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Private Fuel Storage, L.L.C.

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September 21, 2000

COMMENTS ON THE PRIVATE FUEL STORAGE DRAFT ENVIRONMENTAL IMPACT STATEMENT
DOCKET NO. 72-22/TAC NO. L22462
PRIVATE FUEL STORAGE FACILITY
PRIVATE FUEL STORAGE L.L.C.

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Reference: U.S. NRC letter, Delligatti to Parkyn, Request for Comment on the Private Fuel Storage Draft Environmental Impact Statement, dated June 16, 2000

Enclosed are comments from Private Fuel Storage (PFS) on the Draft Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and Related Transportation Facilities (NUREG-1714), which the NRC submitted in the referenced letter. If you have any questions regarding this submittal, please contact me at 303-741-7009.

Sincerely,

John L. Donnell

John L. Donnell
Project Director
Private Fuel Storage L.L.C.

Enclosure

Copy to (with enclosure):

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ADM03
ERIDS 03
Template ADM013
Add Scott Flanders (SCF)

PRIVATE FUEL STORAGE, L.L.C. COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PRIVATE FUEL STORAGE FACILITY

Private Fuel Storage, L.L.C. ("PFS") provides the attached comments with respect to NUREG-1714, "Draft Environmental Impact Statement for the Construction and Operation of an Independent Spent Fuel Storage Installation on the Reservation of the Skull Valley Band of Goshute Indians and the Related Transportation Facility in Tooele County, Utah" ("DEIS"). Behind Tab A are PFS's comments to specific sections and statements in the DEIS. Behind Tab B is PFS's response to comments made at the public meetings on the DEIS that the Private Fuel Storage Facility would have a significant adverse impact on Air Force operations on the Utah Test and Training Range and Hill Air Force Base.

PRIVATE FUEL STORAGE COMMENTS ON DEIS

Section	Page	Line	Comment
ES	xxix	10	Florida Power & Light Company has replaced Illinois Power Company as a member of PFS.
ES	xxxiii	10	PFS uses the name "Intermodal Transfer Point" and the abbreviation "ITP" rather than Intermodal Transfer Facility or ITF.
ES	xli	19	The discussion of the no action alternative should include the possibility that some reactors may have to terminate operations because of state or local restrictions on spent fuel storage, in addition to termination due to physical constraints on spent fuel storage.
ES	xlii	40	The benefit to Tooele County should include economic benefits called for under the agreement between the County and PFS.
ES	xlix-lxxiii	Table ES.2 Summary and Comparison of Potential Environmental Impacts	Table ES-2 presents the environmental impacts for the Proposed Action and the alternatives evaluated in the DEIS. In several instances, it appears that the evaluation of the impacts for the No Action alternative is based on impacts at an individual reactor site rather than at many reactor sites. Comparing the impacts of the Proposed Action to the impacts at an individual reactor site would generally result in lower impacts at the individual reactor site due to its size. It would be more appropriate to assume that the impacts occur at those reactor sites that would depend upon the PFSF throughput scenario. To illustrate this point, under the heading "Socioeconomics and Community Resources", the impacts on Population are compared for the Proposed Action and the No Action alternative. Under the No Action alternative, the DEIS states, "The impacts at any given nuclear plant would be substantially smaller than those expected for the Skull Valley site due to the much smaller quantity of SNF that would need to be stored." While this may be true when comparing the Proposed Action to one reactor site, it may not be true when compared to many reactor sites.

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			In fact, if one assumed that the same quantity of SNF would be stored either at the PFSF or at reactor sites (as was done for the cost-benefit analysis), the population impacts at reactor sites would likely be higher than those for the Proposed Action since many reactor sites have higher population densities than the Skull Valley site. Therefore, it is recommended that NRC examine its results for the No Action alternative to ensure that these results appropriately reflect potential impacts at many reactor sites rather than at a single reactor site.
1.3	1-6	31	The statement that "SNF reprocessing never materialized" is incorrect. Reprocessing of spent nuclear fuel from U.S. commercial reactors took place for a period of time at the West Valley facility.
2.1.1.2	2-5	Table 2.1	The title in the second column of Table 2.1 should be changed to "Construction workers during operations" to make clear that these numbers do not include the operating staff of the PFSF.
2.1.1.2	2-8	12	The statement that the Canister Transfer Building is "75 ft" high is incorrect. It is actually 90 ft high. See PFSF SAR Figure 4.7.1, Sheet 2 of 3.
2.1.1.2	2-10	22	The statement that the "Canister Transfer Building would be heated electrically, while propane tanks located near each of the other three buildings to provide space heating for those structures" is incorrect. As discussed in PFSF SAR, Sections 4.3.12 and 8.2.4, all of the PFSF buildings, including the Canister Transfer Building, will be heated with propane. In addition, electric baseboard heaters will be used in the offices located in the Canister Transfer Building.
2.1.1.3	2-14	35	The statement that the proposed new rail line "would cross 32 arroyos . . . at which drainage culverts designed to the 100-year flood would

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			be installed" is inconsistent with the statement that appears later in the DEIS on page 5-6, line 8 that 110 culverts would need to be installed for the proposed rail line. PFS will provide sufficient culverts for the proposed rail line to maintain the existing drainage and to allow passage of the 100-year flood.
2.1.2.1	2-19	32-35	The statements that "movement of the transfer cask (with the SNF canister inside) from a position above the shipping cask to above the storage cask would occur on the second floor of the Canister Transfer Building" and that the "canister would never be lifted more than 25 cm (10 inches) above the second floor" are incorrect. There is no second floor of the Canister Transfer Building, and the transfer cask and canister are hoisted approximately 19 ft above the building floor during the canister transfer operation, using a single-failure-proof crane.
2.1.5	2-28	22-23	The DEIS states that "[i]f birds are found to be perching and/or nesting around or on the casks, devices (such as cones or spikes) would be installed to deter such bird behavior." PFS would take such action, however, only to the extent that the potential doses would be in excess of the 100 rem/year criterion established to prevent harmful effects to wildlife from radiation. For the Holtec HI-STORM storage casks, the doses would not exceed that criterion. The ER, Section 4.2.9.2.2, reflects that doses to birds spending one-half of their time perched on top of the HI-STORM storage casks were calculated to be 44.7 rem/year. Thus, as noted on DEIS page 4-24, line 21, "even if a bird spent 100 percent of its life for a year on the top surface of a [HI-STORM storage] cask, the dose received would be well below the 1 Sv/yr (100 rem/yr) criterion." For this reason, PFS will not use spikes or cones to prevent birds from perching on top of the HI-STORM

