

RAS 9997

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DOCKETED 05/24/05
LBP-05-12

ATOMIC SAFETY AND LICENSING BOARD
Before Administrative Judges:

SERVED 05/24/05

Michael C. Farrar, Chairman
Dr. Peter S. Lam
Dr. Paul B. Abramson

In the Matter of

PRIVATE FUEL STORAGE, LLC

(Independent Spent Fuel Storage Installation)

Docket No. 72-22-ISFSI

ASLBP No. 97-732-02-ISFSI

May 24, 2005

MEMORANDUM AND ORDER
(Ruling on Reconsideration Motion)

We have before us the Intervenor State of Utah's March 7 Motion for Reconsideration of our February 24 Partial Initial Decision on aircraft crash consequences. After having received a number of additional pleadings from the parties, and to help us resolve the seemingly serious matters raised by the motion, we heard several hours of oral argument on April 6 from counsel for the State, the Applicant Private Fuel Storage, and the NRC Staff.¹ In that regard, we had previously directed counsel to focus upon specific areas during their oral presentations.²

In the February 24 Decision, a majority of the Board (with Judge Lam dissenting) determined that there was less than a one-in-a-million per year likelihood that an accidentally-crashing F-16 from Hill Air Force Base would strike one of the planned 4,000 above-ground concrete and steel casks at the proposed facility in a manner that would breach its internal

¹ That argument took place in our Rockville, Maryland hearing room and, so that it could be open to public observation, was structured to avoid explicit reference to Safeguards-protected matters. The opinion we are issuing today has been structured in that same fashion, to avoid releasing two versions (one Safeguards and one public) as we did on February 24.

² See unpublished Further Memorandum Regarding Oral Argument (Mar. 30, 2005) at 2, as later modified during an impromptu, untranscribed March 31 conference call, the results of which were reflected in a March 31 email message from the Board Chairman to the parties.

canister (containing spent nuclear fuel rods) and thus release radioactive materials. In NRC terminology, such an unlikely accident is therefore not a “credible” threat to create an excessive radiation dose and thus need not be considered as a licensing hurdle.

As the April 6 Transcript reveals, the reconsideration oral arguments, like the parties’ earlier written filings, focused on two major types of deficiencies that the State thought undermined our February 24 Decision. One alleged deficiency involved our giving no consideration to a particular consequence of such crashes as are deemed credible; the other involved our improperly evaluating certain technical issues, involving (1) the strength attributed to the stainless steel canister and (2) the calculations derived from the historical F-16 crashes.

More specifically, in seeking reconsideration, the State argued, first, that we had neglected to focus on the full results of those accidental crashes that were credible and that could, although not breaching a canister and releasing radioactive materials, cause enough damage to the shielding provided by the outer cask as to cause a consequential increase in radiation dose. As the State sees it, it was entitled to, but was being deprived of, the opportunity to demonstrate that an important consequence would flow from the diminished shielding provided by a damaged cask, i.e., that the spent fuel’s ongoing emission of neutron and gamma radiation, which passes through even an intact canister’s walls,³ would lead to post-accident radiation doses so much higher than the doses calculated with shielding in place that they would exceed regulatory standards.⁴

³ As distinguished from the radioactive fission products that might escape from a punctured canister, or from those charged particles that would be captured by the canister walls.

⁴ As part of its March 29 reply to the other parties’ responsive filings, the State asserted (at 3, n. 6) that we did not provide in our February 24 Decision any citation to those standards. It might have improved the clarity of that decision for us to have provided specific citations to those standards, notwithstanding that we had previously provided such citations in our 2003 decision (see n. 6, below). Instead, we cited them only generally on February 24 (in fn. 52 of Part II, at B-1 of the Safeguards version). Given the probability-driven result we reached on February 24, there was no need to apply the dose-consequences content of those standards, and thus no need to cite them more specifically at that point.

The State went on to argue, second, that we had erroneously resolved two concerns on which we had focused. The first involved the manner in which we determined the strength of the canister without regard to a “ductility ratio” reflected in, and recommended by, a U.S. Department of Energy standard upon which the State relies.

The second involved our analysis of the historic F-16 crash data: on the one hand, we had included certain historic crashes that the State claims all parties had agreed should be excluded for purposes of determining the likelihood that a crash would exceed the “bounding impact” which a canister can withstand; on the other hand, we had not included in our probability calculation the effect of those crashes that the State urged could hit the top of a cask in a manner such that, while not causing a breaching top impact to the initial cask, would result in the aircraft skipping off and causing a breaching side impact to an adjacent cask.

The State’s request for reconsideration appropriately brought to our attention significant points, outlined above, that were not specifically addressed in our February 24 Decision. For that reason, we have given the State’s motion great heed, including calling for oral argument to clarify the parties’ respective positions.

Having re-examined the matters raised, and re-evaluated the procedural steps taken and the substantive evidence adduced in creating the record, we find ourselves unconvinced that the asserted procedural and substantive deficiencies to which the State points are of sufficient merit and/or moment to alter the result. We are constrained, then, not to grant the State the relief sought.

Our reasons for adhering to our earlier result are set out below. In Part I (pp. 4-15, in which Judge Lam joins), we explain why the scope of the proceeding did not extend to examining increased radiation doses attributable to loss of shielding. Out of an abundance of procedural caution, however, we do include in Part I (at 13-15) a suggestion to the Commission of a method by which, if it chooses, the “loss of shielding” question could, in our view, be readily

addressed. In Part II (pp. 16-29, in which Judge Lam does not join), we address the questions related to ductility ratio and crash analysis.

The question as to whether to issue the requested license was initially put before the Commission by our February 24 Decision and has already been briefed. As we note in the Part III Conclusion (pp. 29-31), our decision today as to reconsideration interposes no barrier to the Commission's now addressing that question.

I

ASSERTED FAILURE
TO MAKE NEEDED DETERMINATIONS

For the third time, this Board must resolve an issue -- stemming from the so-called "probability/consequences" risk analysis dichotomy -- about the nature and scope of the accidental aircraft crash hearing. On the two prior occasions, that dichotomy -- initially thought of as a simple one⁵ -- led to a ruling, one against the Applicant and one in its favor, limiting the scope of the evidence that would be received at the then-impending session of the hearing.

Those two rulings not only had a major impact on the earlier course of the proceeding but also serve to inform our current decision. Accordingly, we review them briefly here to provide necessary background and context for today's decision that shielding loss was not fairly put in issue at this stage and thus was not, and will not be, part of the formal adjudication.

At the very outset of the hearings in Salt Lake City in April, 2002, we were confronted with motions in limine that focused our attention on whether those original hearings should involve only those questions that related to accident probabilities, not those involving their consequences. See the April 8, 2002 Tr. (of oral argument) at 2981-3008. After oral argument, we determined, based largely on the posture of the case, but also in some measure on the paucity of the evidence being proffered as to consequences, to limit the 2002 hearings to

⁵ But see n. 110 in LBP-03-04 (reprinted in n. 6, below), which presaged complexity.

the issue of probability. We explained that ruling orally at the time (Tr. at 3008), and elaborated on it nearly a year later in the course of our decision on the question of the probability of a crash into the site. See LBP-03-04, 57 NRC 69, 136-41 (March 10, 2003).⁶

On the merits, we held then that the probability of a crash into the site was too high to allow licensing of the proposed facility at that juncture. Looking ahead, we expected that the next hearing would involve a full exploration of all the potential “consequences” of such a crash.

