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USNRC

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

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BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	Docket No. 72-22-ISFSI
PRIVATE FUEL STORAGE, LLC	)	ASLBP No. 97-732-02-ISFSI
(Independent Spent Fuel Storage Installation)	)	November 9, 2000

OF  
ADJUTANT GENERAL

**STATE OF UTAH'S REQUEST FOR ADMISSION OF LATE-FILED  
MODIFICATION TO BASIS 2 OF CONTENTION UTAH L**

Pursuant to the Board's Orders of June 1, 2000 (LBP-00-15, 51 NRC 313), and November 1, 2000, and 10 CFR § 2.714, the State seeks the admission of Modification to Basis 2 of Utah Contention L to address the NRC Staff's position that PFS should be granted the exemption it requested from Part 72 to allow the use of a PSHA methodology with a 2,000 year return period instead of a deterministic analysis required by Part 72. This Modification is supported by the Declarations of Dr. Walter J. Arabasz and Dr. Marvin Resnikoff, attached hereto as Exhibits 1 and 2 respectively.

**Background**

Contention Utah L<sup>1</sup> asserts "[t]he Applicant has not demonstrated the suitability of the proposed ISFSI site because the License Application and SAR do not adequately address site and subsurface investigations necessary to determine geologic conditions, potential seismicity, ground motion, soil stability and foundation loading." State of Utah's Contentions (November 23, 1997) at 80. Utah L and its bases are founded on 10 CFR Part

<sup>1</sup> Contention Utah L and its bases were admitted in their entirety by the Licensing Board in LBP-98-7, 47 NRC 142, 191, 253, *aff'd on other grounds*, CLI-98-13, 48 NRC 26 (1998).

Template = SECY-041

SECY-02

72, including the requirement to analyze seismicity using deterministic methodology. Section 72.102(b) requires ISFSI sites “[w]est of the Rocky Mountain Front . . . will be evaluated by the techniques of appendix A of part 100 of this chapter.” Appendix A requires a deterministic approach based on a site-specific investigation of the largest credible earthquake likely to affect a site. 10 CFR Part 100, App. A, V(a)(1)(i).

In 1997, the NRC amended Part 100 with a new section 100.23 to allow the option of using a probabilistic seismic-hazard methodology. On June 4, 1998, NRC issued a Rulemaking Plan, SECY-98-126,<sup>2</sup> the purpose of which is to make “a conforming change to 10 CFR 72.102 that will require new applicants for dry cask ISFSIs that are West of the Rocky Mountain Front ... to evaluate seismicity by the techniques of Part 100 as amended in 1997, specifically Part 100.23 (instead of 10 CFR 100 Appendix A).” SECY-98-126 at 2. Under the preferred option in the Rulemaking Plan, a Part 72 licensee would be required to “conform to 10 CFR 100.23 in lieu of 10 CFR Part 100 Appendix A” and a licensee could use a “graded approach to seismic design for ISFSI structures, systems, and components.” Id. at 4. In general, the graded approach to structures, systems, and components (“SSCs”) “requires those SSCs, whose failure would result in a greater accident consequence, to use higher design requirements for phenomena such as earthquakes and tornadoes.” Id.

The Rulemaking Plan would allow a probabilistic seismic hazard assessment and require systems, structures, and components to be designed to withstand either a Frequency-Category-1 design basis ground motion (1,000 year recurrence interval) or a Frequency-

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<sup>2</sup> “Rulemaking Plan: Geological and Seismological Characteristics for Siting and Design of Dry Cask Independent Spent Fuel Storage Installations, 10 CFR Part 72,” SECY-98-126 (“Rulemaking Plan”).

Category-2 design basis ground motion (10,000 year recurrence interval). Id. at 5. The Rulemaking Plan does not have intermediate categories between Categories 1 and 2. PFS has classified the following SSCs as important to safety: the canister; the concrete storage cask; the transfer cask; the lifting devices; the cask storage pads; the canister transfer building; the canister transfer cranes; and the seismic support struts. SAR at 3.4-3 to -4 (Revs. 17 and 9, respectively).

On April 2, 1999, the Applicant requested an exemption from 10 CFR § 72.102 (f)(1) to allow it to conduct a probabilistic seismic hazard analysis instead of a required deterministic analysis. In response to the Applicant's exemption request, the State, on April 30, 1999, filed a Motion Requiring Applicant to Apply for Rule Waiver Under 10 CFR § 2.758(b) or in the Alternative Amendment to Utah Contention L, which the Board denied, without prejudice. LBP-99-21, 49 NRC 431 (1999). In its decision, the Board determined "that the question of admitting or amending contentions relative to the PFS exemption request must await favorable staff action on that request." Id. at 439.

