

**RAS 3099**

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
ATOMIC SAFETY AND LICENSING BOARD

LBP-01-19  
**DOCKETED 05/31/01**  
**SERVED 05/31/01**

Before Administrative Judges:

G. Paul Bollwerk, III, Chairman  
Dr. Jerry R. Kline  
Dr. Peter S. Lam

In the Matter of

PRIVATE FUEL STORAGE, L.L.C.

(Independent Spent Fuel Storage Installation)

Docket No. 72-22-ISFSI

ASLBP No. 97-732-02-ISFSI

May 31, 2001

MEMORANDUM AND ORDER  
(Granting in Part and Denying in Part  
Summary Disposition Motion Regarding  
Contention Utah K/Confederated Tribes B;  
Referring Ruling on Aircraft Crash Hazard  
Regulatory Standard to the Commission)

Pending before the Licensing Board in this 10 C.F.R. Part 72 proceeding concerning the application of Private Fuel Storage, L.L.C. (PFS), for authorization to construct and operate an independent spent fuel storage installation (ISFSI) in Skull Valley, Utah, is a motion for summary disposition filed by PFS regarding contention Utah K/Confederated Tribes B, Inadequate Consideration of Credible Accidents. With contention Utah K/Confederated Tribes B, intervenors State of Utah (State) and the Confederated Tribes of the Goshute Nation (Confederated Tribes) challenge the sufficiency of PFS consideration of credible accident scenarios caused by external events and facilities that could affect the proposed facility. The PFS asks that summary disposition be granted in its favor on contention Utah K/Confederated Tribes B, a request that is supported in part by the NRC staff and opposed by the State, as the lead intervenor for this contention. In addition, PFS has filed a motion to strike portions of the

State's responsive pleading and the accompanying supporting materials, which the State opposes and the staff supports.

For the reasons set forth below, we deny the PFS motion to strike, grant in part and deny in part the PFS dispositive motion, and refer to the Commission that portion of our determination regarding the regulatory standard to be applied to aircraft crash hazards for ISFSIs.

## I. BACKGROUND

In its April 1999 decision ruling on the parties' standing and litigable issues, the Licensing Board admitted portions of then-separate contentions Utah K and Confederated Tribes B and consolidated them for consideration in the proceeding. See LBP-98-7, 47 NRC 142, 190-191, 234-35, 247-48, reconsideration granted in part and denied in part on other grounds, LBP-98-10, 47 NRC 288, aff'd on other grounds, CLI-98-13, 48 NRC 26 (1998).

As admitted,<sup>1</sup> the contention reads:

The Applicant has inadequately considered credible accidents caused by external events and facilities affecting the ISFSI and the intermodal transfer site, including the cumulative effects of the nearby hazardous waste and military testing facilities in the vicinity and the effects of wildfires.

Id. at 253. In admitting this contention, however, the Board also limited the scope of the contention to the following issues: (1) the impact upon the ISFSI from (a) accidents involving materials or activities at or emanating from the (i) Tekoi Rocket Engine Test Facility (Tekoi), (ii) Salt Lake City International Airport (SLCIA), (iii) Dugway Proving Ground (DPG), including

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<sup>1</sup> As admitted, the contention also included a portion of a contention submitted by former intervenors Castle Rock Land and Livestock, L.C., and the Skull Valley Co., Ltd. (Castle Rock/Skull Valley). See LBP-98-7, 47 NRC at 214. That portion, however, was dismissed upon Castle Rock/Skull Valley's withdrawal from this proceeding in 1999. See LBP-99-6, 49 NRC 114, 120-21 (1999).

Michael Army Airfield (MAAF), (iv) Hill Air Force Base (HAFB), and (v) the Utah Test and Training Range (UTTR), and (b) wildfires occurring in Skull Valley, Utah; and (2) the impact upon the PFS Rowley Junction Intermodal Transfer Point (ITP) of (a) materials or activities from the above specified facilities; or (b) hazardous materials that pass through the ITP from the Laidlaw hazardous waste incinerator, the Envirocare low-level radioactive and mixed waste landfill, or the Laidlaw Clive Hazardous Waste Facility or Grassy Mountain hazardous waste landfill.

On June 7, 1999, PFS filed a motion for partial summary disposition of contention Utah K/Confederated Tribes B, requesting a ruling in its favor on all non-ITP related aspects of the contention. A central premise of this motion was that there was no genuine dispute of fact as to whether accidents at the PFS facility relative to the above-referenced facilities posed a threat of radioactive release that could result in radiation levels above acceptable regulatory limits. See [PFS] Motion for Partial Summary Disposition of [Contention Utah K/Confederated Tribes B] (June 7, 1999) at 2-18. In addition, PFS asked for summary disposition on the portion of the contention regarding the potential impacts on the PFS ISFSI from wildfires. See id. at 18-20. The staff supported this PFS motion except as it related to military aircraft crashes, for which the staff declared it had not yet completed an analysis. See NRC Staff's Response to [PFS] Motion for Partial Summary Disposition of [Contention Utah K/Confederated Tribes B] (July 22, 1999) at 1-2. The State opposed the PFS motion in all respects except for the issue of aircraft crashes, on which it submitted a separate, unopposed request for deferral pending a staff determination of its position on the matter. See [State] Opposition to [PFS] Motion for Partial Summary Disposition of [Contention Utah K/Confederated Tribes B] (July 22, 1999) at 2, 4-12.

After considering the various submissions by the parties, in an August 30, 1999 ruling, the Board granted in part, denied in part, and deferred in part the PFS motion. See LBP-99-35, 50 NRC 180 (1999). Specifically, the Board (a) granted the motion with regard to Tekoi based on the State's withdrawal of its remaining argument regarding that facility; (b) denied the motion with respect to SLCIA given that at least two issues -- the higher commercial aircraft risks posed by descending aircraft as compared to cruising aircraft and the higher risks based on the growth of aircraft takeoffs and landings -- were found to present disputed material issues of fact; (c) relative to the DPG-related matters, granted the motion in part regarding the testing/storage of chemical munitions and agents, testing of biological materials, transportation of biological, chemical, and hazardous materials, ordnance disposal/unexploded ordnance, and MAAF landings of aircraft carrying "hung bombs" and the X-33 experimental space plane issues; denied the motion in part in connection with the firing of conventional ground weapons in military testing or training matter, and deferred aircraft crash-related issues pending further staff action; (d) in connection with UTTR and HAFB issues, deferred military aircraft crash-related issues pending a staff position, including the firing of air-delivered munitions, and denied the motion as to cruise missiles; (e) granted the motion with respect to the wildfires issue; and (f) deferred ruling on the aircraft accident cumulative impacts issue pending a staff position on military aircraft crashes. See id. at 200-01. Thereafter, based on a ruling regarding contention Utah B, License Needed for Intermodal Transfer Facility, made that same day, see LBP-99-34, 50 NRC 168 (1999), the Board determined that the ITP-related portions of this contention should be dismissed, denied a PFS request for reconsideration on the DPG ground weapons testing and training matter, and clarified that its ruling on UTTR-related non-cruise missile overflights was an acknowledgment of the staff's "no position" determination on Skull Valley military overflights. See LBP-99-39, 50 NRC 232, 236-38 (1999).

As a result of these various rulings, the Board approved a revised contention Utah K/Confederated Tribes B that provides:

CONTENTION: The Applicant has inadequately considered credible accidents caused by external events and facilities affecting the ISFSI, including the cumulative effects of military testing facilities in the vicinity.

Id. at 240.

On September 29, 2000, the Staff presented its revised Safety Evaluation Report (SER) regarding aspects of the PFS facility that are at issue relative to this motion. In that report, with regard to the issue of crash hazards, the staff concluded that the “cumulative probability of a civilian or military aircraft crashing at or affecting the Facility is below the threshold probability criterion of  $10^{-6}$  per year . . . [and] there is reasonable assurance that civilian or military air crashes would not pose a hazard to the Facility.” SER at 15-81. Thereafter, pursuant to 10 C.F.R. § 2.749 and in accordance with a Board scheduling order, see Licensing Board Order (General Schedule Revision, Withdrawal of Contentions Utah H and Utah U, and Status of Contention Utah GG) (Sept. 5, 2000) (unpublished), in late December 2000 PFS filed the motion for summary disposition regarding contention Utah K/Confederated Tribes B now before us, which is supported by a statement of material facts not in dispute, the five affidavits of supporting declarants, and the deposition of a State witness. See [PFS] Motion for Summary Disposition of [Contention Utah K/Confederated Tribes B] (Dec. 30, 2000) [hereinafter PFS Dispositive Motion]; see also id. Statement of Material Facts [hereinafter PFS Undisputed Facts]; id. attach. A (Declaration of George Carruth) [hereinafter Carruth Declaration]; id. attach. B (Declaration of George Wagner and David Girman) [hereinafter Wagner/Girman Declaration]; id. attach. C (Declaration of James L. Cole, Jr., Wayne O. Jefferson, Jr., and Ronald E. Fly) [hereinafter Cole/Jefferson/Fly Declaration]; id. attach. D (Declaration of Jeffrey

R. Johns) [hereinafter Johns Declaration]; id. attach. E (Declaration of Stephen A. Vigeant); id. attach. F (Deposition of Hugh H. Horstman) [hereinafter Horstman Deposition].

In late January 2001, the staff and the State filed responses to the PFS dispositive motion. See NRC Staff's Response to [PFS] Motion for Summary Disposition of Utah Contention K/Confederated Tribes Contention B (Jan. 30, 2001) [hereinafter Staff Response]; [State] Response to [PFS] Motion for Summary Disposition on Utah Contention K/Confederated Tribes Contention B (Jan. 30, 2000) [hereinafter State Response]. In support of its response generally opposing the PFS motion, the State included a statement of disputed and relevant material facts and two affidavits. See State Response, [State] Statement of Disputed and Relevant Material Facts [hereinafter State Disputed Material Facts]; id. exh. 1 (Declaration of Dr. Marvin Resnikoff Regarding Material Facts in Dispute with Respect to Contention K) [hereinafter Resnikoff Declaration]; id. exh. 2 (Declaration of Lieutenant Colonel Hugh L. Horstman, Air Force (Retired) in Support of [State] Response to [PFS] Motion for Summary Disposition of Contention Utah K and Confederated Tribes B) [hereinafter Horstman Declaration]. The staff also included an affidavit of two witnesses in support of its position that portions of the PFS motion should be granted. See Staff Response, unnumbered attach. (Affidavit of Amitava Ghosh and Kazimieras Campe Concerning Utah Contention K/Confederated Tribes B) [hereinafter Ghosh/Campe Declaration]. Finally, the staff's pleading engendered a February 9, 2001 State reply opposing the staff conclusion that summary disposition is appropriate relative to the remaining portions of Utah Contention K/Confederated Tribes Contention B. See [State] Reply to Staff's Response to [PFS] Motion for Summary Disposition on [Contention Utah K/Confederated Tribes B] (Feb. 9, 2001) [hereinafter State Reply].

That same date, PFS submitted a motion to strike portions of the State's January 30, 2001 Response, requesting that the Board strike portions of the purported expert testimony of State affiants Dr. Marvin Resnikoff and Lieutenant Colonel Hugh Horstman, and associated exhibits and portions of the State's response, that PFS asserts are improper.<sup>2</sup> See [PFS] Motion to Strike Portions of [State] Response to [PFS] Motion for Summary Disposition on Utah Contention K/Confederated Tribes Contention B (Feb. 9, 2001 [hereinafter PFS Motion to Strike]. The State and the staff each filed responses to the PFS motion to strike, the former opposing the motion and the latter supporting its requested action. See [State] Response to [PFS] Motion to Strike Portions of [State] Response to [PFS] Motion for Summary Disposition on Utah Contention K/Confederated Tribes Contention B (Feb. 20, 2001) [hereinafter State Motion to Strike Response]; NRC Staff Response to [PFS] Motion to Strike Portions of [State] Response to [PFS] Motion for Summary Disposition on Utah Contention K/Confederated Tribes Contention B (Feb. 20, 2001) [hereinafter Staff Motion to Strike Response].