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			storage casks.[1]
2.1.6	2-28	45-46	The statement that "[a]ll decommissioning activities must be completed within 90 days of expiration of the lease" is incorrect. The lease requires radiological decommissioning to be completed prior to its termination. See Section 4.C.
2.1.6	2-29	14-17	The DEIS states that "[t]he principal activities involved in decommissioning would include: (1) removal of all SNF from Skull Valley, (2) the removal or disposition of all storage casks, (3) the removal or disposition of the storage pads and crushed rock, and (4) the removal of the buildings and other improvements or their transfer to the Skull Valley Band." While the storage pads may be dispositioned and left in place rather than removed, the storage casks must be removed from the site.
2.2.1.1	2-31	37	The statement that no other commercially owned away-from-reactor dry cask storage system ISFSIs "have been proposed" omits the Owl Creek Project in Wyoming and the Pigeon Spur Fuel Storage Facility proposed for Box-Elder County in Utah. Owl Creek Project has been the subject of technical papers and presentations, although no NRC application has yet been filed and state legislative action would be required for the project to proceed. Given this status, the Owl Creek Project is not currently a realistic alternative to the proposed PFSF. Similarly, the Pigeon Spur Fuel Storage Facility is not a realistic alternative to the proposed PFSF, given that it is subject to State of Utah jurisdiction and the opposition of the Utah Governor to such facilities.
2.2.1.3	2-32	16-30	The possibility of DOE taking title to spent

[1] Birds perched on top of a TranStor storage cask, as specified in earlier versions of the License Application, could have received radiation doses in excess of the 100 rem/year criterion. Accordingly, PFS would have used devices such as cones or spikes to deter such bird behavior with respect to the TranStor storage casks.

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			nuclear fuel at reactor sites was included in the July 19, 2000 agreement between PECO Energy and DOE. The take title option in the agreement (as well as a take possession option that would not be available until after plant shutdown) is subject to the same uncertainties as to legal authority, liability, financial and operational responsibilities as cited in the DEIS. As all of these uncertainties remain to be negotiated between PECO Energy and DOE (should PECO Energy ask DOE to take title), the option should still not be considered to be ripe for evaluation. Even if it were ripe for evaluation, DOE's taking title still remains similar to the no action alternative and does not by itself increase on-site storage or allow decommissioning to be completed.
2.2.4.2	2-40	1	The statement that "[p]otable water would be provided for the [ITP] in tanks transported from the site" is incorrect. The ER, Section 4.5.2, states that an on-site storage tank at the ITP would be refilled periodically by a local commercial supplier of drinking water.
2.2.4.2	2-40	29	PFS disagrees with the statement that "[c]onstruction of the [ITP] would require a peak daily water use of 132 m^3/day (35,000 gal/day). . . ." As set forth in ER Section 4.5.2, PFS has calculated that peak water usage for construction of the ITP would be 21,200 gallons per day.
2.2.5	2-45	Figure 2.16	Figure 2.16 on p. 2-45 appears to be a duplicate of Figure 2.16 on p. 2-44.
3.8.2	3-58	21	"Desert Peak" should read "Deseret Peak."
4.2.1.3	4-8	Figure 4.1	Figure 4.1 indicates that construction phase 1, period 2, lasts 35 weeks, whereas ER Section 4.5.5 identifies this interval as being 7 months, or 30 weeks. Likewise, Figure 4.1 indicates that construction phase 1, period 3, lasts 30 weeks, whereas ER Section 4.5.5 identifies this interval as being 9 months, or approximately 39 weeks. These different durations may affect the cumulative water usage calculated by the NRC on this graph.

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4.2.2.4	4-12	28	The statement that "[t]he quantity of water that would be used by workers is estimated to be about 6 m^3/day (1500 gal/day)," referencing the PFSF ER, is incorrect." Section 4.5.4 of the ER indicates that during phase 1 construction, the volume of water required for worker use is 3,300 gal/day, and that during operations, including concurrent phase 2 and phase 3 construction, this amount would decrease to 1,800 gal/day.
4.2.4	4-13	18-24	Construction of the detention basin would be part of the initial grading and civil work at the site which would occur prior to constructing the storage pads and other structures and facilities on the site. Thus, PFS would mitigate the potential impacts to surface water during construction as recommended by the DEIS.
4.4.2.2	4-22	34	The DEIS states that if an animal were to perch on the top surface of a HI-STORM storage cask 100% of the time for one year, the dose received by that animal "would be well below the 1 Sv/yr (100 rem/yr) criterion [i.e. 0.438 Sv/yr (43.8 rem/yr)]." PFS agrees that the dose would be well below the 100 rem/yr, but has calculated a different number for this dose. As set forth in ER Section 4.2.9.2.2, a bird perching on top of a HI-STORM storage cask 100% of the time for one year would receive 2 x 44.7 rem = 89.4 rem, not 43.8 rem.
4.4.2.2	4-22	42	The statement that the light poles at the PFSF are 120 ft high is incorrect. The light poles will be 130 ft high, as stated in ER Section 4.2.8.2.
4.5.1.8	4-32	26	The reference to a construction period of 9 months appears to be a typographical error in that Section 4.5.1.6, line 29 refers to a 19 month construction period. Further, the correct estimated time period for phase I of construction is 18 months. See ER Section 4.1.7.1.
4.5.2.8	4-36	15-17	The agreement between Tooele County and

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			PFS was entered into on May 23, 2000. The payments and fees that PFS will make to the County are "in lieu of taxes" and not taxes. Further, the statement that the payments have been estimated to be $92.1 million over the life of the PFSF appears to be a typographical error, as the correct estimate is $91.2 million, as stated in ER Section 7.2.2. More generally, this page on economic structure refers several times to PFS/RAI #2, 1999 as the reference for financial information. The EIS should instead refer to ER Section 7.2.2, where the applicable RAI response was incorporated.
4.7.1	4-40	Table 4.6	This table identifies the duration of construction phase 1 as 2 years, and the duration of phases 2 and 3 as 10 years each. This should be corrected to show that phase 1 is 1.5 years, and phases 2 and 3 are only 5 years each. See ER Sections 4.1.7.1, 4.1.7.2, and 4.1.7.3. Since the DEIS multiplies the probability of fatal and non-fatal injuries per year by the number of years of each phase, correction of the duration of each phase will significantly reduce the probability of fatal and non-fatal injuries, also shown in this table. Use of the incorrect durations occurs in several other places on page 4-40, lines 40-45, and on page 4-41, lines 1-8.
4.7.2.1	4-43	21	There appears to be a typographical error, in that the calculated dose rate at the OCA boundary assuming a PFSF array of 4,000 HI-STORM storage casks is 2.80 E-3 mrem/hr (SAR page 7.3-13), not the 0.00283 mrem/hr shown.
4.7.2.2	4-44	16	The reference to Table 7.4-2 of the PFSF SAR should be deleted, since that applied to doses from operations involving TranStor casks. This Table, which related to TranStor operations, has been deleted from the SAR.
4.7.2.3	4-47	37	The DEIS correctly states that, in order to demonstrate compliance with 10 CFR 72.106(b), PFS performed a "bounding" calculation which assumed a canister leak rate

