAM NECK	0	26	$ -	$ 208	$ 208
HARRIS 1	0	12	$ -	$ 96	$ 96
HATCH 2	608	18	$ 74	$ 144	$ 218
HOPE CRK 1	189	13	$ 37	$ 104	$ 141
HUMBOLDT BAY	0	35	$ -	$ 280	$ 280
INDIAN PT 1	0	36	$ -	$ 22	$ 22
INDIAN PT 2	99	20	$ 34	$ 160	$ 194
INDIAN PT 3	12	19	$ 22	$ 152	$ 174
KEWAUNEE	95	20	$ 25	$ 160	$ 185
LACROSSE	0	29	$ -	$ 232	$ 232
LASALLE 2	112	14	$ 27	$ 112	$ 139
LIMERICK 2	380	10	$ 59	$ 80	$ 139
MAINE YANKEE	0	26	$ -	$ 208	$ 208
MCGUIRE 2	258	15	$ 45	$ 120	$ 165
MILLSTONE 3	412	14	$ 70	$ 112	$ 182

Table 5.1-2b (continued)

Case 14	No PFSF, 2010 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
MONTICELLO	8	21	$ 20	$ 168	$ 188
NINE MILE PT 2	470	13	$ 66	$ 104	$ 170
NORTH ANNA 2	512	17	$ 70	$ 136	$ 206
OCONEE 3	757	20	$ 112	$ 160	$ 272
OYSTER CRK 1	60	25	$ 18	$ 200	$ 218
PALISADES	254	21	$ 42	$ 168	$ 210
PALO VERDE 3	703	11	$ 85	$ 88	$ 173
PEACH BOTTOM 3	416	20	$ 72	$ 160	$ 232
PERRY 1	96	12	$ 27	$ 96	$ 123
PILGRIM 1	70	20	$ 31	$ 160	$ 191
POINT BEACH 2	323	20	$ 48	$ 160	$ 208
PRAIRIE ISL 2	374	20	$ 54	$ 160	$ 214
QUAD CITIES 2	129	20	$ 26	$ 160	$ 186
RANCHO SECO 1	0	29	$ -	$ 232	$ 232
RIVER BEND 1	228	14	$ 40	$ 112	$ 152
ROBINSON 2	120	21	$ 48	$ 168	$ 216
SALEM 2	3	16	$ 16	$ 128	$ 144
SAN ONOFRE 1	0	28	$ -	$ 17	$ 17
SAN ONOFRE 3	330	15	$ 48	$ 120	$ 168
SEABROOK 1	69	10	$ 24	$ 80	$ 104
SEQUOYAH 2	254	16	$ 42	$ 128	$ 170
SOUTH TEXAS 2	0	11	$ -	$ 88	$ 88
ST LUCIE 2	265	15	$ 64	$ 120	$ 184
SUMMER 1	49	15	$ 20	$ 120	$ 140
SURRY 2	599	20	$ 94	$ 160	$ 254
SUSQUEHANNA 2	791	14	$ 96	$ 112	$ 208
TMI 1	0	20	$ -	$ 160	$ 160
TROJAN	0	27	$ -	$ 216	$ 216
TURKEY PT 4	0	20	$ -	$ 160	$ 160
VOGTLE 2	378	11	$ 80	$ 88	$ 168
VT YANKEE	103	20	$ 36	$ 160	$ 196
WASH NUCLEAR 2	320	14	$ 54	$ 112	$ 166
WATERFORD 3	280	14	$ 49	$ 112	$ 161
WATTS BAR 1	0	5	$ -	$ 40	$ 40
WOLF CREEK 1	168	14	$ 34	$ 112	$ 146
YANKEE-ROWE 1	0	27	$ -	$ 216	$ 216
ZION 2	0	26	$ -	$ 208	$ 208
Total Cost (Constant 1999$)			$ 2,605	$ 10,587	$ 13,192
Total Cost (NPV @3.8%)			$ 1,973	$ 4,808	$ 6,781

Table 5.1-3a provides a projection of the costs for at-reactor spent fuel storage for a 2002 PFS facility operating at the expected capacity of 16,600 MTU assuming that a repository begins operation in 2010. (The expected capacity would be 20,000 MTU under the 2015 No Action Alternative). Table 5.1-3b provides a projection of at-reactor storage costs for the 2010 No Action Alternative. Projected at-reactor storage costs for the reactors in this scenario are estimated to be $3.9 billion (constant 1999$). Under the 2010 No Action Alternative, total at-reactor storage costs for the reactors evaluated in this scenario are estimated to be $7.1 billion. Assuming a 3.8% real discount rate, at-reactor storage costs for a 2002 facility are approximately $2.5 billion (NPV 3.8%) and for the 2010 No Action Alternative, approximately $4.1 billion (NPV 3.8%). This represents a potential savings in at-reactor storage costs of $3.3 billion (constant 1999$) or $1.6 billion (NPV 3.8%). After subtracting the PFS Facility costs of $1.856 billion (constant 1999$) and $ 1.189 billion (NPV 3.8%), the net avoided costs are $1.402 billion (constant 1999$) and $ 368.5 million (NPV 3.8%).

Table 5.1-3a

Case 9	2002 PFSF, 16,600 MTU Capacity, 40 Year Operation, 2010 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
BIG ROCK 1	0	11	$ -	$ 88	$ 88
CALVERT CLF	264	11	$ 51	$ 88	$ 139
CLINTON 1	35	10	$ 27	$ 80	$ 107
COOK	0	10	$ -	$ 80	$ 80
COOPER STN	4	10	$ 16	$ 80	$ 96
CRYSTAL RVR 3	0	12	$ -	$ 96	$ 96
DRESDEN 1	0	25	$ -	$ 15	$ 15
DRESDEN 2 & 3	0	11	$ -	$ 88	$ 88
DUANE ARNOLD	0	10	$ -	$ 80	$ 80
FARLEY	0	10	$ -	$ 80	$ 80
FITZPATRICK	30	10	$ 20	$ 80	$ 100
FORT CALHOUN	0	10	$ -	$ 80	$ 80
GINNA	5	11	$ 24	$ 88	$ 112
HADDAM NECK	0	13	$ -	$ 104	$ 104
HATCH	222	11	$ 39	$ 88	$ 127
HUMBOLDT BAY	0	26	$ -	$ 208	$ 208
INDIAN PT 1	0	28	$ -	$ 17	$ 17
INDIAN PT 2	0	10	$ -	$ 80	$ 80
INDIAN PT 3	0	11	$ -	$ 88	$ 88
KEWAUNEE	9	10	$ 18	$ 80	$ 98
LACROSSE	0	19	$ -	$ 152	$ 152
MAINE YANKEE	0	12	$ -	$ 96	$ 96
MONTICELLO	0	11	$ -	$ 88	$ 88
OYSTER CRK 1	60	11	$ 18	$ 88	$ 106
PALISADES	148	11	$ 33	$ 88	$ 121
PILGRIM 1	0	11	$ -	$ 88	$ 88
POINT BEACH	169	11	$ 34	$ 88	$ 122
PRAIRIE ISL	198	13	$ 38	$ 104	$ 142
QUAD CITIES	0	11	$ -	$ 88	$ 88
RANCHO SECO 1	0	18	$ -	$ 144	$ 144
ROBINSON 2	60	10	$ 39	$ 80	$ 119
SAN ONOFRE 1	0	16	$ -	$ 10	$ 10
SAN ONOFRE	0	10	$ -	$ 80	$ 80
TROJAN	0	15	$ -	$ 120	$ 120
TURKEY PT	0	11	$ -	$ 88	$ 88
VOGTLE	0	10	$ -	$ 80	$ 80
VT YANKEE	13	11	$ 26	$ 88	$ 114
YANKEE-ROWE 1	0	15	$ -	$ 120	$ 120
ZION	0	12	$ -	$ 96	$ 96
Total Cost (Constant 1999$)			$ 381	$ 3,473	$ 3,855
Total Cost (NPV @3.8%)			$ 347	$ 2,196	$ 2,543

Table 5.1-3b

Case 10	No PFSF, 2010 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
BIG ROCK 1	0	25	$ -	$ 200	$ 200
CALVERT CLF	510	19	$ 74	$ 152	$ 226
CLINTON 1	222	12	$ 43	$ 96	$ 139
COOK	2	18	$ 13	$ 144	$ 157
COOPER STN	128	20	$ 34	$ 160	$ 194
CRYSTAL RVR 3	0	18	$ -	$ 144	$ 144
DRESDEN 1	0	34	$ -	$ 20	$ 20
DRESDEN 2 & 3	200	21	$ 33	$ 168	$ 201
DUANE ARNOLD	77	20	$ 23	$ 160	$ 183
FARLEY	29	16	$ 18	$ 128	$ 146
FITZPATRICK	181	20	$ 32	$ 160	$ 192
FORT CALHOUN	1	20	$ 20	$ 160	$ 180
GINNA	76	21	$ 32	$ 168	$ 200
HADDAM NECK	0	26	$ -	$ 208	$ 208
HATCH	608	18	$ 74	$ 144	$ 218
HUMBOLDT BAY	0	35	$ -	$ 280	$ 280
INDIAN PT 1	0	36	$ -	$ 22	$ 22
INDIAN PT 2	99	20	$ 34	$ 160	$ 194
INDIAN PT 3	12	19	$ 22	$ 152	$ 174
KEWAUNEE	95	20	$ 25	$ 160	$ 185
LACROSSE	0	29	$ -	$ 232	$ 232
MAINE YANKEE	0	26	$ -	$ 208	$ 208
MONTICELLO	8	21	$ 20	$ 168	$ 188
OYSTER CRK 1	60	25	$ 18	$ 200	$ 218
PALISADES	254	21	$ 42	$ 168	$ 210
PILGRIM 1	70	20	$ 31	$ 160	$ 191
POINT BEACH	323	20	$ 48	$ 160	$ 208
PRAIRIE ISL	374	20	$ 54	$ 160	$ 214
QUAD CITIES	129	20	$ 26	$ 160	$ 186
RANCHO SECO 1	0	29	$ -	$ 232	$ 232
ROBINSON 2	120	21	$ 48	$ 168	$ 216
SAN ONOFRE 1	0	28	$ -	$ 17	$ 17
SAN ONOFRE	329	15	$ 48	$ 120	$ 168
TROJAN	0	27	$ -	$ 216	$ 216
TURKEY PT	0	20	$ -	$ 160	$ 160
VOGTLE	378	11	$ 80	$ 88	$ 168
VT YANKEE	103	20	$ 35	$ 160	$ 195
YANKEE-ROWE 1	0	27	$ -	$ 216	$ 216
ZION 2	0	26	$ -	$ 208	$ 208
Total Cost (Constant 1999$)			$ 926	$ 6,187	$ 7,113
Total Cost (NPV @3.8%)			$ 742	$ 3,359	$ 4,101

b. Analysis for 2015 Repository

The avoided costs were also requested for a PFS facility operating at the expected capacity assuming a 2015 No Action Alternative.

Table 5.1-4a provides a projection of the costs for at-reactor spent fuel storage for a 2002 PFS facility operating at the expected capacity of 20,000 MTU assuming that a repository begins operation in 2015. Table 5.1-4b provides a projection of at-reactor storage costs for the 2015 No Action Alternative. Projected at-reactor storage costs are estimated to be $4.0 billion (constant 1999$). Under the 2015 No Action Alternative, total at-reactor storage costs for are estimated to be $8.8 billion. Assuming a 3.8% real discount rate, at-reactors storage costs for a 2002 facility are approximately $2.6 billion (NPV 3.8%) and for the 2015 No Action Alternative, approximately $4.6 billion (NPV 3.8%). This represents a potential savings in at-reactor storage costs of $4.8 billion (constant 1999$) or $2.0 billion (NPV 3.8%). After subtracting the PFS Facility costs of $1.854 billion (constant 1999$) and $ 1.180 billion (NPV 3.8%), the net avoided costs are $2.912 billion (constant 1999$) and $ 869.2 million (NPV 3.8%).