⁶ We set out here at some length the introduction to the subject that we there provided:

Under the Commission’s site evaluation regulations (covering nuclear reactors and adapted for spent fuel storage facilities), an applicant must show that if a credible accident were to occur, the consequences would not result in the release of radioactivity that would cause doses in excess of 10 C.F.R. Part 100 guidelines. See 10 C.F.R. §§ 72.90, 72.94, 72.98, 110.10; NUREG-0800 at 3.5.1.6-2; Campe/Ghosh Post Tr. 4078, at 4-6. As a legal matter, then, the ultimate focus is on a unified question, i.e., the probability of an accident that would lead to radiation doses beyond Part 100 [limits].

As a practical matter, however, the regulatory focus and approach often turn out not to be on that unified question but on one of two separate, subsidiary issues, either of which can be determinative in particular circumstances. Specifically, if it can be shown that the likelihood of the triggering accident is so low that the accident can be discounted as not credible, there is no need for an inquiry into whether the radiation dose consequences would be excessive if the accident were to occur. At other times, the opposite approach is taken -- an applicant will assume the accident would occur, but will attempt to demonstrate that even if the event happens there would be no dose consequences. Usually, this would be because the facility’s “design basis” is shown to be such that it can withstand the postulated accident, or mitigate it adequately.

57 NRC at 136. We followed that discussion of the probability/consequences dichotomy with an early indication that the issues could split a different way (n. 110):

[W]e note the categorization of the issue regarding cask penetration is a gray area that depends on how the “accident” is defined. Thus, cask penetration was spoken of on a few occasions as constituting part of the “accident probability” question (when the accident is defined as cask breach by a crashing aircraft), and on other occasions as part of the “dose consequences” evaluation (when the accident is defined, as it most often has been here, as cask impact by such an aircraft).

In effect, this footnote foretold how the second phase would emerge.

Those expectations proved over-simplified. The Applicant -- which had the burden of proof -- eventually indicated that it wished to attempt to demonstrate only that a crash into the site would be highly unlikely to have the intermediate physical consequence of puncturing a spent-fuel-containing canister. The Applicant's approach counted on thereby establishing that a crash that would puncture a canister had a sufficiently low probability that it could be disregarded for licensing purposes. The Applicant recognized that in thus eschewing a hearing on the ultimate dose consequences of the radiological releases caused by such a puncturing event, it was foregoing another potential near-term opportunity to prevail,⁷ and it was informed that it might also be passing up that opportunity permanently.⁸

Rather than proceed, then, to a second phase of the hearing that would fully examine overall consequences, we were being asked by the Applicant, with the Staff's support, to take up a hybrid "probability of intermediate consequences" issue that might prove determinative. The State vigorously opposed the Applicant's proposed approach, and we devoted considerable attention to determining which hearing course to follow. See unpublished Memorandum Concerning Scheduling (Apr. 15, 2004) at 2-3 (summarizing conference calls of March 30 and April 8, 2004), and Transcript references contained therein.

⁷ That is, the Applicant was foregoing the opportunity to establish that the accident of concern (crash-induced canister puncture), even if it occurred, would not occasion releases sufficient to lead to radiological exposure in excess of the regulatory standard, and for that reason would not have to be considered an element of the proposed facility's "design basis."

⁸ See, e.g., Feb. 24, 2004 Tr. at 14515-16; Mar. 30, 2004 Tr. at 14615-22; and final paragraph of note 10, below.

As was recounted at the time (Apr. 8, 2004 Tr. at 14659-61), and in our recent Decision based on the ensuing hearing,⁹ we adopted the Applicant's approach for the most practical of reasons: if the Applicant's approach to the question of intermediate consequences prevailed (in establishing a sufficiently low probability of canister puncture), there would be no need to

⁹ We discussed there at some length the different approaches urged upon us (Feb. 24 Decision at A-15, A-16):

At the outset of this "consequences" phase, the State sought to define its scope broadly enough to allow for the presentation of evidence on the radiological consequences that would result from the breach of a cask's MPC. The Applicant argued, however, that the scope of the consequences phase should be more narrow, limited to the Applicant's effort to demonstrate that the probability of such consequences [was so low that it] left an MPC breach as a non-credible event. Under that view, it was said, radiological consequences would not need to be examined in detail.

We had foreseen, in our first decision, the possibility of this type of disagreement as we moved ahead. Colloquially, all had talked about a two-part proceeding, one involving "probability" and the other embracing "consequences," those being the two factors in a risk determination. But we had noted that the risk question could more precisely [be] separated into three parts: probability of a crash into the site, leading to cask/canister breach, leading to radiological consequences. LBP-03-04, 57 NRC at 136 n. 110. As we observed, depending on how the second factor was defined, it could be viewed as either part of the probability (of a cask breach) calculation or as part of the consequences (of a site impact) analysis. Ibid.

* * *

Against that background, we need add only that the reason we did not entertain the evidence the State proffered is that -- even though the Applicant does not characterize it this way -- in essence the Applicant is, for purposes of this phase only, not challenging the notion that the radiological consequences of an MPC breach could be beyond acceptable norms. But because in its view the probability of such a breach is below one-in-a-million, then even if the probability of excessive consequences of such a breach is taken as a certainty (expressed as unity), the overall risk of an accident that results in excessive radiological releases (being the product of the two factors) remains at less than one-in-a-million. For that reason, the evidence reflected in the State's offer of proof was, and remains, rejected as not material to the more narrow issue before us.

devote considerable time, resources and attention to a thus-mooted ultimate question, i.e., the radiological consequences of a puncture.

In following that course, we did provide the State the opportunity to make an offer of proof as to those radiological consequences. The State indeed exercised that opportunity.¹⁰

To repeat, after considering all the evidence, we determined on February 24 of this year that the Applicant had in fact prevailed on its theory that the probability that a crashing plane would puncture a canister (and thus cause direct release of radioactive products) was less than one-in-a-million per year and therefore that such a canister puncture was not a “credible” event, with the result that its radiological consequences did not have to be examined. We thought that ended the matter (subject, of course, to Commission and judicial review).

But the State sought reconsideration, arguing that we had, in effect, found that the “bounding impact” crash would, although not puncturing the canister, assuredly cause some damage to the outer cask, thus inexorably reducing its shielding capability. As the State sees it, our earlier ruling -- that ultimate radiological consequences were not to be considered at the

¹⁰ Those actions and others we took were later described in our February 24 Decision (pp. A-15-16):

In that light, we did not view it as necessarily an impermissible approach to separate consideration of the second factor from the third one. At that point, the State was ready to, and pressed to proceed on, the third factor. The Applicant and Staff indicated they were unprepared to do so. We made the pragmatic, time-saving decision to have the hearing focus on only the second factor. But we took two additional actions as well.

First, we indicated that the State would be permitted to make an offer of proof, pursuant to 10 CFR § 2.743(e), at the outset of the hearing. The State in fact did so. See Tr. at 19689-90.

Second, the Board Chairman [speaking for himself only] advised the Applicant and Staff that, given the posture of the case, their unreadiness to proceed may have engendered lasting prejudice to their cases. Specifically, they may have forfeited any opportunity to address the radiological consequences issue later, if they were unsuccessful on the MPC-breach matters on which they were ready to proceed to trial. See Tr. at 19666-77; unpublished Memorandum Concerning Scheduling (Apr. 15, 2004) at 4 [emphasis added].

2004 hearing -- necessarily carried with it the corollary that the State would be entitled to be heard on those consequences if that 2004 hearing did not moot the issue.