## II. ANALYSIS

### A. Summary Disposition Standards

We have articulated the standard governing the consideration of a motion for summary disposition several times in this proceeding in ruling on previous PFS motions. We will rely on the same standard noted below in ruling on the present PFS motion for summary disposition:

Under 10 C.F.R. § 2.749(a),(d) summary disposition may be entered with respect to any matter (or all of the matters) in a proceeding if the motion, along with any appropriate supporting

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<sup>2</sup> With the exception of a PFS protest regarding Dr. Resnikoff's expertise in the area of cruise missiles, which is discussed in section II.B.2 below, there have been on party objections to the qualifications or expertise of the various declarants whose statements are relied upon to provide support for other parties' assertions regarding the material factual matters at issue in connection with contention Utah K/Confederated Tribes B.

material, shows that there is “no genuine issue as to any material fact and that the moving party is entitled to a decision as a matter of law.” The movant bears the initial burden of making the requisite showing that there is no genuine issue as to any material fact, which it attempts to do by means of a required statement of material facts not at issue and any supporting materials (including affidavits, discovery responses, and documents) that accompany its dispositive motion. An opposing party must counter each adequately supported material fact with its own statement of material facts in dispute and supporting materials, or the movant’s facts will be deemed admitted. See Advanced Medical Systems, Inc. (One Factory Row, Geneva, Ohio 44041), CLI-93-22, 38 NRC 98, 102-03 (1993).

LBP-99-23, 49 NRC 485, 491 (1999); LBP-99-35, 50 NRC 180, 184 (1999).

With these general principles in mind, we now turn to the PFS summary disposition motion regarding contention Utah K/Confederated Tribes B.

B. Application to Contention Utah K/Confederated Tribes B

1. Use of Military Ordnance at DPG

a. PFS Position. PFS proffers seven undisputed material facts, designated as A1 through A7, in support of its argument that the use of military ordnance on DPG will not pose a threat to the PFS ISFSI. See PFS Undisputed Facts at 1-2. Relying on testimony provided by Dr. George Carruth, a retired DPG Commander and former Chief of the Chemical and Nuclear Biological and Chemical Defense Division for the United States Army who also has experience developing requirements documents for dry storage of spent nuclear fuel (SNF) similar to the PFS fuel, see Carruth Declaration at 1-2 & exh. 1 (Carruth curriculum vitae), PFS proffers the following bases for this conclusion: (1) the firing of weapons is covered by stringent safety procedures; (2) the firing position closest to the PFS facility is more than fifteen miles away; (3) the ranges of the weapons, aside from the Army Multiple Launch Rocket System (MLRS) are insufficient to reach the PFS site from the DPG firing positions; and (4) the weapons, including the MLRS, are fired away from the PFS ISFSI. See PFS Dispositive Motion at 4-5.



Regarding the presence of the MLRS, PFS declares that the Army's manual on the MLRS clearly delineates the area at risk from the firing of such rockets as a maximum of twenty miles to the front of the MLRS and two miles to either side of the line on which the rockets are fired. This area is limited, according to PFS, because of specific design features in the MLRS launcher and rockets (i.e., free-flight/unguided trajectory that eliminates guidance system failures and post-launch deployed missile fins that maintain launcher-imparted spin stability) that are intended to ensure that the rockets fly where they are aimed. See id. at 5; Carruth Declaration at 5-6. Additionally, PFS argues that the firing points and impact locations used for the MLRS at DPG pose no hazard to the ISFSI. It asserts that MLRS rockets have been launched at the DPG only twice in the past twelve years, once into the Causeway impact area, some thirty-seven miles southwest of the PFS site, and once into the Wig Mountain impact area, which at seventeen miles to the southwest is the closest DPG impact site to the PFS facility. In the former instance, the rockets were fired directly away from the PFS site, so that any area of risk would extend only to the thousand yard risk area (440-yard launcher danger area and additional 550-yard noise hazard area) directly behind the MLRS launcher, while in the latter instance both the firing and impact points were located at a distance from the PFS site well beyond the maximum range of the MLRS rockets. Furthermore, PFS argues that because of the location of the DPG firing points, any rockets fired in the future into the Wig Mountain impact area would be fired away from the PFS site, thus causing little risk to the ISFSI. PFS thus contends it is entitled to summary disposition with respect to MLRS launches at the DPG. See PFS Dispositive Motion at 5-6; Carruth Declaration at 6-9.

b. Staff Position. The staff does not find a basis for challenging any of the seven undisputed material factual statements asserted by PFS on this issue. See Staff Response at 1-2, 9. In support of this conclusion, the staff relies on the joint affidavit of Amitava Ghosh, a

principal engineer for staff contractor Southwest Research Institute, and Kazimieras Campe, a Senior Reactor Engineer in the Probabilistic Safety Assessment Branch of the NRC Office of Nuclear Reactor Regulation, both of whom indicate they reviewed the PFS analysis regarding the probability that a rocket deployed from the DPG would impact the PFS site, and helped prepare the staff's September 29, 2000 SER review of the PFS-provided information in which the staff concluded there is reasonable assurance that the MLRS testing at DPG would not pose a hazard to the PFS facility. See id. at 6-7; Ghosh/Campe Declaration 2 (citing Sept. 29, 2000 SER at 15-81 to -84). The staff thus maintains that the PFS analysis with respect to this issue is sufficient and there are no longer any material facts in dispute.

c. State Position. Although noting its concern that the PFS evaluation of risks from munitions is "simplistic and does not adequately characterize the probability of a potentially catastrophic munition strike against the facility," the State declares that it no longer contests the evaluation of risks from munitions launched from the DPG. State Response at 5.

d. Board Ruling. Based on the material factual findings put forth by PFS on this matter, with which the staff agrees and the State does not contest, we conclude there is no remaining genuine issue as to any material fact on this aspect of contention Utah K/Confederated Tribes B, and thus grant the PFS motion with respect to the issue of ground launched munitions from the DPG.

## 2. Cruise Missile Testing Hazards

a. PFS Position. PFS delineates ten undisputed material facts, numbered B1 through B10, that it declares support summary disposition in its favor regarding the portion of contention Utah K/Confederated Tribes B that addresses cruise missile testing on the UTTR. See PFS Undisputed Facts at 2-4. PFS asserts that the cruise missile launches from the UTTR pose no hazard to the PFS site, as outlined in the joint affidavit of United States Navy Rear Admiral

(retired) George F.A. Wagner, an associate at Burdeshaw Associates, Ltd. (BAL), who is asserted to have particular expertise in the area of cruise missile testing and operations, and United States Air Force Reserve Lieutenant David Girman, also a BAL associate, who is identified as being knowledgeable about the safety of the cruise missile tests that are conducted on the UTTR. See Wagner/Girman Declaration & exhs. 1-2 (Wagner and Girman curriculum vitae).

In the context of its material factual statements and the supporting joint affidavit, PFS maintains that the cruise missile launches are generally confined to the northern and western portions of the UTTR, at least thirty statute miles from the PFS site, with the launch aircraft approaches to the missile release points normally being made north to south or east to west that result in launches being directed away from the proposed ISFSI facility. Additionally, cruise missile targets on the UTTR are more than eighteen miles away from the site, and the Air Force anticipates testing only six cruise missiles per year. Further in support of its position, PFS maintains that the Air Force applies rigorous pre-launch planning, safety review, and preparation processes to cruise missile tests. Also significant, according to PFS, is the Air Force use of a minimum two nautical miles separation distance between missile flight pathways and inhabited areas within the UTTR, including the seventeen inhabited areas in Skull Valley. In fact, according to PFS, because of these inhabited areas, Army laboratories, MAAF, and various DPG artillery training ranges, the Air Force does not fly cruise missiles over the eastern portion of DPG. Indeed, PFS declares, as a result of Skull Valley and DPG flight restrictions, missile performance standards, and UTTR missile target placement, the Air Force does not plot cruise missile flight patterns to pass within ten nautical miles of the PFS site. Finally, PFS notes that the closest cruise missile crash that has occurred was over eighteen miles from the proposed PFS site. See PFS Dispositive Motion at 6-7.

In addition to these air space restrictions, in support of its summary disposition request PFS describes the Flight Termination System (FTS) that is required to be installed in all cruise missiles prior to any testing on the UTTR and is designed to destroy the weapons promptly by terminating their flight paths in the event of an anomaly, either on command or automatically if contact is lost by the base or aircraft that is supporting the test. According to PFS, the FTS is designed to bring the cruise missile down to within the two nautical mile separation distance between missile flight paths and inhabited areas. Further, PFS maintains that the UTTR and the Air Force 49<sup>th</sup> Test Squadron, which is responsible for all cruise missile testing, are aware of no instances of known FTS failure or any instance in which a cruise missile has hit the ground more than one mile from its intended flight path. Considering the distance between planned missile flight paths and the PFS site, PFS argues that in the event of an anomaly the FTS would bring the cruise missile to the ground a safe distance from the PFS facility. See id. at 6-8.

Thus, regarding its assertion that a cruise missile strike at the proposed PFS ISFSI is not a credible event, PFS concludes that the undisputed material facts it outlines regarding pre-launch safety review of missile testing, the distance between the planned missile flight paths and the PFS site, and the presence of the FTS, combined with the fact that only a small number of missiles will be launched each year on the UTTR, demonstrate that it is entitled to summary disposition in its favor on this portion of contention Utah K/Confederated Tribes B regarding cruise missile launches from the UTTR. See id. at 8.

b. Staff Position. Because PFS included information in its summary disposition motion that has not received staff review because it was not reflected in the PFS information the staff had before it during SER preparation, the staff declares that it takes no position regarding the PFS undisputed material facts concerning cruise missile testing. See Staff Response at 5 & n.5, 8 nn.6, 8.

c. State Position. In opposing the PFS motion, the State disputes one material fact proposed by PFS, item B10. Although acknowledging that cruise missiles may be “tracked carefully” and an FTS may be available to be activated to destroy the missile, the State contests the significance of these facts in terms of the PFS conclusion that a cruise missile crash at its facility is not a credible event. Pointing to a December 1997 incident in which a cruise missile crashed in the vicinity of a university astronomical observation site that was attributed to a loss of communication between ground and air controllers trying to pass off manual control of the missile, and to sources that indicate “three cruise missiles have crashed outside intended land boundaries of the [UTTR] between June 1999 and September 2000,” the State declares that even with the FTS in place, such a system will fail to protect if it is not activated, therefore possibly causing damage to an unintended area. State Disputed Facts at 1-2 (citing State Response, exh. 3 (Accident Investigation Board Report, United States Air Force AGM-129 Advanced Cruise Missile (Dec. 10, 1997)); id. exh. 5 (Letter from Captain Mary A. Enges-Maas, United States Air Force, to Connie Nakahara, State of Utah Department of Environmental Quality (Aug. 23, 1999) at 2); id. exh. 6 (Michael Vigh, Stray Missile Hits Desert: No Injuries as Cruise Unit Crashes in Remote West Tooele County, Salt Lake Tribune, Mar. 25, 2000, at D1; Air Force to Take Months to Probe Missile Crash, Salt Lake Tribune, Sept. 30, 2000, at A4.). Based on the PFS assumption that six cruise missiles will be tested per year in the UTTR, the staff’s SER estimation that one to two missiles goes out of control during every 150 tests, and a comparison of the size of the UTTR restricted area to the effective area of the PFS facility, proffered State expert Dr. Marvin Resnikoff has calculated that the probability of a cruise missile impacting the PFS site is between 2.78E-07 to 5.55E-07 per year, which he asserts should be included in the overall cumulative hazard probability estimate. See Resnikoff Declaration at 16-18 & exh. I (Probability of Cruise Missile Impacting PFS Facility).

d. PFS Motion to Strike. As part of its January 2000 motion to strike, PFS has challenged certain testimony given by Dr. Resnikoff, including his cruise missile statements, because he is a “technically unqualified witness.” PFS Motion to Strike at 4. Regarding the issue of cruise missiles, PFS challenges Dr. Resnikoff’s probability calculation because Dr. Resnikoff does not have the qualifications necessary to “derive the proper input values to the calculation.” Id. at 5. Specifically, PFS alleges that although his background makes him qualified to perform the mathematical functions necessary to arrive at a probability figure, his statements should be disregarded because, lacking any experience as an aeronautical engineer, a military officer, or a former defense contractor with cruise missile operational experience, he is not qualified to assess the inputs necessary to make those calculations because he is unfamiliar with the process of analyzing cruise missile crashes or the hazards posed to ground facilities. See id. at 5-6. For its part, the staff supported the PFS motion to strike Dr. Resnikoff’s testimony. See Staff Motion to Strike Response at 1.