Table 5.1-4a

Case 1	2002 PFSF, 20,000 MTU Capacity, 40 Year Operation, 2015 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
BIG ROCK 1	0	12	$ -	$ 96	$ 96
CALVERT CLF	264	9	$ 51	$ 72	$ 123
CLINTON 1	35	10	$ 27	$ 80	$ 107
COOK	0	13	$ -	$ 104	$ 104
COOPER STN	4	11	$ 16	$ 88	$ 104
CRYSTAL RVR 3	0	13	$ -	$ 104	$ 104
DRESDEN 1	0	25	$ -	$ 15	$ 15
DRESDEN 2 & 3	0	11	$ -	$ 88	$ 88
DUANE ARNOLD	0	11	$ -	$ 88	$ 88
FARLEY	0	12	$ -	$ 96	$ 96
FITZPATRICK	30	11	$ 20	$ 88	$ 108
FORT CALHOUN	0	11	$ -	$ 88	$ 88
GINNA	5	11	$ 24	$ 88	$ 112
HADDAM NECK	0	13	$ -	$ 104	$ 104
HATCH	222	12	$ 39	$ 96	$ 135
HUMBOLDT BAY	0	26	$ -	$ 208	$ 208
INDIAN PT 1	0	28	$ -	$ 17	$ 17
INDIAN PT 2	0	11	$ -	$ 88	$ 88
INDIAN PT 3	0	14	$ -	$ 112	$ 112
KEWAUNEE	9	11	$ 18	$ 88	$ 106
LACROSSE	0	19	$ -	$ 152	$ 152
MAINE YANKEE	0	13	$ -	$ 104	$ 104
MONTICELLO	0	11	$ -	$ 88	$ 88
OYSTER CRK 1	60	12	$ 18	$ 96	$ 114
PALISADES	148	11	$ 33	$ 88	$ 121
PILGRIM 1	0	11	$ -	$ 88	$ 88
POINT BEACH	169	11	$ 34	$ 88	$ 122
PRAIRIE ISL	198	11	$ 38	$ 88	$ 126
QUAD CITIES	0	11	$ -	$ 88	$ 88
RANCHO SECO 1	0	18	$ -	$ 144	$ 144
ROBINSON 2	60	10	$ 39	$ 80	$ 119
SAN ONOFRE 1	0	16	$ -	$ 10	$ 10
SAN ONOFRE	0	11	$ -	$ 88	$ 88
TROJAN	0	15	$ -	$ 120	$ 120
TURKEY PT	0	11	$ -	$ 88	$ 88
VOGTLE	0	10	$ -	$ 80	$ 80
VT YANKEE	13	11	$ 26	$ 88	$ 114
YANKEE-ROWE 1	0	15	$ -	$ 120	$ 120
ZION	0	13	$ -	$ 104	$ 104
Total Cost (Constant 1999$)			$ 381	$ 3,609	$ 3,991
Total Cost (NPV @3.8%)			$ 347	$ 2,253	$ 2,600

Table 5.1-4b

Case 3	No PFSF, 2015 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
BIG ROCK 1	0	30	$ -	$ 240	$ 240
CALVERT CLF	648	24	$ 86	$ 192	$ 950
CLINTON 1	324	17	$ 52	$ 136	$ 529
COOK	216	23	$ 34	$ 184	$ 457
COOPER STN	128	25	$ 34	$ 200	$ 387
CRYSTAL RVR 3	30	23	$ 23	$ 184	$ 260
DRESDEN 1	0	39	$ -	$ 23	$ 62
DRESDEN 2 & 3	231	26	$ 36	$ 208	$ 501
DUANE ARNOLD	93	25	$ 24	$ 200	$ 342
FARLEY	160	21	$ 30	$ 168	$ 379
FITZPATRICK	212	25	$ 35	$ 200	$ 472
FORT CALHOUN	28	25	$ 23	$ 200	$ 276
GINNA	76	26	$ 32	$ 208	$ 342
HADDAM NECK	0	31	$ -	$ 248	$ 279
HATCH	788	23	$ 91	$ 184	$ 1,086
HUMBOLDT BAY	0	40	$ -	$ 320	$ 360
INDIAN PT 1	0	41	$ -	$ 25	$ 66
INDIAN PT 2	133	25	$ 38	$ 200	$ 396
INDIAN PT 3	81	24	$ 30	$ 192	$ 327
KEWAUNEE	121	25	$ 28	$ 200	$ 374
LACROSSE	0	34	$ -	$ 272	$ 306
MAINE YANKEE	0	31	$ -	$ 248	$ 279
MONTICELLO	8	26	$ 20	$ 208	$ 262
OYSTER CRK 1	60	30	$ 18	$ 240	$ 348
PALISADES	254	26	$ 42	$ 208	$ 530
PILGRIM 1	70	25	$ 31	$ 200	$ 326
POINT BEACH	385	25	$ 54	$ 200	$ 664
PRAIRIE ISL	465	25	$ 62	$ 200	$ 752
QUAD CITIES	150	25	$ 28	$ 200	$ 403
RANCHO SECO 1	0	34	$ -	$ 272	$ 306
ROBINSON 2	120	26	$ 48	$ 208	$ 402
SAN ONOFRE 1	0	33	$ -	$ 20	$ 53
SAN ONOFRE	510	20	$ 62	$ 160	$ 752
TROJAN	0	32	$ -	$ 256	$ 288
TURKEY PT	3	25	$ 11	$ 200	$ 239
VOGTLE	598	16	$ 113	$ 128	$ 855
VT YANKEE	120	25	$ 37	$ 200	$ 382
YANKEE-ROWE 1	0	32	$ -	$ 256	$ 288
ZION 2	0	32	$ -	$ 248	$ 248
Total Cost (Constant 1999$)			$ 1,122	$ 7,636	$ 8,757
Total Cost (NPV @3.8%)			$ 852	$ 3,798	$ 4,650

Update of Unit Costs

It should be noted that the costs provided in the analysis "Utility At-Reactor Spent Fuel Storage Costs for the Private Fuel Storage Facility Cost Benefit Analysis, Energy Resources International, Inc. (ERI), ERI-2025-9701, December 1997 (1997 ERI Study) were based on 1993 costs components contained in a Department of Energy (DOE) contractor report, At-Reactor Dry Storage Issues, Revision, 1, TRW Environmental Safety Systems, Inc., December 10, 1993 (TRW 1993) and were not escalated to current year dollars at that time in order to be conservative. Since this RAI requested that a net present value calculation be performed for the analysis of utility at-reactor storage costs in addition to the constant dollar estimate provided, it is reasonable to remove the conservatism in the original cost estimates and use realistic unit costs that better reflect the fact that dry storage costs have increased since the 1997 ERI Study was completed. The unit costs used throughout this response have been updated to 1999 constant dollars. However, since there are no recent publicly available references that could be cited as a source for new unit costs, the unit costs contained in TRW 1993 were escalated to 1999 dollars in order to more accurately reflect current market costs seen at reactor sites for dry storage.

So that the additional cases evaluated in the 1997 ERI study and provided in the February 18, 1999 RAI response 15-2, table 15-2(a) are consistent with the costs used to respond to RAI 5-1, the following cost scenarios are also updated in this response.

- 2002 ISF Members Only, 2015 Repository and 2015 No Action Alternative, Members Only
- 2002 ISF Maximum Capacity, 2015 Repository and 2015 No Action Alternative

Table 5.1-5a provides a projection of the costs for at-reactor spent fuel storage for a 2002 PFS facility assuming that a repository begins operation in 2015. This analysis assumed that only PFS members would use the facility. Table 5.1-5b provides a projection of the costs for the PFS members assuming for a 2015 No Action Alternative. Projected at-reactor storage costs for PFS members are estimated to be \$1.0 billion (constant 1999\$). Under the 2010 No Action Alternative, total at-reactor storage costs for PFS members are estimated to be \$2.6 billion. Assuming a 3.8% real discount rate, PFS member costs for a 2002 facility are approximately \$0.6 billion (NPV 3.8%) and for the 2010 No Action Alternative, approximately \$1.3 billion (NPV 3.8%). This represents a potential savings in at-reactor storage costs of \$1.6 billion (constant 1999\$) or \$0.7 billion (NPV 3.8%). After subtracting the PFS Facility costs of \$999.3 million (constant 1999\$) and \$ 604.7 million (NPV 3.8%), the net avoided costs are \$595.3 million (constant 1999\$) and \$ 87.9 million (NPV 3.8%).

Table 5.1-5a

Case 5	2002 PFSF, PFS Only, 8,000 MTU Capacity, 40 Years, 2015 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
CLINTON 1	0	10	$ -	$ 80	$ 80
COOK	0	10	$ -	$ 80	$ 80
FARLEY	0	10	$ -	$ 80	$ 80
HATCH	145	10	$ 33	$ 80	$ 113
INDIAN PT 1	0	28	$ -	$ 17	$ 17
INDIAN PT 2	0	10	$ -	$ 80	$ 80
LACROSSE	0	17	$ -	$ 136	$ 136
MONTICELLO	0	10	$ -	$ 80	$ 80
OYSTER CRK 1	60	10	$ 18	$ 80	$ 98
PRAIRIE ISL	198	10	$ 38	$ 80	$ 118
SAN ONOFRE 1	0	14	$ -	$ 8	$ 8
SAN ONOFRE	0	10	$ -	$ 80	$ 80
VOGTLE	0	10	$ -	$ 80	$ 80
Total Cost (Constant 1999$)			$ 88	$ 961	$ 1.049
Total Cost (NPV @3.8%)			$ 82	$ 519	$ 601

Table 5.1-5b

Case 6	No PFSF, 2015 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
CLINTON 1	324	17	$ 52	$ 136	$ 188
COOK	216	23	$ 34	$ 184	$ 218
FARLEY	160	21	$ 30	$ 168	$ 198
HATCH	788	23	$ 91	$ 184	$ 275
INDIAN PT 1	0	41	$ -	$ 25	$ 25
INDIAN PT 2	133	25	$ 38	$ 200	$ 238
LACROSSE	0	34	$ -	$ 272	$ 272
MONTICELLO	8	26	$ 20	$ 208	$ 228
OYSTER CRK 1	60	30	$ 18	$ 240	$ 258
PRAIRIE ISL	465	25	$ 62	$ 200	$ 262
SAN ONOFRE 1	0	33	$ -	$ 20	$ 20
SAN ONOFRE	510	20	$ 62	$ 160	$ 222
VOGTLE	598	16	$ 113	$ 128	$ 241
Total Cost (Constant 1999$)			$ 520	$ 2,124	$ 2,644
Total Cost (NPV @3.8%)			$ 361	$ 933	$ 1,294

Table 5.1-6a provides a projection of the costs for at-reactor spent fuel storage for a 2002 PFS facility with the maximum capacity of 38,000 MTU assuming that a repository begins operation in 2015. Table 5.1-6b provides a projection of at-reactor storage costs for the 2015 No Action Alternative. Projected at-reactor storage costs for all reactors are estimated to be $12.1 billion (constant 1999$). Under the 2015 No Action Alternative, total at-reactor storage costs for all reactors are estimated to be $16.8 billion. Assuming a 3.8% real discount rate, at-reactor storage costs for a 2002 facility are approximately $5.7 billion (NPV 3.8%) and for the 2010 No Action Alternative, approximately $7.9 billion (NPV 3.8%). This represents a potential savings in at-reactor storage costs of $4.7 billion (constant 1999$) or $2.2 billion (NPV 3.8%). After subtracting the PFS Facility costs of $2.411 billion (constant 1999$) and $ 1.535 billion (NPV 3.8%), the net avoided costs are $2.293 billion (constant 1999$) and $ 623.5 million (NPV 3.8%).