When the Staff issued its first Safety Evaluation Report dated December 15, 1999 ("SER"), it recognized that Part 72 currently requires a deterministic analysis for sites west of the Rocky Mountain Front. SER at 2-43. The Staff also recognized that the Rulemaking Plan only requires a 1,000 year or 10,000 return period.<sup>3</sup> Notwithstanding the directives in

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<sup>3</sup> The SER at 2-44 states:

[A]n individual structure, system, and component may be designed to withstand only Frequency Category 1 events (1,000-year return period) if the applicant's analysis provides reasonable assurance that the failure of the structure, system, and component will not cause the Facility to exceed the radiological requirements of 10 CFR 72.104(a). If the applicant's analysis cannot support this conclusion, then the designated structures, systems and component should have a higher importance to safety, and the structures, systems, and component should be designed such that the Facility can withstand Frequency Category 2 events (10,000-year return period).

the Rulemaking Plan, the Staff determined that a 2,000-year return value with the PSHA methodology can be acceptable. Id. at 2-44 to -45.

In reliance on the Staff's determination, the State timely requested admission of Late-filed Modification to Basis 2 of Contention Utah L (January 26, 2000) ("1st Modified Basis 2"), "to require either the use of a probabilistic methodology with a return period of 10,000 years or compliance with the deterministic analysis as currently required by 10 CFR § [72.102 (f)(1)]." 1st Modified Basis 2 at 7. In response, the Staff stated that it has not yet determined to grant the exemption request; thus, the State's modification request is not yet ripe. Staff's Response to [1st Modified Basis 2] (Feb. 14, 2000) at 5-6. The Board agreed, and on June 1, 2000 denied the State's request as not ripe for admission in the absence of a favorable staff ruling on the exemption request. LBP-00-15 at 8-9, 51 NRC 313 (2000).

The Staff, finally, has issued a favorable ruling on PFS's exemption request in its final Safety Evaluation Report ("FSER").<sup>4</sup>

As described in the State's Motion for Clarification or in the Alternative Request for Extension of Time, the State did not receive a hard copy of the FSER until October 10, 2000. In an Order dated November 1, 2000, the Board granted the State's request to file any new or modified contentions based on the FSER by November 9, 2000.

#### **MODIFICATION TO BASIS 2 OF CONTENTION UTAH L**

Contention Utah L Basis 2 addresses ground motion and is founded on 10 CFR Part 72, which requires a deterministic seismic hazard analysis (DSHA) be used to develop the

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<sup>4</sup> See cover letter accompanying the FSER from Mark S. Delligatti to John D. Parkyn dated September 29, 2000 ("in this SER, the staff ... takes the position that PFS should be granted the exemption it requested from 10 CFR 72.102(f), ... [and] agrees that the use of the PSHA methodology with a 2,000-year return period is acceptable, and there is a sufficient basis to grant an exemption ...").

design basis for earthquake ground motions.<sup>5</sup> The Staff has now taken the position that there is a sufficient basis to grant the Applicant's request for exemption to 10 CFR 72.102(f)(1), and that the Applicant's use of a probabilistic seismic hazard analysis (PSHA) with a 2,000-year return period is acceptable for seismic design of the PFS Facility. FSER at 2-40 to 2-42. Accordingly, the State seeks to modify Utah L Basis 2 to require either the use of a PSHA with a return period of 10,000 years, consistent with the NRC Rulemaking Plan, or compliance with the deterministic approach currently required by 10 CFR 72.102(f)(1). In the alternative, if the Board allows the use of a PSHA with a return period less than 10,000 years, the State seeks to require use of a return period significantly greater than 2,000 years to avoid placing undue risk on public safety and the environment.

In ruling on the State's 1st Modified Basis 2, the Board stated: "to countenance an adjudicatory challenge to the PFS exemption petition, the Board would have to invoke its certified question or referred ruling authority under 10 C.F.R. §§ 2.718(i), 2.730(f) to determine whether the Commission wants the Board to consider the contention." LBP-00-15 at 7-8. In order to exhaust its administrative remedies, the State places this matter before the Board and if the Board finds that it may not have authority to address the issue, the State requests the Board to certify or refer this matter to the Commission. The State incorporates

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<sup>5</sup> Basis 2 of Contention L (State of Utah Contentions at 82-83) states:

**Ground motion.** The site may also be subject to ground motions greater than those anticipated by the Applicant due to spatial variations in ground motion amplitude and duration because of near surface traces of potentially capable faults (the Stansbury and Cedar Mountain faults). Sommerville, P.G., Smith, N.F., Graves, R.W., and Abrahamson, N.A., Modification of empirical strong ground motion attenuation relations to include the amplitude and duration effects of rupture directivity, in 68 Seismological Research Letters (No. 1) 199 (1997). Failure to adequately assess ground motion places undue risk on the public and the environment and fails to comply with 10 C.F.R. § 72.102(c).

by reference its discussion of the State's entitlement to a hearing in its February 22, 2000 Reply to the Applicant and the Staff on the 1st Modified Basis 2, Part E, at 11-14. As discussed below, the Staff's acquiescence to the exemption request does not comport with the conceptual change proposed by NRC in the Rulemaking Plan. Furthermore, the Staff's rationale for allowing a 2,000-year return period is arbitrary, capricious, does not ensure an adequate level of conservatism, and is not in accordance with law. The State must have an opportunity in some forum to address these issues.

