

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

July 13, 2004

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OFFICE OF SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF

In the Matter of )

PRIVATE FUEL STORAGE L.L.C. )

(Private Fuel Storage Facility) )

Docket No. 72-22

ASLBP No. 97-732-02-ISFSI

APPLICANT'S RESPONSE TO STATE MOTION IN LIMINE  
REGARDING EVIDENCE ON FLIGHT DATA

Pursuant to 10 C.F.R. § 2.730(c), Applicant Private Fuel Storage, L.L.C. ("PFS") hereby files this response to the State of Utah's ("State") motion in limine to preclude PFS from offering certain evidence on the proper data set to be used for analyzing the impact speeds and angles for potential F-16 crash impacts in Skull Valley, Utah in the upcoming evidentiary proceeding on potential jettisoned ordnance impact and aircraft crash impact consequences at the proposed Private Fuel Storage Facility ("PFSF").<sup>1</sup> The State claims that such evidence should be barred on res judicata grounds arising from the Atomic Safety and Licensing Board's ("Board") decision in the first, or "probability," phase of the PFS proceeding concerning potential aircraft accidents at the PFSF. See State Motion at 4; Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP-03-4, 57 NRC 69 (2003). The State's motion is baseless and must be denied.

Specifically, the State's Motion asserts that various facts concerning potential Skull Valley accidents have been previously established by the Board so as to bar on res judicata grounds PFS's use of the 61-accident Skull Valley Type Event data set to characterize potential impacts speeds and angles at the PFSF. As shown below, the State is

<sup>1</sup> State of Utah's Motion in Limine to Preclude Evidence on Flight Data That Are Not Representative of Skull Valley Flight Profiles Found By the Board in Contention Utah K, Hearing I (June 28, 2004).

wrong for several reasons. First, and important to this motion, the Board did not address in its prior decision the crash impact consequence issue and hence did not make rulings barring PFS's submission of evidence on that subject. The Board ruled on the probability of an F-16 crash into the PFSF but it made no decisions regarding speed and angle characteristics of potential F-16 crash impacts or the data that should be used to assess those characteristics. Hence res judicata cannot apply.

Second, and important to the upcoming hearing, the State is trying to argue that certain evidence that would, under the Board's previous rulings, clearly be relevant for determining impact speed and angle characteristics at the PFSF, is not only irrelevant, but is barred by the Board's previous rulings. It becomes apparent in the middle of the State's motion that the State is attempting to argue, with little more than bare assertions, that the Skull Valley Type Events are not relevant to potential Skull Valley F-16 impacts because the accidents in the data set allegedly are not analogous to accidents that could occur in Skull Valley. PFS witnesses Dr. Allin Cornell, Gen. Wayne Jefferson, and Col. Ronald Fly have just submitted extensive testimony on the question of the relevance of the Skull Valley Type Event data set to assessing potential impact characteristics in Skull Valley. They have explained at length why the State's arguments concerning the asserted irrelevance of Skull Valley-Type Events are erroneous, particularly in view of the Board's previous rulings on the applicability of Skull Valley Type Events for our purposes here. The State's asserted irrelevance of the Skull Valley Type Event database clearly cannot be determined without considering that testimony. Therefore, the State's motion – unsupported by law or evidence, as opposed to argument – must be denied.

## **I. BACKGROUND**

In its decision in the first phase of this proceeding, the Board decided the probability of a military aircraft crash or jettisoned ordnance impact at the PFSF. LBP-03-4, 57 NRC at 77. Indeed, the Board specifically stated that the issue of crash impact conse-

quences, i.e., whether “the design of the proposed facility’s spent fuel storage casks is so robust that an F-16 crash would not have appreciable health and safety consequences . . . is not now before us . . . .” Id. at 78 (emphasis added). In making its probability decision, the Board applied the “four factor” formula that the NRC has traditionally used to determine the probability of an aircraft crash at a proposed site. Id. at 203. To apply the formula it decided upon the values of the variables that make up the formula:

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

where *C* is the F-16 crash rate per mile, *N* is the annual number of F-16 flights transiting Skull Valley, *A* is the effective area of the PFSF, and *w* is the effective width of the corridor through which the F-16s fly. Id.