This analysis assumed that the PFS facility would operate as an interim spent fuel storage facility for all reactor sites and that a geological repository would be operational in 2015. For purposed of modeling this scenario, it was assumed that spent fuel acceptance priority was based on fuel age. It is expected that the costs for at-reactor storage for the 2002 PFS scenario would be even lower if it was assumed that spent fuel acceptance was modeled based on an individual reactor's need for storage capacity, thus increasing the benefits.

Table 5.1-6a

Case 7	2002 PFSF, 38,000 MTU, 40 Year Operation, 2015 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
ARK NUCLEAR	207	19	$ 40	$ 152	$ 192
B VALLEY	0	17	$ -	$ 136	$ 136
BIG ROCK 1	0	18	$ -	$ 144	$ 144
BRAIDWOOD	0	16	$ -	$ 128	$ 128
BROWNS FERRY	0	19	$ -	$ 152	$ 152
BRUNSWICK	194	19	$ 44	$ 152	$ 196
BYRON	0	17	$ -	$ 136	$ 136
CALLAWAY 1	20	19	$ 22	$ 152	$ 174
CALVERT CLF	268	19	$ 51	$ 152	$ 203
CATAWBA	0	18	$ -	$ 144	$ 144
CLINTON 1	111	17	$ 33	$ 136	$ 169
COMANCHE PK	0	12	$ -	$ 96	$ 96
COOK	0	19	$ -	$ 152	$ 152
COOPER STN	45	17	$ 21	$ 136	$ 157
CRYSTAL RVR 3	0	19	$ -	$ 152	$ 152
DAVIS BESSE 1	146	19	$ 34	$ 152	$ 186
DIABLO CNYN	30	18	$ 23	$ 144	$ 167
DRESDEN 1	0	26	$ -	$ 16	$ 16
DRESDEN	0	14	$ -	$ 112	$ 112
DUANE ARNOLD	0	17	$ -	$ 136	$ 136
FARLEY	0	20	$ -	$ 160	$ 160
FERMI 2	222	16	$ 46	$ 128	$ 174
FITZPATRICK	30	17	$ 20	$ 136	$ 156
FORT CALHOUN	0	16	$ -	$ 128	$ 128
GINNA	0	14	$ 24	$ 112	$ 136
GRAND GULF 1	5	19	$ 36	$ 152	$ 188
HADDAM NECK	152	20	$ -	$ 160	$ 160
HARRIS 1	0	17	$ -	$ 136	$ 136
HATCH	255	20	$ 43	$ 160	$ 203
HOPE CRK 1	0	18	$ 21	$ 144	$ 165
HUMBOLDT BAY	0	26	$ -	$ 208	$ 208
INDIAN PT 1	0	28	$ -	$ 17	$ 17
INDIAN PT 2	0	16	$ -	$ 128	$ 128
INDIAN PT 3	0	19	$ -	$ 152	$ 152
KEWAUNEE	20	16	$ 19	$ 128	$ 147
LACROSSE	0	22	$ -	$ 176	$ 176
LASALLE	0	19	$ -	$ 152	$ 152
LIMERICK	92	15	$ 32	$ 120	$ 152
MAINE YANKEE	0	20	$ -	$ 160	$ 160
MCGUIRE	0	20	$ -	$ 160	$ 160
MILLSTONE	167	19	$ 42	$ 152	$ 194

Table 5.1-6a (continued)

Case 7	2002 PFSF, 38,000 MTU, 40 Year Operation, 2015 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
MONTICELLO	0	14	$ -	$ 112	$ 112
NINE MILE PT	284	18	$ 50	$ 144	$ 194
NORTH ANNA	233	20	$ 44	$ 160	$ 204
OCONEE	447	18	$ 84	$ 144	$ 228
OYSTER CRK 1	60	19	$ 18	$ 152	$ 170
PALISADES	147	14	$ 33	$ 112	$ 145
PALO VERDE	250	16	$ 46	$ 128	$ 174
PEACH BOTTOM	51	18	$ 32	$ 144	$ 176
PERRY 1	0	17	$ -	$ 136	$ 136
PILGRIM 1	0	15	$ -	$ 120	$ 120
POINT BEACH	169	15	$ 34	$ 120	$ 154
PRAIRIE ISL	200	18	$ 38	$ 144	$ 182
QUAD CITIES	0	15	$ -	$ 120	$ 120
RANCHO SECO 1	0	22	$ -	$ 176	$ 176
RIVER BEND 1	67	19	$ 26	$ 152	$ 178
ROBINSON 2	99	13	$ 45	$ 104	$ 149
SALEM	0	20	$ -	$ 160	$ 160
SAN ONOFRE 1	0	22	$ -	$ 13	$ 13
SAN ONOFRE	41	20	$ 24	$ 160	$ 184
SEABROOK 1	0	15	$ -	$ 120	$ 120
SEQUOYAH	10	20	$ 21	$ 160	$ 181
SOUTH TEXAS	0	16	$ -	$ 128	$ 128
ST LUCIE	79	20	$ 29	$ 160	$ 189
SUMMER 1	0	20	$ -	$ 160	$ 160
SURRY	409	16	$ 76	$ 128	$ 204
SUSQUEHANNA	415	19	$ 62	$ 152	$ 214
TMI 1	0	18	$ -	$ 144	$ 144
TROJAN	0	21	$ -	$ 168	$ 168
TURKEY PT	0	16	$ -	$ 128	$ 128
VOGTLE	129	16	$ 41	$ 128	$ 169
VT YANKEE	13	15	$ 26	$ 120	$ 146
WASH NUCLEAR 2	165	19	$ 39	$ 152	$ 191
WATERFORD 3	158	19	$ 39	$ 152	$ 191
WATTS BAR 1	0	9	$ -	$ 72	$ 72
WOLF CREEK 1	22	19	$ 22	$ 152	$ 174
YANKEE-ROWE 1	0	21	$ -	$ 168	$ 168
ZION	0	20	$ -	$ 160	$ 160
Total Cost (Constant 1999$)			$ 1,376	$ 10,702	$ 12,078
Total Cost (NPV @3.8%)			$ 1,141	$ 4,569	$ 5,710

Case 8	No PFSF, 2015 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
ARK NUCLEAR 1	590	23	$ 73	$ 184	$ 257
B VALLEY 2	112	17	$ 19	$ 136	$ 155
BIG ROCK 1	0	30	$ -	$ 240	$ 240
BRAIDWOOD 2	338	16	$ 50	$ 128	$ 178
BROWNS FERRY 3	162	24	$ 28	$ 192	$ 220
BRUNSWICK 2	473	24	$ 86	$ 192	$ 278
BYRON 2	259	17	$ 43	$ 136	$ 179
CALLAWAY 1	296	19	$ 46	$ 152	$ 198
CALVERT CLF 2	648	24	$ 86	$ 192	$ 278
CATAWBA 2	0	18	$ -	$ 144	$ 144
CLINTON 1	324	17	$ 52	$ 136	$ 188
COMANCHE PK 2	58	12	$ 20	$ 96	$ 116
COOK 2	216	23	$ 34	$ 184	$ 218
COOPER STN	128	25	$ 34	$ 200	$ 234
CRYSTAL RVR 3	30	23	$ 23	$ 184	$ 207
DAVIS BESSE 1	331	23	$ 49	$ 184	$ 233
DIABLO CNYN 2	524	18	$ 66	$ 144	$ 210
DRESDEN 1	0	39	$ -	$ 23	$ 23
DRESDEN 3	231	26	$ 36	$ 208	$ 244
DUANE ARNOLD	93	25	$ 24	$ 200	$ 224
FARLEY 2	160	21	$ 30	$ 168	$ 198
FERMI 2	424	16	$ 63	$ 128	$ 191
FITZPATRICK	212	25	$ 35	$ 200	$ 235
FORT CALHOUN	28	25	$ 23	$ 200	$ 223
GINNA	76	26	$ 32	$ 208	$ 240
GRAND GULF 1	468	19	$ 63	$ 152	$ 215
HADDAM NECK	0	31	$ -	$ 248	$ 248
HARRIS 1	0	17	$ -	$ 136	$ 136
HATCH 2	788	23	$ 91	$ 184	$ 275
HOPE CRK 1	299	18	$ 46	$ 144	$ 190
HUMBOLDT BAY	0	40	$ -	$ 320	$ 320
INDIAN PT 1	0	41	$ -	$ 25	$ 25
INDIAN PT 2	133	25	$ 38	$ 200	$ 238
INDIAN PT 3	81	24	$ 30	$ 192	$ 222
KEWAUNEE	121	25	$ 28	$ 200	$ 228
LACROSSE	0	34	$ -	$ 272	$ 272
LASALLE 2	322	19	$ 45	$ 152	$ 197
LIMERICK 2	589	15	$ 78	$ 120	$ 198
MAINE YANKEE	0	31	$ -	$ 248	$ 248
MCGUIRE 2	467	20	$ 64	$ 160	$ 224
MILLSTONE 3	559	19	$ 85	$ 152	$ 237

Table 5.1-6b (continued)

Case 8	No PFSF, 2015 Repository				
Plant Name	Estimated Additional Storage (MTU)	Estimated Years of Storage Post Shutdown	Additional Storage Costs ($Millions)	Post Shutdown Storage Costs ($ Millions)	Total Storage Costs ($ Millions)
MONTICELLO	8	26	$ 20	$ 208	$ 228
NINE MILE PT 2	580	18	$ 75	$ 144	$ 219
NORTH ANNA 2	712	22	$ 89	$ 176	$ 265
OCONEE 3	827	25	$ 118	$ 200	$ 318
OYSTER CRK 1	60	30	$ 18	$ 240	$ 258
PALISADES	254	26	$ 42	$ 208	$ 250
PALO VERDE 3	1021	16	$ 112	$ 128	$ 240
PEACH BOTTOM 3	491	25	$ 81	$ 200	$ 281
PERRY 1	207	17	$ 37	$ 136	$ 173
PILGRIM 1	70	25	$ 31	$ 200	$ 231
POINT BEACH 2	385	25	$ 54	$ 200	$ 254
PRAIRIE ISL 2	465	25	$ 62	$ 200	$ 262
QUAD CITIES 2	150	25	$ 28	$ 200	$ 228
RANCHO SECO 1	0	34	$ -	$ 272	$ 272
RIVER BEND 1	331	19	$ 49	$ 152	$ 201
ROBINSON 2	120	26	$ 48	$ 208	$ 256
SALEM 2	96	21	$ 24	$ 168	$ 192
SAN ONOFRE 1	0	33	$ -	$ 20	$ 20
SAN ONOFRE 3	510	20	$ 62	$ 160	$ 222
SEABROOK 1	177	15	$ 34	$ 120	$ 154
SEQUOYAH 2	444	21	$ 60	$ 168	$ 228
SOUTH TEXAS 2	0	16	$ -	$ 128	$ 128
ST LUCIE 2	380	20	$ 75	$ 160	$ 235
SUMMER 1	122	20	$ 26	$ 160	$ 186
SURRY 2	650	25	$ 99	$ 200	$ 299
SUSQUEHANNA 2	1011	19	$ 114	$ 152	$ 266
TMI 1	0	25	$ -	$ 200	$ 200
TROJAN	0	32	$ -	$ 256	$ 256
TURKEY PT 4	0	25	$ -	$ 200	$ 200
VOGTLE 2	598	16	$ 113	$ 128	$ 241
VT YANKEE	120	25	$ 37	$ 200	$ 237
WASH NUCLEAR 2	419	19	$ 63	$ 152	$ 215
WATERFORD 3	373	19	$ 57	$ 152	$ 209
WATTS BAR 1	0	9	$ -	$ 72	$ 72
WOLF CREEK 1	265	19	$ 43	$ 152	$ 195
YANKEE-ROWE 1	0	32	$ -	$ 256	$ 256
ZION 2	0	32	$ -	$ 248	$ 248
Total Cost (Constant 1999$)			$ 3,195	$ 13,588	$ 16,783
Total Cost (NPV @3.8%)			$ 2,280	$ 5,588	$ 7,868

Justification for using a 3.8% real interest rate for discounted cash flow analysis

In response to Question 5-1 of the August 19, 1999 Request for Additional Information, the NRC staff requested that "a discount rate of 7 percent, the current discount rate required by the Office of Management and Budget Circular A-94, should be used". PFS is responding to the RAI question using a real interest rate of 3.8 percent, rather than the 7 percent suggested by the staff. The reasons for using a different rate are explained as follows:

1) The OMB Circular A-94 which suggests the use of 7 percent for the discount rate is dated October 29, 1992 – nearly seven years ago. Section 8.b.1 which suggests the 7 percent rate, also has a statement at the end of the paragraph which states "Significant changes in this rate will be reflected in future updates of this circular". No updates to this section of the circular have been made available, however the appendices (e.g. Appendix C) to the Circular have been updated as recently as January, 1999. Appendix C outlines real interest rates for discounting federal project cash flows and suggests real interest rates in the range of 2.8 percent (assuming treasury bills are the source of funding). Private sector projects such as PFS would have somewhat higher real interest rates due to higher borrowing rates than the federal government, however not high enough to result in 7 percent overall. Because of the lack of current updates to the Circular, and given the changes in the cost of borrowing money and rates of inflation which have occurred since 1992, it is appropriate to consider more appropriate real interest rates for discounted cash flows.