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			of 1 E-4 cm^3/sec, and then correctly provides the doses calculated by PFS from this bounding accident. PFS believes that the EIS should note in addition that the doses calculated in SAR Section 8.2.7 for a postulated leaking HI-STORM canister are much lower than those associated with the bounding accident (2.7 mrem TEDE vs. the 76 mrem TEDE mentioned in the DEIS, and 28.4 mrem organ, vs. the 824 mrem organ mentioned in the DEIS).
Figure 4.2	4-52		Part II of Figure 4.2 by indicating that the project would be visible from a "County road" and a "Local road", but not from a "State highway", suggests that Skull Valley Road is a county road, rather than a State road. As a result of action by Governor Leavitt, Skull Valley Road is a State road and no longer a County road.
4.8.2.8	4-59	33-38	PFS will consult with BLM as recommended by the Section of the DEIS and will implement its proposal to use shielded lights to minimize light diffusion at night.
4.9.5	4-64	7-8	The impacts of closure of the proposed PFSF should include the loss of revenue to the County pursuant to the County-PFS agreement, in addition to the loss of tax payments and the loss of revenue to the Skull Valley Band.
5.2.1.1	5-6	8	The statement that "[t[he rail route would cross approximately 32 arroyos that would require the installation of 110 culverts (PFS/ER 2000)" is inconsistent with the statement that appears earlier in the DEIS (page 2-14, line 35) that 32 culverts would need to be installed for the proposed rail line. PFS will provide sufficient culverts for the proposed rail line to maintain the existing drainage and to allow passage of the 100-year flood.
5.2.2.4	5-10	27-28	The DEIS states that "PFS's current list of BMPs . . . does not include a specific commitment concerning spill response" at the

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			ITP. However, Sections of the ER 9.1-6 to 9.1-8, provide that a spill plan will be developed if the threshold requirements specified in 40 CFR 112 for such are exceeded.
5.2.4	5-10	44-45	The DEIS states that the cooperating agencies recommend that PFS be required to develop a SPCC (spill prevention, control and countermeasure) plan for the rail line or the ITP. There is no requirement that PFS develop a SPCC plan for the rail line because it does not involve a stationary facility. As stated above, PFS will develop a SPCC plan for the ITP if the threshold requirements specified in 40 CFR 112 for such are exceeded.
5.5.4	5-29	10-12	The DEIS states that PFS should be required to develop a plan to minimize impacts to livestock grazing during the construction and operation of the proposed rail line. PFS will take steps to minimize such impacts, such as providing cattle guards and providing livestock-secure fencing crossings. PFS has consulted with BLM and local ranchers on the reference in this section to "water facilities east of the proposed rail line" and has agreed that it will take steps to ensure that PFS does not affect the operation of the existing water facility, i.e., the water line from Eight Mile Spring. Further, PFS does not plan to have a maintenance road along side the rail line and thus gates at unimproved road crossings referenced in this section will not be necessary.

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5.7.2	5-36 et seq.		Section 5.7.2 should compare the radiological exposures during cross-country transportation with those set forth in Table S-4 since the purpose of the analysis set forth in this section should be to ascertain whether the conclusions of Table S-4 of 10 CFR Part 51 remain conservative. In fact, the cross-country analysis is unnecessary in light of the provisions in Part 72 requiring only a regional transportation analysis and the fact that the environmental impact statements prepared for all PFS' potential reactor customers have included the transportation analysis of Table S-4. NEPA does not require that environmental impacts already evaluated in prior EIS's be repeated, particularly where subsequent NRC analyses have shown Table S-4 to be conservative. For example, in the generic EIS for license renewal (NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (1996)), the NRC concluded that "[t]he environmental impacts from the transportation of fuel and waste attributable to license renewal are . . . small when they are within the range of the parameters identified in Table S-4" and that the "[t]he estimated radiological effects are within regulatory standards." NUREG-1437 at 6-36. On this basis, the Commission conducted a rulemaking to revise 10 C.F.R. § 51.52 and Table S-4 to establish by rule that Table S-4 is appropriate "to account for the environmental effects of transportation of fuel and waste to and from a nuclear power plant [and] a repository such as Yucca Mountain, Nevada" as long as fuel enrichment is no greater than "5 percent Uranium-235" and fuel burnup is no greater than "62,000 MWd/MTU." 64 Fed. Reg. 48,496, 48,502 (1999). See also 10 C.F.R. 51 Subpart A, Appendix B, Table B-1, Uranium Fuel Cycle and Waste Management, Issue: Transportation. The transportation anticipated by PFS falls within these parameters.

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			Another factor is the representative transportation distance for the shipment of spent fuel from the originating nuclear power plants to the Private Fuel Storage Facility. The supporting document for Table S-4 (WASH-1238, "Environmental Survey of Transportation of Radioactive Materials to and from Nuclear Power Plants" (1972)) assumes an approximate distance of 1000 miles. It states that "[e]ach shipment will travel a distance of about 1000 miles on average, (a minimum distance of 25 miles to a maximum of 3,000 miles)." WASH-1238 at 23. The generic EIS for 10 C.F.R. Part 72 (NUREG-0575, "Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel" (1979)) addresses environmental risk for travel of 2,000 miles. The estimated <u>average</u> transport distance is 1,000 miles. "However, if the offsite storage facility required an additional 1,000 miles of travel, the probability of occurrence of this accident would increase [from 4×10^{-11}] to 8×10^{-11}. Consequently, the environmental risk due to offsite transportation accidents involving spent fuel casks remains extremely small." NUREG-0575 at 4-24. Applicant's anticipated transportation falls within the other parameters of Table S-4 as well, with the sole potential exception of cask weight. However, recent NRC studies to support the generic EIS for license renewal have concluded that larger, heavier casks, such as those that will be used in transporting the SNF to the PFSF, actually reduce risk because a "smaller number of larger containers can be used to transport SNF." "Supplemental Analysis: Cumulative Environmental Impacts of Spent Nuclear Fuel Transport in the Vicinity of the Proposed Yucca Mountain High-Level Waste Repository Attributable to License Renewal, and Implications of Higher-Burn-Up Fuel for

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			the Conclusions in Table S-4," ORNL at 16 (April 1998). Thus, the Final EIS should explicitly recognize that Table S-4 is the applicable NRC regulatory standard, that PFSF transportation falls within the bounds of Table S-4, and that the RADTRAN analysis described in the EIS confirms the Commission's regulatory standard in Table S-4.
5.7.2.4	5-45	37	The DEIS states the casks being transported by rail will be "widely separated from each other on the train (usually by a buffer car between each cask-carrying railcar)." Applicable regulations do not require that a buffer or spacer car be positioned between cask-carrying railcars, see 49 C.F.R. § 174.85, and PFS does not plan to provide buffer cars between cask cars.
5.8.2.2	5-56	39-40	The DEIS states, in the context of the visibility of the rail line to the residents of the Skull Valley village, that the rail line is approximately 12 miles from the village. In fact, the distance of the rail line to the village will range from approximately three miles at its shortest distance to 32 miles at its longest distance. However, even from its closest approach to the village, the rail line will not be easily visible in light of its low elevation.
6.2	6-20 et seq.		The DEIS' environmental justice analysis should emphasize the fact that the siting of the PFSF on the Skull Valley reservation was a voluntary decision on the part of the Skull Valley Band. The Band began investigating interim storage technology starting well before the Band's involvement with Private Fuel Storage and the negotiations that resulted in the Lease. The Band had been an active participant in the voluntary siting effort initiated under the Nuclear Waste Policy Act by the Nuclear Waste Negotiator. Thus, it cannot reasonably be claimed that the siting of the PFSF was other than a voluntary effort by