In its response, the State argues that the PFS motion to strike “should be denied in toto in that it attacks expert witness declarations, not pleadings,” and because it is essentially a reply to the State response to the PFS dispositive motion by which PFS attempts to fill in the gaps of the arguments it made in that dispositive motion. State Motion to Strike Response at 3-4.

e. Board Ruling. Of the ten cruise missile-related items identified by PFS in its undisputed material facts statement, the first nine are uncontested by the State. These include: (1) the distances and location of the PFS site relative to the UTTR and the DPG; (2) the types of cruise missiles utilized at these sites, along with their speeds and flight altitude ranges; (3) Air Force plans to conduct six cruise missile tests per year on the UTTR; (4) the extensive planning that is applied to cruise missile tests to ensure their safety; (5) the Air Force use of a

minimum distance of two nautical miles between missile flight paths and inhabited areas; (6) the Air Force plotting of cruise missile flights to avoid passing within ten nautical miles of the PFS site due to factors such as the location of inhabited areas, performance characteristics of missiles, and the location of missile targets on the UTTR; (7) the fact that the cruise missile crash impact closest to the PFS site was eighteen miles away; (8) the requirement that cruise missiles have an FTS system because of their capability to exceed range boundaries; and (9) relative to FTS performance history and technical capability of bringing down an errant missile, the lack of an instance in which an FTS has failed or a cruise missile has come down more than a mile from its intended flight path. The State has, however, attempted to raise a material factual dispute with regard to the final item: the PFS declaration that the cruise missiles are accurately tracked and that the FTS may be activated at any time by range safety officers. According to the State, this statement about cruise missiles tracking accuracy and the availability of the FTS does not account for the fact, as illustrated in the 1997 incident, that the FTS must be activated, or that incidents, such as the three recent events, can occur outside the UTTR. The State's premise for its factual dispute is that, as the 1997 crash illustrates, there is the possibility that the FTS might not be activated so that the missile could crash and that, as happened in the three cited incidents in 1999 and 2000, such a crash could happen in areas outside the UTTR, including at the PFS facility. The State declares that this significantly undercuts the PFS conclusion that such an incident is not credible and establishes the validity of Dr. Resnikoff's crash probability calculation.

The problem for the State is that the information it relies upon to establish such a material dispute does not, in fact, do so. PFS has asserted, based on sworn descriptions of discussions with Air Force officials, that the cruise missiles that have crashed have not strayed more than one mile from their planned flight path. Further, PFS has declared, based on these

discussions, that being aware of the PFS facility, Air Force planners will not establish cruise missile flight paths any closer than ten nautical miles from the facility, thus providing a significant temporal buffer for FTS activation if a cruise missile should suddenly go awry during a test, thereby making such an incident extremely unlikely. Nothing provided by the State creates a material factual dispute with this conclusion.

The portion of the 1997 cruise missile crash report provided by the State does indicate that the FTS was not activated before the crash. It also indicates, however, that the crash, which occurred when a communications problem that delayed a planned manual control handoff between the ground control center and the air control center was not corrected in time to make necessary course corrections, was roughly along the planned missile flight path. Moreover, that flight path was over the university astronomical site only because planners did not know the site was there when the flight path was laid out. Thus, this incident is fully consistent with the PFS factual statement that crashes, when they do occur are within close range of flight paths that are planned to avoid inhabited areas. As for the three additional incidents the State asserts establish off-UTTR crash hazards, from the description of those incidents provided in the information included by the State, it is not apparent that the latter two, which occurred several hundred miles from the PFS facility, were off the UTTR, while the former, although off the UTTR, was within a military operations area (MOA) like that which encompasses the PFS facility, that legally can be overflowed so long as planners abide by stringent flight path restrictions intended to avoid inhabited areas. Again, these incidents are in no way inconsistent with the PFS showing that test planners are fully aware of the proposed PFS facility and will not plan missile test flight path that would take them within ten nautical miles of the facility.



Relative to Dr. Resnikoff's probability calculations, they clearly are based on extremely general assumptions that do not reflect any recognition of the PFS showing regarding the planning for and operation of the cruise missile tests over the past decade.<sup>3</sup> Indeed, while Dr. Resnikoff is able to do the math, it is apparent that, much like the alleged support that the recent crash incidents provide for the State assertion that there are material factual disputes, the assumptions that underlie his math are speculative to the degree they are asserted to show anything about the danger posed to the PFS facility by those crashes.

Accordingly, after examining the materials provided by the parties on the cruise missile crash matter, although we decline to strike any portions of Dr. Resnikoff's submission, which have little value relative to the matter before us, we nonetheless find that there is no genuine dispute of material fact and, therefore, grant the PFS summary disposition motion with regard to this portion of the contention.

### 3. Hazards Posed to the PFS ISFSI by Aircraft Crashes

PFS has submitted sixty-seven undisputed material facts, C1 through C67, in support of its summary disposition request regarding the State's allegations that PFS has not complied with the requirements of 10 C.F.R. §§ 72.90, 72.94, and 72.100 in evaluating the impacts upon its ISFSI arising from credible aircraft accident scenarios or the requirement in 10 C.F.R. § 72.122 that PFS demonstrate the proposed facility structures will be constructed to withstand postulated aircraft accidents. See PFS Undisputed Facts at 4-12; see also State Response at 6. And once again, the parties address various aspects of this matter, including (1)

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<sup>3</sup> For example, seemingly ignoring the otherwise uncontested PFS factual showings in B1 through B9 regarding missile flight paths and associate issues, Dr. Resnikoff uses the area ratio between the PFS facility (0.131 square miles) and the UTTR restricted air space (18,862 square miles), see Resnikoff Declaration, exh. I, to calculate the probability of cruise missile crashes impacting the PFS facility. This approach, however, is only valid if cruise missile flights are randomly distributed over the UTTR and, as such, overestimates the impact probability.

regulatory standards for aircraft crashes; (2) F-16 transits of Skull Valley; (3) potential ordnance impacts; (4) aircraft conducting various types of training on the UTTR; (5) aircraft on the Moser recovery route (MRR); (6) aircraft flying to and from the MAAF, (7) civilian aircraft flying on Airways J-56 and V-257, including aircraft flying to and from SLCIA; (8) other general aviation issues; and (9) the cumulative probability of aircraft crashes, ordnance, and cruise missile crashes to the PFS facility. We now address each of these issues in turn.

a. Regulatory Standards Relating to Aircraft Crash Hazards.

As an initial matter, the Board must confront the parties' differing views on what constitutes a credible aircraft accident so as to determine whether PFS has complied with the regulatory requirement to design its facility to withstand the effects of such a crash. According to PFS, a credible design basis event for Part 72 should be one that has a probability of  $1\text{E-}06$  per reactor year (i.e.,  $1 \times 10^{-6}$  or one in one million). See PFS Dispositive Motion at 9-10. As support for this position, PFS cites discussion in the statement of considerations accompanying the Commission's 1996 rulemaking amending 10 C.F.R. Part 60, which provides generic rules governing waste storage and handling at a geologic repository. See 61 Fed. Reg. 64,257 (Dec. 4, 1996). According to PFS, the Commission indicated in that rulemaking that Category 2 design basis events for a geologic repository's operations area "with probabilities of occurrence lower than  $1 \times 10^{-6}$  could be screened from further consideration due to their negligible contribution to individual risk." Id. at 64,261. Further, PFS asserts the Commission intended that this design basis guidance be comparable to ISFSIs licensed under 10 C.F.R. Part 72, such as the proposed PFS facility. In this regard, PFS observes that, in addition to adopting the definition of "design basis" from Part 72 without change in Part 60, id. at 64,262-63, and equating the Part 60 definition of "Category 2 design basis event" with the Part 72 term "design basis accident," id. at 64,265, the Commission declared that "[b]ecause operations at the

repository are expected to be similar to operations at other facilities licensed by the Commission (e.g., 10 C.F.R. part 72 facilities), the Commission believes that it is appropriate that their design bases be comparable,” id. at 64,262. Moreover, PFS declares, in establishing this standard, the Commission distinguished the Part 60 repository from reactor facilities, for which the Commission-cited staff standard review plan, Office of Nuclear Reactor Regulation, United States Nuclear Regulatory Commission, NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (June 1987) [hereinafter NUREG-0800], see 61 Fed. Reg. at 64,265 n.3, uses a design basis event probability measure of 1E-7 per reactor year, see NUREG-0800, at 2.2.3-2, on the basis that “conditions are not present at a repository to generate a radioactive source term of a magnitude that, however unlikely, is potentially capable at a nuclear power plant (e.g., from a postulated loss of coolant event),” 61 Fed. Reg. at 64,266. In sum, according to PFS, a 1E-06 per reactor year standard is appropriate as a screening standard for the PFS facility, a conclusion with which the staff agrees, see PFS Dispositive Motion at 10 (citing Staff SER at 15-77); see also Staff Response at 7.

In contrast, citing the staff standard review plan for reactor facilities, the State maintains that, putting aside the fact PFS cannot meet the 1E-06 standard, the probability bound for a credible design basis accident for a Part 72 facility actually should be 1E-07 per reactor year, or one in ten million. According to the State, the PFS attempt to have the Board implement a 1E-06 per reactor year standard by analogizing to the Part 60 rulemaking is misplaced. Quoting language in the 1996 Part 60 statement of considerations in which the Commission declared that “the criterion of ‘sufficiently credible to warrant consideration’ is inexact, leaving its application to a consideration of the particular [license application] site and design” and “such design basis events would include a broad a range of external phenomena as would be taken

into account in defining the design basis for other regulated facilities, including nuclear reactors,” 61 Fed. Reg. at 64,263, the State asserts that PFS has failed to show through a site-specific probability analysis that the 1E-06 benchmark it champions is appropriate. Specifically, according to the State, PFS has not dealt with the extreme consequences of an aircraft or related cask breach accident at the PFS ISFSI that, State supporting expert Dr. Resnikoff declares, could result in individual doses of 70 rem to over 10,000 rem that are much higher than the 2.1 rem dose cited in the 1996 rulemaking relative to the Yucca Mountain site as justifying the 1E-06 figure. See State Response at 7-8; see also State Motion to Strike Response at 4.

As the above recitation makes apparent, the parties seek to draw support for their position on a probability benchmark figure from the 1996 Part 60 rulemaking. After reviewing their arguments and the Part 60 statement of considerations, it seems to us that PFS and the staff have the better of the argument. Although the State seeks to rely on the lack of a site-specific analysis for the PFS facility, in fact the Commission's discussion in the Part 60 rulemaking regarding the Part 72 facility design basis accidents leads us to believe that it found both were covered by the 1E-06 bounding analysis. To be sure, the Commission's most pointed reference was to “surface facilities” at a Part 72 monitored retrievable storage (MRS) installation that, unlike the proposed PFS interim storage facility, could include spent fuel handling and packaging operations. 61 Fed. Reg. at 64,265. Yet, nothing in that rulemaking discussion suggests that the central basis for the State's claimed 1E-07 boundary figure -- the consequences of an aircraft crash into a storage cask -- was outside the scope of the matters considered by the Commission in reaching its bounding conclusion. Whatever may be the differences relative to fuel handling and packaging, as is the case with the PFS ISFSI facility,

an MRS will utilize above-ground storage casks. Thus, in accordance with the Commission's guidance in the 1996 Part 60 rulemaking, we will apply the 1E-06 standard outlined therein.

Having made this ruling, we recognize that this benchmark probability is an important factor relative to this contention because if, as the State asserts, the figure were found to be 1E-07, based on its current submissions PFS cannot meet this standard relative to the cumulative hazard from aircraft accidents and jettisoned ordnance. See PFS Undisputed Facts at 12 (cumulative hazard is 6.25E-07). Moreover, if, as the State asserts, this figure remains subject to consideration on a case-by-case basis, what the State has provided at this juncture suggests that additional litigation would be warranted on this point.<sup>4</sup> Accordingly, given the significant policy and resource implications of this particular ruling, we have concluded that certification of this portion of our decision is appropriate.<sup>5</sup> Of course, in reviewing whether to accept this certification, in the exercise of its supervisory authority the Commission is free to undertake review any other portions of this ruling it deems appropriate. See LBP-00-6,

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<sup>4</sup> PFS has asked that the portion of the State's response to its summary disposition motion discussing dose consequences, as well as the accompanying materials supporting that discussion, be stricken as irrelevant. See PFS Motion to Strike at 6-9; see also Staff Motion to Strike Response at 1. We see no reason to strike this material, which is irrelevant to our ruling, and thus deny this aspect of the PFS motion.