2) A review of recent activity in the bonding market (a common source of funding for utility projects) indicates that municipal or utility bonds are being sold at 7 percent or less. For example, a recent bond issue by Northern States Power was at 6-7/8 percent. Published numbers in the Wall Street Journal indicate that municipal bonds are currently (Bond Buyer - October 1999) being offered at approximately 6-5/8 percent. Since municipal bonds are the likely source of funding for PFS, these indicate that it is appropriate to use a nominal interest rate of around 6-5/8 percent.

3) Recent published data on rates of inflation show rates at approximately 2-3/4 percent. (Standard and Poors McGraw Hill DRI inflation index for October, 1999).

Combining a nominal interest rate of 6-5/8 percent and an inflation rate of 2-3/4 percent, the calculated real interest rate to be used for discounted cash flow analysis equals:

1.0663/1.0275 = 1.038 or a 3.8% real interest (discount) rate for NPV

Note: While 3.8 percent was used as the discount rate for the NPV calculations, we have included in the reference materials calculations at a 7 percent real interest rate for comparison purposes.

Attachment 2 Table

Summary of Avoided Costs (PFS Net Benefits)

Repository Opening Date	Size (MTU)	Avoided Costs Constant 1999$	Avoided Costs NPV 3.8%	Avoided Costs NPV 7%
2010	16,600	$1,402,400,000	$368,500,000	$ 55,800,000
2010	6,600	$ 30,400,000	$(97,300,000)	$(120,600,000)
2010	38,000	$2,709,700,000	$757,100,000	$ 207,500,000
2015	20,000	$2,912,000,000	$869,200,000	$ 281,600,000
2015	8,000	$ 595,300,000	$ 87,900,000	$ (36,800,000)
2015	38,000	$2,293,400,000	$623,500,000	$ 168,700,000

Table 3.1 Updated
Parameters for Spent Fuel Acceptance Scenarios

Assumptions	Case 1	Case 3	Case 5	Case 6	Case 7	Case 8
PFSF Operation Date	2002 PFSF	No PFSF	2002 PFSF	No PFSF	2002 PFSF	No PFSF
Repository Operation Date	2015	2015	2015	2015	2015	2015
Peak PFSF Capacity (MTU)	20,000	0	8,000	0	40,000	0
Reactors in Comparison	51	51	19	19	all	all
License Duration (Years)	40		40		40	

Table 3.1 Updated
Parameters for Spent Fuel Acceptance Scenarios

Assumptions	Case 9	Case 10	Case 11	Case 12	Case 13	Case 14
PFSF Operation Date	2002 PFSF	No PFSF	2002 PFSF	No PFSF	2002 PFSF	No PFSF
Repository Operation Date	2010	2010	2010	2010	2010	2010
Peak PFSF Capacity (MTU)	16,600	0	6,600	0	40,000	0
Reactors in Comparison	51	51	19	19	all	all
License Duration (Years)	40		40		40	

Table 3.2 Updated
At-Reactor Spent Fuel Storage Cost Summary (Millions Constant 1999$)

	Comparisons of Costs for PFSF versus 2015 Repository Only Systems					
Cost Category	**Case 1 versus Case 3**		**Case 5 versus Case 6**		**Case 7 versus Case 8**	
PFSF Operation Date	Case 1 2002 PFSF	Case 3 No PFSF	Case 5 2002 PFSF	Case 6 No PFSF	Case 7 2002 PFSF	Case 8 No PFSF
Operating Reactor Storage	$ 381.4	$ 1,121.6	$ 88.2	$ 519.6	$ 1,376.4	$ 3,195.3
Shutdown Reactor Storage	$ 3,609.4	$ 7,635.8	$ 961.2	$ 2,124.4	$ 10,702.0	$ 13,587.8
Total Utility At-Reactor Storage	$ 3,990.8	$ 8,757.4	$ 1,049.4	$ 2,644.0	$ 12,078.4	$ 16,783.1
PFSF At-Reactor Storage Benefit	$ 4,766.6		$ 1,594.6		$ 4,704.7	
PFS Facility Cost	$ 1,854.0		$ 999.3		$ 2,411.3	
Net Benefit (Avoided Cost)	**$ 2,912.6**		**$ 595.3**		**$ 2,293.4**	

Table 3.2 Updated
At-Reactor Spent Fuel Storage Cost Summary (Millions Constant 1999$)

	Comparisons of Costs for PFSF versus 2010 Repository Only Systems					
Cost Category	**Case 9 versus Case 10**		**Case 11 versus Case 12**		**Case 13 versus Case 14**	
PFSF Operation Date	Case 9 2002 PFSF	Case 10 No PFSF	Case 11 2002 PFSF	Case 12 No PFSF	Case 13 2002 PFSF	Case 14 No PFSF
Operating Reactor Storage	$ 381.4	$ 926.4	$ 88.2	$ 400.7	$ 1,346.6	$ 2,605.2
Shutdown Reactor Storage	$ 3,473.4	$ 6,186.8	$ 961.2	$ 1,678.4	$ 6,724.4	$ 10,586.8
Total Utility At-Reactor Storage	$ 3,854.8	$ 7,113.2	$ 1,049.4	$ 2,079.1	$ 8,071.0	$ 13,192.0
PFSF At-Reactor Storage Benefit	$ 3,258.4		$ 1,029.7		$ 5,121.0	
PFS Facility Cost	$ 1,856.0		$ 999.3		$ 2,411.3	
Net Benefit (Avoided Cost)	**$ 1,402.4**		**$ 30.4**		**$ 2,709.7**	

Table 3.3 New
At-Reactor Spent Fuel Storage Cost Summary (Millions NPV 1999$ - 3.8% Real Interest Rate)

	Comparisons of Costs for PFSF versus 2015 Repository Only Systems					
Cost Category	**Case 1 versus Case 3**		**Case 5 versus Case 6**		**Case 7 versus Case 8**	
PFSF Operation Date	Case 1 2002 PFSF	Case 3 No PFSF	Case 5 2002 PFSF	Case 6 No PFSF	Case 7 2002 PFSF	Case 8 No PFSF
Operating Reactor Storage	$ 346.9	$ 851.8	$ 82.1	$ 360.7	$ 1,141.0	$ 2,280.0
Shutdown Reactor Storage	$ 2,253.3	$ 3,797.9	$ 519.3	$ 933.3	$ 4,569.0	$ 5,588.0
Total Utility At-Reactor Storage	$ 2,600.2	$ 4,649.7	$ 601.4	$ 1,294.0	$ 5,710.0	$ 7,868.0
PFSF At-Reactor Storage Benefit	$ 2,049.5		$ 692.6		$ 2,158.0	
PFSF Facility Cost	$ 1,180.3		$ 604.7		$ 1,534.5	
Net Benefit (Avoided Cost)	**$ 869.2**		**$ 87.9**		**$ 623.5**	

Table 3.3 New

At-Reactor Spent Fuel Storage Cost Summary (Millions NPV 1999$ - 3.8% Real Interest Rate)

	Comparisons of Costs for PFSF versus 2010 Repository Only Systems					
Cost Category	**Case 9 versus Case 10**		**Case 11 versus Case 12**		**Case 13 versus Case 14**	
PFSF Operation Date	Case 9 2002 PFSF	Case 10 No PFSF	Case 11 2002 PFSF	Case 12 No PFSF	Case 13 2002 PFSF	Case 14 No PFSF
Operating Reactor Storage	$ 346.9	$ 741.7	$ 82.1	$ 297.5	$ 1,122.2	$ 1,973.1
Shutdown Reactor Storage	$ 2,196.1	$ 3,358.6	$ 519.3	$ 811.5	$ 3,367.3	$ 4,807.9
Total Utility At-Reactor Storage	$ 2,543.0	$ 4,100.3	$ 601.4	$ 1,109.0	$ 4,489.5	$ 6,781.0
PFSF At-Reactor Storage Benefit	$ 1,557.3		$ 507.6		$ 2,291.5	
PFSF Facility Cost	$ 1,188.8		$ 604.9		$ 1,534.4	
Net Benefit (Avoided Cost)	**$ 368.5**		**$ (97.3)**		**$ 757.1**	

Table 3.3 New
At-Reactor Spent Fuel Storage Cost Summary (Millions NPV 1999$ - 7.0% Real Discount Rate)

	Comparisons of Costs for PFSF versus 2015 Repository Only Systems					
Cost Category	**Case 1 versus Case 3**		**Case 5 versus Case 6**		**Case 7 versus Case 8**	
PFSF Operation Date	Case 1 2002 PFSF	Case 3 No PFSF	Case 5 2002 PFSF	Case 6 No PFSF	Case 7 2002 PFSF	Case 8 No PFSF
Operating Reactor Storage	$ 326.8	$ 705.6	$ 78.7	$ 279.6	$ 1,013.1	$ 1,814.6
Shutdown Reactor Storage	$ 1,696.2	$ 2,470.5	$ 361.0	$ 561.1	$ 2,703.0	$ 3,179.0
Total Utility At-Reactor Storage	$ 2,023.0	$ 3,176.1	$ 439.7	$ 840.7	$ 3,716.1	$ 4,993.6
PFSF At-Reactor Storage Benefit	$ 1,153.1		$ 401.0		$ 1,277.5	
PFSF Facility Cost	$ 871.5		$ 437.8		$ 1,108.8	
Net Benefit (Avoided Cost)	**$ 281.6**		**$ (36.8)**		**$ 168.7**	

Table 3.3 New

At-Reactor Spent Fuel Storage Cost Summary (Millions NPV 1999$ - 7.0% Real Discount Rate)

	Comparisons of Costs for PFSF versus 2010 Repository Only Systems					
Cost Category	**Case 9 versus Case 10**		**Case 11 versus Case 12**		**Case 13 versus Case 14**	
PFSF Operation Date	Case 9 2002 PFSF	Case 10 No PFSF	Case 11 2002 PFSF	Case 12 No PFSF	Case 13 2002 PFSF	Case 14 No PFSF
Operating Reactor Storage	$ 326.8	$ 635.8	$ 78.7	$ 241.3	$ 1,000.3	$ 1,632.0
Shutdown Reactor Storage	$ 1,665.7	$ 2,293.3	$ 361.0	$ 515.6	$ 2,217.7	$ 2,902.3
Total Utility At-Reactor Storage	$ 1,992.5	$ 2,929.1	$ 439.7	$ 756.9	$ 3,218.0	$ 4,534.3
PFSF At-Reactor Storage Benefit	$ 936.6		$ 317.2		$ 1,316.3	
PFSF Facility Cost	$ 880.8		$ 437.8		$ 1,108.8	
Net Benefit (Avoided Cost)	**$ 55.8**		**$ (120.6)**		**$ 207.5**	

October 7, 1999 NRC EIS Telephone Inquiry

NRC Question

Provide information on the potential number of annual shipments of storage cask overpacks to the PFS facility. Explain the possible modes of transportation that would be used and where the cask overpacks would be fabricated.