Pursuing that line of reasoning, the State says we should not have allowed the proceeding to end with our February 24 Decision's implied "shielding reduction" finding. Instead, the State argues, we should on our own have recognized therein, and should now direct, that there must be another stage to the proceeding, i.e., one in which the State has the opportunity to demonstrate that the reduction in shielding attendant to the "bounding impact" crash -- which is on the margin of being a "credible" event -- leads to an increase in the radiation dose (principally from gamma rays and neutrons passing through the unpunctured canister and the diminished shielding) that exceeds the regulatory maximum at the prescribed boundary. If the Applicant could not defeat that State showing, concludes the argument, the "bounding impact" crash, or one close to it, would have to be recognized as an event against which the facility must be designed to qualify for a license.

The State's reasoning has merit as a theoretical construct. What it overlooks, however, is the manner in which this proceeding developed, which, as we see it, led to a general recognition that the issue the State thinks should now be litigated was never presented and was assuredly not one of those that was kept alive.¹¹

We set out below why we come to that conclusion. Although we find that the State did not take the steps needed to pursue the "diminished shielding" radiation dose issue in the hearing process, we go on to recommend to the Commission an extra-judicial means available to it (but not to us) to insure that the issue is examined if, in its view, such attention is warranted.

Our analysis starts with the fundamental manner in which NRC hearings are structured. While an applicant has the ultimate burden of proof on any issues upon which a hearing is held,

¹¹ As the State correctly points out (Motion at 2), the issue of diminished shielding was litigated and decided in the seismic phase (see p. 13, below). The State incorrectly, however, sees resulting inconsistency in our rulings. The question is not whether diminished shielding may be raised (it may), but whether it was raised. In this phase, unlike in seismic, it was not.

hearings are held on only those issues that an intervenor brings to the fore. And the burden of going forward on any issues which make it to the hearing process is on the intervenor which is pursuing that issue.¹²

In this proceeding, the State brought the “credible accidents” contention and pursued it in the preliminary stages of the proceeding in the face of the Applicant’s motions to dismiss and for summary disposition. Through that process, the precise shape of the contention was altered a number of times, as we recounted in our recent February 24 Decision (at A-4). Eventually, the contention went to trial, and the State’s evidence adduced during the 2002 hearings carried the day on the “probability” aspect of the contention. Our March 2003 ruling on that aspect (LBP-03-04) precluded then awarding the Applicant the sought-after license.

After that ruling, we moved into the so-called “consequences” phase. The State argued that our consideration of that aspect should await the filing of an amended application by the Applicant and a responsive contention by the State (see Mar. 30, 2003 Tr. at 14586-87; “Second Joint Report” (Apr. 30, 2003), at 8-9). Mindful, however, of the Commission’s expectations as to expedition (see May 29, 2003 Tr. at 13873-75 (referring to CLI-03-05, 57 NRC 279, 284-85 (May 28, 2003)), we allowed the proceeding to move forward on the existing application and contention.

For some time, we expected to hear the full range of “consequences” issues, including those involving the impact of a crash on the cask/canister combination and those involving the resulting radiological impact. See LBP-03-04 at n. 110; unpublished Memorandum Concerning Scheduling (Apr. 15, 2004) at 2. As the matter unfolded, however, the Applicant suggested the deferral of the purely radiological part of the “consequences” issue (ibid., see also p. 6, above).

The manner in which that suggestion was presented and addressed is both instructive and determinative. During the entire time the matter was under discussion, the question of

¹² That an issue does not for whatever reason become part of the hearing process does not mean that it receives no agency attention, for all matters are supposed to be addressed by the NRC Staff in the standard performance of its regulatory review. We draw upon the existence of this system in suggesting, later herein, a measure for Commission adoption.

diminished shielding never arose. Rather, the discussion was launched by, and centered upon, the Applicant's belief that it could establish there would be no "cask breach," which in the "either/or" context in which that discussion took place was apparently recognized by all to mean a puncture of the internal canister.¹³ For such a puncture could release radioactive fission products if it did occur, while if no puncture occurred, no such substances would be released (and neither their magnitude nor their dose consequences would thus need be considered).¹⁴

Seeing that matter, then, as an "either/or" proposition, it made sense to us to defer the radiological consequences issue until we reached a decision on the canister puncture issue, which had potential to -- and indeed did -- moot the entire radiological issue. In contrast, the question of diminution of shielding is not an "either/or" matter -- it is instead a matter of degree.

Had the shielding matter been brought before us to determine whether it should be deferred, the prehearing discussion would have been entirely different -- it would not have focused on the potential for efficiencies to be gained through mootness, for the matter could not be mooted (although we might have deferred it on other grounds). Put another way, unlike the situation with the canister puncture issue, it would have been abundantly clear that, as to the reduced shielding, a third phase of the hearing was inexorably going to be required, and that factor would have been crucial in a decision whether to undertake that phase then or later.

But such a discussion never took place -- and we view its absence as an important indicator or identifier of what we and the parties recognized was remaining at issue. Put simply, the State -- whose "credible accidents" contention was what underlay the proceeding --

¹³ As we pointed out at the oral argument (Tr. at 19717), the word "shielding" was never used during the critical prehearing conference. [To be sure, the word "canister" was used only infrequently, but in context "cask breach" was there understood to mean "canister puncture," a usage that prevailed at the later hearing (see Tr. 15677-78, 19717).] In response to our several requests at the oral argument on the motion for reconsideration, the State did not point to a single hearing-record instance where it focused on site-boundary radiation doses arising out of a reduction in shielding. See, e.g., Tr. 19718-19.

¹⁴ Similarly, as to the "criticality" issue, the intrusion into the canister of water (from fire-fighting equipment) that might serve to moderate a chain reaction could take place if and only if the canister were punctured.

did not respond to the Applicant's deferral suggestion in a manner that indicated any intention whatsoever that the likelihood or the consequences of "diminished shielding" be considered an ongoing part of that contention. In that fashion, the State implicitly acknowledged that its contention, reshaped many times previously,¹⁵ had since become focused only upon those aspects relating to, or stemming from, canister puncture.

This apparent acknowledgment was then confirmed by the content of the State's offer of proof as to the "radiological consequence" matters that, having been deferred, were excluded from the second phase. That offer of proof put forward material bearing only on radiological releases escaping from (or criticality stemming from) a punctured canister, and made no mention of the possibility of increased radiation resulting from diminished shielding.

The hearing's limited scope, defined at the prehearing stages and confirmed by the offer of proof at the outset of the hearing itself, was in effect re-confirmed during the hearing. In response to Board questions about possible untoward crash consequences other than those resulting from a canister puncture, counsel for the Applicant argued forcefully that the only matter at issue in this hearing was whether an F-16 crash would breach a canister. See Tr. at 15674-84. If the State believed that loss of shielding remained to be considered (despite the prior indicia that it was not), it should have taken that "last clear chance" opportunity to say so.

In short, the State failed at any point to put specifically in issue the concern it now expresses about reduced shielding. See generally Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, 435 U.S. 519, 553-54 (1978). Perhaps the State believed that such an argument was evident from its overall presentation. But we hold that neither we nor the State's opponents had notice of the need to address that theory.

Accordingly, we adhere to the course taken in our February 24 Decision, which focused only on canister puncture -- for the State did not preserve any aspects of its contention as might have required a Board decision then addressing the degree to which shielding is diminished, or as would have preserved the State's opportunity now to demonstrate the extent of the resulting dose increase. As far as this adjudication is concerned, those matters are not in issue.

¹⁵ See Feb. 24 Decision at A-4-5.