<sup>5</sup> Our ruling on the appropriate probability threshold might be considered as lacking ripeness to the degree that if the State is able to sustain its assertion that PFS is unable to comply with the 1E-06 standard, then the State's assertion that a higher standard is appropriate is irrelevant. On the other hand, if the State is correct that a case-by-case analysis still is appropriate relative to Part 72 facilities, then considering the State's evidentiary material on this point at the currently planned November-December 2001 hearing likely would be a much more efficient utilization of Board and party resources.

In this regard, we do not accept the staff's assertion that the State's argument regarding consequences is outside the scope of this contention. See Staff Motion to Strike Response at 1 n.1. As the discussion of the applicable benchmark standard in the PFS summary disposition motion suggests, in this context the State's challenge to the adequacy of the PFS discussion of credible accidents necessarily encompasses the bases upon which those accidents are asserted to be credible.

51 NRC 101, 136 n.12, aff'd in part and rev'd in part on other grounds, CLI-00-13, 52 NRC 23 (2000).

b. Types of Aviation Activity in the Vicinity of the PFS ISFSI in Skull Valley

i. PFS Position. An important aspect of this contention is the question of the types of aircraft activity that occur within the confines of Skull Valley. Relying on the declarations of three of its experts, PFS has proffered four asserted undisputed material facts, labeled C1 through C4, regarding the presence of aircraft in Utah that could possibly affect the PFS ISFSI. See PFS Undisputed Facts at 4-5 (citing Cole/Jefferson/Fly Declaration at 5-7). With these proposed undisputed material facts, PFS seeks to establish that in connection with the PFS ISFSI, which is located about fifty miles southwest of Salt Lake City, Utah, aviation activity consists of military operations associated with the UTTR, along with civilian commercial and general aviation. The airspace over the UTTR extends somewhat beyond the range's boundaries and is divided into restricted areas, over which the airspace is limited to military operations, and military operating areas (MOAs), which are located on the edges of the range, adjacent to the restricted areas. The PFS site lies within the Sevier B MOA, two statute miles to the east of the edge of the restricted airspace, and eighteen statute miles east of the eastern land boundary of the UTTR South Area. The area covered by airspace of the Sevier B MOA is approximately 145 miles long and 12 miles wide in the vicinity of the PFS site. See PFS Dispositive Motion at 11.

According to PFS, military air operations in the vicinity of the Skull Valley include (1) Air Force F-16 fighter aircraft transiting Skull Valley from HAFB to the UTTR south area; (2) F-16s from HAFB and various other military aircraft conducting training exercises on the UTTR; (3) F-16s from HAFB returning from the UTTR South Area to HAFB via the MRR, which runs to the northeast, two to three miles north of the PFS site; and (4) military aircraft, comprised mainly of

large transport aircraft, flying on military airway IR-420 to and from MAAF, which is located on the DPG about seventeen miles southwest of the PFS site. Civilian aircraft also will be flying in the vicinity of the PFS site, including (1) aircraft flying on federal Airway J-56, which runs east-northeast to west-southwest about twelve miles north of the PFS site; (2) aircraft flying on Airway V-257, which runs north to south approximately twenty miles east of the site; and (3) other minimal general aviation activity, which has not been reported but nonetheless could occur in the air and thus is considered in the PFS analysis. See id. at 12.

ii. Staff Position. The staff again has expressly taken no position with regard to the material facts C1 through C4 submitted by PFS, asserting that PFS has changed several of its assumptions as considered by the staff in its analysis in its SER. See Staff Response at 8 n.8. Specifically, in its summary disposition motion, PFS included recent sortie and aircraft data from HAFB regarding the number of F-16s transiting Skull Valley for fiscal years 1999 and 2000 that PFS asserts increase the effect of the calculated hazard to the PFS facility for crashes involving F-16s transiting the Skull Valley; falling ordnance jettisoned from those aircraft; crashes involving aircraft operating on the UTTR; and crashes involving the MRR. See Staff Response at 5; see also PFS Dispositive Motion at 13 n.20. Furthermore, PFS included in its motion a new assessment of the impact posed by general aviation aircraft that revised the likelihood of a crash from 2.36E-06, as was previously reported to the staff and reflected in the SER, to a probability of zero. Given this new information, the staff takes no position on issues involving F-16 flights in Skull Valley, including ordnance jettisoned from those aircraft, crashes involving aircraft on the UTTR, crashes on the MRR, and general aviation aircraft, simply because it has not yet evaluated the possible effects to the data. See Staff Response at 5-6.

iii. State Position. The only statement submitted by PFS that is disputed by the State regarding the scope of general aviation activity in the Skull Valley area is item C3. In this

regard, the State contests a portion of the statement regarding military operations that declares “F-16s from [HAFB] occasionally [return] from the UTTR South Area to [HAFB] via the Moser Recovery Route.” PFS Undisputed Facts at 4. Relying on the declaration of Lieutenant Colonel Hugh Horstman, the State disputes the use of the term “occasionally” as it refers to the number of F-16s that return from the UTTR to HAFB via the MRR. According to Lieutenant Colonel Horstman, “PFS’s estimate that fewer than five percent of the sorties use the [MRR] underestimates its use” and he “suspect[s] that the estimate was not obtained from [HAFB] because PFS referred to the air traffic controllers as ‘local’.” Horstman Declaration at 25. Lieutenant Colonel Horstman also describes other unknown factors he asserts could affect the purported conservatism of the PFS flight frequency analysis, including whether that flight estimate was documented before night vision goggle training was implemented for all pilots and the term of the PFS estimate (e.g., whether it was for a summer month when there are fewer flights due to weather or was done on a fiscal or calendar year basis). See id. at 25.

iv. Board Ruling. The only dispute raised by the State regarding the types of general aircraft activity in the Skull Valley area near the PFS facility was the item C3 reference to the number of flights taken by F-16s through the MRR as “occasionally.” For the reasons set forth in section II.B.3.c below, we conclude there is a material factual dispute relative to the frequency of those flights so as to permit that issue to be litigated further. However, as to whether those flights, as well as the other types of air activity outlined by PFS, constitute the types of air activity that should be considered in arriving at analysis of flight crash impacts, we conclude that there is no material factual dispute and so grant summary disposition in favor of PFS relative to this scoping aspect of the State’s issue.



c. F-16 Aircraft Transiting Skull Valley

i. PFS Position. PFS has posited ten undisputed material facts, C5 through C14, that are intended to address issues regarding the flight patterns of F-16 aircraft that could have an effect on the PFS site. See PFS Undisputed Facts at 5-6. In making these statements, PFS generally asserts that F-16 crashes do not pose any threat to the PFS facility. Relying on statements made by supporting affiants General Cole, General Jefferson, and Lieutenant Colonel Fly, PFS asserts that F-16 aircraft normally fly north to south down Skull Valley, en route from HAFB to the UTTR within the Sevier B MOA, usually at an altitude between 3,000 and 4,000 feet above ground level, and at a minimum 1,000 feet above ground level. The predominant route for travel is down the eastern side of Skull Valley, away from the proposed PFS facility, thereby eliminating almost all danger of crashing on the site. On the basis of past data available from HAFB, PFS estimates that 5,870 F-16 sorties would occur per year. This number is derived from the number of flights per year that occurred in Fiscal Years (FY) 1998, 1999, and 2000 and a recent increase in activity at HAFB because of a new Air Force program called the Air Expeditionary Force (AEF) that is designed to reduce away-from-home-base time. PFS arrived at this figure by averaging the sortie numbers for the three fiscal years and estimating an increase in activity to account for the recent increase in sorties. PFS argues it is not appropriate to use the FY 2000 figure alone because the possible deployment of troops away from the area, combined with the fifteen-month rotational status of the AEF, could alter that figure. See PFS Dispositive Motion at 13 (citing Cole/Jefferson/Fly Declaration at 9-12).

Based on this information, PFS asserts that the likelihood of an aircraft crashing into the PFS site is minimal. The nature of most flights is routine and administrative, and the most likely cause of an accident would be engine failure, which would still leave the pilot in control of the plane. According to PFS, it is Air Force protocol that, when a mishap occurs, if the pilot

remains in control of an aircraft and its direction, the pilot tries to avoid ground facilities.

Furthermore, PFS declares, the Sevier B MOA may be modeled as an airway with a width of ten statute miles, thereby negating any argument that a pilot going through the Skull Valley will navigate using (and thus fly toward) large objects such as the PFS site. See id. at 13-14.

Relying on these assumptions and utilizing a modified version of the staff's NUREG-0800 methodology to assess aircraft crash hazards, PFS has calculated the probability that an F-16 transiting Skull Valley would impact the proposed Skull Valley site. PFS has used this guidance, normally restricted to an operating power reactor, to calculate the probability of an F-16 crash at its proposed ISFSI, assuming that the F-16 flights are uniformly distributed across the Sevier B MOA in the vicinity of the site. The probability was calculated using the following factors: (1) the number of F-16s that transit the Skull Valley annually; (2) the effective area of the PFS site from the perspective of a crashing F-16; (3) the width of the Skull Valley in the vicinity of the PFS facility (where the F-16s are assumed to fly); and (4) the crash rate per mile for the F-16 under the conditions in which they transit the Skull Valley.<sup>6</sup> See PFS Dispositive Motion at 14 (citing Cole/Jefferson/Fly Declaration at 8-9). The number of F-16 flights used in the calculation was assumed to be 5,870 per year, which was determined as described above. According to PFS, the Sevier B MOA airspace in the vicinity of the site was taken as ten statute miles, and the effective area of the site was determined to be 0.1337 square miles. Further, the crash rate per mile for F-16 flights was determined to be 2.736E-08, based on Air Force F-16 data. PFS also incorporated into its probability calculation the assumption, based upon a review of accident reports over a ten-year period, that over ninety percent of the F-16 crashes that result from accident initiating events occurring over the Skull

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<sup>6</sup> The formula used for this calculation is  $P = N \times C \times A / W$ , where  $P$  is the probability,  $N$  is the number of flights per year,  $C$  is the crash rate per mile,  $A$  is the effective area of the site, and  $W$  is the width of the airway. See Cole/Jefferson/Fly Declaration at 8.

Valley would leave the pilot in control of the aircraft, thus allowing the pilot to divert the aircraft before impact. Thus, considering all these factors, PFS calculates the probability of a crashing F-16 impacting the Skull Valley to be  $3.11\text{E-}07$  annually. PFS also notes that in its SER the NRC staff used a similar method to calculate the probability of an F-16 crashing on the PFS site, but without the benefit of sortie and basing data only recently available from HAFB. See id. at 14-15 (citing SER at 15-49 to -57).

ii. Staff Position. The staff has specifically expressed no position on the PFS motion for summary disposition regarding undisputed material facts C7 and C8, which respectively concern the nature of the risks to F-16s in Skull Valley and the assumption that the Sevier B airspace over the Skull Valley has a width of ten statute miles. See Staff Response at 8 n.6. With respect to the remaining eight items, the staff takes no position regarding all aspects of F-16 flights in Skull Valley because PFS has provided a revised assessment of the impact hazard posed by general aviation aircraft that adjusted the likelihood of a crash from the  $2.36\text{E-}07$  figure that previously was reported to the staff and is reflected in its SER. See id. at 5. Therefore, the staff concludes it will not take a position on the issue of F-16 aircraft transiting the Skull Valley, including ordnance jettisoned from those aircraft, until it has an opportunity to evaluate the new PFS-supplied information. See id.

iii. State Position. Of the ten statements of material fact proffered by PFS regarding F-16 aircraft crash hazards at its facility, the State disputes eight: C5 through C8, C10, C11, C12, and C14. See State Disputed Facts at 2-7. To support its position, the State relies on the declarations of Dr. Resnikoff and Lieutenant Colonel Horstman, as well as statements made by certain PFS affiants.

Initially, the State disputes the PFS estimate that only 5,870 F-16s would be transiting the Skull Valley en route to the UTTR. The State argues that the estimate is not conservative

and that it does not reasonably anticipate the number of flights that could occur over the next forty years, the life of the proposed facility. The State notes that in FY 2000, 5,757 aircraft flew through Skull Valley. This number appears larger than those of FY 1998 and FY 1999. Because the FY 1998 and FY 1999 figures do not reflect AEF implementation, which occurred in FY 2000, the State argues that to include these two years in the calculation of an average is erroneous. The State argues that the estimated number of F-16 flights occurring in the Skull Valley thus should reflect the data available from the FY 2000 data, but include an additional twelve F-16 aircraft to be assigned to HAFB. See State Response at 9-10 (citing Resnikoff Declaration at 7; Horstman Declaration at 7). Given these criteria, the State estimates that the number of sorties transiting Skull Valley annually would be at least 6,759. See State Disputed Facts at 3.