Response

As discussed in the response to EIS RAI No. 2, Question 2-6, the ultimate capacity of the PFSF is based on 4,000 casks received over 20 years. This translates to an average receipt rate of 200 loaded shipping casks per year. Thus, an average of 200 storage cask overpacks would potentially be needed at the PFS site each year of operation. It is anticipated that these overpacks will be fabricated at local steel manufacturing facilities in the Salt Lake City or Tooele City area. A number of steel fabricators that are located in the surrounding areas have the capability to construct the steel forms and plates needed to make up the overpack inner and outer sections, as well as the upper and lower plates. Once the overpacks are delivered to the site, they will be filled with concrete from the on-site batch plant and finished on an as-needed basis. Approximately 4 overpacks per week on average would be prepared to match the receipt rate of fuel arriving at the storage facility.

Transportation of the overpacks from the steel fabrication plant to the site could be accomplished in a number of ways. The most likely method would be delivery by over-the-road truck as they are fabricated, resulting in an average of 200 shipments per year. It is also possible to ship the overpacks in groups of 10 or more, by common carrier freight train. This would result in fewer shipments (on the order of 20 per year). Final transportation methods have not been selected and would depend on where fabrication of the overpacks is done, and cost comparisons of the various shipment options.

ACTION

The ER will be updated to include the above information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-9 Provide an estimate of emissions of criteria pollutants (SO_2, CO, Pb, PM-10, PM-2.5, VOCs) from any diesel generator(s) PFS plans to use during construction and operation.

Response

The PFSF will utilize a 250 horsepower diesel generator during operation to supply back-up electrical power when normal service is interrupted. Criteria pollutant emissions estimates for this engine are provided using uncontrolled emission factors from the latest version of AP-42 Chapter 3.3, "Gasoline and Diesel Industrial Engines" (Supplement B, October, 1996) for diesel fueled engines. AP-42 assumes that all particulate matter is less than or equal to 1 micrometer. Also, the emission factor shown for VOC is actually based on total organic compounds (TOC) which is conservative for VOC. The annual emissions below assume a maximum of 500 operating hours per year.

The emission factors used and estimates of criteria pollutant emissions are summarized as follows:

Pollutant	Emission Factor (lb/hp-hr)	Hourly Emissions (lb/hr)	Annual Emissions (tons/yr)
NO_x	0.031	7.75	1.94
SO_2	0.00205	0.51	0.13
PM-10/PM-2.5	0.0022	0.55	0.14
CO	0.00668	1.67	0.42
VOC	0.00247	0.62	0.16
Pb	N/A	N/A	N/A

PFS has no specific plans to use any diesel generators during construction, however it is possible that portable generators could be used on occasion for short term construction activities that might require portable lights. These engines would be of a much smaller size (approximately 30-50 hp) than the facility back-up generator. The emissions estimates given above are so conservative relative to expected emissions that it is reasonable to assume that any construction diesel generator emissions would be encompassed within these estimates.

ACTION

The ER will be updated to include the above emissions estimates.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-10 Provide an estimate of the time of day construction and operation activities, resulting in air emissions, will take place.

Include estimates of the time of day Skull Valley Road will be used by construction vehicles and heavy haul vehicles.

RESPONSE

Construction

As stated in ER Section 4.1.7, construction traffic for the PFSF, involving delivery of material, equipment and supplies and commuting of workers to and from the site is based on a 10 hour shift length at least 5 days per week principally during daylight hours. Use of Skull Valley Road will presumably be highest during worker commutes. These periods will involve primarily private vehicles rather than larger construction type vehicles. Construction trucks will travel the road throughout a normal working day. These construction activities will result in an estimated average of 299 truck trips per day (30 vehicles per hour) during Phase 1 of the project, 154 trucks per day (16 vehicles per hour) during Phase 2, and 54 truck trips per day (5 vehicles per hour) during Phase 3. Emissions for the construction vehicles are shown in ER Table 4.1-4.

Operation

Operation of the PFSF is planned to occur during a typical 8-hour day shift, 5 days per week for standard operations and 7 days per week for fuel shipment receipt. Again, worker commutes, in private vehicles, will comprise the majority of traffic on Skull Valley Road at the beginning and end of the workday. The heavy haul vehicle is expected to travel along the 26-mile Skull Valley Road making 2-4 round trips per week to deliver spent fuel shipments. As shipments arrive at the ITP, crews will be dispatched to drive the empty heavy haul tractor/trailer to the ITP during any hour of the day. Heavy haul delivery to the storage facility will principally be made during daytime hours.

As discussed in the response to ER RAI 2, Question 2-6, extended workdays will only be used for those infrequent times when a 3-cask shipment is received.

ACTION

Since this information is currently present in the ER, no further revisions are required.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-11 Provide a brief overview of any air monitoring program that PFS intends to implement at the site, rail line, and ITP.

RESPONSE

There is no plan to implement an air monitoring program for fugitive dust or any other air pollutant emissions at the PFSF site, Low Corridor rail line, or ITF as there is no requirement to do so under state or federal regulations.

As stated in the response to EIS RAI No. 2, Question 1-1:

> "The Preservation of Air Quality subsection of Section 9.1.3 of the ER discusses the minimal effect PFSF construction and operations will have on air quality. Throughout the PFSF operation, no exceedances of Clean Air Act (CAA) Title I, III, IV, and V permitting thresholds are expected. An initial draft of a CECP, for managing fugitive dust emissions during PFSF construction activities has been developed. Following completion of the draft, it will be incorporated into the Storm Water Pollution Prevention Plan (SWPPP) associated with the construction of the PFSF and access road. This CECP is not a document that must be filed with or approved by Federal and State agencies."

ACTION

No changes to the ER are required.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-12 Discuss any planned fueling station(s) for (1) on-site vehicles used at the proposed storage site, (2) locomotives used on the Skunk Ridge rail route, and (3) heavy-haul vehicles used for the Timpie ITF.

Include estimations of the fueling station location(s), types of fuels, fuel tank sizes and capabilities, specification of whether the tanks would be above ground or below ground, spill prevention and /or containment measures, clean-up procedures, etc.

RESPONSE

In general, all fueling activities at the PFSF must comply with applicable regulations. The need for a 40 CFR 112 Spill Prevention Control and Countermeasures Plan (SPCC) will be evaluated, as discussed in the response to EIS RAI No. 2, Question 1-1. Operation and use of the stored fuel will be in accordance with 29 CFR 1910 (OSHA) regulations to ensure employee health and safety requirements are met. Prior to fueling, a management plan and procedures will be developed to ensure that personnel are properly trained and fuel deliveries are carried out in accordance with the plan. Should a spill occur, spill control equipment will be readily available for immediate use by trained on-site personnel.

(1) <u>Fueling of on-site vehicles used at the proposed storage site</u>

As stated in PFSF SAR Section 8.2.4.1 and in PFS letter, Donnell to Delligatti, Submittal of Commitment Resolution Information, dated March 24, 1999, a diesel fuel oil storage tank will be located inside the restricted area (RA), and will supply diesel fuel oil for the cask transporter. This tank will be located near the RA fence, approximately 200 ft northeast of the northeast corner of the Canister Transfer Building and approximately 700 ft from the nearest storage casks. The outdoor tank will be above-ground, mounted on a concrete pad, with a double wall, having all necessary equipment for pumping and dispensing diesel fuel. The tank will have a capacity of approximately 1000 gallons and will store low grade sulfur No. 2-D diesel fuel. The tank includes a double wall for primary and secondary spill containment requirements, fill and venting requirements, and fire prevention requirements in accordance with NFPA 30, "Flammable and Combustible Liquids Code." The tank will be designed in accordance with the requirements of UL-142, "Above Ground Tanks for Flammable and Combustible Liquids." The tank will also be designed in accordance with UL-2085, "Insulated Secondary Containment for Aboveground Storage Tanks, Protected." This code requires that the tank meet 2-hour liquid-pool furnace fire tests, vehicle impact, and projectile resistance criteria. The station tank will be supplied with fuel from a regional bulk fueling service.

(2) Fueling of locomotives used on the Low Corridor Rail Line

The PFSF will not include an on-site diesel fuel storage tank for the locomotives. Rather, the locomotives at the PFSF will be fueled outside the restricted area (RA) via a regional bulk fueling service that will deliver fuel to the PFSF approximately every two weeks with a tanker truck. Use of the fueling service will eliminate the need to store large quantities of fuel required for the locomotives near the PFSF as well as fuel station maintenance. The fueling service must comply with EPA and OSHA regulations and must provide containment and clean up for any spills in accordance with the regulations.

(3) Fueling of heavy-haul vehicles used for the Intermodal Transfer Point

The heavy-haul vehicles will be fueled via a self-contained diesel fuel filling tank located near the Operations/Maintenance Building. The tank will be the same as the tank described above for the transporter vehicles and will meet the same criteria per NFPA 30, UL-142, and UL-2085 except that it will have a capacity of approximately 1200 gallons. The station tank will be supplied with fuel from a regional bulk fueling service.

ACTION

The ER will be revised to include this information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-13 Provide a detailed description of the revised revegation plan for the project area (the site, rail line, and ITF).

Include the types of vegetation to be replanted, as well as the geographic areas where such revegetation will occur. Also, provide information on the type, frequency, etc., of anticipated monitoring that will be conducted to ensure the successful establishment of such vegetation. Describe any corrective actions that may be undertaken if successful revegetation is not achieved.

RESPONSE

A detailed revegetation plan has not yet been developed for the PFSF site, the Low Corridor rail line, or the Intermodal Transfer Point (ITP). All areas at each of these locations that are temporarily disturbed during construction will be revegatated. The location and size of these disturbed areas is currently discussed in ER sections 4.1.2, 4.3.2, and 4.4.2. As discussed in ER section 4.1.2, a 68-acre area surrounding the Restricted Area (RA) will be revegetated with crested wheat grass to provide an additional fire barrier to protect the facility from wild fires.

A detailed revegetation plan will be developed in consultation with the BLM for the rail line and ITP and with the Tribe and BIA for the PFSF site. The plan will be developed during construction and will incorporate the latest requirements/recommendations for soil preparation, type of seed mix, time of year to plant, watering frequency, etc. The revegetation plan will follow guidelines currently used by the BLM such as the Interagency Forage and Conservation, Planting Guide for Utah, EC 433 or later documents in effect at the time the plan is developed.

Development of the revegetation plan in this time frame (during construction) and in consultation with the above mentioned groups will ensure that the latest requirements/recommendations are incorporated into the plan while providing flexibility to accommodate land use preferences of the Tribe or BIA.

ACTION

The ER will be updated to include the above information on development of the revegetation plan.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-14 Provide dose assessment information for wildlife that may be exposed to the casks. Specifically, dose estimates are needed for reptiles and small mammals that might not be excluded by the proposed nuisance and security fences. Also, dose estimates are needed for birds that may perch upon the tops of the casks.

The February 18, 1999, response included a general description of the effects of ionizing radiation on wildlife, as well as a calculation that estimated the dose to an animal standing at the security fence for a year.

