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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSIONOFFICE OF SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFFBEFORE THE COMMISSIONERS

In the Matter of:

Docket No. 72-22-ISFSI

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

ASLBP No. 97-732-02-ISFSI

June 11, 2003

**STATE OF UTAH'S PETITION FOR REVIEW OF LBP-03-08**

The State petitions the Commission, pursuant to 10 C.F.R. § 2.786, for review of the Board's May 22, 2003 Partial Initial Decision, LBP-03-08, \_\_ NRC \_\_ (2003) (hereinafter "PID") ruling in favor the Applicant on all issues raised by the State in Contention Utah L/ QQ (Geotechnical). The State believes the Board's flawed rationale upholding PFS's facility design is a setback to earthquake engineering, but because the record and the findings surrounding PFS's facility design are of such technical complexity, the State does not hold out any hope that the Commission will re-visit those issues on appeal. The State's petition, therefore, focuses on three issues: (1) PFS's post license soil-cement testing program and absence of license conditions; (2) exemption from the existing seismic standard; and (3) the Board's erroneous 10 C.F.R. § 72.106(b) legal standard relating to accident duration.

**I. SUMMARY OF THE PROCEEDING, ISSUES RAISED, AND THE DECISION BELOW**

Commencing in November 1997 with its original geotechnical contention, Utah L; mounting various challenges to PFS's request for an exemption from the standard for ascertaining seismic ground motions; filing new and modified contention Utah QQ, in response to PFS's 2001 seismic re-evaluation which revealed a thirty-five percent increase in ground motions; and fending off summary disposition of Utah L, the State has diligently and timely raised the issues that went to

hearing in summer of 2002. Appendix, References<sup>1</sup> 1-20. At hearing, the State presented testimony by six expert witnesses and participated fully in cross examining other parties' witnesses. Refs. 21-41.

Issues that went to hearing involve six major topics: (1) PFS's characterization of the site's subsurface soils; (2) PFS's proposed use of soil-cement to resist foundation sliding of the storage pads and Canister Transfer Building; (3) PFS's assumptions about facility behavior which underlie PFS's seismic design; (4) stability of the casks during a design basis earthquake; (5) exemption from the long-standing deterministic standard for predicting ground motion in favor of a 2,000-year mean return period probabilistic one; and (6) radiation dose consequences after a design basis earthquake. PID at 4. The Board concluded that the casks would not tip over during a design basis seismic event and even if they did, "the spent fuel canister inside would not break or melt." *Id.* at 5 and 370.

## **II. REQUEST FOR COMMISSION REVIEW OF THE BOARD'S ERRONEOUS DECISION AND ACTIONS.**

### **A. Post License Deferral of PFS's Program to Test and Evaluate Admixtures to PFS Site Soil Does Not Satisfy NRC's Licensing Requirements.<sup>2</sup>**

Critical to PFS's ability to meet foundation loadings during a design basis earthquake ("DBE") is PFS's use of cement-treated soil under the storage pads<sup>3</sup> and surrounding the Canister Transfer Building ("CTB"). Bartlett/Mitchell Tstmy, Post Tr.11,033 at 4. PFS's precedent-setting design concept places cement-treated soil on top of relatively soft clays with the intent that seismic loads from casks and pads will be transferred horizontally through the cement-treated soils to the

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<sup>1</sup>Filed herewith is a consecutively numbered reference appendix listing relevant documents (cited to as "Ref.") relating to State-raised geotechnical issues in this proceeding. See Commission Order, June 2, 2003.

<sup>2</sup>This issue is presented in Refs. 8-12; 13 ¶ C.3 (PID at 20-21); 14; 24; 37; 38 ¶¶ 74-135; 39 at 25-40.

<sup>3</sup>In a layer between the storage pad and the underlying native clay soils, PFS intends to mix a yet to be determined quantity of Portland cement with the top layer of excavated soil (silt); glue the cement-treated soil lifts together; and glue the bottom of those treated soils to the native clays and the top of the treated soils to the underside of the cement storage pad.

native clay below. PID ¶ D.11. This was not part of PFS's original seismic design; only later when PFS discovered that there was a 35% increase in ground motion did it introduce using cement-treated soil as a mechanism to resist seismic loading. Id. ¶ D.10.

The Commission may only issue a specific ISFSI license upon finding, *inter alia*, that the "proposed site complies with the criteria in subpart E [Siting Evaluation Factors]." 10 C.F.R. § 72.40(a)(2). A siting evaluation factor PFS has the burden of meeting is 10 C.F.R. § 72.102(d), which states: "Site-specific investigations and laboratory analyses must show that soil conditions are adequate for the proposed foundation loading."

The Board found acceptable PFS's post licensing intent to conduct further laboratory analyses, sampling, and field testing to determine what engineered soil cement properties will support foundation loadings (*i.e.*, PFS's soil cement testing program). PID at 46-48. Moreover, the Board considered the benefits of license conditions but found them unwarranted in this case.<sup>4</sup> Id. In sum, the Board's decision does not enable the Commission to make the required finding under section 72.40 prior to license issuance.

The Board's erroneous action raises substantial legal, discretionary, and policy questions. Post-license evaluation of whether PFS's soil cement testing program will prove its design concept<sup>5</sup> will truncate the State's hearing rights as there will be no adjudicatory forum in which the State may challenge the adequacy of PFS's post-license testing program to meet section 72.102(d). Union of

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<sup>4</sup>There are no existing license conditions, such as technical specifications, relating to the design requirements for the properties PFS's post license soil cement testing program needs to achieve to demonstrate that those properties will support proposed foundation loading. The only technical specification applicable to the storage pads and underlying foundations relate to the deceleration of a hypothetical cask drop and to lift height above the storage pads. PFS LA App. A (Rev. 12), TS -28; Consolidated Safety Evaluation Report (March 2002) ("ConSER") (Staff Exh. C) at 19-2 to -3.