Having said that, and even though the burden of preserving the scope of its contention rested upon the State, it might have been more clear, although not required, had the Board not merely ruled upon the scope of the hearing, but also had gone on to define more precisely and expressly the outlines of, and limits upon, the issues. Although it is incumbent upon a party to act to protect its rights, there is no bar to a Board's taking every precaution to be sure that, after a ruling is made, there is not even a possibility that its full import may be misunderstood. Here, we might have redrafted the contention once again and obtained the parties' agreement that it specifically and accurately reflected all the matters that would be the subject of the hearing.

That applies even where, as here, the expressed emphasis on the major concern about canister puncture and resulting releases would have tended to minimize focus on, or concern about, the lesser problem of diminished shielding and the resulting reduction of protection against gamma and neutron radiation. In that regard, the lack of expressed concern about the extent to which a cask's shielding would be diminished (without canister puncture occurring) appeared fully consistent with our earlier opinion on seismic matters herein, where we held that an acceptable approach to remediating such a reduced shielding situation, before unacceptable radiation doses are incurred, may be a very simple one -- erecting temporary shielding to buttress the compromised shielding. See LBP-03-08, 57 NRC 293, 369 (2003).¹⁶

This proceeding has been underway a long time. Although we are convinced that in all the circumstances we fairly delimited the scope of its final stage, it might be prudent, after so

¹⁶ We held there that, for purposes of calculating radiation dose consequences in a slow-developing post-accident situation, an applicant can "take credit for a contingency plan" through which it would "take whatever steps are necessary to mitigate the situation -- such as by building a protective berm or by evacuating the surroundings" In accordance with that principle, had the State been successful here in pressing for a third phase of the hearing related only to shielding, the evidentiary presentations might well have focused on, among other things, the feasibility and effectiveness of any post-accident-erected barriers the Applicant might plan to utilize to replace the reduced shielding being provided by a damaged cask.

much time and effort has been expended, not to leave unaddressed at the end the merits of any lingering concern the State may now be expressing about the full effects of the “bounding impact” crash. Happily, there is a way -- albeit an extra-judicial one -- through which that matter might be readily addressed.

Specifically, the Staff indicated at the recent oral argument that, as part of its continuing regulatory responsibilities (see note 12, above), it might well examine the reduced shielding matter independent of the reconsideration outcome (April 6 Tr. at 19781-83). As has long been the recognized rule, Licensing Boards have no jurisdiction over the Staff’s performance of such responsibilities as it fulfills outside the hearing process.¹⁷ But the Commission does.

The examination the Staff referred to would not appear to be a major undertaking for, in the course of addressing crash impact, the parties adduced evidence that, while directed to canister effects, necessarily also examined, in depth, physical damage to the overpack. From that evidence one could, in our view, readily determine any accompanying reduction in shielding capability and the consequences thereof.¹⁸

Accordingly, we respectfully suggest to the Commission that, independent of this adjudication, it consider directing the Staff (1) to do as it said it could and examine “the evidence that has been presented . . . in order to ensure public health and safety protection” in regard to the diminished shielding and any accompanying projected increases in site-boundary

¹⁷ See New England Power Co. (NEP, Units 1 and 2), LBP-78-09, 7 NRC 271, 278-79 (1978); Curators of the Univ. of Missouri, CLI-95-01, 41 NRC 71, 121 (1995); Duke Energy Corp. (Catawba Nuclear Station, Units 1 and 2), CLI-04-06, 59 NRC 62, 74 (2004).

¹⁸ Indeed, with that evidence available for scrutiny, and in light of the Staff’s expressed intentions, we asked the Staff and the Applicant (Tr. at 19756, 19760-61, 19767, 19774, 19778-80) whether they wished to have the opportunity to respond to the State’s complaint, before we ruled on it, by filing affidavits reflecting their view of the radiation dose increases that might result from different degrees of shielding reduction reflected in the evidence (the State would, of course, then have had the opportunity to file a countering affidavit). The Staff and Applicant both turned down our offer (Tr. at 19763, 19768, 19775, 19805-06), making it impossible for us on this record to determine whether the matter is significant or not. Cf. generally Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station), ALAB-124, 6 AEC 358, 364-65 (May 23, 1973), reflecting an analogous test for reopening a record on a new issue, and Apr. 6 Tr. at 19797-98.

radiation doses (see Tr. at 19782-83), and (2) to report to the Commission on the results of its analysis.¹⁹ That would put the Commission in position, after receiving the views of the Applicant and State if it desired, to assure itself about the significance, or lack thereof, of the diminished shielding, and to direct such followup proceedings, if any, as it might deem appropriate.

We are aware of no reason why this extra-judicial activity, if undertaken at the Commission's behest, would need affect the Commission's determination as to whether to issue the requested license, a matter that our February 24 Decision put before it and which is unchanged by our decision today.²⁰ Even if the license were to be issued, no spent fuel could arrive at the PFS site for a considerable period, and thus there would be no conceivable danger to the public related to accident-diminished cask shielding while only the site infrastructure was under construction. Of course, such construction, like any a licensee undertakes pending Commission and judicial review, would be at its own risk,²¹ a risk ordinarily substantial enough that we suspect it would not be materially affected by the additional pendency, outside of the formal adjudication, of the diminished shielding matter.

¹⁹ Given the posture of the case and the State's interest (albeit belated) in pursuing this issue, we elect not simply to refer the matter to the Staff for study, as might be done in circumstances different from those presented here. See Florida Power and Light Co. (Turkey Point Nuclear Generating Plant, Units 3 and 4), CLI-91-13, 34 NRC 185, 188 (1991)(no intervenors left in case). Our more formal suggestion here is more consonant with what has gone before and with the State's ongoing participation, and puts the Commission in position to insure the matter is brought to a speedy conclusion, if it believes any further inquiry would be worthwhile.

²⁰ Our suggestion to the Commission is less unorthodox than it may at first appear, when measured against the somewhat analogous situations in the NRC's Rules of Practice which allow licenses in some types of proceedings to be issued prior to -- but subject to the outcome of -- evidentiary hearings yet to be scheduled. See 10 C.F.R. [former] § 2.1205(m) and [current] § 2.1202(a).

²¹ See CFC Logistics (Materials License), LBP-03-16, 58 NRC 136, 147-48 (2003).

ASSERTED ERRONEOUS DETERMINATIONS

As set forth in the introduction (p. 3, above), the second major thrust of the State's motion involved challenges to the manner in which we evaluated certain technical issues. The State's argument about the strength we attributed to the stainless steel canister is addressed in Section A below (pp. 16-18), while its arguments about our analyses of the historical F-16 crashes are addressed in Section B below (pp. 18-29).

A. Using Physical Properties to Determine Criterion for Canister Failure.

The State posits that the Board overlooked critical evidence in determining that the DOE Standard's selection of a particular ductility ratio is unrelated to the case at hand. The State argues, once again, that we should follow the DOE Standard's prescription of a ductility ratio of 20 as a criterion by which to gauge when the steels at issue here would fail in tension.

In our February 24 Decision, we foreswore reliance upon any Code-delineated prescriptive formula for determination of failure in this sort of examination.²² In doing so, we expressly rejected the criteria prescribed by either the DOE Standard or the ASME Code.²³ The State now suggests that our Decision "relied" upon: (a) a standard set out in Table Q1.5.8.1 of the ANSI/AISC Standard; (b) the premise that the DOE Standard was developed with a clear focus upon "structural" members made of carbon, not stainless, steel; and (c) the belief that the DOE standard was developed to assess the ability of a structural member to continue to perform its structural function.