RESPONSE

Dose rates and annual doses were calculated for animals assumed to be in contact with both HI-STORM and TranStor storage casks in PFSF Calculation No. 05996.02-UR(D)-008, Dose Rate Calculations at PFSF Locations Potentially Accessible to Wildlife and Estimates of Annual Doses to Individual Animals, Revision 0, Stone & Webster. The analysis assumed that an animal is in contact with a HI-STORM or a TranStor storage cask containing relatively hot PFSF spent fuel, represented by PWR fuel having 40,000 MWd/MTU burnup and 10 years cooling time (PFSF SAR Section 7.3.3.5). In addition to radiation from the cask contact, the analysis also included calculation of the contribution to the total dose rate from neighboring casks in the array. It was assumed that neighboring casks are the same model as the contact cask (HI-STORM or TranStor), and are loaded with average or typical PFSF spent fuel, represented by PWR fuel having 35,000 MWd/MTU burnup and 20 years cooling time (PFSF SAR Section 7.4).

Dose rates were calculated at two locations: 1) in contact with an inlet duct at the bottom of a cask, and 2) on top of the cask, in contact with the center of the storage cask lid. It is conservative to assume the animal is on contact with the inlet duct of a cask containing relatively hot PFSF fuel, since dose rates at the inlet ducts are higher than dose rates at the concrete at the base of the cask away from the inlet ducts due to scattered radiation paths through the cooling air ducts. The dose point identified in the vendor SARs at the top of the storage casks is at the center of the cask lid. Therefore, it is assumed that birds that perch on top of a storage cask are located in the center, in contact with the lid. Based on the total dose rates calculated for animals in contact with the air inlet ducts and tops of the HI-STORM and TranStor storage casks, annual doses were estimated assuming that the animals were in contact with the cask for one-half year (4,380 hours) and spend the remainder of their time at a location where dose rates are insignificant by comparison.

The following is a compilation of dose rates and annual doses for animals assuming contact with a storage cask 50% of the time, determined in PFSF Calculation No. 05996.02-UR(D)-008.

Summary of Dose Rates and Annual Doses at Locations of Interest in Contact with Storage Casks at the PFSF

Receptor Point Location	Gamma Dose Rate (mrem/hr)	Neutron Dose Rate (mrem/hr)	Total Dose Rate (mrem/hr)	Annual Dose Assuming Animal Spends 1/2 Year in Contact with Cask (Rem/year)
Contact with Air Inlet Duct of HI-STORM cask, PWR fuel	11.43	2.56	14.0	61.3
Contact with Top of HI-STORM cask (center lid), PWR fuel	7.01	3.20	10.2	44.7
Contact with Air Inlet Duct of TranStor cask, PWR fuel	22.0	4.75	26.8	117
Contact with Top of TranStor cask (center lid), PWR fuel	21.8	98.6	120	526
Contact with Top of TranStor cask (center lid), BWR fuel	23.2	125.2	148	648

Calculated annual doses to animals that could spend time in contact with the HI-STORM storage cask inlet ducts and lid are less than the 100 rad/year PFSF criterion, discussed in the response to EIS RAI No. 1, Question 10-8. Calculated annual doses to animals that could spend time in contact with the TranStor storage cask inlet ducts are slightly in excess of the 100 rad/year PFSF criterion, while annual doses to a bird postulated to be in contact with the top of the TranStor storage cask for one-half the time during a year are well above this criterion. Shielding on top of the storage casks differs significantly between the HI-STORM and TranStor designs. While the steel canister lids provides similar shielding for the two designs, the HI-STORM storage cask lid includes a 10.5 inch thick concrete plug in addition to approximately 5 inches of steel, whereas the TranStor storage cask lid is 0.75 inch steel. This results in higher dose rates above the TranStor storage cask, consisting primarily of neutron radiation.

Since animals on contact with storage casks could potentially exceed the 100 rad/year PFSF criteria for wildlife, PFS will take actions to assure wildlife does not spend significant amounts of time inside the PFSF Restricted Area fence. As stated in the response to EIS RAI No. 1, Question 10-8, "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 cask storage area 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."

ACTION

The ER will be updated to reference the dose calculation for wildlife, and incorporate the discussion on PFS's commitment to keep wildlife out of the restricted area.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-15 Provide any available surveys of protected species in the vicinity of the alternate Wyoming site.

RESPONSE

The following information on threatened and endangered species at the Wyoming site was provided in Section 4.3, page 22 of the "Field Investigation Evaluation Report". This report was provided (PFS letter, Parkyn to Director, Office of Nuclear Material Safety and Safeguards, dated February 18, 1999) as an attachment to EIS RAI No. 1, Question 6-2.

> It is unlikely that any Federal or State-listed threatened or endangered species inhabit the site area. A 1994 request by NEW Corporation to the Nature Conservancy, which handles the Natural Diversity Data Base, revealed that the common loon was the only identified State-listed animal species, and this was located at Boysen Reservoir. Two candidate plant species under the Endangered Species Act were identified, both of these from around the Reservoir.
>
> Conversations with Bob Luce and Andrea Cryzowski of the Nongame Division of the Wyoming Fish and Game Department indicate that there is unlikely to be any State-listed endangered or threatened species present, but no formal surveys have been performed by the State in the area, and the database files would consist of reports from random observations.
>
> The site visit included a probable identification of a nesting pair of ferruginous hawks on the west side of the bluff situated about 0.5 miles east of the site area. The ferruginous hawk is a hawk of the open plains and is a species of "special concern" in Wyoming as well as a "candidate species" for the USFWS.
>
> In addition, the presence of prairie dog communities in the site area suggests the possible presence of the Federal-listed black-footed ferrets, a predator relying heavily on prairie dogs as prey. The black-footed ferret is a Federal endangered species.

PFS has not conducted any rare and endangered species surveys at this site. However, the Wyoming Natural Diversity Database and U.S. Fish & Wildlife Service have been contacted recently requesting the latest rare species information. Their responses will be provided upon receipt.

ACTION

After receipt and review of the requested information, the ER will be updated as required.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-16 Clarify whether the estimate of 130 workers for construction and 43 workers for operation includes the necessary workers for the construction and operation of the rail line and ITF.

If the estimate does not include the rail line and ITF, then provide information on the number of workers needed for construction and operations for the following portions of the proposed project: (1) the Low railhead (siding), (2) the Skunk Ridge rail corridor, (3) the ITF, and (4) the heavy-haul use of Skull Valley road. In addition to the information about the numbers of workers, provide the time periods during which these workers would be present in Skull Valley.

RESPONSE

(1)(2) <u>Number of workers for activities at the Low Corridor Rail Siding / Rail Line</u>

Construction

The estimate of 130 workers from ER Section 4.1.1 applies to construction of the storage facility and not the Low Corridor Rail siding or rail line. The rail siding consists of three siding tracks just off the UP mainline approximately 2400 ft long. The rail line consists of 32 miles of railroad track. Both the rail siding and rail line will be constructed as one project utilizing the same construction crews. Construction activities will be conducted primarily during daylight hours and will be completed in approximately one-year.

During construction of the rail line, an estimated peak work force of 125 workers will be required for various tasks. The bulk of the manpower will be for the earthwork. This work will involve clearing, cutting and filling, installing culverts, contouring the ground for the required profile, finish grading, and seeding. The equipment will include bulldozers, scrapers, dump trucks, front-end loaders, compactors, graders, and water trucks. This portion of the work is estimated to take approximately 109 workers including equipment operators, laborers, electricians, iron workers, concrete finishers, and construction supervision staff.

The remainder of the work involves laying the sub ballast, ballast, ties, track, and spikes. A track-laying machine with dedicated work locomotives will be utilized. Approximately 16 workers will be required to support the track-laying machine.

Operation

The number of workers stated in ER Section 4.1.1 for operation of the storage facility (43 workers) does include the workers required for operation of the rail line. As stated in ER Section 4.4.7, there will generally be 1-2 locomotive round trips per week. Typically, 2 personnel will be required to operate the locomotives and perform the necessary coupling and uncoupling operations at the siding. The delivery of a train to the PFSF from the siding area could occur at any time of the day although daytime hours are preferred in order to minimize shift schedule impacts.

(3) Number of workers for activities at the Intermodal Transfer Point

Construction

The estimate of 130 workers from ER Section 4.1.1 does not apply to construction at the ITP. As stated in ER Section 4.3.1, construction at the ITP will involve alteration of 11 acres of land for the gantry crane enclosure (Metal building), access road, and rail siding. The work will involve earthwork to level the site, grade the access road, and prepare the rail bed, pour the building foundation, erect the gantry crane and metal building, install building electrical and mechanical infrastructure, lay railroad track, pave the access road, and install site fencing. Equipment will include bulldozers, scrapers, dump trucks, front end loaders, compactors, graders, water trucks, rail lying equipment, mobile crane, cement trucks, and an asphalt paver. The work will be performed within a year, principally during daytime hours and is estimated to take approximately 35 workers including equipment operators, laborers, electricians, iron workers, concrete finishers, and construction supervision staff.

Operation

The number of workers stated in ER Section 4.1.1 for operation of the storage facility (43 workers) does include the workers required for operations at the ITP. As stated in ER Section 4.3.7, it is expected that 2-4 round trips per week will be required to move the shipping casks from the ITP to the storage facility. Transfer of a shipping cask will involve moving a rail car loaded with a cask from a siding to the gantry crane, lifting the shipping assembly off the rail car and moving it onto the heavy haul trailer, and transferring the cask from the ITP to the storage facility. This process is estimated to require a 4-man crew and will occur principally during daytime hours.

(4) Number of workers for heavy haul activities on the Skull Valley Road

Construction

As stated in ER Section 4.3.2, heavy haul transport of storage casks from the ITP to the storage facility will not require any land disturbance or widening of Skull Valley Road to accommodate the heavy haul tractor/trailers. Therefore, there will be no construction activities associated with Skull Valley Road.

Operation

The ITP is not normally manned. The work crew that transfers the shipping cask from the rail car to the heavy haul trailer will be the same 4-man crew that will transport the heavy haul trailer to the storage facility. These activities will be conducted principally during daytime hours.

ACTION

The ER will be revised to include this information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-17 Discuss the potential sources(s) of labor for construction and operation of the proposed project.

Include an estimate of the number of Native Americans that could potentially be employed.

RESPONSE

The Salt Lake City region of Utah in which the PFSF site is located has had more than an adequate supply of skilled construction personnel to meet the area's needs in recent years and there is no indication that critical skill shortages will appear in the near future. Commercial construction has flourished recently which has, in turn, increased the number of construction workers in the area. According to the Utah Building and Construction Trades Council, the major venues for the 2002 Winter Olympics, hosted in Salt Lake City, have already been built with only the construction of private facilities to be completed before 2002. A continuation of this construction boom is anticipated for the next two years until the onset of the 2002 Winter Olympics. The construction trades work force has been rapidly growing to meet the upswing in demand, and the PFSF project will be positively impacted by this job market expansion.

In addition to construction activities for the Olympics, over $1 billion in highway construction projects are currently underway in the state. These projects are expected to peak in the year 2000. As the need for labor on the highway projects declines, there will be a surplus of construction workers skilled in the civil trades.

Although it is not possible to give a specific number of Native Americans that might be employed by the project, the area's Native American work force will be utilized to the greatest extent practicable on PFSF construction. Special efforts to train and employ Native-Americans in the construction trades will be undertaken on the project and Native-American owned contractors will be identified, and given every opportunity to bid on specified construction work packages.

The source of operational staff is expected to be mainly drawn from local communities. Some health physics and nuclear engineering staff may come from elsewhere in the industry though a number of Utah natives have this background and may wish to apply.