<sup>5</sup>The person responsible for PFS's soil cement program, Paul Trudeau, admitted that only after PFS has completed its soil cement testing program will PFS have proven its design concept. State Exh. 108 at 81.

Concerned Scientists v. NRC, 735 F.2d 1457 (D.C. Cir. 1984). Instead, acceptability of PFS's testing program relies on extra legal post-license discretionary Staff evaluation. Moreover, PFS's promises as to how it will achieve soil cement properties, and implement that program, are scattered throughout the licensing process.<sup>6</sup> This raises the concern of what promises and material properties the Staff will evaluate post license and whether those promises are enforceable. See, e.g., Private Fuel Storage, LLC, CLI-00-13, 52 NRC 23, 32 (2000). Furthermore, should PFS discover post-license that the soil cement properties do not work as intended and do not support PFS's seismic design, the NRC's licensing basis will be invalid and arbitrary.

The Board's reliance on Commission precedent – Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit No. 1), ALAB-729, 17 NRC 814 (1983) and the preamble to Part 72 – as support for allowing post license evaluation and finding license conditions unwarranted is inapposite. PID at 47. At issue in TMI was whether to allow post license quantification and reliability testing of emergency diesel generators – generators that had been tested monthly at their rated capacity. TMI, 17 NRC at 886. It required the Staff to verify procedures that heater loads will not be reconnected under certain circumstances and to evaluate a reliability test. Id. Unlike the standard equipment at issue in TMI, PFS's intended use of cement-treated soil for seismic design has never previously been used to resist foundation sliding; the material must conform to certain minimum strength limits because of Holtec's bounding cask tipover analysis; and there has been no analysis of whether construction techniques will remold and degrade underlying native soils that are

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<sup>6</sup>PFS's tests, concepts, and promises are variously described in PFS Exh. GGG, in the PFS SAR, in pre-filed hearing testimony, and in hearing testimony and cross examination. Moreover, because of unacceptable test results obtained by PFS's initial contractor, PFS placed its testing program on hold. While PFS employed Dr. Anwar Wissa – a person knowledgeable in soil cement testing – as a hearing witness, there is no assurance of the competency of the person who will conduct and implement PFS's program. Dr. Wissa testified that PFS's soil cement program is adequate if properly implemented. PID ¶ C.45. Moreover, the testing program would need to begin anew if Dr. Wissa were to conduct it because he could not otherwise vouch for the results. Id.

expected to absorb the seismic forces.<sup>7</sup> Such evaluations will likely involve more than ministerial action. As for the preamble, the Board takes the Commission's generic statement that ISFSIs are simple operations subject to few controversial techniques out of context. Here, PFS's seismic design,<sup>8</sup> for a site at which there is the potential for strong ground motion, is unconventional and unproven and, as evidenced by the length of the seismic hearing and the Board's findings, involves controversial techniques.

On a final note, many (but not all) of the issues the State raised could have been resolved if PFS had completed its soil cement testing program before the summer 2002 seismic hearings.<sup>9</sup> Bartlett/Mitchell Tstmy, Post Tr. 11,033 at 5. The Commission should not endorse a policy that allows the Applicant to pick and choose which licensing requirements it can put on hold and conduct post-license. There is no practical reason why PFS has not yet completed its soil cement testing program. Id.

Allowing PFS to defer its demonstration that site soils meet foundation loading, failing to compile PFS's promises into license conditions, permitting Staff extra legal post license discretion, and endorsing PFS's dilatory practices as a way to evade licensing requirements until after license issuance, raise substantial legal, discretionary, and policy questions that warrant Commission review.

**B. The Grant of an Exemption to PFS is Unjustified, Contrary to Public Interest and a Departure from Existing Seismic Standards.<sup>10</sup>**

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<sup>7</sup>Even without disturbance, the site soils have limited capacity to carry loads. PID ¶ D.13.

<sup>8</sup>PFS's design uses unanchored casks on shallowly embedded foundations with additional seismic sliding resistance and buttressing provided by an unprecedented use of cement-treated soil. PID ¶ D.4.

<sup>9</sup>PFS's program, initiated in about March 2001 (State Exh. 108 at 72), was supposed to take 13 months to complete (PFS Exh. GGG). The program has been "on hold" since at least March 2002 for two reasons: one, because it had lower priority than licensing litigation and SAR updates and, two, because PFS needed expert assistance in evaluating why preliminary test results had failed. State Exh. 108 at 71-73.

<sup>10</sup>This issue is presented in Refs. 2-7; 13 at ¶ E (PID at 23-25); 19-20; 27; 37; 38 ¶¶ 185-230; and 39 at 101-119.