The State also challenges PFS material fact C10 regarding the crash rate of airplanes transiting Skull Valley. The State argues that the PFS figure is not “conservative or bounding” because the figure incorporated the 2.736E-08 crash rate developed by the United States Department of Energy (DOE) for “normal flight,”<sup>7</sup> which was based on FY 1989 through FY 1998 crash data. State Response at 11. The State argues that this number is too low because it fails to account for higher crash rates due to the “bathtub” effect, as that phenomena is described by State witness Lieutenant Colonel Horstman. According to Lieutenant Colonel Horstman, the data put forth by PFS fails to take into account his own personal observation that crash rates are higher at the beginning and at the end of an aircraft model’s service life. See id. at 10-12 (citing Horstman Declaration at 8-9).

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<sup>7</sup> According to PFS, “normal flight” is flight that does not involve high-stress training maneuvers or other special operations. See Cole/Jefferson/Fly Declaration, exh. 4, at 11 (Aircraft Crash Impact Hazard at the Private Fuel Storage Facility (rev. 4 Aug. 10, 2000)).

In fact, the State argues, the applicability of the bathtub effect in the case of the F-16 fighters is shown in PFS's own exhibit and should be considered in determining crash rates. See id. at 11 (citing Cole/Jefferson/Fly Declaration, exh. 4, fig. 1 (Aircraft Crash Impact Hazard at the Private Fuel Storage Facility (rev. 4 Aug. 10, 2000))). The State declares that because the F-16 fleet has been in service since 1975, and can be expected to be replaced within the next ten years, or at least within the life of the proposed ISFSI, using a ten-year average of craft-life ignores the rise in crash rates at the end of service-life. Similarly, the State maintains that utilizing a crash rate based on the middle of the F-16's service life is also likely to be inaccurate by failing to account for the increase in crash rate in the beginning of service for the aircraft model that is likely to replace the F-16 during the proposed period of PFS facility operation. Further with respect to the "bathtub" effect, although the State agrees with the PFS assertion that the end of an aircraft's service life is not representative of the actual crash rate because of the low flight hour sums, it also notes that, as demonstrated by the FY 1991 to FY 1993 data, prior to the decrease in flight time the crash rate for the F-16A dramatically increased. The State argues that a better approach would be to use FY 1999 data to account for the increase in accident rate, as well as to compensate for the fewer flight hours as seen in the end of service life. See id. at 11-12.

The State disagrees as well with the PFS claim that an aircraft crash into the PFS facility is not a credible event, and thus disagrees with PFS material facts C7, C8, C11, C12, and C14. See State Disputed Facts at 3-7. In challenging the PFS probability calculation, in addition to the above-described disagreement with the number of flights that will be taken over Skull Valley per year, the State questions the assumption that a random distribution of flights will occur. In this regard, the State asserts that pilots currently fly throughout the Skull Valley, based on the path selected by the flight leader and the training mission, and not randomly as PFS asserts.

Furthermore, the usable airspace in the Skull Valley is limited to a seven- to eight-mile wide swath, not ten miles as PFS asserts. Moreover, the State maintains that F-16s usually fly in a south to southeastern direction in the Skull Valley in two or four ship formations that vary in width between 1.5 and 4 miles, thus spanning one-third to one-half of the available Skull Valley airspace. See State Response at 12-13. Finally, because of the PFS facility's size and location, the State believes that pilots will use the site as a navigation point, resulting in a narrowed, more concentrated navigation path around the PFS site with a concomitant increase in the potential for an F-16 crash on the site. See id. at 13-14.

The State also argues that PFS "inappropriately eradicated the majority of the risk from F-16s flying en route through Skull Valley" by asserting that the pilots will be able to avoid the facility in the event of an accident occurring over Skull Valley. Id. at 14. According to the State, in making this assertion PFS failed to consider various factors such as weather conditions, altitude, the magnitude of the emergency, and human factors, each of which potentially could affect a pilot's ability to perform emergency procedures necessary to avoid the PFS site. Furthermore, according to the State, it is difficult to extrapolate adequately from the circumstances of an accident generally to an accident occurring in Skull Valley. The State thus maintains that the PFS use of the Air Force's class A mishap reports for the F-16 from FY 1989 through FY 1998 is inadequate to assess all of the accident events that could occur. See id. at 15. Specifically, the State disputes the "applicability of [some of the] accident data to PFS's risk, the parameters considered in many of the categories, and the assessment and categorization of past accidents." Id. at 16. For example, although PFS figures included engine failures that were a result of high-stress maneuvers, the State observes that PFS admitted these types of maneuvers will not occur in Skull Valley, so that including them in the

category of events that are avoidable with pilot assistance artificially raises the percentage of collisions seen as avoidable. See id. at 16-17.

The State also maintains that the PFS use of what its declarants describe as the “Sevier B MOA Conditions” does not identify all relevant past accidents that could occur in Skull Valley. Examples of relevant accidents cited by the State include those occurring outside an altitude of 1000 to 5000 feet above ground level, while under instrument flight rules, or those involving lightning, gravity (G)-induced loss of consciousness, or collisions in mid-air. See id. at 17; see also id. at 23. Relying on the personal knowledge and experience of its affiant Lieutenant Colonel Horstman, the State also concluded that, excluding weather effects, pilots in only 62.5 percent of the past Class A mishaps that could occur in the Skull Valley would have been able to avoid the site. See id. at 18 (citing Horstman Declaration at 16-17).

The State also relies upon the information provided by its declarant Lieutenant Colonel Horstman as support for its assertion that PFS has failed to account for Skull Valley weather conditions that may affect the probability of an F-16 crashing into the proposed Skull Valley ISFSI. Utilizing data generally applicable to Skull Valley, the State asserts that the area exhibits a cloud cover of fifty percent or higher, forty-six percent of the time, at or below 12,000 feet above ground level, leading him to conclude that forty-six percent of the time a pilot may not be able to avoid the facility because it is concealed. Regarding this forty-six percent figure, the State also notes that the PFS assertion to the effect that a PFS-supplied UTTR advertising brochure indicates that ninety-six percent of time the cloud ceiling is at or above 3,000 feet with a visibility of three miles does not counter the State’s claim that there is a possibility of a crash into the site. This is so, the State maintains, because if there is cloud cover, the pilot either must fly above or below the cloud cover, creating the possibility that he or she will be unable to

see the facility in the event of a mishap and, particularly in the latter instance, be unable to react in time to avoid the facility. See id. at 18-19 (citing Horstman Declaration at 21).

The State also disagrees with the PFS assertion that if the pilots flew over the proposed facility while using it to update the F-16 navigation system, they will be able to avoid crashing onto the site because they will be aware of the exact location. The State argues that even if a pilot knows the basic location of such a facility, he or she will not be able to avoid it if it is not visible, as would be the case in extensive cloud cover or other inclement weather. Furthermore, according to the State, it will be difficult for a pilot to determine the aircraft's position relative to the site when trying to perform emergency procedures at a speed of 400 to 500 knots. Finally, the State disagrees with the PFS assertion that the pilot would also be able to rely on instrumentation for the orientation of the aircraft. The State claims that a mechanical failure or other damage to the aircraft would prevent the pilot from relying on the instrument panel. See id. at 19-20.

The State also argues that the PFS assumption that five percent of pilots who have the time and opportunity to avoid the PFS facility will fail to do so is not conservative because it fails to account for the lack of experience of some pilots. Finally, asserting that the PFS selective attempt to modify the F-16 crash rate by eliminating a significant portion of the potential accidents is not consistent with NUREG-0800, the State declares that its affiant Dr. Resnikoff has postulated the probability of an F-16 crashing into the proposed PFS facility while flying from HAFB en route to the UTTR South Area as  $4.65E-06$  per year. See id. at 20 (citing Resnikoff Declaration at 10-13).

iv. PFS Motion to Strike. With regard to the accident reports that were used in the parties' assessments, PFS has requested that Lieutenant Colonel Horstman's testimony and the State's response regarding his assessment of the F-16 accident reports and the PFS claim,



based on those reports, that F-16 pilots would remain in control of their aircraft in the event of an emergency be stricken because PFS has not had the opportunity to review or challenge his conclusions. This sanction is appropriate, PFS argues, because during his December 2000 deposition Lieutenant Colonel Horstman claimed he had reviewed PFS's assessment of the accident reports and stated there was nothing in the reports with which he disagreed. See PFS Motion to Strike at 2 (citing Horstman Deposition at 203-04).

In response, however, the State argues that even though PFS did not have the opportunity specifically to depose Lieutenant Colonel Horstman on his concerns regarding the PFS analysis of the accident reports, PFS should have been aware of his general concerns, which were addressed in the State's December 5, 2000 supplemental discovery response and in his December 11, 2000 deposition. In support of this argument, the State notes specific statements made by Lieutenant Colonel Horstman during his deposition, and of which PFS thus "was fully aware," in which he disagreed with a number of PFS aircraft crash assumptions including (1) the fact that accidents that could occur above 5,000 feet in the Sevier B MOA , incidents that PFS allegedly "completely disregarded"; (2) the effects of cloud cover upon visibility; (3) the fact that accidents could occur under instrument flight rules, which PFS also did not address in its analysis; (4) various types of accidents based on different flight activities such as gravity awareness warmups and night vision goggle training that the PFS analysis did not address; and (5) the occurrence of accidents involving bird strikes, which PFS also excluded from its analysis. State Motion to Strike Response at 6-7. Nonetheless, according to the State, PFS chose not to address these general concerns in its summary disposition motion.

Furthermore, according to the State, Lieutenant Colonel Horstman did not specifically review the accident reports prior to his deposition, and did not feel the need to do so until he reviewed the December 12, 2000 deposition of PFS declarant Colonel Fly and read the PFS

summary disposition motion. Due to various personal and professional obligations, and given the volume of materials, Lieutenant Colonel Horstman did not complete his review of all the materials relating to PFS characterization of the accident reports until January 21, 2000. Hence, it is not unreasonable for the State to have submitted his concerns in its summary disposition response. See id. at 8-9 & nn.8-9.

v. Board Ruling. Of the ten PFS statements of material fact relating to the issue of F-16s transiting Skull Valley, the State has not challenged C9 and C13. The first statement pertains to the effective area of the PFS site while the second statement sets forth the formula for calculating the probability that an aircraft flying over the PFS site would crash and impact the site. With respect to the other eight statements, C5 through C8 , C10 through C12, and C14, there clearly are material factual disputes based on the declaration of Lieutenant Colonel Horstman regarding his analysis of the submitted accident reports. Assuming his statements are not subject to being struck pursuant to the PFS motion, the State has presented credible evidence that is in direct conflict with the position of the PFS declarants on matters that are material to an evaluation of whether the PFS facility meets the appropriate design basis criteria in terms of aircraft mishaps and/or crashes.

Relative to that motion, the State's explanation regarding Lieutenant Colonel Horstman's position on the aircraft crash analysis reports is troubling, given his clear declaration during the December 11, 2000 deposition that he had reviewed the PFS report discussing F-16 crash analyses and had no particular disagreement with it. On the other hand, we do not believe that the State or Lieutenant Colonel Horstman intentionally withheld information from PFS during his deposition; rather, it seems apparent that Lieutenant Colonel Horstman overstated his familiarity with those analyses. Although any future misstatements of this type by this witness could call into serious question the thoroughness, and thus the viability, of his analysis, the

circumstances here do not warrant the action requested by PFS. At the same time, the circumstances do justify providing PFS with an additional opportunity to depose Lieutenant Colonel Horstman on his assessment of the accident analyses. We thus deny the PFS motion to strike with respect to this matter, but allow PFS the option of taking another deposition of Lieutenant Colonel Horstman regarding his analysis of the accident reports.

In light of this ruling, we deny the PFS motion for summary disposition relative to this portion of the accident analysis at issue in contention Utah K/Confederated Tribes B.

d. Potential F-16 Ordnance Impacts

i. PFS Position. PFS has put forth nine undisputed material facts, C15 through C23, relating to potential ordnance impacts at the PFS site. See PFS Undisputed Facts at 6-7. Relying on the testimony of its declarants, Cole, Jefferson, and Fly, PFS calculated the probability of ordnance carried by F-16s impacting the PFS site based on various scenarios.