Although we indeed noted that the latter two of those factors supported our ultimate conclusion, our Decision rested on a more basic, clearly enunciated rationale -- that the

²² See Feb. 24 Decision at B-16 (all "B"-page references are to the Safeguards version).

²³ See Feb. 24 Decision at B-17, B-18.

determination of the conditions which cause failure in tension of the steels at issue, in the sort of circumstances at issue in the analysis we must make,²⁴ is most appropriately based upon examination of the actual physical properties of these steels under the sorts of loadings expected.²⁵ Nothing the State now presents causes us to depart from that approach.

Indeed, a proper understanding of the ductility ratio concept confirms, rather than undercuts, the validity of our earlier conclusion. Specifically, a ductility ratio is simply a measure of the displacement observed under particular conditions compared to the maximum elastic displacement which could occur in the particular material at issue.²⁶ Such a ratio may be computed for any circumstance; it was posited by the State that a ductility ratio of approximately 20 (which corresponds to a true strain on the order of 2.5 percent), selected as a criterion for failure in the DOE Standard, should be used categorically as a proper measure for failure of the steels at issue under the circumstances of these accidents.²⁷

The testimony of the Applicant and Staff experts, however, indicated that the stainless steel at issue here would not fail in tension under the types of dynamic loads computed to be incurred until true strain reached more than 90 percent,²⁸ and that the carbon steel at issue would not fail until true strains reached not less than 69 percent.²⁹ Those strains correspond to

²⁴ The issue before us involved at what point the crash-induced forces would puncture a canister (as stressed in Part I, above), not (1) what other types of non-puncturing damage those forces might inflict on a canister or (2) how a canister might perform against those forces if it were intended to serve other purposes than as a barrier to releases.

²⁵ See Feb. 24 Decision at B-17-18.

²⁶ See State Exh. 254, United States Department of Energy Standard (DOE-STD-3014-96), Accident Analysis for Aircraft Crash into Hazardous Facilities (Oct. 1996) at 76.

²⁷ See Feb. 24 Decision at 12 (citing Tr. at 16514-16 (Sozen)).

²⁸ See Tr. at 16006, 16010, 19598-99 (Bjorkman); see also Feb. 24 Decision at B-13.

²⁹ See Tr. 16825, 16850-52, 16860, 16888, 16893, 19598, 19599 (Bjorkman).

ductility ratios vastly in excess of the 20 proposed by the State (which corresponds to a strain on the order of 2.5 percent): in that regard, Staff witness Bjorkman indicated that the ductility ratio corresponding to a 69 percent failure true strain would be on the order of 250.³⁰

To be sure, no witness in testimony, or party in pleadings, proposed or suggested an appropriate numerical value for the ductility ratio which would indicate the type of tensile rupture failures of interest in this situation, namely the failure of a canister to maintain the integrity of its external boundary against releases of its internal contents. Therefore, while we might indeed have employed the ductility ratio concept had an appropriate one been presented (based on experimental data about the type of tensile failure of concern), there was no justification for us to adopt a standard ductility ratio, developed for other situations, when that standard ratio was not shown to be relevant to, or derived from experiments about, the peculiar type of failures at issue here. Instead, we turned to the actual physical properties of the stainless steel, and experimental evidence about it, to make the appropriate determinations.

For the foregoing reasons, we deny the State's motion to reconsider our ruling as it related either to use of the DOE Standard or the ASME or AISC Code provisions, or to use of the numerical value of the ductility ratio proposed by the State as a failure criterion for these analyses. We turn now to the State's arguments about our analyses of the aircraft crash data.

B. Analyzing F-16 Crashes to Determine Probability of Canister Puncture.

The State argues that the Board misapprehended evidence that, viewed properly, shows the so-called "unanalyzed event probability (UEP)" from aircraft crashes is higher than we concluded.³¹ Specifically, the State claims that the Board-determined UEP for aircraft crashes

³⁰ See Tr. at 16863-66. See also Apr. 6 Tr. at 19934-44.

³¹ State's Motion at 5.

into the casks fails to incorporate two elements which, when taken together, would increase the overall UEP to an amount in excess of the one-in-a-million per year criterion (referred to herein by the scientific shorthand notation of " 1.0×10^{-6} ") and thus turn a crash exceeding the previously-determined "bounding impact" into a "credible accident."

First, the State categorically claims that the parties have agreed that seven crashes, which it characterizes as take-off and landing crashes, should be eliminated from the data, and that we therefore erred in including them.³² We explain briefly in subsection 1, below, why this claim is at least partly, and perhaps entirely, erroneous, and even if it had any underlying validity, would be immaterial.

Second, the State suggests that aircraft crashes cannot simply be divided, as the Applicant and Staff did, into two categories: those initially impacting the tops of casks and those initially impacting their sides. As the State sees it, some high-speed crashes which occur at angles close to the horizontal could make a primary grazing impact on a cask top and glance off -- with no appreciable damage to that cask or to the aircraft -- and then go on to impact the side of a second cask, with the possibility of causing appreciable cask damage that was not factored into our earlier Decision (which would have considered such a crash simply as a non-damaging top impact).³³ Because we did not directly address in our February 24 Decision this narrow but important point as to how to categorize crash angles and impacts for analytical purposes, we now give it considerable attention in subsection 2, below.

1. The Inclusion of Seven Assertedly Questionable Crashes.

The State argues that the Board improperly included seven accidents in the flight crash data set. The State claims that the State and the Applicant agreed that, along with the four runway related accidents that were excluded to bring the data set down from 61 to 57 crashes,

³² See id. at 7-8.

³³ See ibid.

an additional seven crashes should be excluded because all parties agreed that they cannot reasonably occur in Skull Valley.³⁴ As a result, the State argues, we erred in not excluding the seven accidents from the database. Elimination of those seven low speed crashes, says the State, would cause the probability of an impact speed greater than the bounding event to be increased from 15.8 percent to 18 percent, thus increasing the Board-determined UEP.³⁵

Neither the Applicant nor the Staff supports the State's claim that the parties agreed that the seven accidents should be excluded.³⁶ On the contrary, the Staff points out that the exhibit referenced by the State was an expert's sensitivity study that, at our request, re-evaluated all the data points. For purposes of that particular study, the Staff notes, the Applicant's expert Dr. Cornell did not conclude that the seven low-altitude events at issue here should be excluded, but that if that were done it should be in connection with a re-analysis of the entire data set, including weighting flights according to the Skull Valley flight patterns.³⁷ He went on to state that "we maintain that our original approach, which included all Skull Valley Type Event accidents without need for selecting or weighing accidents by altitude, is appropriate"³⁸

Thus, the State's proposition that the parties all agreed to eliminate the seven crashes misconstrues their positions. The very exhibit referenced by the State shows that the Applicant had taken a different position: in response to our request that the parties provide alternative data sets -- with exclusion criteria different from the ones used for their previously-submitted

³⁴ See State's Motion at 7-8 (citing Applicant Exh. 319, Dr. C. Allin Cornell, "Treatment of F-16 Accidents Sought to Be Excluded from Use in Crash Impact Speed and Angle Frequency Distribution Determination by the State of Utah" [hereinafter Applicant Exh. 319]).

³⁵ See id. at 8.

³⁶ See Applicant's Response at 7-8; Staff's Response at 8.

³⁷ See Applicant Exh. 319 at 1.