In its previous decision the Board also decided whether to apply a fifth factor to the four-factor formula to account for the ability of a pilot of a crashing F-16 to avoid a site on the ground prior to ejecting from the aircraft. See id. at 160-201. While the Board ultimately declined to apply the factor, it made several findings regarding potential F-16 mishaps in Skull Valley related to whether a mishap would leave the pilot in control of the aircraft with time and the ability to avoid (as opposed to whether the pilot would actually avoid) a site on the ground. See id. at 162-70 (“Estimate of R1 Value”). The Board discussed PFS’s evaluation of 126 F-16 Class A mishap reports covering the period from FY 1989 to FY 1998. Id. at 163. It noted that PFS “categorized each accident as (a) one that could or could not have occurred in Skull Valley (i.e., ‘Skull Valley-type events’) and (b) one in which the pilot did nor did not have control of his aircraft and time to direct it away from a site on the ground (i.e., ‘able to avoid’).” Id. at 164. It noted that PFS found that “sixty-one accidents during the 10-year period were Skull Valley-type events and in fifty-eight of them, or 95%, the pilot retained control of the aircraft with time to direct it away from a site on the ground.” Id. The State challenged PFS’s assessment of which accidents were Skull Valley Type Events on several grounds. See

id. at 165. The Board, however, rejected all of those challenges. See id. at 165-69. The State also challenged PFS's assessment of the accidents as to whether the pilot would have been "able to avoid," but the Board rejected that challenge as well. Id. at 169-70.

As set forth in the Cornell/Jefferson/Fly testimony, the Skull Valley Type Event database is the relevant database for assessing impact speed and angles at the PFSF for many of the same reasons that led the Board to rule in PFS's favor on the above issues. Certainly, the Board made no ruling that would preclude as a matter of res judicata such use of the Skull Valley Type Event database. The Board made no rulings on the potential impact speeds, angles or azimuths (i.e., compass headings) for potential F-16 crash im-  
pacts at the PFSF. Nor did it rule on the data set that should be used for that assessment.

## II. DISCUSSION

### A. Res Judicata

"[T]he doctrine [of res judicata or collateral estoppel] precludes the relitigation of issues of law or fact which have been finally adjudicated by a tribunal of competent jurisdiction in a proceeding involving the same parties or their privies."<sup>2</sup> Here, because the characteristics of potential F-16 crash impacts at the PFSF were never adjudicated by the Board, res judicata cannot apply.

### B. Res Judicata Does Not Bar PFS's Use of Its Crash Impact Analyses

The State asserts that "PFS and the Staff should be precluded from offering evidence of speed and angle derived from data that are not representative of flights in Skull Valley, as found by the Board in Hearing I." State Motion at 2.<sup>3</sup> The State claims further that "PFS is now attempting to relitigate . . . the characteristics of flight over the PFS

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<sup>2</sup> Toledo Edison Co. (Davis-Besse Nuclear Power Station, Units 1, 2, and 3), ALAB-378, 5 NRC 557, 561 (1977) (citations omitted, emphasis added). See also Applicant's Motion in Limine to Preclude New State of Utah Testimony Regarding Jettisoned Ordnance Impact Probability (June 9, 2004) at 4-5.

<sup>3</sup> The State refers to the probability phase of this proceeding as "Hearing I" and the upcoming consequences phase as "Hearing II." See State Motion at 1-2.

site.” Id. at 3-4. The State is simply incorrect. PFS is litigating the characteristics of potential F-16 crash impacts in Skull Valley and their potential structural consequences for the PFSF. It is not seeking to relitigate issues previously decided by the Board. Indeed, it is building upon the previous findings by the Board in terms of the general applicability of Skull Valley Type Events for purpose of analysis of accidents in Skull Valley. None of the factual matters on which the State objects to PFS submitting evidence were ever ruled upon as the State asserts. Indeed, on the issue of ejection below 2,000 ft. the Board expressly found that such ejections did and could occur and it relied upon evidence of ejections below 2,000 ft as one of its bases for rejecting the R2 factor.

**1. The State’s Specific Requests for Relief Should Be Denied**

At the outset, the State makes three specific requests for relief from the Board on the basis of res judicata. It requests an order from the Board precluding:

- (a) evidence of impact speed and angle estimated from accidents where the ejection altitude is unknown; where the ejection altitude is below 2,000 ft. AGL or above 18,000 ft. AGL for controllable flights, and below 2,000 ft. AGL or above 14,000 ft. AGL for uncontrollable flights;
- (b) evidence of the effective area based on the equal probability of angles of impacts from all compass headings; and
- (c) evidence of impact angle probability based on impacts greater than 6 degrees for controllable flights where the accident report does not specify an impact angle.

Id. at 4; see also id. at 8 (same). Contrary to what the State implies, the Board never ruled upon these issues in the manner it asserts and hence res judicata cannot preclude PFS’s presentation evidence on them.

Regarding the State’s first request, the Board simply never made any ruling concerning the impact speed of a potential F-16 crash in Skull Valley and it never made any ruling relating ejection altitude and impact angle. As noted above, the Board’s prior ruling concerned the probability of impact, not the speed or angle thereof. The Board discussed the altitudes at which F-16s fly through Skull Valley, see id. at 110-11, but it

made no ruling bounding the altitudes at which F-16 pilots could or would eject in Skull Valley. More importantly, the Board made no ruling limiting the data, from F-16 accident reports that could be used to estimate potential F-16 crash impact speeds and angles for Skull Valley.