The number of Native Americans employed at the site during operations is expected to be significant. Preference will be given to members of the Skull

Valley Band of Goshute Indians and they will be encouraged to apply. Several other reservations are located within Utah at differing distances from the site and depending on work scheduling (e.g. length of shifts and number of days per week) employment at Skull Valley may well be an attractive option for members of other Tribes as well. The nature of the work is consistent with the working background of several members of the Band and a job explanation session is currently scheduled for interested members of the Skull Valley Band (including youth) to outline the requirements for those jobs requiring certain college degrees or technical skills. This will permit Band members wishing to qualify for these jobs to direct their studies in a manner that allows them to reach their goals. All persons will, of course, be required to meet the job qualifications consist with the License Application.

ACTION

The ER will be updated to include the above information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-18 Provide an estimate of the amounts of state and county tax payments, local payroll, and other such local expenditures that are anticipated over the lifetime of the PFSF.

A basis for the estimation should be provided.

RESPONSE

(NOTE: The following values are for the 15,000 MTU base case)

The amount of state tax payments is estimated to be $53.5M, based on a review that PFS performed on the Utah tax structure. Payments to Tooele County are estimated to be $91.2M, based on a proposed agreement that was negotiated between PFS and the County. Site payroll (exclusive of facility construction or canister manufacture) is estimated to be $81M. This estimate is based on actual staff positions and anticipated pay for each position, including benefits. Other local expenditures, including operations support and utilities, is estimated to be $79M. Local expenditures for operations support are based on the number of personnel involved, and utilities are based on the number of buildings and the estimated utility load for these buildings. The construction of casks and canisters if done locally is estimated to be $747M. Payroll expenditures for Phase I construction are estimated to be approximately $30 M. This includes the cost of constructing the Low Corridor rail line, and does not include the cost of constructing the Intermodal Transfer Point.

ACTION

The ER will be updated to include the above information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-19 Discuss the planned use of Skull Valley Road for heavy-haul vehicles from the proposed Timpie ITF.

The discussion should specify the anticipated number and frequency of shipments on Skull Valley Road, as well as the time of day these shipments would most likely be scheduled.

RESPONSE

Number and Frequency of Shipments.

As stated in ER Section 4.3.7, it is expected that 2-4 round trips per week will be required for the heavy haul transportation of casks along the 26-mile Skull Valley Road.

Typical Time of Day of Shipments

Typically, work at the ITP will be planned for day shift hours. As shipments arrive at the ITP, crews will be dispatched to drive the empty heavy haul tractor/trailer to the ITP as necessary during work hours. Transfer of a shipping cask from a rail car to the heavy haul trailer will take approximately 4 hours. Therefore, the return trip with a loaded heavy-haul vehicle would be near the end of the same day.

Time to travel from the ITP to the PFSF

The time for the heavy-haul shipment to travel from the ITP to the PFSF is determined as follows:

> The heavy-haul vehicle will travel a minimum of 20 mph in accordance with UDOT Utah Regulations for Legal and Permitted Vehicles, Section 600.
>
> As stated in ER Section 4.3.7, the travel distance from the ITP to the PFSF is 26 miles.
>
> Therefore, 26 miles / 20 mph = 1.3 hours

Assume with start and stop time the trip will take approximately 1.5 hours.

Pilot/Escort Vehicle Requirements

In accordance with UDOT Utah Regulations for Legal and Permitted Vehicles, Section 600 (Oversize Loads), pilot/escort vehicles will be required in the front and rear of the heavy haul tractor/trailer due to its length. The distance between the pilot/escort vehicles and the heavy haul vehicle is not specified in the Regulations but is presented in the Utah Escort Certification Manual as follows: The front pilot/escort vehicle needs to be far enough ahead to alert the load vehicle driver of any upcoming problems. The rear pilot/escort vehicle needs to be far enough behind to warn trailing vehicles of the slow/oversize load ahead. These distances are based on the escort's judgement and depend on traffic levels, highway conditions, and heavy-haul vehicle speed. It is anticipated that the pilot/escort vehicles will need to travel no more than approximately 1000 ft from the heavy-haul vehicle since Skull Valley Road is flat and straight allowing long sight distances and has little traffic.

Distance and Time Required to Pass Heavy-Haul Shipment

As stated in the response to EIS RAI No. 1, Question 11-5, the current level of service (LOS) on Skull Valley Road is level A (least use) so it is anticipated that there will be very few vehicles desiring to pass the heavy-haul vehicle. The heavy-haul vehicle will be moving at a slower rate of speed (estimated at near the minimum of 20 mph) than the posted limit of 55 miles per hour, which will require other traffic to reduce travel speed or make passing maneuvers. Because of the distances between the heavy-haul vehicle and pilot/escort vehicles, it is assumed that vehicles desiring to pass will do so in three passes versus one long passing maneuver. Passing the pilot/escort (two-axle truck, i.e., pickup) and heavy-haul vehicles should present few problems because of the large difference in vehicle speeds, the highway is straight providing ample passing distance/maximum visibility, and there would most likely be no oncoming traffic. Assuming the heavy-haul vehicle, which is approximately 175 ft long, is traveling 20 mph and the passing vehicle has slowed somewhat from 55 mph to 45 mph and is starting and ending their passing maneuver in the same lane 100 ft from the heavy-haul vehicle, the time and distance required to pass would be:

45 mph = 66 fps, 20 mph = 29 fps

distance traveled by passing vehicle (d) = (66 fps) x time (t)

= 100' (behind) + 175' (truck length) + 29t (truck travel dist.) + 100' (ahead)

66t = 375 + 29t
37t = 375
t = 10.1 sec

d = 66 x 10.1 = 667 ft

Limits on heavy haul transport at night

UDOT Utah Regulations for Legal and Permitted Vehicles, Section 600.3 state that overweight/oversize vehicles are generally prohibited from operating during hours of darkness. However, there are provisions in the regulations where movement after dark is permitted if it is determined by the Department to be in the best interest of safety and convenience.

ACTION

The ER will be revised to include this information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-20 Provide information on the current and projected time-of-day traffic use (for all traffic, not just PFSF traffic) on Skull Valley Road.

RESPONSE

ER Section 2.8.3 addressed the average daily traffic (ADT) counts that were obtained from the State of Utah for existing traffic. The ADT for Skull Valley road south of Iosepa is 325. Peak-hour data was not available from the state. In the absence of hourly data, we assumed that the maximum vehicle per hour (v/h) volume is one-sixth of the total ADT. This is equivalent to 1/3 of the ADT occurring during the morning 2-hour commute period, and 1/3 during the evening 2-hour commute. This computes to a volume of 54 v/h during each 2-hour commute. It was assumed that the remaining third of the non-peak traffic will be evenly distributed over a 12-hour, non-rush hour period resulting in a non-peak, average daytime traffic volume of 9 v/h.

ER Section 4.1.7 provides a detailed breakdown of traffic added due to the construction. The traffic numbers were derived from calculation 0599601-E(B)-03, Revision 1.

Construction ADT of the PFSF during Phase 1 will add 299 trucks at 30 v/h during Period 1, 154 trucks at 16 v/h during Period 2, and 54 trucks at 5 v/h during Period 3. In addition, a peak construction labor force of 130 workers is projected which will contribute 130 trips to and from the work site or 260 trips/day or 130/2 = 65 v/h during morning and evening peak periods. The following table shows the peak volume as 149 v/h during Period 1, 135 v/h during Period 2, and 124 v/h during Period 3.

Construction ADT during Phase 2 will add 8 truck trips per day or less than 1 truck trip per hour. The construction labor force vehicles will increase the ADT by 86 trips. The operational labor force will increase the ADT by 84 trips resulting in an ADT of 503 vehicles and a peak hour volume of 104 vehicles.

Construction ADT during Phase 3 will add 20 truck trips per day or 2 truck trip per hour. The construction labor force vehicles will increase the ADT by 86 trips. The operational labor force will increase the ADT by 84 trips resulting in an ADT of 515 vehicles and a peak hour volume of 105 vehicles.

After November 30, 2021, all construction will be complete and the ADT will only increase by the 84 operational labor force vehicles resulting in a total ADT of 409 vehicles and a peak hour volume of 81 vehicles.

Construction Time	ADT	Morning 2-hour commute v/h	Non-peak traffic v/h	Evening 2-hour commute v/h
Existing Traffic	325	54	9	54
Phase 1 Period 1	884	149	39	149
Phase 1 Period 2	739	135	25	135
Phase 1 Period 3	639	124	14	124
Phase 2 (2002 - 2011)	503	104	10	104
Phase 3 (2012 - 2021)	515	105	11	105
Operation (after 2021)	409	81	9	81

ACTION

The ER will be revised to include the table above showing the time-of-day traffic figures. The other information is already included in Section 4.1.7 of the ER.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-21 Provide an estimate of radiation dose from the storage casks to the nearest resident at the Wyoming site and person-rem estimates for the nearby population around the Wyoming site.

RESPONSE

The response to this RAI is proprietary, and is being submitted under separate cover.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-22 Provide the approximate number of occupational personnel that would receive an annual radiation dose exposure during operation of the PFSF.

This information should be provided for the following four categories: (1) personnel receiving, transferring, and moving SNF to storage; (2) personnel involved with security, inspection, and maintenance; (3) personnel at the facility not directly associated with Items 1 or 2; and (4) personnel involved at the proposed ITF.

RESPONSE

The PFSF operational organization is shown in SAR Figure 9.1-3. A list of personnel identified in Figure 9.1-3 that are expected to receive occupational radiation exposure is provided below. Following each organizational breakout there is an indication of which of the above categories these personnel are involved with and the number of personnel involved. For instance, the instrument/electrical and mechanical maintenance personnel are involved in receipt, transfer, and moving SNF to storage (Category 1), performing maintenance operations (Category 2), and they are also involved in intermodal transfer operations (Category 4). The radiation protection personnel and Emergency Preparedness/Training Coordinator (who provides health physics backup) are involved in receipt, transfer, and moving SNF to storage (Category 1), performing radiological inspections/surveillances at the PFSF (Category 2), and could provide any necessary health physics coverage of intermodal transfer operations (Category 4).

Instrument/Electrical Maintenance personnel (Cats. 1, 2, and 4)	(4)
Mechanical Maintenance/Operations personnel (Cats. 1, 2, and 4)	(4)
Quality Assurance personnel (Cats. 2 and 4)	(3)
Emergency Preparedness/Training Coordinator, health physics backup (Cats. 1, 2, and 4)	(1)
Radiation Protection personnel (Cats. 1, 2, and 4)	(3)
Security personnel (Cats. 2 and 4)	(18)
Nuclear Engineering (Cat. 3)	(1)
Transportation Specialist	(1)
Total number of personnel expected to receive occupational exposure	(35)

As seen from the above, most of the personnel in the PFSF operational organization are expected to receive occupational exposure. A list of personnel identified in SAR Figure 9.1-3, Operational Organization, that are not expected to receive occupational exposure under any of the above listed Categories 1 – 4 is provided below.

Nuclear Engineering Secretary	(1)
Administrative Assistant	(1)
Administrative Secretary	(1)
Public Relations Coordinator	(1)
Financial/Purchasing Specialist	(1)
Total number of personnel not receiving occupational exposure	(5)

ACTION

The ER will be updated to include the above information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-23 Describe the locations and the economic status (where employed in what kinds of economic activities, approximate income level) of any non-Native American minority and low-income populations (if any) within 4 miles of the proposed Skull Valley PFSF.

RESPONSE

ER Figure 2.2-4 identifies 1 residence outside of the reservation but within 4 miles of the site. The population of 3 people assigned to that residence was derived by multiplying the people per household factor (3.35) for the Census tract in which this area is included by the number of houses counted in the area.