The Commission may grant an exemption from the requirements of Part 72 regulations if the exemption is “authorized by law and will not endanger life or property or the common defense and security and [is] otherwise in the public interest.” 10 C.F.R. § 72.7. The Board’s decision upholding the grant of an exemption to PFS from NRC’s long-standing deterministic standard for predicting ground motion in favor of a 2,000-year mean return period (“MRP”) design basis earthquake (“DBE”) using a probabilistic methodology (“PSHA”) is based on clearly erroneous findings and conclusions and is contrary to the public interest. PFS requested an exemption from 10 C.F.R. § 72.102(f)(1) because the 1.15g (horizontal) and 1.17g (vertical) peak ground acceleration, estimated using a deterministic standard, exceeds the design values in PFS’s Safety Analysis Report. ConSER at 2-34; PID at 12. This issue is ripe for review not only because of the Board’s erroneous action but also because the Commission’s proposed rule change, published July 22, 2002, specifically requests comments on the value of the mean return period earthquake in the range of 2,000 to 10,000 years for ISFSI sites. 67 Fed. Reg. 47,745-55 (2002); PID ¶ F.4.

The Staff rejected PFS’s initial 1999 exemption request – to use a PSHA with a 1,000-year mean return period earthquake<sup>11</sup> – but in March 2000 the Staff approved PFS’s modified 2,000-year MRP earthquake exemption request. PID ¶ F.5. Staff acceptance of a 2,000-year MRP earthquake was premised, in part, on the assertion that the PSHA for the PFS site was “conservative” and on bracketing the MRP earthquake range between 1,000-years at the low end and 5,000-years at the high end. The latter comes from the Staff’s claim that 5,000-years would be the reference probability for a safe shutdown earthquake (“SSE”) for a hypothetical nuclear power plant (“NPP”) located at the Skull Valley site. PID ¶¶ F.84, 104. Much of the contested testimony between the

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<sup>11</sup>Filed April 2, 1999, PFS’s exemption request attempted but failed to come within the rulemaking plan, SECY-98-126, which set a 1,000-year MRP earthquake for SSCs whose failure would not result in radiation doses exceeding 10 C.F.R. § 72.104(a); the MRP earthquake for SSCs whose failure would exceed section 72.104(a) was set at 10,000 years. PID ¶¶ F.2 and F.5.

Staff and the State revolves around those two issues. The Staff also relied on the 2,000-year 1994 standard in DOE-STD-1020 – now superseded to 2,500-years (see State Exh. 207) – and the previous grant of an exemption to DOE for the storage of spent fuel debris from the TMI incident at an ISFSI located at INEEL, Idaho. PID ¶ F.106.

In upholding the rationale used by the Staff, the Board relied on testimony by Staff witness, John A. Stamatakis and was dismissive of that by Utah witness, Walter J. Arabasz. Looking at the credentials of the two witnesses, the evidentiary support for their testimony, and the logic of the theories they presented, leads to the incontrovertible conclusion that the Board has no rational basis for its action.

First, Dr. Arabasz is more credentialed and is more knowledgeable on the seismic conditions in the Intermountain West than the Staff's witness. Dr. Stamatakis, a structural geologist and geophysicist, received his Ph.D in geology in 1990; he is involved in multi-disciplinary studies at the Center for Nuclear Waste Regulatory Analysis located in San Antonio, Texas. Stamatakis/Chen/McCann Tstmy, Post Tr. 8,050 at Stamatakis resume. By contrast, Dr. Arabasz has more than 30 years' professional experience in seismology, tectonics and seismic hazard evaluation. State Exh. 123. Since 1977 he has made studying and monitoring earthquakes in Utah (Intermountain West) the mainstay of his career and he is the long-time Director of the University of Utah Seismograph Stations. Tr. (Arabas) at 9,200; State Exh. 123. In addition to service on numerous seismological national advisory and policy making committees, he has been affiliated, since its inception, with the U.S. National Earthquake Hazards Reduction Program. State Exh. 123. As to the credentials of the two witnesses, there can be no doubt that Dr. Arabasz's training, experience and intimate knowledge of the seismic conditions in the Intermountain West, and particularly those in Skull Valley and along the Wasatch fault, are substantially superior to those of Dr. Stamatakis.

Second, as to the reference probability for the SSE for a NPP sited in the Intermountain West,<sup>12</sup> Dr. Stamatakos relied on a sample size of five previously licensed NPPs in the western United States (“WUS”)<sup>13</sup> to support his 5,000-year SSE position for the entire WUS, whereas Dr. Arabasz’s scholarly presentation demonstrated a justifiable scientific basis for a 5,000-year reference probability for sites with steep hazard curves located near tectonic plate boundaries but not for sites in the Intermountain West.<sup>14</sup> In support of his proposition that a 5,000-year MRP earthquake may justifiably apply only at WUS sites with steep hazard curves (such as those located near tectonic plate boundaries) but not indiscriminately to the entire WUS, Dr. Arabasz relied on the following:

- Staff’s acceptance of a 10,000-year MRP as the reference standard for a future NPP at the INEEL ISFSI site in Idaho. Ref. 38 ¶ 457.
- Even though DOE calculated an average 5,000-year MRP for five NPPs in the WUS,<sup>15</sup> it chose 10,000 years – not 5,000 years – as the MRP for the Yucca Mountain DBE. Id. ¶ 458.
- Using Kennedy & Short’s approach to measure how much ground motions increase as the annual probability decreases, Dr. Arabasz showed that of the five WUS sites relied on by Dr. Stamatakos, three are located near tectonic plate boundaries and have steep hazard curves, while the other two (Palo Verde and Yucca Mountain) are more like eastern sites. Id. ¶ 459.
- Using the 84th percentile deterministic motions as a proxy for NPP information at non-coastal western sites, Dr. Arabasz’s presentation credibly shows that as you move eastward from the plate boundary to Hanford, Palo Verde, Yucca Mountain, INEEL, Los Alamos and the PFS site, the appropriate SSE reference probability for a NPP would appropriately be pegged at  $1 \times 10^{-4}$  (10,000-year MRP) – not at  $2 \times 10^{-4}$  (5,000-year MRP). Id. ¶ 460.