To address the implied basis for the State's request directly, while the Board discussed the altitudes at which pilots in the Skull Valley Type Event accidents ejected in assessing whether it would be likely for a pilot to actually avoid a site on the ground before ejecting (i.e., the "R2" factor), it never found that pilots of controllable aircraft would never eject below 2,000 ft. above ground level ("AGL"). Indeed, the Board found the opposite. The Board recognized that according to the Air Force, the minimum ejection altitude "should be no less than 2000 feet above the ground," but it found that pilot action "sometimes leads to ejecting below the desired altitude." LBP-03-4, 57 NRC at 102. The Board took note of the 1996 message from the Air Force Chief of Safety stating that, among other things, aircrews delayed ejection because of futile attempts to recover failed engines, and "eject[ed] below the published minimum altitudes." Id. at 105. That message noted that "73% of ejections in the previous 6 months occur[ed] below the published minimum altitude of 2000 feet due to futile attempts to restart failed engines." Id. at 179. Thus, the Board clearly did not put a 2,000 ft. AGL lower bound on potential ejection altitudes in Skull Valley. Similarly, the Board also put no upper bound on potential F-16 ejection altitudes in Skull Valley. The State points to no such Board findings and in fact there are none.

Regarding the State's second request, the Board never made any ruling on the possible F-16 compass headings (i.e., azimuths) at the time of impact in Skull Valley or the probabilities thereof. The Board did discuss the general directions of F-16 flights down Skull Valley and on the Moser Recovery in the vicinity of the PFSF. See id. at 110-11; see also id. at 215-18. But the Board simply never made any findings as to pos-

sible headings at impact. The State claims that it is “established” that “the normal route over the PFS site is in the south-easterly direction.” State Motion at 8 (citing Thorne Report, Appendix).<sup>4</sup> The Thorne Report Appendix, at 4-5, makes several assertions regarding the direction in which F-16s fly in Skull Valley, but it points to no Board findings to support any of its claims regarding F-16 compass headings at impact.

Regarding the State’s third request, in the context of evaluating whether a pilot would actually avoid a site on the ground before ejecting from his aircraft (i.e., R2), the Board discussed the glide angles that F-16 pilots would seek to establish after an engine failure. See LBP-03-4, 57 NRC at 195-97. However, the Board never made any findings regarding aircraft impact angles or probabilities thereof. Nor did it ever discuss the information in the F-16 mishap reports concerning the aircraft’s impact angles. The State claims that it is “established” that “the glide path for controllable crashes is 6 degrees.” State Motion at 8 (citing Thorne Report, Appendix). The Thorne Report Appendix asserts that the pilot will establish a glide path of six degrees and that the F-16 flight control computer will hold it on that path from the time of ejection until impact. Thorne Report Appendix at 4 (citing LBP-03-4, slip op. at 72, 166, 168). What the Thorne Report Appendix fails to note, however, is that the statement it cites regarding the flight path after ejection was made by PFS in support of its pilot avoidance (R2) argument which the Board rejected. See LBP-03-4, 57 NRC at 196-97, 201. The Appendix also fails to note the Board’s discussion of the State’s claim that immediately prior to ejection the pilot will raise the nose of the aircraft to as much as 20 degrees above the horizon. Id. at 195-96.

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<sup>4</sup> M.C. Thorne, “Ordnance Impacts and Aircraft Crashes at a Proposed Private Fuel Storage Facility for Spent Nuclear Fuel in Utah: Summary of Probability Estimates,” MTA/P0014/2004-1: Issue 2 (May 2004) (“Thorne Report”).

The discussion above shows that the State's requests for relief are not supported by Board findings regarding the State's specific factual claims. Therefore, contrary to the State's arguments, res judicata does not apply and the State's requests should be denied.

**2. The Board's Prior Ruling Does Not Bar PFS's Use of Skull Valley Type Events to Characterize Potential F-16 Crash Impacts in Skull Valley But Rather Deems Them Relevant**

The State complains of PFS's use of data from the 61 F-16 accidents found by the Board to be Skull Valley Type Events (see LBP-03-4, 57 NRC at 164) to characterize the possible impact speeds and angles for potential F-16 crashes in Skull Valley. State Motion at 5-6. The State asserts that the Board only relied on PFS's categorization of the Skull Valley Type Events in rejecting PFS's proposed pilot avoidance factor and that they are "irrelevant to the F-16 flight profile found by the Board to present a risk" to the PFSF. Id. at 6.