³⁸ Id. at 8; see Staff's Response at 8.

data sets -- the Applicant re-examined all the aircraft crash data and its approach to analysis of those crashes. As a result, the Applicant suggested that an appropriate re-analysis might incorporate two new approaches: both the elimination of particular low-speed crashes and the weighting of the probabilities of all crashes to reflect the fact that only 4 percent of Skull Valley flights take place in the Sevier D flyway (which goes from 5,000 feet above ground level (AGL) to 14,000 feet AGL) while 96 percent are in Sevier B (which goes from near the desert floor up to 5000 feet AGL, with F-16's generally flying between three to four thousand feet AGL there).³⁹

The Applicant's rough estimate of the effect of such a re-analysis was that it would yield a UEP not materially different from the one initially presented. In that re-analysis, the elimination of low-speed crashes was expressly coupled with another measure re-weighting the remainder, so the State's suggestion -- that the Applicant had "agreed" simply to eliminate the crashes from the earlier analysis -- is not a fair characterization of what occurred.

In addition, it is important to recognize that these seven crashes were all initiated by types of engine problems that could have happened in Skull Valley, and then involved the pilots taking some last-minute actions at low speed and relatively low altitude. To remove these accidents from the data set because of those actions, or because they occurred at low altitudes, would distort the historical results which provide the foundation for predicting the future. There is simply no reason to believe that, even without such activity, the crash speed would not be in the same low speed range as most loss of engine power crashes, or would vary materially from the F-16's relatively low speed when the pilots took those actions.

Put another way, while it is possible that the pilots' actions caused the crash speeds to be somewhat different than might have occurred without those actions, these seven events are fairly representative of one end of the range of crash scenarios; to remove them entirely from

³⁹ See Applicant Exh. 319 at 1-2; State Exh. 242, Lt. Col. Hugh L. Horstman, "Evaluation of Impact Velocity and Impact Angles for F-16 Crashes at the Proposed PFS Site," at 1.

consideration would inaccurately shift the predicted probability distribution toward higher speeds. Perhaps, because of the pilots' actions, these seven events should have been used in a different manner in the regression analysis. No such re-analysis was, however, provided to us, and, in any event, there is no reasonable basis to conclude that such a re-analysis could increase the probability of a crash impact above the bounding event impact speed and thereby shift the UEP. For all these reasons, we reject the State's arguments that all parties "agreed," or that we should have determined, simply to exclude the seven crashes from consideration.⁴⁰

2. The Exclusion of Certain Assertedly Damaging Crashes.

The State contends that the Board erred in adopting PFS's probability analysis, because by so doing it implicitly determined that a cask top impact F-16 crash, at an angle different from the potentially damaging ones, could not at any speed breach another cask in the facility.⁴¹ Put another way, the State claims the Board made an "incredible leap of faith," unsupported by the evidence, in therefore implicitly finding that a neighboring cask, only 5 feet away, could not suffer a high-speed damaging side impact from a crashing plane that just grazed the top of the initial cask (and was thereby eliminated as a damaging top impact crash).⁴² Common sense, the State continues, teaches that the F-16 "will not be slowed in any substantial manner by a shallow impact to a cask top;" along those lines, it asserts, the only evidence in the record

⁴⁰ In any event, even if these events were to be excluded, the Staff's sensitivity analysis -- wherein nine low speed crashes were eliminated -- indicated that any increase in the probability of impact speeds greater than the bounding event would be somewhat less than 10 percent, not the larger amount the State urged. See Staff Exh. 119, "NRC Staff's Response to . . . Questions Concerning the Probability of an Accidental F-16 Crash into the PFS Facility," at 16; April 6 Tr. at 19859; compare State's Motion at 8. This nine-crash sensitivity analysis would tend, of course, to overstate what could be expected if only the seven incidents at issue were eliminated, and thus tends to demonstrate that the result would be small enough not to materially affect the outcome previously reached.

⁴¹ See State's Motion at 6.

⁴² See ibid.

indicates that after such a crash, the F-16 should be assumed to continue on to damage the sides of one or more of the other casks in its path.⁴³

Based on the Board's adoption of the Applicant's analysis for side impact probability in determining "analyzed" events, the State asserts that any top impact with a greater horizontal component of speed than the bounding event must be considered an "unanalyzed" side impact to neighboring casks.⁴⁴ Accordingly, the State argues, because the Applicant calculated an incremental UEP for such impacts, this amount should be added to the total UEP which we adopted.⁴⁵

The Applicant disagrees with the State's analysis and urges that it presents nothing new, being merely a repetition of claims made at the hearing and in the proposed findings.⁴⁶ In that regard, the Applicant calls attention to the evidence it adduced in an effort to rebut the State's theory: (1) an F-16 flying at speeds necessary to cause significant damage and impacting the top of one cask at an angle near horizontal cannot at that speed drop far enough to hit the second cask in a manner causing canister puncture; and (2) the tops of the casks are not simple flat disks but in fact have strong vertical protuberances that would be expected to catch the F-16's air scoop or damage its fragile underside in a manner that would decrease or redirect its momentum and prevent it from simply "skipping" into the neighboring cask.⁴⁷

The Applicant also challenges the State's reliance on a "hypothetical" UEP calculation, reflected in Applicant Exh. 324, that shows a higher UEP than the Applicant originally calculated and the Board adopted. That exhibit, the Applicant says, must be read in light of its premise,

⁴³ See ibid.

⁴⁴ See id. at 6-7.

⁴⁵ See id. at 7.

⁴⁶ See Applicant's Response at 6.

⁴⁷ See Tr. at 19555-65.

which its expert Dr. Cornell explicitly characterized as an “unrealistic scenario” where an aircraft impacting at a particular angle undergoes no diminution in either horizontal velocity or mass and was assumed to continue on unaffected until it impacts the second cask in a fashion that would induce serious damage.⁴⁸ This hypothetical calculation, the Applicant continues, is not supported by the evidence in the record as to what indeed would happen if an F-16 hit the top of the cask at the angle of concern, and therefore it provides no basis for reconsideration. The Staff agrees with the Applicant.⁴⁹

Although crashes into the tops of casks were thoroughly analyzed, the parties focused only upon such crashes as might breach the top -- and therefore upon crashes which had a high vertical component to their velocity. The State would, in essence, have us increase the damaging side-impact crash probability based on very high horizontal speed component crashes which glance off the top of one cask and then impact the side of a second cask.⁵⁰

We do not find any significant evidentiary support for the State’s proposition that the postulated secondary crashes can occur or indicating what damage they might cause. In any event, we have already seen that the State’s argument that the UEP should be increased by the increment computed in Applicant Exh. 324 by Dr. Cornell reads too much into his conservative analysis of the hypothetical possibility of such crashes.⁵¹

⁴⁸ See Applicant’s Response at 7 (quoting Applicant Exh. 324, Dr. Allin Cornell, “Analysis of Hypothetical Unmitigated Shallow Angle Top Impact Case” [hereinafter Applicant Exh. 324]).

⁴⁹ See Staff’s Response at 7.

⁵⁰ See Dr. M. C. Thorne, Post Tr. at 18857, ¶¶ 3-5.

⁵¹ In fact, Dr. Cornell calculated that number “for the unrealistic scenario in which it is assumed that certain shallow angle aircraft hits on the top of the cask do not undergo any diminution of either their horizontal velocity or mass and then impact the side of a second cask at the most critical location for inducing damage.” See Applicant Exh. 324.