**A. The Grant of the Exemption Request Fails to Comply with the NRC Rulemaking Plan.**

By allowing PFS to conduct its seismic hazard analysis using a PSHA with a 2,000 year return period, the Staff has taken a position contrary to the Rulemaking Plan. As described in 1st Modified Basis 2 at 7-9, the Rulemaking Plan provides only two alternatives for design basis ground motions: 1,000 year return period or 10,000 year return period. The Staff has rejected the use of a 1,000 year return period. FSER at 2-41. The State continues to maintain that safety consequences may result from using a 2,000 year return. The State incorporates by reference the following safety issues described in its 1st Modified Basis 2 at 9-12: (1) The radiological consequences of a failed design; (2) PFS's failure to demonstrate that either (a) the design of the PFS facility will provide adequate protection against an exceedance of the dose limits in section 72.104(a), or (b) the equipment is designed to withstand a 2,000 year recurrence earthquake. See Resnikoff Dec., Exh. 2, wherein he states "there have been no significant changes in the safety concerns raised in Second Modification to Basis 2 from those described in the First Modification to Basis 2 and my supporting

Declaration. . . if Modification to Basis 2 is admitted, I am prepared to provide expert testimony regarding the matters described in my Declaration of January 26, 2000.”

Resnikoff Dec. at ¶¶ 5 and 6.

**B. The Staff's Reasons for Allowing the Applicant to Use a PSHA With a 2,000-Year Return Period Are *Ad Hoc* and Either Flawed or Not Compelling.**

In the FSER, the Staff did not adhere to the NRC Rulemaking Plan to justify the use of a PSHA with a 2,000-year return period. SER at 2-41-42. Besides not complying with the Rulemaking Plan and inadequately accounting for radiological requirements and consequences, the Staff's reasoning for justifying the acceptability of a 2,000-year return value with the PSHA methodology is *ad hoc* and variously either flawed or not compelling.

The *ad hoc* nature of the Staff's reasoning becomes evident when one compares the reasons set forth in the Staff's SER (December 15, 1999) at 2-44 - 2-45 with those adduced in its FSER (September 29, 2000) at 2-41 - 2-42. Two of the four justifications offered in the SER did not appear in the FSER after the State criticized them. In the case of one justification, the State pointed out that building-code documents and standards cited by the Staff for favorable comparison were outdated and have been superseded by subsequent code development leading to more stringent requirements. 1st Modified Basis 2 at 13-16. In the case of another justification, the State criticized the Staff's supportive use of conclusions presented by Geomatrix Consultants, Inc. in its Final Report, Fault Evaluation Study and Seismic Hazard Assessment (February 1999) (“Geomatrix (1999)”), as circular reasoning. *Id.* at 18-19. The other two justifications set forth in the Staff's SER also appear in the FSER and are addressed below under items 4 and 5.

In its FSER, the Staff states it “has determined that a 2,000-year return value with the PSHA methodology can be acceptable for the following reasons,” which reasons are presented in five statements, attached hereto as Exhibit 3. FSER at 2-41 -2-42. These reasons are addressed sequentially. *See* Arabasz Dec., Exh. 1.

**1. Statements 1-3: The mean annual probability of exceedance for the PFS Facility may be less than [sic]  $10^{-4}$  per year.**

The Staff’s first three statements (*see* Exh. 3) were presented and linked in a flawed logical argument in the FSER at 2-41 to 2-42. As a preliminary matter, the State recognizes that the Staff apparently confused the inverse relation between probability of exceedance and return period when it concluded in the third statement that the mean annual probability of exceedance for the PFS Facility may be “less than”  $10^{-4}$  per year; the Staff presumably intended to write “greater than”  $10^{-4}$  per year. A return period of 2,000 years corresponds to an annual frequency or probability of exceedance of  $5 \times 10^{-4}$  per year, which obviously is greater than  $1 \times 10^{-4}$  per year. Arabasz Dec. ¶ 6.

In the second statement, the Staff cites Murphy et al. (1997) to establish the premise that the reference probability for seismic design of commercial nuclear power plants, defined in terms of a median annual probability of exceedance of  $10^{-5}$ , corresponds to the same ground motion level as for a mean annual probability of exceedance of  $10^{-4}$ . From this, the Staff deduces in the third statement that the mean annual probability of exceedance for the PFS Facility may be [greater than]  $10^{-4}$  because the Facility will be inherently less hazardous than a commercial nuclear power plant. The Staff’s reasoning is critically flawed because the relationship between median and mean exceedance probabilities determined by Murphy et



al. (1997), as pertaining to the reference probability for commercial nuclear power plants defined in Reg. Guide 1.165, is definitely not valid for the PFS site. Arabasz Dec. ¶ 8.