Placing the probability of an inadvertent ordnance release at zero based on Air Force information that there had never been an unanticipated munitions release outside of a designated UTTR launch/drop/shoot box, PFS first analyzed a scenario involving ordnance (live or inert) jettisoned from an aircraft crashing into Skull Valley on the PFS site. PFS postulated that in the event of an accident in which the pilot would have time to respond before ejecting from the aircraft (e.g., engine failure), the pilot would jettison any ordnance from the aircraft. PFS used an approach similar to that for calculating the probability of F-16 impact to the site to calculate the probability of jettisoned ordnance directly impacting the site. Other factors that were included in the calculation were the fraction of F-16s flying in the area per year that would be carrying ordnance that could be jettisoned, the fraction of events that would leave the pilot in control such that the pilot could jettison the ordnance before ejection, and the area of the site from the perspective of a piece of ordnance flying north to south over the site, which PFS has

stated is equal to 0.08763 square miles. Assuming these additional factors, PFS calculated the probability of a piece of jettisoned ordnance directly impacting the site as 1.49E-07 per year.

See PFS Dispositive Motion at 15-16 (citing Cole/Jefferson/Fly Declaration at 12-14).

PFS also calculated the probability of jettisoned live ordnance that could land near the site after being ejected, as well as the hazard posed by live ordnance carried aboard a crashing aircraft that might crash into the ground near the facility. Noting that it has been advised by the Air Force that (1) Air Force pilots do not arm live ordnance carried while transiting over the Skull Valley; (2) there has never been an unanticipated munitions release outside UTTR designated explosion areas, see PFS Undisputed Facts at 6; and (3) the likelihood of an unarmed live jettisoned ordnance exploding upon impact with the ground is “remote,” PFS asserts it is “highly unlikely” there would be facility damage from jettisoned live ordnance or live ordnance carried aboard an aircraft that crashed, but did not directly hit the facility. PFS Dispositive Motion at 16. In making its probability calculation, however, PFS assumed that this type of live ordnance would have a one percent chance of exploding and, further assuming the bomb was the largest carried by F-16s over Skull Valley, sought to assess the damage that would result if an explosion occurred close enough so that the blast overpressure would damage a storage cask or the Canister Transfer Building (CTR), albeit without hitting either one. See id. Using the same method that was used for calculating the probability of an F-16 crashing into the facility, PFS calculated the probability of crashing F-16 jettisoned live ordnance landing near the facility, or an F-16 crash near the site without jettisoning live ordnance at 2.43E-10 per year.<sup>8</sup> See id. at 16-17 (citing Cole/Jefferson/Fly Declaration at 14-15).

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<sup>8</sup> The formula for this calculation is  $P = N \times C \times e \times A/W$ , where  $P$ ,  $C$ ,  $A$ ,  $W$  are defined as in note 6 supra;  $N$  is the number of F-16s carrying jettisonable ordnance and,  $e$  is the fraction of aircraft crashes that leave the pilot in control of the aircraft.

ii. Staff Position. As was the case with F-16 flights in Skull Valley, the staff takes no position regarding the portion of the PFS dispositive motion concerning potential ordnance impacts to the PFS site. See Staff Response at 5.

iii. State Position. Based on the testimony of its declarant Dr. Resnikoff, the State asserts it disputes PFS material facts C17 and C19 addressing potential ordnance impacts from F-16 flights over Skull Valley. While the State does not contest the PFS methodology used for calculating the probabilities for the previously described scenarios, the State disputes the effective area of the facility with respect to jettisoned ordnance, claiming that the correct area is 0.12519 square miles. Moreover, based on its analysis incorporating this effective area calculation as well as a different figures for aircraft flights per year, engine failures as a crash initiation factor, and Skull Valley airspace width, the State argues that the probability that jettisoned ordnance would impact the PFS facility is 4.97E-07 per year. See State Disputed Facts at 7 (citing Resnikoff Declaration at 13 & exh. E (Jettisoned Military Ordnance -- Impact)). Furthermore, the State declares that certain live and inert ordnance by the Air Force could strike and penetrate the PFS storage casks that will be utilized by PFS at the facility. See id. at 7 (citing Resnikoff Declaration at 20-21; Horstman Declaration at 24).

iv. Board Ruling. Although the State specifically disputes only two of the nine ordnance-related statements proposed by PFS -- C17 and C19 -- it is apparent from the analysis of its supporting witness Dr. Resnikoff, in particular his analysis of the factors that contribute to a probability estimate for ordnance impacts, that there are material factual disputes between the parties relative to this cumulative probability estimate element. Therefore, we deny the PFS summary disposition request with regard to this item.<sup>9</sup>

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<sup>9</sup> In doing so, however, we note that, given the PFS assumption that an aircraft or associated ordnance strike will cause a radioactive release, see PFS Dispositive Motion at 29, (continued...)

e. Aircraft Training on the Utah Test and Training Range

According to PFS, sorties flown over the UTTR reflected a variety of training activities, including air-to-air combat training, air-to-ground attack training, and air-refueling training.<sup>10</sup> Further, in analyzing the potential for these three training activities to impact its proposed Skull Valley ISFSI, PFS addressed these activities in twelve material factual statements, C24 through C35, in two categories: aircraft impacts and air-delivered weapons impacts. Below we address the summary disposition arguments put forth by the parties with respect to these various activities.

i. PFS Position. Because of the distance of UTTR air-to-ground attack and air refueling training activities from the PFS facility -- twenty and fifty miles respectively -- PFS considers only fighter aircraft air-to-air combat training activities, which are conducted some ten miles from the proposed ISFSI, as representing even a potential hazard. In this regard, PFS calculated the annual probability that the aircraft would crash and impact the PFS facility on the basis of the total crash rate per square mile per year calculated for the UTTR; the area of the UTTR from which aircraft could credibly impact the site; the effective area from the perspective of a crashing aircraft; the footprint area in which a crashing aircraft possibly could hit the ground

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<sup>9</sup>(...continued)

as currently presented Dr. Resnikoff's assertions about ordnance penetration, see State Disputed Facts at 7, appear to have little relevance to this particular probability calculation. Further, given the relatively small probabilities involved with this item, namely 2.43E-10 per year, the materiality of his assertions regarding the significance of the possibility of live ordnance exploding at high temperatures, see State Response at 25, is questionable.

<sup>10</sup> According to PFS, another aspect of UTTR training is transportation to and from the MAAF, located beneath UTTR airspace, which is addressed in section II.B.3.g below. See PFS Dispositive Motion at 17.

in the event of a crash; and the probability that a pilot will be able to take action to avoid the site.<sup>11</sup> See PFS Dispositive Motion at 17-18.

Relying on the information provided by its declarants Brigadier General Cole, Major General Jefferson, and Colonel Fly, and the data contained in the August 10, 2000 report to the NRC on PFS facility aircraft crash impact hazards those declarants prepared, PFS provides a maximum annual aircraft impact probability for aircraft engaging in air-to-air combat training. In doing so, PFS assumes that the total number of hours flown per year by fighter aircraft in air-to-air training is 3,741 -- the number of hours flown accounted for in FY 1998 multiplied by a factor of 1.156 to account for recent basing and sortie data. PFS also determined that the total crash rate for UTTR restricted areas R6402 and R6406 that are nearest the PFS facility are 2.52E-06 and 2.05E-05 crashes per square mile, respectively, and that the F-16 air-to-air combat training crash rate is 3.96E-05 per hour, based on data in the August 2000 aircraft report. Regarding the area that could credibly be impacted by an aircraft in the event of a crash and the footprint area (i.e., the area in which aircraft could possibly hit the ground in the event of a crash), both were assumed to be ten miles. Finally, PFS calculated the fraction of accidents that would leave the pilot in control of the aircraft to be 0.573, which was based on Air Force data indicating that ninety-five percent of all F-16 crashes on the UTTR are due to engine failure or some other accident which leaves the pilot in control of the aircraft, and data that suggests that forty-five percent of F-16 crashes that occur during air-to-air combat training are related to engine failure. See PFS Undisputed Facts at 7-8 (citing Cole/Jefferson/Fly

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<sup>11</sup> The calculation can be stated as:  $P = C_a \times A_c \times A/A_p \times R$ , 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 in which aircraft could credibly impact the PFS site in the event of a crash,  $A$  = effective area of the PFS site,  $A_p$  = the area in which a disabled aircraft could possibly hit the ground in the event of a crash, and  $R$  = the probability that a pilot would be able to take action to avoid the site in the event of a crash.

Declaration at 15-18). With these figures, PFS calculated the probability that an aircraft conducting air-to-air combat training would affect the PFS site in the event of a mishap as  $7.7E-08$  per year. See PFS Dispositive Motion at 18-19.

With respect to air-delivered weapons use on the UTTR, PFS also asserted that the air-to-ground attack training and weapons testing using air-delivered ordnance do not pose a significant hazard to the PFS facility. PFS argues that because the site is located eighteen statute miles to the east of the easternmost boundary of the range and, in addition, over twenty miles from the nearest target for air-delivered ordnance on the UTTR, there is no danger to the PFS site. Furthermore, according to PFS, weapons use is strictly regulated by the Air Force and there has never been a release beyond the designated areas. See PFS Dispositive Motion at 19 (citing Cole/Jefferson/Fly Declaration at 18-19).

ii. Staff Position. The staff supports the PFS position regarding the issue of air-delivered weapons at the UTTR (other than cruise missiles, upon which it takes no position), but takes no position as the issue relates to crashes involving aircraft on the UTTR. See Staff Response at 5, 7, 8 & n.8; see also section II.B.3.c.ii above.

iii. State Position. Relying on the sworn declarations provided by Dr. Resnikoff and Lieutenant Colonel Horstman, the State challenges PFS undisputed material facts C26, C28, C29, C33, and C34, each addressing an aspect of the PFS probability calculation regarding the impact of an aircraft crash involved in air-to-air combat training. The State argues that, contrary to PFS's assertion, air-to-air combat training over the UTTR does pose a potential hazard to the PFS facility. Further, although it does not disagree with the method utilized by PFS in its calculation of the probability of an aircraft engaged in air-to-air combat training affecting the site, the State does disagree with PFS probability figure arrived at by using that calculation.



First, the State disputes the total number of hours flown per year by aircraft in air-to-air combat training, stating that the number utilized in the probability calculation should be based on the number of FY 2000 sorties rather than modified FY 1998 figures. Furthermore, the State argues that FY 1999 data should be used for the F-16 crash rate, 5.27E-05 crashes per hour, in lieu of the PFS crash rate figure. The State also disputes the fraction of F-16 accidents on the UTTR that would leave the pilot in control of the plane, claiming it should be a factor of 0.765, rather than the lower figure reported by PFS. Ultimately, based on these disputed figures, the State calculates the probability that air-to-air combat training crashes will affect the PFS facility as 2.29E-07 per year. See State Disputed Facts at 8 (citing Resnikoff Declaration at 14 & exh. G (Probability of Aircraft Conducting Air-to-Air Combat at UTTR-South Impacting Facility); Horstman Declaration at 24).

On the other hand, with regard to the issues of the applicability of air-to-ground and air-refueling testing and air-to-ground weapons testing on the UTTR, the State does not challenge the PFS assertion that these activities do not pose a significant threat to the site. See State Disputed Facts at 7-8.

iv. Board Ruling. The State does not dispute PFS material factual statements indicating that any probability estimate for UTTR aircraft training need involve only impacts relating to aircraft crashes from air-to-air combat training. We therefore grant the PFS motion for summary disposition as relates to UTTR air-to-ground and air-refueling training activities and air-delivered weapons. We decline, however, to grant the PFS motion with regard to potential air-to-air combat testing activities. It is apparent from the analyses of State supporting declarants Dr. Resnikoff and Lieutenant Colonel Horstman, particularly the former's analysis of the factors that contribute to a probability estimate for UTTR air-to-air combat testing impacts,

that there are material factual disputes between the parties relative to this cumulative probability estimate element.

f. Aircraft Flying on the Moser Recovery Route

i. PFS Position. PFS has proposed five undisputed material facts, C36 through C40, concerning the issue of the likelihood that aircraft traversing the MRR, which may be used by some aircraft returning to HAFB from the UTTR South Area during limited periods of marginal weather conditions or at night under specific wind conditions, will crash into the PFS facility. In this regard, PFS declares that the MRR runs southwest to the northeast approximately two miles from the site. PFS estimates that, based on information from local air traffic controllers, approximately five percent of aircraft returning to HAFB use the MRR. Utilizing Air Force data confirming that there were 5,726 F-16 sorties in FY 1998, PFS calculated that only 286 aircraft used that route. See PFS Undisputed Facts at 9 (citing Cole/Jefferson/Fly Declaration at 19).