Other evidence on the point indicates that the Staff's expert computed a much smaller UEP increment in his more refined analysis of the maximum effect one could expect from such secondary impacts. We find that if one were to incorporate any such events into the analysis, the Staff's conservative computation of the probability is a materially better estimate of the maximum effect one could reasonably expect from secondary crashes. Thus, even if we were to incorporate such events into the UEP, their maximum contribution cannot reasonably be expected to be larger than the net increase of approximately 0.4×10^{-7} found by the Staff's expert.⁵²

The State properly challenges an aspect of the method by which the overall analysis in support of the application was performed: it was assumed that a crash into the storage area hits either the top or the side of a cask and that, because the F-16 is a fragile structure, the primary impact would so alter the plane's mass and velocity (and would remove so much of the plane's momentum) that no secondary impact could have any material effect. That assumption would be valid if an F-16 were as concentrated as a laser beam shining down the plane glide angle toward impact -- that beam would hit only one or the other of a cask side or a cask top, not both. An F-16 of course does not have the characteristics of such a beam, however, and therefore the State is correct that there can be some F-16 crashes wherein the plane strikes a glancing blow to the top of a cask and thereafter hits the side (or top and side) of another cask.

But not every impact on the top of a cask will have a secondary impact of great import. To put this in perspective, we note that the diameter of the fuselage of an F-16 is about one-third the diameter of a cask. For those crashes in which a major portion of the fuselage of the F-16 primarily impacts the top of a cask, then, one can reasonably expect the plane not only to

⁵² See Staff Exh. 102, Dr. Dennis R. Damon, "NRC Staff's Evaluation of Private Fuel Storage, L.L.C. Aircraft Crash Probability Assessment" (May 11, 2004, as revised Sept. 9, 2004) at 20 [hereinafter Staff Exh. 102]. (The precise calculation came out to 0.387×10^{-7} ; we round off rather than seem to be assigning more accuracy than the uncertainties would allow.)

suffer material deformation, but also to lose substantial momentum to that first cask, and thus, in such a case, the plane cannot reasonably be expected to have significant secondary impact.

That still leaves open the State's current suggestion that we have failed to incorporate the effects of secondary impacts when a crashing F-16 merely "clips" the back edge of a cask top without material damage, and then impacts the side of a second cask at essentially its original pre-crash velocity and in its original pre-crash configuration. The worst cask damage from such a secondary impact would, however, be no worse than the damage caused by an F-16 making a primary impact on the side of a "first" cask at that speed and angle, a probability that has been fully considered except insofar as inclusion of such secondary crashes effectively enlarges, from a computational perspective, the cross sectional area of the sides of the casks being impacted. To this extent, the State's motion makes a valid point, but not a prevailing one.

The probability of side impact breaches was determined on the basis of cross sectional area of the sides as related to the angle of the incoming aircraft, and the probabilities of impacts on the tops of casks were similarly based upon the cross section of the tops as related to the angle of the incoming aircraft. Thus, side impacts and top impacts were effectively separated in order to aid in examining the worst case structural damage.

The State has focused its technical arguments upon impacts at 10 degrees or less from the horizontal (although it initially asserted that those at 30 degrees or less from the horizontal had been ignored).⁵³ The only technical (or even quasi-technical) analyses presented to us relate to crashes very close to the horizontal, and therefore we focus here upon impacts at 10 degrees or less.⁵⁴ A grazing impact must, to cause the effects the State posits, hit near the

⁵³ State Motion at 6.

⁵⁴ It is also obvious that as impacts become steeper, the contact with the first cask top becomes more damaging, or, conversely, that a "grazing" crash can occur only in a smaller portion of the back edge of the top.

back of the top, not the front, and thus it would be inappropriate to utilize the entire area of the top for an impact of less than 10 degrees.⁵⁵ Indeed, it is geometrically apparent that less than (and likely much less than) half of that area would avail the trajectory of concern to the State.⁵⁶

To understand the general issue, we note that the azimuth-weighted effective area for such impacts was estimated by the Applicant (and not controverted by the State) to be 0.0498 (compared to 0.0702 for side impacts).⁵⁷ Furthermore, the contribution to the UEP from side-impacts was computed to be 3.53×10^{-7} , and 41 percent of that contribution came from impacts in the 0 - 10 degree increment⁵⁸ (i.e., the contribution to the UEP from all crashes into the side at less than 10 degrees was approximately 1.4×10^{-7} [41% of 3.53]). If one were to assume that all crashes into the top of a cask in the 0 - 10 degree increment would result in an unimpeded crash into the side of a second cask at the same angle, their contribution to the UEP would be calculated using a simple linear ratio of the two areas, or around 1.0×10^{-7} .⁵⁹

But as reasoned in the underlined sentence above, a large portion of such top impacts would hit in an area that would preclude an F-16 from proceeding unaffected into another cask's side. Thus, the general analytical approach outlined in the preceding paragraph would yield a very conservative (over)estimate of the additional UEP which might be assigned to such

⁵⁵ We note that cross sections were computed for 10 degree increments, so this terminology means the cross section assigned to the zero to ten degree interval.

⁵⁶ In addition, a significantly smaller portion of the cross section would be used for the 10 - 20 degree increment and an even smaller portion for the 20 - 30 degree increment, and so on.

⁵⁷ See Applicant Exh. 265, Dr. C. Allin Cornell, "Probability Assessment of the Aircraft Crash Impact Hazard for the Private Fuel Storage Facility Based on Engineering Evaluations of Storage Cask and Canister Transfer Building Structural Integrity (Rev. 1) (Jan. 2004) at 48 (Tables V-3 and V-4) [hereinafter Applicant Exh. 265].

⁵⁸ See Applicant Exh. 265 at 49.

⁵⁹ That result is derived from the ratio of the effective top area of 0.0498 to the effective side area of 0.0702, multiplied by the 1.4×10^{-7} UEP from less than 10 degree side impacts.

events -- even if one were to incorporate crashes at steeper angles (since, as stated above, an even smaller fraction of those would proceed undamaged). Thus, one would expect a more detailed, less conservative analysis to lead to a substantially smaller number than 1.0×10^{-7} . That said, even this number is considerably lower than Dr. Cornell's very conservative (as he put it, "unrealistic") estimate of 1.94×10^{-7} , which the State asserts is the only evidence before us.⁶⁰ In fact, as previously observed (note 52, above), the Staff's expert Dr. Damon conservatively estimated that the UEP would increase by only approximately 0.4×10^{-7} when assuming there was no loss of momentum from the grazing impact.⁶¹

We find the Staff's conservative estimate to be fully consistent with the foregoing generalized analysis and therefore that, even if such events were to be shown to be possible, the incremental effect on the UEP can reasonably be expected not to exceed 0.4×10^{-7} , increasing the overall UEP to a maximum of no more than 7.8×10^{-7} . This remains below the threshold of 1.0×10^{-6} for design basis events, even without consideration of the numerous conservatisms built into the analyses and discussed in depth in our February 24 Decision. Therefore, whether or not the State is correct in faulting our original analyses for not incorporating these hypothetical events, we find that the posited effects of a secondary side impact arising from a grazing top impact could not materially affect the outcome reached in our prior ruling on this matter.

In sum, for the reasons stated above, we disagree with the State that the probability of a consequential crash, which we found on February 24 to be below one-in-a-million per year, should -- by eliminating the seven questionable crashes and focusing on the potential "skipping" secondary impact crashes -- be increased to above that cut-off number. In light of that conclusion, we need not address the possibly difficult question -- which we posed two years ago

⁶⁰ Applicant Exh. 324.

⁶¹ Staff Exh. 102 at 20-21.

(see LBP-03-04, 57 NRC at 135, n. 105) -- of whether there should be any essential licensing difference between a calculation that falls just short of the 1×10^{-6} mark and one that lies just beyond it. Nor need we determine whether the qualitative conservatisms that made us even more comfortable with a number that meets the standard (Feb. 24 Decision at B-37-41) might also be employed to convert a number that fails to meet the standard into one that does.