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<sup>12</sup>The importance of this issue is that it establishes a legitimate upper DBE benchmark for the PFS facility. Ref. 38 at ¶¶ 452-53.

<sup>13</sup>Two of the five NPPs in the survey are located in California, one is in Arizona, and two are in Washington state. State Exh. 202.

<sup>14</sup>There is better understanding of earthquake occurrence along the WUS tectonic plate margins – they occur more frequently and, thus, there are more data. By contrast, there is sparse information on controlling faults near the PFS site. For example, the last earthquake occurrence on the Stansbury fault (about 5 miles from the PFS site) was about 8,000 years ago, and previous to that 15,000 or more years ago. Not only is there a potential for a large earthquake, it is uncertain whether it will occur tomorrow or a thousand years hence. Ref. ¶ 449.

<sup>15</sup>See State Exh. 202, Table C-2.



After describing the evidence presented, the Board wrote the 5,000-year NPP benchmark out of consideration by noting: “although the Staff testified to a 5000-year NPP benchmark at the hearing, the SER only concludes that, because the PFS facility’s risk is lower than that of a NPP, the PFS facility may have a DBE that has a MAPE greater than  $1 \times 10^{-4}$ .” PID ¶ F.30. This is a gross distortion of the SER. One of the reasons the Staff found the 2,000-year return value acceptable was because “analyses of nuclear power plants in the western United States show that the estimated average mean annual probability of exceeding the safe shutdown earthquake is  $2.0 \times 10^{-4}$  [5,000-year MRP] (U.S. Department of Energy 1997).”<sup>16</sup> ConSER at 2-50. The Staff’s acceptability finding in the SER aligns precisely with the unsupportable Stamatakos testimony.

Third, in his attempt to show that the Geomatrix PSHA<sup>17</sup> for the PFS site was “conservative,”<sup>18</sup> Dr. Stamatakos fallaciously compared disparate methodologies and relied on generic studies, questionable scientific bases, and unjustifiable assumptions regarding slip tendency near the PFS site. Relying on his long career in seismic hazard evaluation and in studying and monitoring earthquakes in Utah, Dr. Arabasz refuted both general concepts Dr. Stamatakos presented: his slip tendency analysis and a comparison of ground motions at the PFS site with sites in and around Salt Lake City.

Slip Tendency. In an effort to show Geomatrix’s PSHA as “conservative,” Dr. Stamatakos

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<sup>16</sup>The DOE referenced document contains the five sites from which Dr. Stamatakos made his prognosis that a 5,000-year SSE applies indiscriminately to the entire WUS. See State Exh. 202.

<sup>17</sup>A PSHA is an enormous undertaking – one that the Staff did not conduct for the PFS site – that requires an incredible spectrum of parameters and values to be aggregated into the process of calculating the hazard; central to a well executed PSHA is capturing the technically supportable and legitimate range of informed opinion representing the whole scientific community on specific aspects of the PSHA. Ref. 38 ¶ 480.

<sup>18</sup>Unlike the Staff, PFS did not rely on the Geomatrix PSHA as being “conservative” to justify a 2,000-year DBE. Furthermore, Board reliance on a structural geologist as representative of a range of informed opinion as a basis for finding Geomatrix’s PSHA to be “conservative” is untenable. PID at 98.

conducted a slip tendency analysis – a modeling technique to assess potential fault activity. As used by the Staff, the analysis requires as a starting point a specification of the orientation and relative magnitudes of stresses acting on the local Skull Valley geology. PID ¶ F.123. Unlike the stress state for the Wasatch front area, the stress state in Skull Valley is unknown. Id. Dr. Stamatakos posited the stress state in Skull Valley by assuming applicability of regional stress information from elsewhere, chiefly from GPS data in a paper by Martinez, et al, 1998 (id.); however, his extrapolation of these data invalidates his analysis. First, the Martinez paper does not contain the value Dr. Stamatakos relied upon – he took the Martinez GPS data and subjectively tuned his model to guess at the regional Skull Valley stress state. Ref. 38 ¶ 482. Second, he ignored evidence presented in the Geomatrix PSHA for the seismogenic potential of the East fault, namely physical evidence of surface rupture of late Quaternary deposits by the East fault, in favor of his subjectively tuned computer model. Id. ¶ 483. Third, Dr. Stamatakos attempts to compare the slip rates on the Stansbury and East faults with those on the Wasatch fault by inappropriately relying on two disparate methodologies (GPS-measured geodetic deformation rates and slip rates measured from geological displacements). Tr. (Arabasz) at 10,103. Dr. Arabasz presented irrefutable evidence (as supported by the findings in the Geomatrix PSHA) that the difference in slip rate between the Wasatch fault and the Stansbury fault is a factor of three – not ten as Dr. Stamatakos insists upon. Tr. (Arabasz) at 9,878-79; Ref. 39 at 104-05. The Staff’s reliance on scientific interpretations plainly acknowledged by their own authors to be uncertain and comparing disparate methodologies offer no support that the Geomatrix PSHA is “conservative.” See Ref. 38 ¶ 483. The Board’s action is clearly erroneous. PID at 98, ¶¶ F.130-31.