As explained in Appendix B to Reg. Guide 1.165, the reference probability of  $10^{-5}$  was determined by using PSHAs to compute the annual probability of exceeding the Safe Shutdown Earthquake (SSE) ground motions at a set of nuclear power plants operating in the Central and Eastern United States (CEUS), and then selecting the median of these probabilities. Reg. Guide 1.165 at 12. The paper by Murphy et al. (1997) cited by the Staff states that, "For the CEUS sites, as shown in Figure 10, the median reference probability of  $1E-5$ /yr [ $10^{-5}$  per year] corresponds to a mean probability of  $1E-4$  [ $10^{-4}$ ]." Murphy et al. (1997) at 8 (data are not presented in the paper to support this conclusion; the referenced Figure 10 is simply a schematic illustration of the result). While the stated relationship between median and mean may be true for CEUS sites east of the Rocky Mountains, Murphy et al. caution that this relationship may be quite different in other situations, illustrating this point with a western US (WUS) situation where mean and median hazard curves are close (as is the case at the PFS site). Murphy et al. (1997) at 8.

Mean hazard estimates can be significantly different than median hazard curves at sites where the uncertainties in the input are large, as in the CEUS, because the mean estimates are more sensitive to the outliers in the distribution of inputs. Reiter, L.R., Earthquake Hazard Analysis, 1991, Columbia University Press, at 188-189. At the PFS site, however, the mean and median ground motion exceedance frequencies differ by only about 10% to 20%, and the mean hazard is higher than the median. Geomatrix (1999), Figure 6-11.

If a commercial nuclear power plant were to be licensed at the PFS Skull Valley site,

under current NRC regulations, the design ground motions would have to correspond to a median annual probability of exceedance of  $10^{-5}$  or to an alternative reference probability developed from risk considerations. Reg. Guide 1.165 at 12.<sup>6</sup>

Because neither the Staff nor PFS has presented any analysis for an alternative reference probability, the appropriate reference probability for a hypothetical commercial nuclear power plant at the PFS site is a median annual probability of exceedance of  $10^{-5}$ . By comparison, the mean annual probability of exceedance of  $5 \times 10^{-4}$  (2000-year return period) that the Staff determines to be acceptable for an ISFSI at the same site is a factor of 50 greater. Is a factor of 50 acceptable? What about a factor of 2, 10, 100, or 1000? The point is that the Staff's acceptance of a mean annual probability of exceedance of  $5 \times 10^{-4}$  is completely arbitrary. If the Staff chooses not to use the reference probabilities for an ISFSI specified in the Rulemaking Plan, then it should determine and justify an alternative reference probability from a quantitative risk analysis using a procedure similar to the one referenced in Appendix B to Reg. Guide 1.165. This it has failed to do. Arabasz Dec. ¶ 8.

## **2. Statement 4: The DOE standard for DOE performance Category-3 facilities**

The Staff's fourth statement (second basic justification) claims that potential accident consequences of ISFSIs are similar to DOE performance-3 facilities. FSER at 2-42 (see Exh. 3). In its Rulemaking Plan, the NRC relies on the technical basis it used to change Part 100 to support changes to Part 72. Rulemaking Plan at 5. The Plan also discussed the Part 60 design basis event rulemaking for a geological repository and mentions that in the Part 60

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<sup>6</sup> Appendix B of Reg. Guide 1.165 refers to a quantitative procedure to determine such an alternative reference probability, the application of which would have to be reviewed "on a case-by-case basis." Reg. Guide 1.165 at 12 The procedure is cited in Reg. Guide 1.165 as "Attachment to Letter from D.J. Modeen, Nuclear Energy Institute, to A.J. Murphy, USNRC, Subject: Seismic Siting Decision Process, May 25, 1994."

rulemaking NRC “adopted a graded approach similar to DOE standard 1020.” *Id.* However, the Rulemaking Plan categorically did not adopt the various DOE facility performance categories, including the category corresponding to a 2,000-year return period. *Id.* The Plan requires either a 1,000-year return period for Frequency-Category-1 design basis events or a 10,000-year return period for Frequency-Category-2 design basis events. *Id.* at 4-5.

### **3. Statement 5: DOE’s TMI-2 ISFSI Facility Exemption.**

The Staff’s fifth statement (third basic justification) is based on the Staff’s grant of a previous exemption to the existing regulations. FSER at 2-42. *See* Exh. 3. Why the Staff reworded this justification in the FSER to eliminate any comparison to the deterministic ground motion values is unclear. However, as a matter of record, the Staff has stated that, for the PFS site, neither the original nor the updated Geomatrix DSHAs “meet the deterministic requirements in 10 C.F.R. Part 100 Appendix A.” Staff’s Response to the State’s Sixth Set of Discovery (February 14, 2000) at 7-8.