III

CONCLUSION

As has been seen, we have reconsidered, at the State of Utah's request, elements of our February 24, 2005 Final Partial Initial Decision regarding "F-16 Aircraft Accident Consequences." Having done so, we are essentially adhering to the result previously reached, but are modifying the supporting rationale to the extent set out above.

Accordingly, the ultimate relief sought by the State's Motion for Reconsideration -- a determination as to Contention Utah K that, contrary to our earlier ruling, the Applicant PFS has not carried its burden of proof concerning the risk to the proposed facility from F-16 accidental crashes -- is DENIED. Having given the matter due evaluation, we affirm our earlier determination that the likelihood of a consequential accidental F-16 crash is less than the one-in-a-million per year standard set by the Commission in this case.

As requested by the State (Motion at 8-9) and acceded to by the other parties (Applicant's Response at 8-9; Staff's Response at 8-9), we are, however, making explicit a premise of our Decision that was previously only implicit. Specifically, our findings and conclusions in favor of the Applicant are applicable only to the modified cask design,⁶² and only under the conditions, which the Applicant put forward partway through the proceeding to respond to certain Staff concerns and to resolve related matters raised by the State's ensuing contention. Any other design and conditions are not covered by our Decision.

⁶²The design changes involve Safeguards-related matters and are thus not recited here.

Given the result we reach today, nothing said herein alters the status quo, under which the Commission has been, and continues to be, vested by NRC regulations with the authority to issue the requested license. See February 24 Final Partial Initial Decision, p. C-2, citing 10 C.F.R. § 2.764(c). As outlined above, we nonetheless suggest to the Commission that, independent of the action it takes as to the issuance (or not) of the license, it consider:

(1) directing the NRC Staff to perform the “diminished shielding” radiation dose analysis described on pages 14-15 herein, and (2) based on the Staff’s report thereof, taking whatever additional steps it may then deem appropriate, in this proceeding or in a collateral one.

The Commission has previously held in abeyance the time within which a Petition for Review of our February 24 Final Partial Initial Decision may be filed, pending our ruling on the State’s Motion for Reconsideration. See March 11, 2005 Commission Order at 1. With today’s ruling, the matter is no longer in abeyance and -- subject to the Commission issuing a different directive -- the review periods enunciated in our February 24 Decision are once again in force, *as follows*:

Pursuant to 10 C.F.R. § 2.760(a), our February 24, 2005 Final Partial Initial Decision, as amended by this Memorandum and Order (Ruling on Reconsideration Motion), will constitute the FINAL ACTION of the Commission within forty (40) days of this date unless a Petition for Review is filed in accordance with 10 C.F.R. § 2.786(b), or the Commission directs otherwise.

Within fifteen (15) days after service of this Ruling on Reconsideration (which shall be considered to have been served by regular mail for the purpose of calculating that date), any party may file with the Commission a PETITION FOR REVIEW, on the grounds specified in 10 C.F.R. § 2.786(b)(4), of the February 24 Final Partial Initial Decision, as hereby amended. Any such Petition for Review should also cover those interlocutory rulings of ours that were not previously appealable either by NRC Rule or by Commission Order, if indeed there remain any such rulings. The filing of a Petition for Review is mandatory in order for a party to have exhausted its administrative remedies before seeking judicial review. 10 C.F.R. § 2.786(b)(1).

Within ten (10) days after service of a petition for review, any party to the proceeding may file an ANSWER supporting or opposing Commission review. 10 C.F.R. § 2.786(b)(3).

The petition for review and any answers shall conform to the requirements of 10 C.F.R. § 2.786(b)(2)-(3).

It is so ORDERED.

THE ATOMIC SAFETY
AND LICENSING BOARD

_____/RA/_____
Michael C. Farrar, Chairman
ADMINISTRATIVE JUDGE

Peter S. Lam *
ADMINISTRATIVE JUDGE

Rockville, Maryland
May 24, 2005

_____/RA/_____
Paul B. Abramson
ADMINISTRATIVE JUDGE

* Because Judge Lam joins in Part I but does not join in Part II of this Memorandum and Order, he has not affixed his signature hereto, but instead makes the statement appearing below.

Separate Statement of Judge Lam:

I join in my colleagues' Part I discussion of why the concern about the consequences of diminished shielding was not preserved in this adjudication, as well as in their suggestion to the Commission as to how it might address the matter if it chooses to do so. Because Part II does not significantly alter the rationale by which the Board majority reached its February 24 decision, I adhere to the dissenting opinion I issued at that time.

/RA/
Peter S. Lam
ADMINISTRATIVE JUDGE

Copies of this Memorandum and Order were sent this date by Internet e-mail transmission to counsel for the Applicant PFS, the Intervenor State of Utah, and the NRC Staff.

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 (RULING ON RECONSIDERATION MOTION) (LBP-05-12) 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

Administrative Judge
Michael C. Farrar, Chairman
Atomic Safety and Licensing Board Panel
Mail Stop - T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Administrative Judge
Paul B. Abramson
Atomic Safety and Licensing Board Panel
Mail Stop - T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Administrative Judge
Peter S. Lam
Atomic Safety and Licensing Board Panel
Mail Stop - T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Sherwin E. Turk, Esquire
Laura C. Zaccari, Esquire
John T. Hull, Esquire
Office of the General Counsel
Mail Stop - 0-15 D21
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Diane Curran, Esquire
Harmon, Curran, Spielberg
& Eisenberg, L.L.P.
1726 M Street, NW, Suite 600
Washington, DC 20036

Joro Walker, Esquire
Director, Utah Office
Western Resource Advocates
1473 South 1100 East, Suite F
Salt Lake City, UT 84105

Martin S. Kaufman, Esquire
Atlantic Legal Foundation
205 E. 42nd St.
New York, NY 10017

Docket No. 72-22-ISFSI
LB MEMORANDUM AND ORDER (RULING ON
RECONSIDERATION MOTION) (LBP-05-12)

Denise Chancellor, Esquire
Assistant Attorney General
Utah Attorney General's Office
160 East 300 South, 5th Floor
P.O. Box 140873
Salt Lake City, UT 84114

Jay E. Silberg, Esquire
D. Sean Barnett, Esquire
Pillsbury Winthrop Shaw Pittman LLP
2300 N Street, NW
Washington, DC 20037-1128

John Paul Kennedy, Sr., Esquire
David W. Tufts, Esquire
Confederated Tribes of the Goshute
Reservation and David Pete
Durham Jones & Pinegar
111 East Broadway, Suite 900
Salt Lake City, UT 84105

Richard Wilson
Department of Physics
Harvard University
Cambridge, MA 02138

Tim Vollmann, Esquire
3301-R Coors Road N.W., #302
Albuquerque, NM 87120

Paul C. EchoHawk, Esquire
ECHOHAWK LAW OFFICES
151 North 4th Avenue, Suite A
P.O. Box 6119
Pocatello, ID 83205-6119

Joseph R. Egan, Esquire
Martin G. Malsch, Esquire
Egan, Fitzpatrick, Malsch & Cynkar, PLLC
The American Center at Tysons Corner
8300 Boone Boulevard, Suite 340
Vienna, VA 22182

Stephen L. Simpson, Esquire
Office of the Solicitor
Department of the Interior
Division of Indian Affairs
1849 C Street, NW, Mailstop 6456-MIB
Washington, DC 20240

[Original signed by Evangeline S. Ngbea]

Office of the Secretary of the Commission

Dated at Rockville, Maryland,
this 24th day of May 2005