It is impossible to determine the ethnic background or economic status of the small population residing within 4 miles of the site from published data. To protect confidentiality, the Census and state agencies that develop population projections, don't provide data when the sample group is so small that one would be able to identify the individuals for whom the data apply. Given the sparse population of the region, the smallest area for which information is enumerated around the site is census tracts. The entire area within 4 miles of the Skull Valley PFSF is included within Tooele County Census Tract 1306, which encompasses 5,751 square miles and contained a total population of 3,592 people in 1990.

A total of 1,008 households were identified within Census Tract 1306 in the 1990 census with a median household income of $25,852.00. In 1989 about 12% of the families had incomes below the poverty level.

Approximately 1,628 persons 16 and over were employed with 32% employed in service occupations, 15% in administrative support occupations (including clerical), 11% in sales occupations and 10% in executive, administrative and managerial occupations. The balance were distributed among a wide variety of business sectors.

ACTION

The ER will be updated to include the above information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-24 Discuss the current health status of the Skull Valley population, especially low-income and minority populations (e.g., presence of chronic poor health conditions, unusual incidence of diseases of certain organs, skin conditions, and documentation of possible causes).

RESPONSE

No data is available that would allow us to determine the specific health status of the Skull Valley population. The Utah Department of Health reports health statistics by Health District. While Health Districts can be as small as a zip code area in more densely populated urban areas, the health district in which Skull Valley is located consists of all of Tooele County and is the smallest area for which published information is available. The following table lists the prevalence of various chronic diseases within the Tooele Health District (including the Tribe) and the State of Utah in 1996. We were not able to identify any unusual incidences of diseases or the income or ethnicity of the individuals with chronic diseases.

Disease	Percent of Population: Tooele County	Percent of Population: State of Utah	Tooele Residents With Disease As Percentage of State Total*
Asthma	5.5%	4.1%	1.8%
Arthritis	5.5%	5.1%	1.5%
Heart Disease	3.7%	2.7%	1.9%
Chronic Obstructive Pulmonary Disease	1.1%	1.0%	1.5%
Diabetes	3.7%	2.9%	1.7%
Stroke	0.9%	0.9%	1.1%

*Total Tooele County population is 1.4% of the State's total population.

Source: Utah Department of Health, Bureau of Surveillance and Analysis. Overview of 1996 Health Status Survey.

ACTION

The ER will be updated to include the above information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-25 Identify low income and minority groups known to be in the vicinity of the Wyoming site (i.e., within 4 miles of the site), and include an estimation of the population of any known groups.

RESPONSE

The Wyoming site is located in Fremont County. The area surrounding the site is extremely rural but contains two small communities: Shoshoni, located just over 2 miles to the south-southwest; and Bonneville, about 1 mile north. The U.S. Census counted a total population of 527 people in Shoshoni in 1990 (population Estimates Program, Population Division, U.S. Census Bureau – SU-98-9). Although we have no specific census count, we estimate that approximately 60 people resided in Bonneville in 1990, based on a house count of 22 houses multiplied by a Fremont County persons per household factor of 2.74. Less than 1 percent of the total 1990 county population was Black, about 18.5 percent was of Native American decent, and about 4 percent were Hispanic (1990 Census Profile 1 for Fremont County). Specific information on ethnicity for either Bonneville or Shoshoni was not found. Median household income in Fremont County was $22,260 in 1990, with about 19% of the population living below the poverty level.

ACTION

The ER will be updated to include the above information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-26 Describe any known TCP or ethnobiological resources in the vicinity of the Wyoming site that could potentially be impacted by the construction and operation of the proposed facility.

RESPONSE

No Traditional Cultural Properties are known to be located within the impact area of the Wyoming site. The nearest cultural property listed in the National Register of Historic Places (it is unclear whether this is listed as a TCP or just a significant prehistoric site) is the Castle Gardens Petroglyph Site, which is located in Moneta, over 20 miles to the southeast.

Information on ethnobiological resources for this region is not available through any published reports and can only be obtained by contacting each Native American group in the region. Since PFS did not select this site we have not contacted any Native American groups for information on ethnobiological resources.

ACTION

The ER will be updated to include this information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-27 Provide the noise levels produced by the nearby Tekoi Rocket Motor Test facility when it is in operation.

Noise level data should be provided in decibels and their associated distances and directions from the Tekoi facility.

RESPONSE

No rocket motors were tested during the recent ambient sound level survey conducted for the PFSF Environmental Report as operations at the test facility are very infrequent. It was therefore not possible to directly measure rocket noise during the survey. The Tekoi Rocket Motor Test facility was therefore contacted to determine if they had any sound level data for motor testing. They reported that to their knowledge no sound level measurements have been taken in the last decade.

Other historical data, however, has been obtained. The sound levels of several rocket motors were summarized in "Environmental Impact Analysis, Rocket Motor Test Site, Skull Valley Band of Goshute Indians, Skull Valley Reservation, March 18, 1975. This data is given in the following table. Current rocket motors may be expected to be somewhat larger and louder.

Trident I C4 Rocket Motor Sound Level Test Data

Rocket Motor	Background Noise, dBA	Distance, ft.	Rocket Motor Noise dBA
C4 F/S[1]	45	7800	72-74
C4 F/S	52	7800	60-62
C4 S/S	55	7800	Audible, not measurable
C4 S/S	55	7800	Audible, not measurable
C4 F/S	58	7800	70
C4 F/S	58	1600	90
C4 T/S	25	1600	88

[1] F/S, First stage, S/S second stage, T/S third stage

ACTION

The ER will be updated to include the above sound level data.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-28 Provide an estimation of the frequency of rocket motor tests.

Also, discuss any expected changes in frequency over the expected life of the PFSF.

RESPONSE

Based on recent phone conversations with Alliant Techsystems Inc., Alliant currently has no rocket engine tests scheduled at the Tekoi test facility for the next ten years, and no plans to conduct rocket motor testing at the Tekoi test facility in the foreseeable future. According to Alliant, five rocket engine tests were conducted at the Tekoi test facility over the past two years, with each test lasting approximately 1.5 to 2 minutes. In order for this facility to be used by Alliant Techsystems Inc. in the future, the lease agreement between Alliant and the Goshute Band would need to be renegotiated.

ACTION

The ER will be updated to include the above information.

ENVIRONMENTAL IMPACT STATEMENT

4. ENVIRONMENTAL CONSEQUENCES

4-29 Provide sketches or artist renderings of the full facility (4,000 casks, batch plant, earthen berms, buildings, light poles, etc.), rail line and siding, and ITF.

Include daytime and night time sketches or renderings from points where people are most likely to view the site, rail line and siding, and ITF, such as Desert Peak, Skull Valley Road, Cedar Mountains, and Skull Valley Indian Reservation village.

The February 18, 1999, response to RAI Question 14 was deficient. None of the renderings provided for the proposed facility included a perspective from Desert Peak or the Skull Valley Indian Reservation village. Responses 14-1 and 14-2 are inadequate and incomplete in that none of the figures in those responses appear to include the facility's light poles. In addition, the batch plant and cask manufacturing areas do not appear to be shown.

RESPONSE

Artist's concepts of the PFSF on the Skull Valley Band of Goshute reservation, the Low Corridor Rail Line / sidings, and the Intermodal Transfer Point are presented in Figures 1 through 16. The vantage points used focused on locations the viewing public would reasonably find accessible. Locations include the siding area at Low, UT and mid-valley for the rail corridor; the Intermodal Transfer Point viewed from I-80; and the storage facility itself is viewed from the highest accessable point (private road) of Deseret Peak, the Skull Valley Band of Goshute tribal village, the Pony Express Store on the reservation and from Skull Valley Road on the reservation.

The following index can be used to correlate each Figure with the viewing location.

FIGURE 1: PFS Rail Siding Area at Low from the I-80 Off-ramp -- Looking south from the I-80 westbound off-ramp at Low, toward the UP main line and rail siding area, one cannot see the rail line, rail sidings, nor trains, since the tracks are 15' to 27' below grade from left to right in the center of the photo.

FIGURE 2: PFS Rail Line at Low from I-80 -- Looking east from the I-80 median near the Low exit, one can barely see the PFS rail line and trains emerging at grade near the center-left side of the photo. In this photo the rail line is about 15' below grade in the right-center portion of the photo and thus, cannot be seen from this point.

FIGURE 3: PFS Rail Line from the I-80 Off-ramp -- Looking east from the I-80 westbound off ramp at Low, one can see a little more of the PFS train than in Figure 2, since this vantage-point is at a slightly higher elevation.

FIGURE 4: PFS Rail Line from West of Low -- Looking east from the paved I-80 frontage road at a point west of Low, one cannot see the rail line at all since it is some 27' below grade at the connection point to the UP mainline railroad. However, the slight cut in the terrain near the center-left side of the picture, near the series of utility poles, indicate where the rail line begins.

FIGURE 5: PFS Rail Line from Old US 40 -- Looking north from the old US Route 40 (now abandoned), one can see I-80 and the overpass over the UP mainline. Near the right of the photo, one can barely see the tops of the PFS locomotives as the train emerges eastbound from Low where the rail line and siding are 27'-15' below grade left to right in the photo.

FIGURE 6: PFS Rail Line from Cedar Mountains at Mid-valley -- Looking east from the foothills of the Cedar Mountains at a point near the middle of Skull Valley near a promontory accessible to the public, one can see the PFS line running left to right near the center of the photo.

FIGURE 7: PFS Intermodal Transfer Point -- Looking north from the I-80 median, one would see this view of the PFS Intermodal Transfer Point (ITP) and rail siding adjacent to the UP main-line tracks. Light poles, fences, and access road are visible in this view.

FIGURE 8: PFS Intermodal Transfer Point at Night -- From the same vantage-point of Figure 7, this is a nighttime view of the PFS Intermodal Transfer Point (ITP) looking north from the I-80 median.

FIGURE 9: PFS Facility from Deseret Peak – Looking west from the highest accessible point (private road) near Deseret Peak in the Stansbury Mountains east of the PFS site, one can see the general layout of the facility and buildings. The access road and power poles enter into the facility from the east (left of photo) while the rail line enters from the west (right of photo). The batch plant/cask manufacturing area is located north of the Canister Transfer Building. Earthen berms are visible on the south and west sides of the facility and also intersect the access road on the left side of the photo.

FIGURE 10: PFS Facility from Deseret Peak at Night – From the same vantage-point as Figure 9, this is how the PFS Facility will appear with nighttime illumination.

FIGURE 11: PFS Facility from Goshute Village -- Looking west from the Village where about 30 members of the Skull Valley Band of Goshute reside, one can barely see the PFS facility some 3 1/2 miles away in the distance. Power poles along the access road are also visible in this view.

FIGURE 12: PFS Facility from Goshute Village at Night -- From the same vantage-point as Figure 11, this is how the PFS Facility will appear with nighttime illumination.

FIGURE 13: PFS Facility from Pony Express Store -- Looking northwest from the Pony Express Store operated by the Skull Valley Band, one can barely see the PFS facility some 2 1/2 miles away in the distance. Power poles along the access road are also visible in this view. Although the Pony Express Store is closer to the facility than the Goshute Village, it is at a lower elevation, therefore less of the facility is visible from the Pony Express Store.

FIGURE 14: PFS Facility from Pony Express Store at Night -- From the same point as Figure 13, this is how the PFS Facility will appear with nighttime illumination.

FIGURE 15: PFS Facility from Skull Valley Road -- Looking west from Skull Valley Road, one can see the general layout of the PFS facility and buildings some 2 miles in the distance. The batch plant/cask manufacturing area is located north of the Canister Transfer Building. Earthen berms are visible on the south and west sides of the facility and also intersect the access road on the left side of the photo. Power poles along the access road are also visible in this view.

FIGURE 16: PFS Facility from Skull Valley Road at Night -- From the same point as Figure 15, this is how the PFS Facility will appear with nighttime illumination.

ACTION

The ER will be updated to include the above discussion and figures.

Figure 1
PFS Rail Siding Area at Low from the I-80 Off-ramp