In the case of the TMI-2 ISFSI exemption, there were extenuating circumstances that led DOE to press for the exemption, namely existing design standards at INEEL for a higher risk facility at the ISFSI host site that required a peak design basis horizontal acceleration of 0.36 g, including effects of soil amplification, based on DSHA results from the 1970s. Chen and Chowdhury, 1998, at 4-1. The problem has been stated this way:

[T]he DOE-proposed design PHA [for the ISFSI] of 0.36 g does not bound the most recent 84th-percentile deterministic value of 0.56 g and 10,000-yr return period probabilistic value of 0.47 g. Therefore, a judgment of whether the DOE-design approach is acceptable depends on whether there are regulatory and technical bases to accept an ISFSI-design value that bounds the 50th-percentile deterministic value and the 2,000-yr return period probabilistic value.

Id. at 4-2. Further, DOE was party to a settlement agreement with the state of Idaho that required construction of the ISFSI by the end of 1998. SECY-98-071 at 40124. Ultimately, DOE was allowed to use the peak design basis horizontal acceleration of 0.36 g, which was higher than the corresponding probabilistic mean ground motion of 0.30 g for a 2,000-year return period. Id. at 40125. The TMI-2 ISFSI exemption does not establish a 2,000-year return period as the reference probability for ISFSI design. What NRC accepted was a higher design seismic value that fortuitously “envelopes” the 2,000-year return period probabilistic ground motion value. Arabasz Dec. ¶ 9.

**C. Use of a PSHA With a 2,000-year Return Period Does Not Ensure an Adequate Level of Conservatism.**

The State does not agree that a 2,000-year return period ensures an adequate level of conservatism for seismic design of the PFS Facility. As argued in part A here, PFS has not demonstrated that the design of the PFS Facility will provide adequate protection against radiological impacts on public health and safety or that equipment essential to safety will be designed to withstand a 2,000-year recurrence earthquake. Further, it will be unconvincing to the citizens of Utah that the design ground motion level for a nuclear waste storage facility is adequately conservative when design levels for new building construction and new highway bridges in Utah are more stringent.

The design ground motion level for highway bridges in the I-15 corridor expansion project in the Salt Lake Valley corresponds to a 10 percent probability of exceedance in 250 years (equivalent to 2 percent in 50 years or a return period of 2,400 years).<sup>7</sup> Similarly, under

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<sup>7</sup> Crouse et al., Seismic Hazard Analyses for the I-15 Corridor Expansion Project, *Proceedings of the Symposium on Engineering Geology and Geotechnical Engineering*, Boise, Idaho, vol. 32 (1997) at 215-230.

the International Building Code (2000), which replaces the Uniform Building Code and other model codes, ground motions for design are based on a likelihood of exceedance of 2 percent in 50 years, the “maximum considered earthquake spectral response accelerations.”

*International Building Code*, International Code Council, Inc. (March 2000), at § 1615.

Although the design earthquake ground motion is selected at two-thirds of the maximum considered earthquake ground motion, an importance factor of 1.5 is applied to essential buildings and structures (or those containing hazardous materials), which then increases the seismic design requirements. *Id.* at section 1616.

Assurance of adequate conservatism is commonly made in the form of a probability statement indicating the likelihood of non-exceedance of the design basis values during an exposure period of interest. For a given rate (or return period), the smaller the exposure period, the higher the probability of non-exceedance; so a smaller exposure period gives more favorable “assurance.” For example, in its SER, the Staff stated:

Considering the radiological safety aspects of a dry spent fuel storage facility, conservative peak ground motion values that have a 99 percent likelihood of not being exceeded in the 20-year licensing period of the Facility are considered adequate for its seismic design. This exceedance probability corresponds to a return period of 2,000 years.

SER at 2-45. But is 20 years either realistic or conservative?

The anticipated loading cycle for the Facility is 200 casks per year for a 20-year loading cycle to reach the maximum capacity of 4,000 casks. DEIS at 1-5, lines 34-35.<sup>8</sup> Considering then a comparable time required to remove the casks from the Facility, is the 20-year period

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<sup>8</sup> See also University of Utah Environmental Engineering Seminar, “What is the Private Fuel Storage Project?”, April 7, 1999 presentation by John Donnell, wherein Mr. Donnell stated the shipment rate at 200 casks per year. Arabasz Dec. ¶ 10.

of initial licensing a conservative exposure period? Or is an exposure period of 30 to 40 years more realistic? At the TMI-2 ISFSI, fuel debris will be completely moved into the facility by June 1, 2001, and has to be removed from the state of Idaho by January 1, 2035. Chen and Chowdury, 1998, at 1-1. For the PFS site, a 99-percent probability of not being exceeded in 30 years would require a design value corresponding to a return period of 2,985 years, and for a 40 year exposure period the return-period value would be 3,980 years.