PFS utilized this information to calculate the probability that traversing aircraft on this route would pose a hazard to the proposed PFS facility. The average annual crash impact probability was calculated using the same method as for F-16s traversing Skull Valley. Utilizing data provided in the August 2000 aircraft report, as analyzed by the PFS declarants Cole, Jefferson, and Fly, PFS assumed that the MRR has a width of ten nautical miles; the number of aircraft flying the route per year is 286; the crash probability for F-16s is  $2.736\text{E-}8$  per year; the PFS facility has an effective area of 0.1337 square miles; and 85.5 percent of all crashes involving planes traversing the MRR would leave the pilot in control of the aircraft to direct it away from the PFS site. PFS thus calculated the annual impact probability of F-16s traversing the MRR to be  $1.38\text{E-}8$  per year. Nonetheless, accounting for the increase in flight activity in fiscal year 2000, PFS adjusted this calculation by a factor of 1.516, making the

probability 2.0E-08 per year. See PFS Dispositive Motion at 19-20 (citing Cole/Jefferson/Fly Declaration at 19-20).

ii. Staff Position. The staff takes no position on the issue of aircraft impact hazard to the PFS facility from aircraft traversing the MRR because of recent sortie and other aircraft data provided by PFS and the PFS modified assessment of the hazard posed by general aviation aircraft, as noted supra. See Staff Response at 5.

iii. State Position. Of the five PFS material factual statements regarding the MRR, the State disputes two: C37 and C40. The State disagrees with statement C37, asserting that the PFS estimate of five percent as the maximum number of aircraft that traverse the MRR is too small. According to the State, this estimate is too low because it does not reflect the increased use of the MRR due to implementation of night vision goggle training missions or higher usage of the MRR during winter months. See State Response at 21; Horstman Declaration at 25. And, as a result of its disagreement with the PFS estimate of total traversing aircraft, the State also disagrees with the PFS calculation of the overall crash impact probability from the MRR, which Dr. Resnikoff calculated as having an impact risk of 1.49E-07 per year. See State Disputed Facts at 8 (citing Resnikoff Declaration at 14). Furthermore, the State urges that because the staff has not taken a position regarding this matter, the Board should deny the PFS summary disposition motion until the staff has completed its evaluation and taken a position. See State Reply at 3.

iv. Board Ruling. We discern no dispute among the parties regarding the location of the MRR and the direction in which aircraft fly with respect to it; the assumption that the MRR can be modeled as an airway with a ten nautical mile width; and the sufficiency of the PFS methodology for determining the impact probability of F-16s using that route. Once again, however, a genuine dispute exists between PFS and the State regarding an appropriate

probability estimate that aircraft transiting the MRR will impact the PFS ISFSI, specifically with regard to State declarant Dr. Resnikoff's analysis of the factors that contribute to a probability estimate for MRR transit impacts. Therefore, we deny the PFS motion with respect to this item as well.

g. Aircraft Flying to and from Michael Army Airfield on IR-420

i. PFS Position. PFS has provided seven statements, C41 through C47, regarding aircraft flying to and from MAAF on military airway IR-420. See PFS Undisputed Facts at 9-10. With these statements, PFS seeks to establish that MAAF, which is located on the DPG, is some seventeen statute miles south-southwest of the PFS facility. Utilizing 1997 DPG data, PFS asserts there are approximately 414 flights annually in the direction of the PFS facility, the majority of which are large cargo aircraft. PFS argues that the impact probability regarding the aircraft on IR-420 can be calculated using the same approach as that for the F-16s transiting Skull Valley. In its calculation of the impact probability of planes from MAAF, the crash rate for aircraft flying to and from MAAF was estimated to be  $4.0\text{E}-10$  per mile (based on the assumption for large commercial aircraft in NUREG-0800); the effective area of the PFS site relative to large cargo aircraft is 0.2116 square miles; and the area flown from MAAF toward IR-420 was assumed to be ten nautical miles. PFS thus concluded that the crash impact probability for flights traversing to and from MAAF was equal to  $3.0\text{E}-09$  per year. PFS further asserts that takeoff and landings at the MAAF would pose a negligible hazard to the PFS facility because the airfield is located over seventeen miles away from the site. See PFS Dispositive Motion at 20 (citing Cole/Jefferson/Fly Declaration at 20).

ii. Staff Position. The staff supports the position provided by PFS with regard to aircraft traversing to and from MAAF, agreeing that there is no genuine issue of material fact with

regard to this issue and that these activities do not pose a credible threat to the PFS facility.

See Staff Response at 7 (citing SER at 15-46 to -47).

iii. State Position. Of the seven statements of material fact proposed by PFS relative to MAAF flight impacts, the State disputes only statements C42 and C44. In connection with statement C42, relying on the testimony of Dr. Resnikoff, the State argues that the estimated number of flights in and out of MAAF is too low. Although PFS has asserted that there are 414 flights into and out of MAAF per year, the State estimates that the number of flights flying to and from MAAF should be 1,359 annually. According to the State, more recent, FY 1999 data from DPG indicates that there has been a dramatic rise in flights to or from the airfield. Furthermore, the State declares, since eighty-nine percent of the flight activity originates from HAFB, this number can be expected to rise based on the increased number of planes to be stationed at HAFB and the increased number of sorties due to the AEF program discussed in section II.B.3.c. supra. See State Response at 21-22; State Disputed Facts at 8-9 (citing Resnikoff Declaration at 25); Resnikoff Declaration, exh. N (Data From DPG).

Further, although the State does not indicate in its statement of disputed material facts that it challenges PFS statement C44, in its response it states that it does in fact dispute the crash rate assumed by PFS from NUREG-0800. According to the State, that figure --  $4.0E-10$  per mile -- reflects only the crash rate for large commercial aircraft, but most of the flights to and from MAAF are made by F-16s. See Resnikoff Declaration at 25. As a result of this discrepancy, the State also disputes statement C47, the PFS crash impact hazard probability for flights to and from MAAF asserted by PFS, which the State argues should be  $1.53E-08$  per year. See State Disputed Facts at 9 (citing Resnikoff Declaration at 25).

iv. Board Ruling. Although the State does not dispute four of the seven PFS material factual statements, C41, C43, C45, and C46, it raised concerns regarding the two of these

statements, C42, concerning the number flights to and from the MAAF, and C44, concerning aircraft crash rates -- that are instrumental in determining the crash impact hazard to the PFS from planes traversing the MAAF. As a result, we also find that there is a genuine dispute of material fact regarding C47, the crash impact hazard for planes traversing MAAF, and thus deny this portion of the PFS summary disposition request.

h. Civilian Aircraft Flying on Airways J-56 and V-257 Including Aircraft Flying to and from Salt Lake City International Airport

i. PFS Position. PFS has provided fourteen undisputed material facts -- C48 through C61 -- in calculating the hazard to the PFS site posed by civilian aircraft using Airways J-56 and V-257. PFS asserts that Airway J-56 runs from west-southwest to east-northeast 11.5 miles north of the site, while Airway V-257 runs north and south 19.5 statute miles east of the site. PFS assumed that Airway J-56 occupies a width of eight nautical miles while Airway V-257 was assumed to be twelve nautical miles wide. Air traffic found on these airways consists of commercial airliners and private business jets, including air traffic to and from the SLCIA. See PFS Dispositive Motion at 20-21 (citing Cole/Jefferson/Fly Declaration at 21).

In determining the hazard posed to the site from aircraft on these airways, PFS utilized the same methodology it adopted to calculate the hazard of F-16s flying over Skull Valley. In this instance, however, PFS assumed that the crash rate for aircraft on J-56 and V-257 is  $4.0\text{E}-10$  per mile, which was also taken from the guidance found in NUREG-0800 for commercial aircraft. PFS also utilized the F-16 methodology to compute the effective area of the facility with respect to large commercial air liners, which it determined was 0.2116 square miles. In addition, PFS assumed that only twelve aircraft per day transit each airway, which was data derived from observations of local air traffic controllers. Using this information, PFS calculated the total probability that an aircraft flying on J-56 or V-257 would impact the PFS facility is  $3.1\text{E}-08$  per year. See id. at 20-21 (citing Cole/Jefferson/Fly Declaration at 21-22).

PFS also asserts that takeoff and landing operations occurring at the SLCIA will not pose a hazard to the facility because SLCIA is over fifty miles away from the PFS facility. According to PFS, takeoff and landing hazards at a commercial airport generally do not extend more than ten miles away from the end of the runway. Moreover, PFS claims that the method provided in NUREG-0800 for determining the magnitude of takeoff and landing hazards on the basis of distance from the airport and annual number of operations also establishes that the hazard to the facility to be negligible. See PFS Dispositive Motion at 21 (citing Cole/Jefferson/Fly Declaration at 21-22.

ii. Staff Position. The staff declares its agreement with PFS that there is no genuine dispute of material fact regarding the hazard posed to the PFS facility by civilian aircraft flying on Airways J-56 and V-257. See Staff Response at 1. With regard to factual statement C54, however, the staff notes that the correct target area for the PFS facility is 0.2615 square miles, which was reported in exhibit four to the Cole/Jefferson/Fly declaration, but mistakenly stated as 0.2116 square miles in the PFS motion. The staff also notes, however, that this error has no effect on the overall analysis because the PFS original analysis relied on the correct figure. See id. at 8 n.7. Therefore, the staff supports the PFS dispositive motion and its conclusion that aircraft from SLCIA do not pose a threat to the facility. See id. at 9.

iii. State Position. The State does not indicate any disagreement with the PFS assertions regarding the issues of civilian aircraft on Airways J-56 and V-257 in either its response to the PFS motion or in its disputed statement of facts. With regard to the issue of aircraft taking off and landing at the SLCIA, the State's only challenge to the PFS claims is its statement in its response that although PFS has assumed a twenty-percent increase in flight traffic by the time the facility is in operation, the PFS use of national statistics to reach this

conclusion failed to account for the large increase in air traffic that is expected for the SLCIA. See State Response at 25 (citing Resnikoff Declaration at 25).

iv. Board Ruling. The State has failed to provide any analysis to counter the PFS demonstration that there is no dispute of material fact extant regarding this matter such that this civilian aircraft issue needs to be pursued further. Dr. Resnikoff has not provided any separate calculation of the hazard probability regarding aircraft using Airways J-56 and V-257, instead utilizing the PFS-calculated probability on this issue as part of the State's version of the cumulative probability calculation analyzed in section II.B.3.j infra. Furthermore, although Dr. Resnikoff asserts that air traffic may increase significantly more than PFS has assumed based upon national statistics, he has not provided any support to show why his surmise is correct, other than the bald statement that it is "expected," Resnikoff Declaration at 25, which is insufficient to create a material factual issue.<sup>12</sup> Accordingly, with regard to the issue of hazards to the facility from civilian aircraft activity on Airways J-56 and V-257 we grant the PFS motion for summary disposition.

i. General Aviation Activity

i. PFS Position. PFS outlines three undisputed material factual statements regarding general aviation activity in Skull Valley, C62 through C64. See PFS Undisputed Facts at 11. In this regard, PFS argues that the level of aviation activity in Skull Valley is negligible because there are no civilian airports within twenty-five miles of the facility; the facility is located in a very sparsely populated area; and the ISFSI will be located inside an MOA that, because it is off-limits to civilian aviation during times of Air Force activity, most pilots avoid due to the difficulty in receiving clearance for transit. See PFS Dispositive Motion at 21 (citing

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<sup>12</sup> Additionally, we note that the State made no attempt to address our earlier stated concern about Dr. Resnikoff's remarks regarding SLCIA expansion. See LBP-99-35, 50 NRC at 189 n.3.