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			the Band, weighing the significant positives against the small negatives associated with the project. While there are opponents of the project among the members of the Band, the Band acting under its governing procedures (as overseen by the BIA) has determined to proceed with the PFSF project. The underlying philosophy of Executive Order 12898, that minority and low-income groups not be compelled to bear a disproportionate share of negative environmental consequences from governmental actions, simply does not apply in this case.
6.2.1.2	6-27	24	The DEIS refers to "affected representatives of the Skull Valley Band." If this phrase is meant to relate to those members of the Band opposed to the project, the use of the term "representatives" is inappropriate since they are not "representing" the Band. The Band is represented by its Tribal government. A more appropriate phrase would be "some members of the Skull Valley Band."
6.7	6-43	24-25	Another effect of the no-action alternative would be the absence of revenue to Tooele County under its agreement with PFS.
6.7	6-43	29	The DEIS states that under current DOE plans, removal of SNF from nuclear power plants would not begin until 2010. DOE's statements consistently refer to a start for SNF removal in 2010 "at the earliest." The DEIS correctly describes the DOE's announced policy at p. 8-2, line 46. At p. 8-7, line 9, however, the DEIS again omits the qualifier "at the earliest."
6.7	6-43 et seq.		Section 6.7 should address the impacts, as identified by PFS (see DEIS p. 6-43, lines 15-17) of the delay in decommissioning shut down reactors under the no-action alternative. It should also address the added costs of building ISFSI's at reactors sites that would be avoided by the PFSF.
6.7.1	6-45	3-5	Activities at existing reactor sites may have additional impacts beyond those discussed in

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		existing NEPA documentation for those sites since additional land may need to be cleared for an ISFSI. Cumulatively, the impacts at existing sites will likely be as large as, or larger than, those at the PFSF. A similar comment applies to the small impacts at existing sites for water resources, air quality, ecological resources, etc. While small at each site, cumulatively they may be as large as, or larger than, those at PFSF.
7-33	14	The payments to Tooele County would be made pursuant to the agreement between PFS and the County and would not be "tax payments." As stated in the comment on page 4-36, lines 16-17, the correct estimate for these payments is $91.2 million, as stated in ER Section 7.2.2.
8-10	12-23	The description of environmental benefits should include the payments to Tooele County under the agreement with PFS, in addition to the payments received by the Skull Valley Band.
8-11	3-5	Although the rail line could in the future potentially make economic development of Skull Valley more attractive, the right-of-way requested by PFS from BLM is for PFS use only.
9-12	32-34	There is no requirement that PFS develop a SPCC program for the rail line because it does not involve a stationary facility. As stated in previous comments above, PFS will develop a spill plan for the ITP if the threshold requirements in 40 C.F.R. Part 112 for such are exceeded.
9-15 to 9-39	Table 9.1 Summary and Comparison of Potential Environmental Impacts	Same comment as on Table ES.2 in Executive Summary

THE PRIVATE FUEL STORAGE FACILITY WILL NOT HAVE A SIGNIFICANT IMPACT ON AIR FORCE OPERATIONS ON THE UTAH TEST AND TRAINING RANGE OR AT HILL AIR FORCE BASE

It has been claimed that the construction and operation of the Private Fuel Storage Facility (PFSF), for the temporary storage of spent fuel from nuclear power plants, sited on the Goshute Indian Reservation in Skull Valley, Utah, would require the U.S. Air Force to curtail its testing and training operations on the Utah Test and Training Range (UTTR), which would in turn reduce the utility of Hill Air Force Base and potentially subject the base to closure. It has also been claimed that the Air Force would have to curtail its operations because the proximity of the PFSF to the UTTR would make the risk of an accident involving the facility and the radioactive material stored there unacceptably high.[1]

On the contrary, the probability of an accident involving an Air Force aircraft, bomb, or missile and the PFSF would be extremely low, well below the regulatory standards set by the NRC. Furthermore, even if such an accident were to occur, it is unlikely that any radioactive material would be released into the environment from the heavy concrete and steel casks in which it will be stored at the PFSF. The calculations and data supporting this conclusion are set forth for the NRC and the public in "Aircraft Crash Impact Hazard at the Private Fuel Storage Facility," Revision 4 (Aug. 10, 2000).

A. The Private Fuel Storage Facility

The PFSF will temporarily store spent nuclear fuel sealed inside welded stainless steel canisters placed within cylindrical steel, reinforced concrete casks approximately 2½ feet thick. Each cask will weigh 170 tons when fully loaded. The PFSF Restricted Area, in which the spent fuel storage casks will be located, will cover approximately 99 acres (0.15 sq. mi.) and will contain, at full capacity, 4,000 spent fuel storage casks.

B. The Utah Test and Training Range and Hill Air Force Base

The UTTR is an Air Force training and testing range over which the airspace is restricted to military operations. It is divided into a North Area, located on the western shore of the Great Salt Lake, north of Interstate 80, and a South Area, located to the west of the Cedar Mountains, south of Interstate 80 and northwest of Dugway Proving Ground. The airspace over the UTTR extends somewhat beyond the range's land boundaries and is divided into military operating areas (MOAs) and restricted areas. The MOAs on the UTTR are located on the edges of the

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[1] Public Meeting on the Draft Environmental Impact Statement for the Private Fuel Storage Facility (July 28, 2000) at 204-09 (remarks of Rep. Hansen); Public Meeting on the Draft Environmental Impact Statement for the Private Fuel Storage Facility (Aug. 21, 2000, 2:00 p.m.) at 10-13 (remarks of Mayor Waggoner); id. at 57-59 (remarks of Mr. Bushnell); Public Meeting on the Draft Environmental Impact Statement for the Private Fuel Storage Facility (Aug. 21, 2000, 6:00 p.m.) at 69-72 (remarks of Mr. Rush); id. at 85-88 (remarks of Gen. Pavich); id. at 89-90 (remarks of Ms. McCall); see Public Meeting on the Draft Environmental Impact Statement for the Private Fuel Storage Facility (July 27, 2000) at 8 (remarks of Gov. Leavitt).

range, adjacent to the restricted areas. The area covered by the airspace of the UTTR South Area is roughly 148 miles long (at its longest point) by 102 miles wide (at its widest point).[2] The PFSF site is located over 18 statute miles east of the eastern land boundary of the UTTR South Area and 8.5 statute miles northeast of the northeastern boundary of Dugway Proving Ground. The site lies within the Sevier B MOA, two statute miles to the east of the edge of restricted airspace. The area covered by the airspace of the Sevier B MOA is roughly 145 miles long and, in the vicinity of the PFSF site, is roughly 12 miles wide.