Again, the State argues that the Staff is completely arbitrary in selecting and accepting a 2,000-year return period for seismic design of the PFS Facility. Given that the consequences of failure threaten not only health and human safety but also long-term environmental damage, it seems fair that the citizens of Utah would expect safety standards for design that significantly exceed those for ordinary structures such as highway bridges and buildings.

**Late Filed Factors:**

The State meets the 10 CFR § 2.714(a) late filed factors.

**Good Cause:** It cannot be seriously argued that the State is late in filing its request to modify Basis 2. The State has attempted to address this issue on two previous occasions only to be told it is too early. The Staff's FSER is the triggering document for filing the latest request to modify Basis 2 and it is timely. *See* Background above.

**Development of a Sound Record:** The State's participation will assist in developing a sound record. In particular, testimony by Dr. Arabasz will give the Board another perspective on the Applicant's seismic hazard analysis. *See* 1st Modified Basis 2 at 21-22, which is incorporated by reference. *See also* Arabasz Dec., Exh. 1. The State will also offer testimony by Dr. Marvin Resnikoff with respect to the potential for SSCs at PFS to exceed

Part 72 dose limits. See Resnikoff Dec., Exh. 2.

**Availability of Other Means for Protecting The State's Interests:** The State has no alternative means, other than this proceeding, for protecting its interest.

**Representation by Another Party:** The State's position will not be represented by any other party; there is no other party with a similar admitted contention

**Broadening of Issues or Delay of the Proceeding:** Admitting Modification to Basis 2 of Utah L will not unduly broaden or delay the proceeding.<sup>9</sup> To the contrary, if this modification is not admitted, there will be confusion as to which standard applies to Basis 2 as presently admitted.

## **Conclusion**

For the foregoing reasons, the State request the Board admit modification to Basis 2 of Contention Utah L or certify or refer the matter to the Commission.

DATED this 9<sup>th</sup> day of November, 2000.

Respectfully submitted,



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<sup>9</sup> The State is still confused why it, rather than the Applicant through a Rule Waiver Petition, must bear the burden of getting before the Board in this proceeding, the Staff's grant of an exemption to a rule upon which part of the basis of an admitted contention is pending before the Board.

CERTIFICATE OF SERVICE

I hereby certify that a copy of STATE OF UTAH'S REQUEST FOR ADMISSION 5 P 4:11  
OF LATE-FILED MODIFICATION TO BASIS 2 OF CONTENTION UTAH I was  
served on the persons listed below by electronic mail (unless otherwise noted) with  
conforming copies by United States mail first class, this 9<sup>th</sup> day of November, 2000:

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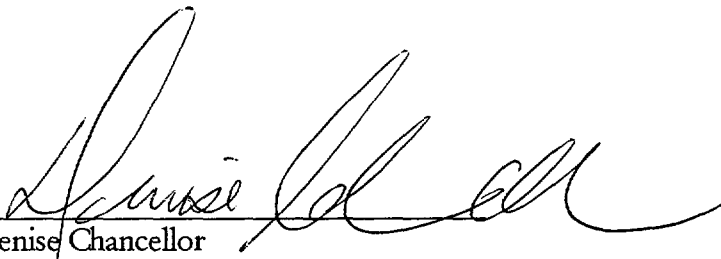
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State of Utah

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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In the Matter of:

PRIVATE FUEL STORAGE, LLC  
(Independent Spent Fuel  
Storage Installation)

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Docket No. 72-22-ISFSI

ASLBP No. 97-732-02-ISFSI

November 9, 2000

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**DECLARATION OF DR. WALTER J. ARABASZ IN SUPPORT OF  
STATE OF UTAH'S REQUEST FOR ADMISSION OF LATE-FILED  
MODIFICATION TO BASIS 2 OF UTAH CONTENTION L**

I, Dr. Walter J. Arabasz, declare under penalty of perjury that:

1. I am Research Professor of Geology and Geophysics and Director, University of Utah Seismograph Stations; University of Utah, Salt Lake City, Utah. I have 30 years professional experience in scientific research, occasional teaching, consulting, and publishing articles in observational seismology, seismotectonics, and earthquake hazard analysis with a primary focus on Utah and the Intermountain West. Since 1977 I have routinely provided professional consulting services on earthquake hazard evaluations for dams, nuclear facilities, and other critical structures. During the past decade I have had major involvement in assessing vibratory and fault-displacement hazards for the high-level nuclear waste repository at Yucca Mountain, including peer review, review of technical reports, and serving on expert teams for seismic source characterization for probabilistic hazard analyses. My service on numerous national and state advisory boards and panels has included — relevant to this filing — serving on the National Research Council's Panel on Seismic Hazard Evaluation (1992-96), the Utah Seismic Safety Commission (currently as chair) since 1994, and numerous NEHRP panels and work groups since the early 1980s. My curriculum vitae, was submitted as Exhibit A to my January 26, 2000 Declaration and gives greater detail about my professional qualifications, experience and publications.