Cole/Jefferson/Fly Declaration at 22). In addition, PFS argues that even though there is little likelihood that an aircraft would crash in Skull Valley, based on PFS calculations it is equally unlikely that a general aviation aircraft would penetrate a spent fuel cask, given the relatively low weight and slow speed of such aircraft. Because there is no likelihood of radiation release, PFS has assigned the hazard from general aviation activity as zero. See id. at 21-22; Johns Declaration at 1-3.

ii. Staff Position. The staff takes no position on the issue of the hazard posed by general aviation activity in Skull Valley. As is noted in section II.B.3.c.ii supra, PFS provided a revised number for the likelihood of a crash. Indeed, PFS formerly reported an impact probability of  $2.36\text{E-}07$  per year, which the staff utilized in its SER, but then provided a new standard of zero probability in its summary disposition motion. Because the staff had not had the opportunity to review this change at the time it filed its response, it takes no position regarding this issue. See Staff Response at 5-6.

iii. State Position. Once again, the State fails to provide any objection to the PFS material factual statements relating to this issue in either its response to the PFS motion or in its statement of disputed facts. In his declaration, however, Dr. Resnikoff points out that he has not yet evaluated the PFS probability calculation, and thus assumes for purposes of the cumulative impact calculation that the range of hazard to the facility is from zero to  $2.36\text{E-}7$  per year. See Resnikoff Declaration at 15.

iv. Board Ruling. As with the issue of civilian aircraft flying on Airways J-56 and V-257, including aircraft flying to and from the SLCIA, the State has provided no evidence to indicate that there is a dispute regarding any of the PFS material factual statements relating to this issue. Certainly, Dr. Resnikoff's failure to analyze this item per the revised PFS submission

does not create such a dispute.<sup>13</sup> We thus grant the PFS motion for summary disposition with regard to general aviation.

j. Cumulative Hazard

i. PFS Position. PFS provides three undisputed material factual statements, C65, C66, and C67, alleging that the cumulative hazard to the PFS facility from aircraft accidents provides no genuine dispute of material fact relative to safety of the PFS facility. See PFS Undisputed Facts at 12. Asserting it has acted in accord with NUREG-0800, PFS has summed the probability for all types of incidents described in this decision, including cruise missile testing; F-16 aircraft transiting Skull Valley; jettisoned ordnance from crashing F-16s; ordnance carried aboard a crashing F-16; aircraft conducting training on the UTTR, including weapons training; aircraft flying within the MRR; civilian aircraft flying on Airways J-56 and V-257 and aircraft taking off and landing at SLCIA; and general aviation activity occurring in Skull Valley and concludes that the total facility aircraft hazard probability is 6.27E-07 per year. This figure, PFS asserts, demonstrates that potential aircraft accidents do not pose an unacceptable hazard to the facility because it is below the Category 2 design basis regulatory standard of 1.0E-06 events per year that we have accepted as the applicable standard in section II.B.3.a supra.

ii. Staff Position. The staff did not indicate in its response whether it supports the PFS conclusion that the cumulative hazard for potential aircraft crashes, including potential ordnance and cruise missile impacts, does not pose an unacceptable threat to the facility. The staff notes, however, that the only issues it views are appropriate for summary disposition do not include the cumulative impact value proposed by PFS. See Staff Response at 9.

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<sup>13</sup> In contrast to the issue of military flights through airspace IR-420, in which the substance of the State's disagreement with PFS material facts can be discerned from the information provided by its declarant notwithstanding an initial reliance on the PFS-supplied probability estimate, the State has provided no independent probability analysis of this factor, other than to note there has been a change in the PFS position.

iii. State Position. The State disputes PFS statements C65, C66, and C67, alleging that PFS has underestimated the total probability because PFS does not rely on conservative assumptions in calculating its various hazard values for potential aircraft crashes, ordnance impacts, and cruise missiles. See State Disputed Facts at 9. Based on the testimony of Dr. Resnikoff, in which he posits a cumulative probability of aircraft hazards to the facility in the range of from 6.11E-06 to 6.35E-06 per year, the State asserts that there is a material factual dispute that makes summary disposition inappropriate. See State Response at 22. Moreover, according to the State, in making its cumulative calculation PFS did not consider properly factors that would make such incidents significantly more likely, including the percentage of and circumstances surrounding incidents that would leave a pilot in control of the plane so as to avoid the PFS facility; the number of F-16s involved in activities in and near Skull Valley and F-16 crash rates; the uncertainty associated with using past frequency distributions relative to pilot crash avoidance and F-16 accident rates; actual weather conditions as affecting a pilot's ability to avoid the PFS facility; flight path width and aircraft formation that would reduce the effective flying area assumed by PFS; the use of bombs that could penetrate the storage casks and cause a radiation leakage; the possibility of midair collisions in Skull Valley; ordnance explosions due to exposure to high temperatures; the increasing numbers of flights through military airspace IR-420; possible expansion of the SLCIA; the fact that crash statistics involving engine failures in high stress maneuvering flights have no relevance to the Skull Valley situation; and the PFS failure to consider accident rates based on data other than that compiled from past aircraft statistics. See State Response at 22-25; Resnikoff Declaration at 23-26.

iv. Board Ruling. Notwithstanding the fact that we have granted the PFS motion relative to several issues, including cruise missiles, aircraft flying Airways J-56 and V-257, and general aviation aircraft, as was noted above, we find that there is a genuine dispute of material

fact with respect to other aspects of the PFS motion that could affect the PFS estimates on various probability factors. These potential effects, in turn, could put the cumulative probability over the regulatory threshold we acknowledge in section II.B.3.a above, thus establishing there are disputed issues of material fact regarding the issue of cumulative probabilistic impact. We thus deny the PFS motion for summary disposition with regard to the cumulative impact of aircraft hazards at the PFS site.<sup>14</sup>

k. PFS Motion to Strike State Testimony Related to the Value of the UTTR to the Training of Military Forces

i. PFS/Staff Positions. In its motion to strike, along with various other items (which has already been addressed in this decision), PFS has requested that the Board strike evidence presented by the State regarding the value of the UTTR to the military for its training procedures. Specifically, PFS requests that we strike statements made by Lieutenant Colonel Horstman stating that “[t]he UTTR is a unique and valuable asset to the U.S. military, and its continued use as a military training and testing area is vital to military training and the national security of the United States.” Horstman Declaration at 3 (citing id. exh. C (Statement by Utah

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<sup>14</sup> Relative to the question of the conservatism utilized by PFS in establishing many of its probability calculations, in its dispositive motion, PFS has outlined various aspects of conservatism that it argues it used in considering the impact to the PFS from aircraft crashes, ordnance, and cruise missiles, including: (1) its assessments of F-16 crash rates being based on Class A and Class B mishap rates rather than destroyed aircraft rates; (2) its assumption that any F-16 impacting the site would cause a release of radioactive material; (3) its assumption that the aircraft operating on the UTTR could potentially impact the PFS site even though, realistically they are too far away to cause an effect; (4) its calculation of the hazard from jettisoned ordnance does not account for open space where there are no casks or the fact that inert ordnance carried by an F-16 would not penetrate the top of a storage cask; (5) its assumption the ISFSI will be at full capacity at all times, whereas the average area of the site over its lifetime will equal to only 55 percent of the area at full capacity. See PFS Dispositive Motion at 28-29. The State counters this with its own list of items, described in section II.B.3.j.iii above that it asserts demonstrate a lack of conservatism on the part of PFS. For those portions of this contention that remain for litigation, so long as they are relevant to our assessment of whether the PFS has adequately considered the effects upon its proposed facility of credible accidents caused by external events, the impact of such “conservatisms,” or the lack thereof, are items that the parties may continue to pursue.

First District Congressman, Representative James V. Hansen to Licensing Board (June 23, 2000))). According to PFS, this statement should be stricken because it is irrelevant to the contention at issue, which concerns credible accidents caused by external events affecting the ISFSI. PFS also argues that this assertion regarding the value of the UTTR to Utah and the United States as a whole has already been considered in late-filed contention Utah KK, which was rejected by this Board. See LBP-00-27, 52 NRC 216 (2000). The staff concurs with the PFS motion to strike this testimony. See Staff Motion to Strike Response at 1.

ii. State Position. The State argues that the statement made in Lieutenant Colonel Horstman's declaration is relevant to contention Utah K/Confederated Tribes B because the testimony is directly related to the actual probability of an aircraft, ordnance, or cruise missile striking the facility to the degree that need is proportional to use. The State further notes that whether or not evidence is relevant goes to the weight given to it in evaluating the merits, and is not a justification for striking the material. See State Motion to Strike Response at 4.

iii. Board Ruling. Because we find this statement irrelevant in the context of our rulings on this motion, and thus give it no consideration in the context of our determinations, we deny the PFS motion to strike with regard to this testimony given by Lieutenant Colonel Horstman and the accompanying exhibit.

### III. Conclusion

The PFS December 30, 2000 motion for summary disposition of contention Utah K/Confederated Tribes B is denied in part and granted in part as follows:

1. The use of military ordnance on DPG -- granted.
2. Cruise missile testing hazards relative to the PFS facility -- granted.

3. Aircraft accident hazards relative to the PFS facility -- (a) regulatory standard, granted; (b) scope of aviation activity in Skull Valley, granted; (c) F-16s transiting the Skull Valley, including jettisoned ordnance, denied; (d) aircraft conducting training on the UTTR, granted as to the issues of air-to-ground and air-refueling training and air delivered weapons and denied as to air-to-air combat training; (5) aircraft flying on the MRR, denied; (6) aircraft flying to and from MAAF on IR-420, denied; (7) civilian aircraft on Airways J-56 and V-257, including aircraft landing and taking off from SLCIA, granted; (8) general aviation in the Skull Valley, granted; (9) cumulative hazard to the PFS facility from aircraft accidents and ordnance, denied.

In addition, the Board (1) denies the February 9, 2001 PFS motion to strike portions of the State's January 30, 2001 response and supporting material, finding that the material at issue is not relevant to our rulings regarding the PFS motion; (2) provides PFS with an additional opportunity to depose State declarant Horstman; and (3) refers the Board's ruling in section II.B.3.a above regarding the regulatory standard that governs ISFSI aircraft crash hazards to the Commission for its further consideration.

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For the foregoing reasons, it is this thirty-first day of May 2001, ORDERED, that:

1. The December 30, 2000 motion for summary disposition of applicant PFS is granted in part and denied in part as outlined above ; and (2) as to those portions of this contention for which summary disposition is granted, PFS having established that there is no genuine issue as to any material fact, a decision regarding these matters is rendered in favor of PFS.

2. The February 9, 2001 PFS motion to strike portions of the State's January 30, 2001 response to the December 30, 2000 PFS dispositive motion is denied.

3. In accordance with our ruling in section II.B.3.c.v above, absent some agreement by the parties setting another date, PFS shall have up to and including Friday, June 15, 2001, within which to conduct an additional deposition of State declarant Horstman regarding his assessment of the F-16 accident reports and the PFS claim, based on those reports, that F-16 pilots would remain in control of their aircraft in the event of an emergency.

4. In accordance with 10 C.F.R. § 2.730(f), the Licensing Board's ruling in section II.B.3.a above regarding the regulatory standard to be applied to aircraft crash hazards for ISFSIs is referred to the Commission for its consideration and further action, as appropriate.

THE ATOMIC SAFETY  
AND LICENSING BOARD<sup>15</sup>

*/RA/*

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G. Paul Bollwerk, III  
ADMINISTRATIVE JUDGE

*/RA/*

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Dr. Jerry R. Kline  
ADMINISTRATIVE JUDGE

Rockville, Maryland

May 31, 2001

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<sup>15</sup> Copies of this memorandum and order were sent this date by Internet e-mail transmission to counsel for (1) applicant PFS; (2) intervenors Skull Valley Band of Goshute Indians, Ohngo Gaudadeh Devia, Confederated Tribes, Southern Utah Wilderness Alliance, and the State; and (3) the staff.

Although Judge Lam participated in final deliberations regarding this issuance and agrees with the reasoning and result, he was unavailable to sign it.



UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
PRIVATE FUEL STORAGE, L.L.C.	)	Docket No. 72-22-ISFSI
	)	
(Independent Spent Fuel Storage	)	
Installation)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing LB MEMORANDUM AND ORDER (GRANTING IN PART AND DENYING IN PART SUMMARY DISPOSITION MOTION REGARDING CONTENTION UTAH K/CONFEDERATED TRIBES B; REFERRING RULING ON AIRCRAFT CRASH HAZARD REGULATORY STANDARD TO THE COMMISSION) (LBP-01-19) have been served upon the following persons by deposit in the U.S. mail, first class, or through NRC internal distribution.

Office of Commission Appellate  
Adjudication  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

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Docket No. 72-22-ISFSI  
LB MEMORANDUM AND ORDER  
(GRANTING IN PART AND DENYING  
IN PART SUMMARY DISPOSITION  
MOTION REGARDING CONTENTION  
UTAH K/CONFEDERATED TRIBES B;  
REFERRING RULING ON AIRCRAFT  
CRASH HAZARD REGULATORY  
STANDARD TO THE COMMISSION) (LBP-01-19)

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[Original signed by Adria T. Byrdsong]

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Office of the Secretary of the Commission

Dated at Rockville, Maryland,  
this 31<sup>st</sup> day of May 2001