Hill AFB is located in Ogden, Utah, approximately 65 miles northeast of the PFSF. Most of the aircraft that use the UTTR fly from Hill and the 388th Fighter Wing and the 419th Fighter Wing (reserve), comprising approximately 80 F-16 fighter aircraft, are based there. In Fiscal Year 1998, 13,367 sorties (aircraft flights) were flown on the UTTR, with 5,083 in the North Area and 8,284 in the South Area.

C. Military Aviation on the UTTR and the Risk to the PFSF

Military aircraft flying in or around the UTTR South Area in rough proximity to Skull Valley comprise four groups: 1) F-16 fighter aircraft flying from Hill AFB, down Skull Valley en route to the range; 2) aircraft conducting training in the restricted airspace on the range; 3) aircraft departing the range via the Moser Recovery to return to Hill AFB; and 4) aircraft flying to and from Michael Army Airfield on Dugway Proving Ground. PFS has calculated the probability that a military aircraft flying on or near the UTTR South Area would crash and hit the PFSF and has found the probability to be significantly less than one in a million per year.[3] Aircraft flying on or around the UTTR North Area pose no hazard to the PFSF because of the distance from the facility.

1. F-16 Aircraft Transiting Skull Valley

F-16 fighter aircraft fly north to south down Skull Valley, within Sevier B MOA, en route from Hill AFB to the UTTR South Area. The F-16s use the eastern side of Skull Valley as their predominant route of travel and typically pass approximately five miles to the east of the PFSF site. The U.S. Air Force has indicated that the F-16s typically fly between 3,000 and 4,000 ft. above ground level (AGL), with a minimum altitude of 1,000 ft AGL. In Fiscal Year 1998, 3,871 such flights passed through Skull Valley.

It is not credible that a crashing F-16 would impact the PFSF. The predominant route of travel for the F-16s is down the eastern side of Skull Valley, away from the PFSF. The likely nature of an F-16 crash in Skull Valley would be such that a crashing aircraft would not pose a

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[2] See Salt Lake City Sectional Aeronautical Chart, National Oceanic and Atmospheric Administration (Apr. 22, 1999); Las Vegas Sectional Aeronautical Chart, National Oceanic and Atmospheric Administration (Mar. 25, 1999). The Sevier B MOA extends from a point approximately 9 miles north of the PFSF to a point approximately 137 miles south-southwest of the facility. At its widest point, approximately 100 miles south-southwest of the PFSF site, the MOA is approximately 56 miles wide.

[3] Private Fuel Storage, Report to the Nuclear Regulatory Commission, Aircraft Crash Impact Hazard at the Private Fuel Storage Facility, Rev. 4 (Aug. 10, 2000).

hazard to the PFSF unless it was pointed directly at the site at the time of the event leading to the crash. And Air Force pilots are instructed to avoid ground facilities in the event of a mishap in which the pilot retains control of the direction of the aircraft. Nevertheless, PFS calculated the probability that a transiting F-16 would impact the PFSF and conservatively assumed that the F-16 flights are uniformly distributed across the Sevier B MOA airspace in the vicinity of the PFSF.

PFS calculated the probability that an F-16 transiting Skull Valley would crash and impact the PFSF using the following equation:

$P = C \times N \times A / w$, where

P = probability per year of an aircraft crashing into the PFSF

C = in-flight crash rate per mile

N = number of flights per year along the airway

A = effective area of the PFSF in square miles

w = width of airway in miles

To calculate the F-16 impact probability, the Sevier B MOA airspace in the vicinity of the PFSF was treated as an airway with a width of 10 miles. Given the flight characteristics of the F-16, the region within PFSF where the storage casks are located has an effective area of 0.1337 sq. mi., assuming a facility at full capacity with 4,000 spent fuel storage casks on site. The number of flights through the valley was taken to be 3,871 per year. The crash rate for the F-16 was calculated from Air Force data to be 2.736 E-8 per mile of aircraft flight. It was also determined, from an extensive review of Air Force F-16 accident investigation reports, that over 90 percent of the F-16 crashes that would result from accident-initiating events that could occur in Skull Valley would leave the pilot in control of the aircraft after the event. Furthermore, because of the training Air Force pilots receive in responding to such in-flight events, the flight characteristics of the F-16, the absence of other built up areas in Skull Valley, and the small effort required for the pilot to avoid the PFSF site in the event of a crash caused by an accident-initiating event leaving him in control of the aircraft, the pilot would be able to direct the aircraft away from the PFSF at least 95 percent of the time in which such an event caused a crash in Skull Valley. Accordingly, 85.5 percent (90% x 95%) of the crashing F-16s would be able to avoid the PFSF and hence the calculated crash impact hazard to the PFSF would be reduced by this fraction. Thus, the annual crash impact probability for the F-16s in Skull Valley (assuming a fully loaded facility) was calculated to be 2.05 E-7.

PFS also calculated the probability that ordnance jettisoned from a crashing F-16 in Skull Valley would impact the PFSF.[4] Some of the F-16 flights through Skull Valley carry ordnance

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[4] Id.

(live or inert). In the event of an incident leading to a crash in which the pilot would have time to respond before ejecting from the aircraft (e.g., an engine failure), one of the pilot's first actions would be to jettison any ordnance carried by the aircraft. PFS used an approach similar to the approach it took to calculating the aircraft impact probability to calculate the probability that jettisoned ordnance would impact the PFSF. The fraction of the 3,871 F-16s transiting Skull Valley per year that would be carrying ordnance that could be jettisoned was determined from data from Hill AFB to be 11.8 percent. Thus the number of aircraft carrying ordnance through Skull Valley per year, N in the equation, would be 457. The crash rate for the F-16s, C, was taken to be 2.736 E-8 per mile, as above. Nonetheless, the pilot was assumed to jettison ordnance in only 90 percent of all crashes, the fraction of the crashes, e, assumed to be attributable to engine failure or some other event leaving him in control of the aircraft (in crashes attributable to other causes it was assumed that the pilot would eject quickly and would not jettison ordnance). Skull Valley was treated as an airway with a width, w, of 10 statute miles. As with the calculation for F-16s transiting Skull Valley, PFS conservatively assumed that the F-16s are uniformly distributed across the 10 miles, despite the fact that their predominant route of flight is down the eastern side of the valley and that, according to Hill AFB, aircraft carrying live ordnance avoid flying over populated areas to the maximum extent possible. The area of the PFSF, from the perspective of a piece of ordnance jettisoned from an aircraft flying from north to south over the site, A, was taken to be the product of the width and the depth of the cask storage area (assuming a full facility with 4,000 casks) plus the product of the width and depth of the canister transfer building,[5] in that the pieces of ordnance are small relative to an aircraft and impact the ground at a steep angle. Thus, the area of the PFSF was calculated to be 0.08763 sq. mi. The probability that the ordnance would impact the PFSF is given by $P = N \times C \times e \times A/w$, or:

$$P = 457 \times 2.736\text{ E-}8 \times 0.90 \times 0.08763 / 10 = 9.85\text{ E-}8$$