2. I am familiar with Private Fuel Storage's ("PFS's") license application and Safety Analysis Report in this proceeding, and other information submitted by the Applicant with respect to earthquake hazards. I am also familiar with NRC regulations, Rulemaking Plan to amend Part 72, guidance documents, the methodologies for earthquake hazard evaluation and new developments pertaining to the latter.

3. I have reviewed the NRC Staff's preliminary Safety Evaluation Report (SER) for the PFS facility, dated December 15, 1999 and have also reviewed the NRC Staff's revised and final Safety Evaluation (FSER) dated September 29, 2000.

4. I assisted in the preparation of State of Utah's Request for Admission of Late-Filed Modification to Basis 2 of Utah Contention L, filed on January 26, 2000 ("Modification to Basis 2"), with the exception of the portion of the document that relates to dose limits. I gave my opinion that the four justifications offered in the preliminary SER by the Staff to approve the Applicant's use of a probabilistic seismic hazard analysis with a 2,000 year return period were technically flawed.

5. I also assisted in the preparation of the State's November 9, 2000 Request for Admission of Late-filed Modification to Basis 2 of Utah Contention L, with the exception of the portion of the document that relates to dose limits ("Second Modification Request"). As stated in the Second Modification Request, Sections B and C, the Staff's reasons for allowing the Applicant to use a PSHA with a 2,000 year return period are *ad hoc* and either flawed or not compelling.

6. The Staff in the FSER presents five statements in support of its justification to accept PSHA methodology with a 2,000-year return value. FSER at 2-42 to 2-42. See Exhibit 3 to the State's Second Modification Request for the text of those statements.

7. First, the Staff's confused the inverse relation between probability of exceedance and return period and refer to the mean annual probability of exceedance as "less than"  $10^{-4}$  per year when presumably it intended to write "greater than"  $10^{-4}$  per year. See FSER at 2-42.

8. As described in more detail in the Second Modification Request, the Staff's reasoning is critically flawed in concluding the mean annual probability of exceedance for the PFS facility may be greater than  $10^{-4}$  because the facility will be inherently less hazardous than a commercial nuclear power plant. The Staff failed to take into consideration that the median reference probability of  $10^{-5}$  in Reg. Guide 1.65 Appendix B was determined in relation to nuclear power plants operating in the Eastern United States (CEUS) and does not necessarily correspond, for a site in the western United States, to the same ground-motion level as a mean annual probability of exceedance of  $10^{-4}$ . Neither the Staff nor PFS has presented any analysis for an alternative reference probability to NRC's median reference probability of  $10^{-5}$ . As a consequence the Staff's acceptance of a mean annual probability of exceedance of  $5 \times 10^{-4}$  for the PFS facility is completely arbitrary.

9. The FSER's reliance on the DOE performance Category-3 facilities does not comply with the Rulemaking Plan to amend Part 72. In addition, the Staff's reliance on TMI-2 ISFSI exemption does not take into account the circumstances specific to that request, such as the existing design standards at INEEL for a higher risk facility, the time pressure of the settlement agreement with the State of Idaho, or the use of a peak design basis horizontal acceleration of 0.36g, higher than the 2,000-year return value of 0.30g.

10. The use of a PSFA with a 2,000 year return period does not ensure an adequate level of conservatism when design levels for new building construction and new highway bridges in Utah are more stringent. In the preliminary SER the Staff argued that peak ground motion values corresponding to a return period of 2,000 years were adequately conservative because they had a 99-percent probability of not being exceeded in the 20-year licensing period of the Facility. An exposure period of 20 years does not seem either realistic or conservative. I heard Mr. Donnell, PFS Project Director, during his presentation on April 7, 1999, at the University of Utah Environmental Engineering Seminar, "What is the Private Fuel Storage Project?" say the loading rate at the PFS facility would be 200 casks per year for 20 years. If this is the case, then a comparable time required to remove the casks could be another 20 years. For the PFS site, a 99-percent probability of not being exceeded in 30 years would require a design value corresponding to a return period of 2,985 years, and for an exposure period of 40 years the return-period value would be for 3,980 years.