Ground Motion Comparisons: The Board upholds two erroneous comparisons the Staff made between the PFS site and other Salt Lake City sites. PID at 98-99 and ¶¶ F.97-98. The Staff

suggests that it will be 1.5 times more likely that 0.5g or greater horizontal peak ground acceleration (“pga”) will be exceeded at the PFS site than at Salt Lake City sites. See *Id.* ¶ F.126. Staff uses PFS site-specific data but for Salt Lake City uses national hazard mapping done on a regional scale from the USGS National Earthquake Hazard Reduction Program. *Id.* Without independently performing site-specific PSHAs for the two sites, the Staff’s inference that Geomatrix’s PSHA is conservative, as compared to generic Salt Lake City sites, is pure speculation. *Id.* Board reliance on this speculative evidence is reversible error. PID ¶ F.97. In the other comparison, the Staff argues that the 2,000-year horizontal pga at the PFS site is actually higher than in the 2,500-year horizontal pga at nine sites in the Salt Lake Valley I-15 corridor. See PID ¶ F.127. This is also reversible error; the comparison is not scientifically defensible because without stripping off the site responses at the PFS and I-15 sites, the PSHA comparisons are meaningless. Ref. 38 ¶ 488. A scientifically defensible explanation is that the large predicted ground motions at the PFS site are due to the unusual closeness of the East fault and the controlling earthquakes<sup>19</sup> and also due to local site amplification effects accounted for in Geomatrix’s PSHA. Tr. (Arabasz) 10,228-29.

Even though PFS’s presentation is not as fundamentally flawed as that of the Staff, its concepts, nonetheless, severely minimize safety margins on the demand (*i.e.*, the earthquake forces) placed on the capacity (*i.e.*, seismic design) of the system. PFS espouses that there are added margins in the design because of the codes and standards used in the construction of the casks and the CTB and, thus, a 2,000-year DBE is acceptable. PID at 88. However, by placing less demand on the system (*i.e.*, decreasing ground motions and designing only to a 2,000-year DBE), the absolute

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<sup>19</sup>The Stansbury fault (about 5 miles from PFS site) and East fault (dipping under the site) are the two largest contributors to the total mean hazard at the PFS site for return periods greater than a few hundred years; the mean maximum magnitudes of these faults are 7.0 and 6.5, respectively. Ref. 38 ¶ 486.

margins of safety are greatly diminished. Ref. 38 ¶ 536.

Part of the rationale underpinning the Board's acceptance of PFS's design cuts against safety margins. First, the Board recognizes that PFS has taken a somewhat unconventional overall approach to its design and analysis. PID at 52. Second, the Board rationalizes its decision by declaring there is no governing NRC regulations requiring (a) demonstration through prior use of the suitability of a proposed design, if it is otherwise found acceptable (*id.* at 48); (b) soil cement testing prior to license issuance (*id.* ¶ C.67 ), and (c) soil structure interaction analysis for the design of the storage pads (*id.* ¶ D.33). Third, whether through design or effect, the Board accepts that if the casks and pads undergo uncontrolled sliding during an earthquake, this will have a "beneficial effect" on cask stability. *Id.* ¶¶ D.17-18; D.50. Finally, the Board found PFS's analysis conservative, in part, because the peak magnitude of an earthquake "exist[s] for only one very brief moment of time." *Id.* ¶ F.72.

Should the Commission accept any of the positions relied on by the Board, the Staff, or PFS in support of PFS's exemption allowing it to use a 2,000-year DBE, it will be setting a trail blazing path – but one that is not based on any actual test data or valid scientific bases, and one that severely reduces safety margins by relying on concepts contrary to earthquake engineering practices.

Putting aside the Board's erroneous conclusions, the establishment of a design basis earthquake for an ISFSI involves significant questions of public policy and public interest. There is no discussion in the PID, in Staff hearing testimony, or the SER, of the section 72.7 public interest requirement. *See* ConSER § 2.1.6.2; Stamatakos/Chen/McCann Tstmy, Post Tr. 8,050. As described above, certain aspects of the Board's 372 page decision undermine the public interest. Moreover, the reason for PFS's exemption request is that PFS's facility design cannot meet the

deterministic seismic qualification under the existing regulation. PID at 12. Thus, there is no public interest justification in granting PFS's request.

The Board alluded to the Commission's statement that ISFSIs pose a lower radiological risk than nuclear power plants. PID ¶ F.102. That statement, however, does not in and of itself justify a five fold decrease from 10,000 years to 2,000 years for an ISFSI DBE. Although reluctant to put forward a specific number, State witness Dr. Arabasz presented a cogent position for a 4,000-year MRP earthquake for an ISFSI located in the Intermountain West. Tr. (Arabas) at 9,205-09. First, a 4,000-year MRP is lower than the SSE reference probability for a NPP located at a site with a steep hazard curve (generally those near tectonic plate boundaries, such as coastal California). Second, any precedential value in the grant of an exemption to the TMI-2 ISFSI at INEEL can be reconciled because that facility is designed to ground motions between a 3,000- to 4,000-year MRP earthquake.<sup>20</sup> Arabasz Tstmy, Post Tr. 9,098 at 12. Moreover, unlike the commercial PFS venture, there was a public interest need in storing debris from the TMI incident.<sup>21</sup> Fourth, the NRC would avoid the public perception that a nuclear facility has a lower DBE than the 2,500-year MRP for highway bridges or buildings under the International Building Code 2000. Tr. (Arabas) 9,207-08. Finally, a comparison of the 40 year operational life of the PFS ISFSI with another Intermountain West facility – the 100 year operational life pre-closure facility at Yucca Mountain with a  $1 \times 10^{-4}$  MAPE (10,000-year MRP) – would yield a one percent total probability of exceeding the design

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<sup>20</sup>At INEEL, the TMI-2 ISFSI is located on the site of an existing higher risk facility, the Idaho Chemical Processing Plant, which was designed to peak horizontal accelerations of 0.36 g. When the TMI-2 ISFSI was constructed, it was also designed to 0.36 g horizontal design value. Tr. (Chen) at 8,184; Arabasz Tstmy, Post Tr. 9,098 at 12.