In addition to the potential hazard posed by direct impacts of crashing aircraft and jettisoned ordnance, PFS also calculated the hazard to the PFSF posed by jettisoned live ordnance that might land near the facility and explode on impact, as well as the hazard posed by a potential explosion of live ordnance carried aboard a crashing aircraft that might impact the ground near the PFSF.[6] At the outset, aircraft transiting Skull Valley near the PFSF with live ordnance do not carry it armed. Furthermore, the U.S. Air Force has indicated that the likelihood that unarmed live ordnance would explode when impacting the ground after being jettisoned is "remote" and the Air Force has no records of such incidents in the last 10 years. Thus, it is highly unlikely that jettisoned live ordnance or live ordnance carried aboard a crashing aircraft that did not directly impact the PFSF would damage the facility. Nevertheless, to calculate a numerical hazard to the facility, PFS assumed that such ordnance would have a 1 percent chance of exploding and assessed that damage to the PFSF would result if an explosion occurred close

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[5] The Canister Transfer Building is where the welded stainless steel canisters in which the spent fuel is sealed will be transferred from transportation casks, inside which the canisters are transported to the PFSF, to storage casks, inside which the canisters will be stored at the PFSF. The Canister Transfer Building is a reinforced concrete building designed to withstand the earthquakes that could foreseeably occur in Skull Valley.

[6] PFS Report, Aircraft Crash Impact Hazard at the Private Fuel Storage Facility.

enough that the blast overpressure would damage a storage cask or the Canister Transfer Building, without hitting either one. The explosive overpressure limit for a storage cask was taken to be 10 psi. The limit for the Canister Transfer Building was taken to be 1.5 psi. PFS assumed that the ordnance in question was a 2,000 lb. bomb, the largest single piece of ordnance carried by the F-16s that transit Skull Valley. Hill AFB data indicated that 193 F-16s transited Skull Valley in 1998 with live ordnance. PFS calculated the probability that an F-16 carrying live ordnance would crash and jettison the ordnance so as to impact near the PFSF, or crash near the PFSF without jettisoning the ordnance, following the same method it used to calculate the probability that an F-16 would crash and impact the facility. The results of PFS's final calculation showed that the annual probability that a storage cask or the Canister Transfer Building would be damaged by an explosion of live ordnance jettisoned from a crashing aircraft or carried aboard a crashing aircraft that impacted the ground near the PFSF was equal to 2.43 E-10. This is exceedingly low and is insignificant relative to the other aircraft crash and jettisoned ordnance impact hazards calculated for the PFSF.

2. Aircraft Training on the UTTR

According to the Air Force, 8,284 sorties were flown over the UTTR South Area in 1998. Those aircraft conducted a variety of activities, including air-to-air combat training, air-to-ground attack training, air-refueling training, and transportation to and from Michael Army Airfield (which is located beneath UTTR airspace). Hazards posed by aircraft flying to and from Michael Army Airfield on Dugway Proving Ground are addressed below. Of the remaining aircraft, only fighter aircraft conducting air-to-air training represent a potential hazard to the PFSF, in that aircraft conducting air-to-ground attack training do so over targets that are located more than 20 miles from the PFSF site and aircraft conducting air refueling training do so on the far western side of the UTTR, over 50 miles from the site.[7] The Air Force indicated 6,360 fighter sorties were flown on the UTTR South Area in 1998 and one-third, or approximately 2,120, involved fighter aircraft conducting air-to-air training.

The crash impact probability for fighter aircraft conducting air-to-air training on the UTTR was calculated as follows:

$P = C_a \times A_c \times A/A_p \times R$, where

P = annual crash impact probability

C_a = total air-to-air training crash rate per square mile on the UTTR

A_c = the area of the UTTR from which aircraft could credibly impact the PFSF in the event of a crash

A = effective area of the PFSF in square miles

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[7] Id.

A_p = the footprint area, in which a disabled aircraft could possibly hit the ground in the event of a crash

R = the probability that the pilot of a crashing aircraft would be able to take action to avoid hitting the PFSF

The total air-to-air training crash rate per square mile on the UTTR, C_a, was calculated from the total number of hours flown in air-to-air training on the UTTR South Area (2,468), the crash rate per hour for fighter aircraft (the F-16) in combat training (3.96 E-5), the distribution of air operations over the sectors of the UTTR nearest the PFSF, and the ground areas of those sectors. As with the F-16s transiting Skull Valley, 95 percent of the crashes on the UTTR attributable to engine failure or some other cause leaving the pilot in control of the aircraft were determined not to pose a hazard to the PFSF, in that the pilot would retain control of the aircraft and would be able to avoid the site. Based on Air Force data, 45 percent of all F-16 crashes occurring during combat training are attributable to engine failure; thus the factor R in the equation above was set equal to 0.573 (1-(45% x 95%)). The area from which an aircraft could credibly impact the PFSF in the event of a crash, A_c, was taken to be the portion of the UTTR within 10 miles of the PFSF and outside a three-mile buffer zone assumed to exist on the edge of the UTTR restricted areas. A crashing aircraft more than 10 miles from the PFSF would have to be under control of the pilot in order to glide and reach the site, and the pilot would guide any such aircraft away from the site, which is outside the land boundaries and the restricted airspace of the UTTR. The buffer zone represents the fact that aircraft do not routinely fly within three miles of the edges of the restricted areas while conducting training on the UTTR. The site effective area, A, was determined as above for a facility at a full capacity of 4,000 storage casks. The footprint area, A_p, was calculated by assuming that a crashing aircraft could glide in any direction up to a distance equal to the product of its starting altitude above ground and its glide ratio. Accordingly, the aircraft conducting air-to-air training over the UTTR were divided into altitude bands and an impact probability calculated for each band. Aircraft too low to glide to the PFSF in the event of a mishap were calculated not to contribute to the crash impact hazard, in that they would have no chance of reaching the site. The maximum annual air crash impact probability for aircraft conducting air-to-air training on the UTTR South Area was calculated from the sum of impact probabilities of the altitude bands to be 7.35 E-8.

3. Aircraft Using the Moser Recovery

Most of the F-16s returning to Hill AFB from the UTTR South Area exit the northern edge of the range (away from the PFSF) in coordination with air traffic control. However, some aircraft returning to Hill from the UTTR South Area may use the Moser recovery route, which runs from the southwest to the northeast, approximately two miles from the PFSF site.[8] The Moser route is only used during marginal weather conditions or at night under specific wind conditions which require the use of Runway 32 at Hill AFB. Based on information from local air traffic controllers, conservatively estimated, the Moser recovery is used by less than five percent of the aircraft returning to Hill. According to the Air Force, 5,726 F-16 sorties were flown on the UTTR South Area in FY98, almost all of which flew from Hill AFB (not all aircraft transit

[8] Id.