11. If Second Modification to Basis 2 is admitted, I am prepared to provide expert testimony on the seismic hazard analysis for the PFS site. I expect that my testimony would follow the general outline of the statements in paragraphs 5 through 10 above and Part B of the Second Modification to Basis 2. Moreover, I may provide additional testimony based on information gathered in discovery

  
Dr. Walter J. Arabasz

November 9, 2000

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	Docket No. 72-22-ISFSI
	)	
PRIVATE FUEL STORAGE, LLC	)	ASLBP No. 97-732-02-ISFSI
(Independent Spent Fuel	)	
Storage Installation)	)	November 8, 2000

**DECLARATION OF DR. MARVIN RESNIKOFF IN SUPPORT OF  
STATE OF UTAH'S REQUEST FOR ADMISSION OF LATE-FILED  
MODIFICATION TO BASIS 2 OF UTAH CONTENTION L**

I, Dr. Marvin Resnikoff, declare under penalty of perjury that:

1. I am the Senior Associate at Radioactive Waste Management Associates, a private consulting firm based in New York City. A statement of my qualifications has been filed previously in this proceeding. *See e.g.*, Exhibit 2 to State of Utah Contentions filed November 23, 1997. I am an expert in the field of radioactive waste management, including spent nuclear power plant fuel storage.

2. I am familiar with Private Fuel Storage's ("PFS's") license application and Safety Analysis Report in this proceeding, as well as the applications for the storage and transportation casks PFS plans to use. I am also familiar with NRC regulations, guidance documents, and environmental studies relating to the transportation, storage, and disposal of spent nuclear power plant fuel, and with NRC decommissioning requirements.

3. I assisted in the preparation, in part, of State of Utah's Request for Admission of Late-Filed Modification to Basis 2 of Utah Contention L, filed on January 26, 2000 ("First Modification to Basis 2") and submitted a Declaration in support thereof. A copy of my January 26, 2000 declaration is attached hereto.

4. I have reviewed another request by the State of Utah for Admission of Late-Filed Modification to Basis 2 of Utah Contention L, to be filed November 9, 2000 ("Second Modification to Basis 2").

5. There have been no significant changes in the safety concerns raised in Second Modification to Basis 2 from those described in the First Modification to Basis 2 and my supporting Declaration.

6. If Modification to Basis 2 is admitted, I am prepared to provide expert testimony regarding the matters described in my Declaration of January 26, 2000. I expect that my testimony would follow the general outline of the statements in paragraphs 4 through 8 of that Declaration. In addition, I would provide additional detail regarding the PFS facility design based on information gathered in discovery, as well as additional detail regarding my analysis of the size of the breach hole considered by PFS in its accident analysis.



Dr. Marvin Resnikoff

November 8, 2000

## EXHIBIT 3

### NRC Staff's FSER Statements on the Acceptance the PSHA Methodology with a 2,000-year Return Value

**Statements 1-3: The mean annual probability of exceedance for the PFS Facility may be less than [sic]  $10^{-4}$  per year.**

The radiological hazard posed by a dry cask storage facility is inherently lower and the Facility is less vulnerable to earthquake-induced accidents than operating commercial nuclear power plants (Hossain et al., 1997). In its Statement of Consideration accompanying the rulemaking for 10 CFR Part 72, the NRC recognized the reduced radiological hazard associated with dry cask storage facilities and stated that the seismic design basis ground motions for these facilities need not be as high as for commercial nuclear power plants (45 FR 74697, 11/12/80; SECY-98-071; SECY-98-126).

Seismic design for commercial nuclear power plants is based on a determination of the Safe Shutdown Earthquake ground motion. This ground motion is determined with respect to a reference probability of  $10^{-5}$  (median annual probability of exceedance) as estimated in a probabilistic seismic hazard analysis (Reference Reg Guide 1.165). The reference probability, which is defined in terms of the median probability of exceedance, corresponds to a mean annual probability of exceedance of  $10^{-4}$  (Murphy et al., 1997). That is, the same design ground motion (which has a median reference probability of  $10^{-5}$ ) has a mean annual probability of exceedance of  $10^{-4}$ .

On the basis of the foregoing, the mean annual probability of exceedance for the PFS Facility may be less than [sic]  $10^{-4}$  per year.

FSER at 2-41 - 2-42.

#### **Statement 4: The DOE standard for DOE performance Category-3 facilities**

The DOE standard, DOE-TD-1020-94 (U.S. Department of Energy, 1996), defines four performance categories for structures, systems, and components important to safety. The DOE standard requires that Category-3 facilities be designed for the ground motion that has a mean recurrence interval of 2000 yrs (equal to a mean annual probability of  $5 \times 10^{-4}$ ). Category-3 facilities in the DOE standard have a potential accident consequence similar to a dry spent fuel storage facility.

FSER at 2-42.

#### **Statement 5: DOE's TMI-2 ISFSI Facility Exemption**

The NRC has accepted a design seismic value that envelopes the 2,000-yr return period probabilistic ground motion value for the TMI-2 ISFSI license (Nuclear Regulatory Commission, 1998b; Chen and Chowdury, 1998). The TMI-2 ISFSI was designed to store spent nuclear fuel in dry storage casks similar to the PFS Facility.

FSER at 2-42.