<sup>21</sup>Notably, many of PFS members are storing or about to store fuel in dry casks at their reactor sites. See NRC Part 72 ISFSI docket. Also a former state law (applicable to one of PFS members) capping storage at the Prairie Island ISFSI has recently been lifted. Minnesota H.F. 9, (2003 1st Special Session).

earthquake during each of their lifetimes if the PFS ISFSI had a MAPE of about  $2.5 \times 10^{-4}$  (4,000-year MRP). Arabasz Tstmy, Post Tr. 9,098 at 14; Tr. (Arabasz) at 9,204-09; 10,152-53. The Board's acceptance of a 2,000 year DBE for the PFS site without any consideration of public interest warrants Commission review; the Board's action minimizes margins of safety, is not in the public interest and creates injudicious public policy.

**C. The Board Erroneously Relied upon Operational Hours for the Duration of an Accident under the Accident Dose Consequence Standard.<sup>22</sup>**

Central to the Board's decision in favor of PFS is its conclusion that there will be no adverse radiation consequences if the casks were to tip over during a design basis earthquake. *See e.g., PID* at 5 ("even if one or more casks were to tip over, the spent fuel canister inside would not break or melt"). The Board, however, erroneously interpreted the 5 rem accident dose limit in 10 C.F.R. § 72.106(b), as applying only during operational hours at the PFS site. Notably, section 72.104(a) sets the operational dose limit at 25 mrem. The Board reached its conclusion by relying on testimony by PFS witnesses – all employees of Holtec located in New Jersey – who have no familiarity with the PFS site or land use in Skull Valley and by ignoring contrary testimony on the potential future residential land use in Skull Valley. *Of PID* ¶ G.18 *with* Tr. (Redmond) 12,081-82; (Donnell) 12,578-82. The Board also ignored the difference in the wording in section 72.104(a) operational conditions ("a real individual") and section 72.106(b) accident conditions ("any individual"). In failing to consider that an individual would be located at the boundary all year, the Board lowered the accident dose limit at the PFS site by at least fourfold. *PID* ¶ G.14, *citing* Resnikoff Post Tr. 12,349 at 6. Finally, the Board's legal conclusion is also contrary to Holtec's certificate of compliance for the HI-

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<sup>22</sup>This issue is presented in Refs. 1; 3; 13 at section E (*PID* at 24); 19; 29; 35; 37; 38 at ¶¶ 544-585; 39 at 119-133; 45; 48; and 50.

STORM 100 cask which is supported by an analysis using 8,760 hours per year for the exposure duration rather than the 2,000 hours per year accepted by the Board for accident conditions at the PFS site. PID ¶¶ G.13, G.15.

The Commission should accept review of the Board's erroneous precedent-setting legal conclusion. The issue involves a substantial question of law and policy. Significantly, the Board's erroneous legal conclusion, resting upon unreliable hearing testimony, creates a legal standard that eviscerates any conservatism in the accident dose standard and sets a precedent for future litigation in this proceeding. As the Commission is aware, the PFS site is located directly under the flight path used extensively by U.S. Air Force fighter planes for access to and from the Utah Test and Training Range. The one remaining issue before the Board is the radiation dose consequences of an F-16 aircraft crashing into the PFS facility. Therefore, the Board's undifferentiated treatment of the exposure time for accident conditions and normal operations will be at issue in that proceeding - a proceeding that involves health, safety and common defense and security.

#### CONCLUSION

For the foregoing reasons, the State urges the Commission to accept review of these important legal, discretionary and policy questions and to set a briefing schedule on all three issues.

DATED this 11<sup>th</sup> day of June, 2003.

Respectfully submitted,



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### CERTIFICATE OF SERVICE

I hereby certify that a copy of STATE OF UTAH'S PETITION FOR REVIEW OF LBP-03-08 was served on the persons listed below by electronic mail (unless otherwise noted) with conforming copies by United States mail first class, this 11<sup>th</sup> day of June, 2003:

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# **REFERENCE APPENDIX**

**State of Utah's Petition for Review of  
LBP-03-08**

**June 11, 2003**

## APPENDIX

In the Matter of Private Fuel Storage L.L.C., Docket No. 72-22-ISFSI

### RECORD REFERENCES RELATING TO STATE-RAISED ISSUES IN CONTENTION UTAH L/QQ (Geotechnical)

#### Contention Filing/Contention Admission Stage:

1. *State of Utah's Contentions on the Construction and Operating License Application by Private Fuel Storage, LLC for an Independent Spent Fuel Storage Facility* (November 23, 1997) at 80-95 (Utah L<sup>1</sup>).
2. *State's Motion Requiring Applicant to Apply for Rule Waiver Under 10 CFR § 2.758(b) or in the Alternative Amendment to Utah Contention L* (April 30, 1999) and all attachments thereto, filed after PFS's April 2, 1999 Request for Exemption to 10 CFR 72.102(f)(1), Seismic Design Requirement.
3. *State of Utah's Request for Admission of Late-filed Modification to Basis 2 of Utah Contention L* (January 26, 2000) and all attachments thereto, filed after Staff's issuance of its December 1999 Safety Evaluation Report ("SER").
4. *State of Utah's Reply to Applicant's and NRC Staff's Responses to Late-filed Bases for Utah Contention L* (February 22, 2000).
5. *State of Utah's Request for Admission of Late-filed Modification to Basis 2 of Contention Utah L* (November 9, 2000) and all attachments thereto, filed after Staff's September 2000 SER, in which the Staff recommended granting PFS's exemption request.
6. *State of Utah's Brief on the Commission's Review of Applicant's Seismic Exemption Request and Admission of Amendment to Contention Utah L (Geotechnical)* (March 2, 2001), as certified to the Commission by LBP-01-03, 53 NRC 84 (January 31, 2001).
7. *State of Utah's Reply Brief on the Commission's Review of Applicant's Seismic Exemption Request and Admission of Amendment to Contention Utah L (Geotechnical)* (March 12, 2001).
8. *State of Utah's Request for Permission to File Late Filed Geotechnical Contentions Within Thirty Days of Receipt of Calculations Supporting License Amendment* (April 23, 2001).
9. *State of Utah's Request for Admission of Late-filed Contention Utah QQ (Seismic Stability)* (May 16, 2001) and all attachments thereto.
10. *State of Utah's Request to Modify the Bases of Late-filed Contention Utah QQ in Response to Further*

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<sup>1</sup>Original Contention Utah L does not include seismic exemption (filed as Modification to Basis 2, Utah L and denominated by the Board in its June 15, 2001 Order as Utah L ¶ B) or the later filed Contention Utah QQ.

*Revised Calculations from the Applicant* (June 19, 2001) and all attachments thereto.

11. *State of Utah's Second Request to Modify the Bases of Late-filed Contention Utah QQ in Response to More Revised Calculations from the Applicant* (August 23, 2001) and all attachments thereto.
12. *State of Utah's Motion to Strike Exhibit 1 to Applicant's Response to State of Utah's Second Request to Modify the Bases of Late-filed Contention Utah QQ* (September 12, 2001).
13. *Joint Submittal of Unified Geotechnical Contention, Utah L and Utah QQ* (January 16, 2002).
14. *Joint Stipulation of Facts and Issues Not in Dispute with Respect to Unified Contention Utah L/ QQ (Geotechnical)* (January 31, 2002).

### Summary Disposition

15. *State of Utah's Response to Applicant's Motion for Summary Disposition of Utah Contention L* and all attachments thereto (January 30, 2001).
16. *State of Utah's Reply to NRC Staff's Response to Applicant's Motion for Summary Disposition of Utah Contention L (Geotechnical)* (February 9, 2001).
17. *State of Utah's Response to Applicant's Motion to Strike Portions of State of Utah's Response to Applicant's Motion for Summary Disposition of Utah Contention L* (February 20, 2001).
18. *State of Utah's Motion for an Opportunity to Supplement its Response to Applicant's Motion for Summary Disposition or in the Alternative Motion for Extension of Time to Respond to Summary Disposition* (November 13, 2001).
19. *State of Utah's Response and Opposition to Applicant's Motion for Summary Disposition of Part B of Utah Contention L* (December 7, 2001) and all attachments thereto.
20. *State of Utah's Supplemental Response and Opposition to Applicant's Motion for Summary Disposition of Part B of Utah Contention L* (December 21, 2001).

### Hearing

21. *State of Utah's Prefiled Testimony on Unified Contention Utah L/ QQ - Geotechnical Key Determinations and exhibit list* (April 1, 2002).
22. *State of Utah Testimony of Barry Solomon on Unified Contention Utah L/ QQ - Geotechnical (Geologic Setting)* dated April 1, 2002 and as revised May 16, 2002, Post Tr. 8,965.
23. *State of Utah Testimony of Dr. Steven F. Bartlett on Unified Contention Utah L/ QQ (Soils Characterization)* dated April 1, 2002 and as corrected June 20, 2002, Post Tr. 11,822.
24. *State of Utah Testimony of Dr. Steven F. Bartlett and Dr. James K. Mitchell on Unified Contention Utah*