Skull Valley en route to the South Area); thus fewer than 286 aircraft per year (5% x 5,726) would use the Moser recovery on their return flights.

The average annual crash impact probability for aircraft flying the Moser recovery was calculated using the same method used for calculating the hazard from F-16 flights through Skull Valley. The Moser recovery is defined as an airway with a width, *w*, of 10 nautical miles (11.5 statute miles) (equal to the width of military airway IR-420). The number of aircraft, *N*, is conservatively taken to be 286; the crash probability, *C*, is equal to 2.736 E-8 per mile; the effective area of the site is 0.1337 mi^2; and it is calculated that 85.5 percent of all crashes would be attributable to events leaving the pilot in control of the aircraft, in which the pilot could direct the aircraft away from the PFSF (see Section 2 above). Thus, the annual crash impact probability is conservatively estimated to be 1.32 E-8.

4. Michael Army Airfield and Airway IR-420

Michael Army Airfield is located on the Dugway Proving Ground, 17 statute miles south-southwest of the PFSF. This military airfield has a 13,125 foot runway, and can accommodate all operative aircraft in the Department of Defense inventory, although the majority of the aircraft flying to and from Michael AAF are large cargo aircraft such as the C-5, C-17, and C-141. The airspace over the Dugway Proving Ground is restricted. Military airway IR-420 passes over the PFSF site area and is used by aircraft flying to and from Michael AAF. The same method used to calculate the hazard to the PFSF from F-16s transiting Skull Valley was used to estimate the probability of an aircraft impacting the PFSF from this airway.[9]

NUREG-0800 provides an in-flight crash rate of 4 E-10 per mile for large commercial aircraft, which is appropriate to apply to the types of aircraft flying to and from Michael AAF. Information provided by the Dugway Proving Ground states that there are approximately 414 flights annually at this airfield. The effective area of the PFSF is 0.2116 mi^2, calculated for the types of aircraft flying to and from Michael AAF, using the same method as was used to calculate the effective area of the PFSF for an F-16 above. The width of the airway is 10 nautical miles (nm), or 11.5 statute miles. The probability of an aircraft impacting the PFSF is therefore 3.0 E-9 per year. Because of the distance from the PFSF to Michael Army Airfield and the runway alignment there, takeoff and landing operations at Michael AAF pose a negligible hazard to the PFSF.

5. Conclusion Regarding Aircraft Flights Near the PFSF

The cumulative probability that a military aircraft would crash and impact the PFSF or that ordnance jettisoned from military aircraft would impact the site is equal to the sum of the probabilities that an aircraft conducting the activities analyzed above would crash and impact the site or jettison ordnance that would impact the site. Thus, the cumulative probability of such an

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[9] Id.

impact is 3.93 E-7 per year.[10] This probability is below the NRC regulatory limit for siting spent fuel facilities. It is also low enough that the construction and operation of the PFSF would not require the Air Force to change its operations on or around the UTTR in any way.

D. Weapon Use on the UTTR and the Risk to the PFSF

Military aircraft conduct air-to-ground attack training using air-delivered ordnance on the UTTR South Area. Military aircraft also conduct weapons testing, including the testing of cruise missiles. Nevertheless, the use of air-delivered ordnance on the UTTR does not pose a significant hazard to the PFSF and thus the construction and operation of the PFSF would not require the Air Force to change its operations on or around the UTTR. The PFSF site is located 18 statute miles to the east of the easternmost land boundary of the range and over 20 miles from the nearest target for air-delivered ordnance on the UTTR. Weapons use on the UTTR does not pose a credible hazard to the PFSF.[11]

Weapons use on the UTTR is strictly controlled and the UTTR has never experienced an unanticipated munitions release outside of designated launch/release areas. Aircraft flying over Skull Valley are not permitted to have their armament switches in a release capable mode, and all switches are "safe" until the aircraft are inside DOD land boundaries. Master Arm switches are not actually armed until the aircraft are on the ranges within the UTTR where the bombs are to be dropped. Furthermore, the targets on the UTTR are all over 18 miles from the PFSF site and there are no run-in headings for weapons delivery over the Skull Valley area.

1. Hung Ordnance

The probability of "hung ordnance" (i.e., the failure of ordnance to release from an aircraft when delivery is attempted) and an unintentional release of the ordnance in Skull Valley are exceedingly low. First, most aircraft do not even carry live ordnance but instead carry training ordnance such as Bomb Dummy Units (BDU) or inert filled MK 82 500 lb bombs. According to the U.S. Air Force, only approximately 15% of the 8,711 UTTR sorties flown in Fiscal Year 1998 actually carried live ordnance. Training bombs, by contrast, pose no explosive hazard to the PFSF and the dead weight of the BDUs pose no risk to the facility as well. BDU-33's have ballistic characteristics similar to MK 82 bombs but carry only a small smoke charge for marking purposes. They weigh only 25 pounds and are often the weapon of choice for training missions. Second the probability that any ordnance will "hang" is very low. Michael AAF is the designated primary airfield for aircraft landing with live hung ordnance that has failed to release. There were only five hung ordnance aircraft diversions/recoveries into Michael AAF during 1998. Since only approximately 15% of the aircraft sorties carry live ordnance, a total of only five hung ordnance recoveries in 1998 for a total of about 2,000 sorties (approximately 15% of the 13,367 over the UTTR) produces a probability for failing to release

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[10] PFS also calculated the probability that a civilian aircraft would crash and impact the PFSF. If that probability is added to the probability that a military aircraft or military ordnance would impact the site, the cumulative probability is equal to 6.6 E-7 per year. Id.

[11] Id.

of approximately one in 400. Moreover, a failure to release does not mean there will be an inadvertent release or an inadvertent release and explosion. As indicated above, the Air Force has never had an unintentional release of ordnance outside the launch/drop/shoot boxes on the UTTR. All of these are obviously within the UTTR and in fact are over 20 statute miles from the PFSF site.

Finally, the probability of "hung ordnance" striking the PFSF is not credible because aircraft carrying hung ordnance do not fly over Skull Valley. In the event of hung ordnance, the first priority is to maintain aircraft control and then assess the situation and take appropriate action. Pilots contact Clover Control Air Traffic Control Facility and advise them of the situation. When hung ordnance is encountered, the pilot has the option of either jettisoning the rack and munitions on the range, if able, or recovering to base. Michael AAF is the designated primary recovery base for hung ordnance, although Hill AFB is available as well. Pilots request clearance to Michael AAF for hung ordnance recovery/landing. Pilots maintain a stable flight path and remain in Visual Meteorological Conditions by avoiding clouds. Clover Control provides assistance as required and ensures Michael AAF is prepared to receive the aircraft to include fire fighting equipment and medical personnel standing by. The pilot maneuvers the aircraft to the northwest, approximately 20 statute miles from the proposed PFSF site, and proceeds to Michael AAF, avoiding rapid or steep turns and abrupt climbs or descents. Test facilities or any populated areas are avoided. A long straight-in approach with a shallow rate of descent is established to a full stop landing on runway 12 (to the southeast). Runway 12 is 13,125 ft long and 200 ft wide with a barrier cable at the end. After landing, Dugway Proving Ground Explosive Ordnance Disposal personnel inspect and safe the ordnance.