At the outset, the Board found the Skull Valley Type Events to be the accidents whose initiating events could have occurred in Skull Valley. See LBP-03-4, 57 NRC at 164. The State is wrong in asserting that the Board only relied on the Skull Valley Type Event designation in rejecting the proposed pilot avoidance factor. In fact, the Board accepted PFS's designation and relied on it in part to calculate the jettisoned ordnance impact probability for the PFSF. See LBP-03-4, 57 NRC at 164, 170, 226-27. In any event, the State does not even claim that the Board's prior decision has a res judicata effect on PFS's use of the Skull Valley Type Events to characterize possible impact speeds and angles for crashes in Skull Valley.

As noted at the beginning of PFS's response, the State's relevance claim is little more than a bare assertion. As discussed, it is a matter that cannot be resolved in the State's favor prior to full consideration of the extensive evidence that PFS has submitted on the issue of the data set to use in characterizing the possible impact speeds and angles for potential F-16 crashes in Skull Valley.



The State goes on to complain that PFS's use of Skull Valley Type Events as a data set to characterizing possible impact speeds and angles in Skull Valley is inappropriate because there are accidents in the data set in which the event causing the accident could occur in Skull Valley but "the flight itself" could not. State Motion at 6. The State asserts that PFS's use of the Skull Valley Type Events is "heedless of the Board's findings on flight characteristics over the PFS site." Id. at 7. The State claims that the accidents do not fit the characteristics of flight operations in Skull Valley and that because they include cases of ejection at low altitude which result in lower impact speeds, they ultimately bias PFS's consequences assessment. Id.

Again, the State's claim is not a matter of res judicata. The subject of the Board's prior ruling was impact probability, not impact consequences, and the Board made no findings on F-16 impact speeds, angles, or azimuths, or the data that should be used to assess them. The State is arguing the relevance of PFS's data to potential F-16 impacts in Skull Valley with little evidence of its own and without consideration of the actual evidence as to whether the data is relevant. Thus, the State's motion must be denied.

### **3. The Board's Prior Ruling Does Not Support the State's Other Requests for Relief**

In addition to the foregoing, the State also claims that certain additional facts have been "established" and requests that the Board preclude PFS's introduction of evidence contrary to them. State Motion at 8. To the extent that PFS has not addressed them above, PFS addresses them here and shows that the State's claims are not supported by the Board's prior ruling.

First, the State asserts that it is "established" that "10% of flights in [Sevier B and Sevier D] MOAs are uncontrollable." State Motion at 8 (citing Thorne Report, Appendix). However, the Board found that only five percent of the accidents in Skull Valley would leave the pilot without control of his aircraft and time such that he would be able

to avoid a site on the ground. LBP-03-4, 57 NRC at 164, 170. The Board found that sufficient to support PFS's conservative assumption that a pilot would be "able to avoid" (although he would not necessarily actually avoid) 90 percent of the time. Id. at 170.

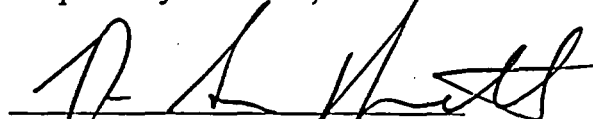
Second, the State asserts that it is "established" that "in the 90% controllable flights, the pilot will zoom and gain an additional 4,000 ft. elevation before ejecting." State Motion at 8 (citing Thorne Report Appendix). The Board discussed the zoom maneuver that pilots will perform after an engine failure (as opposed to all mishaps) that left the F-16 controllable. LBP-03-4, 57 NRC at 171-72. However, the Board did not find that the zoom maneuver would result in a gain of 4,000 ft. in altitude in all circumstances.

Third, the State asserts that "the flight risk to the PFS site is 96% from flights in the Sevier B MOA and 4% from those in Sevier D MOA. State Motion at 7-8 (citing Thorne Report Appendix in turn citing Board decision)<sup>5</sup>. While, the Board stated that "approximately 96% of the F-16 flights through Skull Valley are in Sevier B MOA," LBP-03-4, 57 NRC at 215, it did not assess any risk from a consequences standpoint.

### III. CONCLUSION

In accordance with the foregoing, the State's motion in limine should be denied.

Respectfully submitted,



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Dated: July 13, 2004

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<sup>5</sup> The Thorne Report asserted that 96 percent of the flights "that present a crash risk to the PFS site" occur in the Sevier B MOA while the remaining four percent occur in the Sevier D MOA. Thorne Report Appendix at 2 (citing LBP-03-4, slip op. at 196).

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**CERTIFICATE OF SERVICE**

I hereby certify that copies of the "Applicant's Response to State Motion In Limine Regarding Evidence on Flight Data" were served on the persons listed below (unless otherwise noted) by e-mail with conforming copies by U.S. mail, first class, post-age prepaid, this 13<sup>th</sup> day of July, 2004.

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