- L/QQ (Soil Cement)* (April 1, 2002), Post Tr. 11,033.
25. *State of Utah Testimony of Dr. Steven F. Bartlett and Dr. Farhang Ostadan on Unified Contention Utah L/QQ (Dynamic Analyses)* dated April 1, 2002, as corrected, and revised April 26, 2002 per Board Ruling of April 25, 2002, Post Tr. 7,268.
  26. *State of Utah Testimony of Dr. Mohsin R. Khan and Dr. Farhang Ostadan on Unified Contention Utah L/QQ (Cask Stability)* dated April 1, 2002, as corrected May 7, 2002, along with *Answer 9 to State Testimony of Dr. Mohsin R. Khan and Dr. Farhang Ostadan on Unified Contention Utah L/QQ Part D (Cask Stability)*, originally filed April 1, 2002 as proprietary, but not considered proprietary as represented by PFS during the hearing (Tr. 7,118), Post Tr. 7,123.
  27. *State of Utah Testimony of Dr. Walter J. Arabaszw Regarding Unified Contention Utah L/QQ (Seismic Exemption)* (April 1, 2002), Post Tr. 9,098.
  28. *State of Utah Testimony of Dr. Steven Bartlett and R. Farhang Ostadan on Unified Contention Utah L/QQ, Part E (Lack of Design Conservatism)* dated April 1, 2002, as corrected and revised June 5, 2002, Post Tr. 12,776.
  29. *State of Utah Testimony of Dr. Marlin Resnikoff on Unified Contention Utah L/QQ (Seismic Exemption - Dose Exposure)* dated April 1, 2002, as amended June 21, 2002, Post Tr. 12,349.
  30. *State of Utah Partial Surrebuttal Testimony of Dr. Steven F. Bartlett to Rebuttal Testimony of Paul J. Trudeau on Unified Contention Utah L/QQ (Dynamic Analyses)* (June 18, 2002), Post Tr. 11,306.
  31. *Surrebuttal of Dr. Steven Bartlett to PFS Witness Paul Trudeau's Rebuttal Testimony on Section C of Unified Contention Utah L/QQ* (June 21, 2002), Post Tr. 11,982.
  32. *State of Utah's Motion in Limine to Exclude Portions of NRC Staff's Prefiled Testimony of Luk & Guttman; Waters; and Stamatakis, McCann & Chen (Unified Contention Utah L/QQ)* (April 15, 2002).
  33. *State of Utah's Motion in Limine to Strike Applicant's Prefiled Direct Testimony (Unified Contention Utah L/QQ)* (April 15, 2002).
  34. *State of Utah's Response in Opposition to the NRC Staff's Motion in Limine to Exclude Exhibits and Portions of Prefiled Testimony of Dr. Marlin Resnikoff Concerning Unified Contention Utah L/QQ (Geotechnical)* (April 22, 2002).
  35. *State of Utah's Response to PFS's Motions to Strike Portions of the Separate Testimony of Khan, Ostadan and Resnikoff* (April 22, 2002).
  36. Letter from State counsel to Board re errata to *State of Utah's Response in Opposition to the NRC Staff's Motion in Limine to Exclude Exhibits and Portions of Prefiled Testimony of Dr. Marlin Resnikoff Concerning Unified Contention Utah L/QQ (Geotechnical)*, with replacement pages 8 and 9 (April 23, 2002).

37. Transcript from evidentiary hearings conducted April/May/June 2002 regarding Utah L/QQ (Tr. 5206-5349; 5484-8348; 8958-12989) and all admitted exhibits.
  - a. State Exhibits 91-106; 108-110; 112-132; 134-143; 168-171; 173-175; 178-179; 181; 183-185; 188-199; 201-204; 206; 208-216; 218-219;
  - b. PFS Exhibits LL-JJJ; 84-85; 86B-86D; 88-89; 92; 94; 102A; 222-225B; 225D-228A; 230-244; 247-248;
  - c. NRC Staff Exhibits C, E, P, Q, S-X, OG-VV, XX-ZZ; 53; 55-60; 62-64.
38. *State of Utah's Proposed Findings of Fact and Conclusions of Law on Unified Contention Utah L/QQ* (September 5, 2002).
39. *State of Utah's Reply to Proposed Findings of Fact and Conclusions of Law of the Applicant and NRC Staff on Unified Contention Utah L/QQ* (October 16, 2002).
40. *Errata to State of Utah's Reply to Proposed Findings of Fact and Conclusions of Law of the Applicant and NRC Staff on Unified Contention Utah L/QQ* (October 25, 2002).
41. *Proposed Joint Corrections to the Transcript for the Evidentiary Hearing on Unified Contention Utah L/QQ* (November 16, 2002).

#### Decisions by the Board or the Commission on Utah L/QQ

42. LBP-98-7, 47 NRC 142, 191, 253 (April 22, 1998) admitted Contention Utah L.
43. LBP-99-21, 49 NRC 431 (May 26, 1999) denied State's motion for rule waiver under 10 C.F.R. § 2.785(b) (exemption request does not bear on Utah L), and denied State's request to amend Contention Utah L.
44. LBP-00-15, 51 NRC 313 (June 1, 2000) denied State's motion to modify basis 2 of Utah L (proposed modification is not ripe absent favorable Staff ruling on exemption request).
45. LBP-01-03, 53 NRC 84 (January 31, 2001) ruled on the admissibility of Late-Filed Modification of Contention Utah L Basis 2, referred its rulings to the Commission.
46. CLI-01-06, 53 NRC 111 (February 14, 2001) granted review and set briefing schedule.
47. MEMORANDUM AND ORDER (Schedule for Late-Filed Submissions Regarding License Application Amendment and Page Limit Extension) (April 26, 2001) allowed submission of contentions re probabilistic seismic hazard analysis; CTB design changes, including use of soil cement, or revisions to storage pad analyses, soils analyses, soil-cement design calculations/analyses, and Holtec site-specific cask analyses; requested the inclusion of a discussion the impact, if any, of the admission of any late-filed contention on the matters currently pending before the Board in connection with the PFS dispositive motion on

contention Utah L, Part A.

48. CLI-01-12, 53 NRC 459 (June 14, 2001) affirmed the Board's decision, LBP-01-03, on State's seismic exemption contentions and remanded admitted portions of Modified Utah L for further proceedings.
49. LBP-01-39, 54 NRC 497 (December 26, 2001) denied in toto PFS's motion for summary disposition of Utah L Part A and admitted Contention Utah QQ.
50. LBP-02-01, 55 NRC 11 denied PFS's motion for summary disposition of Utah L Part B (January 9, 2002).
51. Order (December 11, 2002) approving joint proposed transcript correction and ruling on admission of testimony and outstanding exhibits from hearing on Contention Utah L/ QQ.
52. LBP-03-08, \_\_ NRC \_\_ (May 22, 2003): Partial Initial Decision (Regarding Geotechnical Issues).