The UTTR record of no unintended release of live ordnance outside of designated launch/release areas and the procedure for landing aircraft with hung ordnance, which avoids populated areas and approaches Michael Army Airfield from the northwest, away from the PFSF, assures that hung ordnance will not impact the PFSF. Consequently, hung ordnance striking the PFSF is not a credible event and does not require the Air Force to change its operations on or around the UTTR.

2. Cruise Missiles

Cruise missile launches are generally confined to the northern and western portions of the UTTR and are at least 30 statute miles away from the PFSF site. Cruise missile tests are carefully planned to ensure the safety of the test. Run-ins, drops, and launches are normally done from north to south or east to west and are thus directed away from the PFSF site. Cruise missile targets on the UTTR are located over 18 miles from the PFSF. Furthermore, Air Force instructions require that cruise missile flight paths avoid inhabited areas by a distance of at least 1 nm for flights below 6,000 ft. AGL and a distance equal to the missile altitude (up to 3 nm) for flights above 6,000 ft. AGL.[12] In practice, the Air Force uses a minimum separation distance of

[12] Air Force Instruction 13-212, UTTR SUPPLEMENT I (TEST), 1 April 1998, § 2.9.2.

2 nm on the UTTR.[13] The presence of inhabited areas on Dugway Proving Ground and the Goshute Indian Reservation make it very unlikely that the Air Force would fly cruise missiles near the PFSF site even if the facility were never built.

Cruise missiles and other weapon systems that have a capability of exceeding range boundaries are required to have a Flight Termination System (FTS) installed prior to testing on the UTTR.[14] The FTSs are designed to promptly destruct the weapons, by terminating the weapons' flight paths, in the event of an anomaly. The FTS will bring the missile to the ground within less than 2 nm along the missile flight path from the point of FTS activation and within approximately 0.4 nm perpendicular to the missile flight path from the point of FTS activation.[15] This is well within the 2 nm separation distance used by the Air Force on the UTTR. Before a bomber launches a test cruise missile, the Mission Control Center verifies that the missile's remote control systems are working properly. At all times throughout the flight the cruise missile FTS must detect a signal that in effect permits the missile to keep flying. If the missile does not detect the signal for a preset time, the FTS activates. Safety Officers can also activate the FTS, if required, at any time. The Range Safety Officer at Mission Control and the Airborne Range Instrumentation Aircraft are both capable of terminating missile flight almost immediately. In addition, at least two chase aircraft with the capability of terminating the missile flight follow the missile and track it visually at all times.[16] The Air Force has stated that the UTTR has never experienced an FTS failure. Consequently, a cruise missile striking the PFSF is not a credible event and if the PFSF is built and operated, the Air Force would not need to change its testing of cruise missiles on the UTTR.

E. The Potential for an Accident to Cause a Release of Radioactive Material

As shown above, the probability that a military aircraft would crash and impact the PFSF is less than four in ten million per year. Furthermore, because of the safety measures taken by the Air Force to prevent harm to inhabited areas when using ordnance on the UTTR, the probability that an accident would cause ordnance to strike the PFSF is remote. These low probabilities alone show that the Air Force would not be required to curtail its operations on or around the UTTR because of the construction and operation of the PFSF. Nevertheless, additional safety is provided by the robust construction of the concrete and steel casks in which the spent nuclear fuel will be stored at the PFSF. If an aircraft or a piece of ordnance were to

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[13] Accident Investigation Board Report, United States Air Force AGM-129 Advanced Cruise Missile, Serial Number 90-0061, 10 December 1997, Dugway Proving Ground, Utah, at 11.

[14] Air Force Instruction 13-212, UTTR SUPPLEMENT I (TEST), 1 April 1998, § 3.5.2.

[15] E.g., General Dynamics, Convair Division, Tomahawk Sea Launched Cruise Missile System Flight Termination System Report for Land Attack Missile Equipped with Inert or Live Conventional Warhead and Range Safety System P/N 3123AS769 U/RGM 109-C (May 1992) at 2-13 (in the worst case missile falls to ground less than 2 nm along missile flight path); see Tomahawk Flight Test Operations on the West Coast of the United States, Final Environmental Assessment (Oct. 1998), at 2-19 (length of missile impact area (along flight path) is roughly 2.7 times greater than the total width).

[16] E.g., id. at 2-14.

impact the facility, the most likely result would be that the storage casks would prevent any radioactive material from being released to the environment.

The storage casks that will be used at the PFSF are approximately 20 ft. high and 11 ft. in diameter and weigh over 170 tons when loaded.[17] The cylindrical walls of the casks consist of 26.75 in. of concrete and 2.75 in. of steel. The walls of the steel canister inside the cask, in which the spent fuel is sealed, are 0.5 in. thick.[18] A direct impact of an F-16 at a speed of 360 knots or less would not penetrate the walls of the cask and thus would not cause a release of radioactive material. Such a velocity is significantly greater than the typical air crash impact velocities (200-250 knots) for the F-16. The casks could also withstand a direct impact of a cruise missile at similar velocities. Furthermore, the casks could resist aircraft or missile impacts at even greater velocities at angles other than perpendicular to the walls of the casks. For example, the casks could withstand the impact of an F-16 at a 60-degree angle with the ground at a velocity of 508 knots. This resistance of the casks to impact penetration means that most impacts at the PFSF would not cause the release of <u>any</u> radioactive material. Thus, the actual probability that an aircraft or missile impact at the PFSF would cause a release of radioactive material is significantly lower than the very low probability that an impact would occur in the first place. This reinforces the conclusion of the probabilistic analysis above that the Air Force would not need to curtail operations on or around the UTTR because of the construction and operation of the PFSF.

F. Conclusion

PFS has thoroughly analyzed the risk to the PFSF from military aircraft flights and ordnance used on and around the UTTR. The probability that an accident involving military aircraft or ordnance could impact the PFSF is extremely low. In addition, the probability that such an unlikely accident would cause a release of radioactive material is further reduced by the robust design and construction of the concrete and steel casks in which the spent fuel will be stored. Even in the remote event of an accident at the PFSF involving a military aircraft or a cruise missile, it is extremely unlikely that any radioactive material would be released to the environment. Therefore, there is no reasonable basis for the Air Force to curtail its operations on or around the UTTR because of the construction and operation of the PFSF. Hence, the PFSF poses no threat to the continued operation of Hill AFB and thus would pose no threat to the economy of the State of Utah.

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[17] PFSF Safety Analysis Report, Table 4.2-2.

[18] PFS Report, Aircraft Crash Impact Hazard at the Private Fuel Storage Facility.