

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

2002 APR 29 AM 10:30

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF THE SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF

In the Matter of:	)	Docket No. 72-22-ISFSI
PRIVATE FUEL STORAGE, LLC	)	ASLBP No. 97-732-02-ISFSI
(Independent Spent Fuel	)	
Storage Installation)	)	April 22, 2002

**STATE OF UTAH'S RESPONSE TO PFS'S MOTIONS TO STRIKE PORTIONS OF THE SEPARATE TESTIMONY OF KHAN, OSTADAN AND RESNIKOFF**

The State responds to three separate motions<sup>1</sup> to strike filed by Private Fuel Storage, LLC ("PFS") on April 15, 2002, with respect to certain portions of the direct testimony of Dr. Mohsin Khan, Dr. Farhang Ostadan and Dr. Marvin Resnikoff. PFS's motions are without merit and should be denied.

A. Dr. Mohsin R. Khan Testimony

PFS anchors its motion to strike Dr. Khan's testimony on a simplistic proposition: Dr. Khan has not conducted evaluations or analyses of the stability of free-standing casks – such as the HI-STORM free standing casks to be used at PFS – in the event of an earthquake, *ergo* Dr. Khan has no direct experience in this matter and his testimony should be stricken. Motion at 2. Of course Dr. Khan does not have direct experience in conducting analyses of the stability of such an unprecedented, unproven and untested design concept as the one PFS has proposed. Two of the State's witnesses – whose credentials and

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<sup>1</sup> Applicant's Motion to Strike the Testimony of Dr. Moshin [sic] R. Khan on Unified Contention Utah L/QQ; Applicant's Motion to Strike Portions of the Testimony of Dr. Farhang Ostadan on Unified Contention Utah L/QQ; and Applicant's Motion to Strike Portions of the Testimony of Dr. Marvin Resnikoff on Unified Contention Utah L/QQ (April 15, 2002).

expertise have not been challenged by PFS – state that PFS has presented a one-of-a kind design and they know of no similar design that uses untested concepts that are inherent in PFS’s design. Ostadan & Bartlett Dynamic Analyses Tstmy<sup>2</sup> at 5. According to Dr. Ostadan, a unique feature of Holtec’s design concept is “controlled sliding.” He adds:

Holtec puts forward the proposition that during strong ground motions, the casks will be allowed to slide and such sliding will occur in a uniform and controlled manner without collision or tipping. Such a concept defies observations from major earthquakes and engineering logic. It is unprecedented to design unanchored dry storage casks for a seismically active area with such intense strong ground motions similar to those at the PFS facility. The unconservatism in the design is further compounded when PFS uses its claim of “controlled” cask sliding as a mechanism to reduce the seismic loading to the pad foundations.

Id. PFS’s motion to strike Dr. Khan’s testimony underscores the State’s overriding concern with PFS’s design: the design is unprecedented. Therefore it is illogical to expect any expert in the field to have direct experience in analyzing a design that allows free standing casks and pads to rotate and slide – a design that has never been used at any site with ground motions equivalent to or greater than those for a 2,000-year return period earthquake at the PFS site.

PFS’s two cask stability witnesses, Dr. Krishna Singh and Dr. Alan Soler, both individually testified that they will “respond to claims concerning the modeling of the stability of the HI-STORM System under earthquake forces raised by State’s witness, Dr. Moshin [sic] Khan.” Singh-Soler Tstmy<sup>3</sup> at A.8 and A.16, respectively. PFS’s challenge to Dr. Khan’s credentials rings hollow in light of the fact that PFS’s witnesses Singh and Soler

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<sup>2</sup> State of Utah Testimony of Dr. Steven F. Bartlett and Dr. Farhang Ostadan on Unified Contention Utah L/ QQ (Dynamic Analyses) (April 1, 2002).

<sup>3</sup> Testimony of Krishna P. Singh and Alan I. Soler on Unified Contention Utah L/ QQ.

have very little direct experience in analyzing free standing casks at a site with strong ground motions. Although Dr. Singh says he provides “consultation and technical oversight” (Tstmy at A.7), he admits he has not been the “principal analyst” for a cask stability analysis in about ten years. Singh/Soler 2002 Tr.<sup>4</sup> at 15. Furthermore, other than for the PFS case, the Diablo Canyon ongoing seismic analysis and the Humbolt Bay scoping report are the only studies conducted by Dr. Soler where the ground motions are equivalent to or exceed the PFS 2,000-year design basis earthquake (“DBE”). Singh/Soler 2002 Tr. at 17-21. Significantly, the ongoing seismic analysis for Diablo Canyon relates only to anchored casks – not to freestanding casks. Id. at 21.

In determining an expert’s qualifications the “ultimate test of a witness’s qualification is whether his knowledge of the matter in relation to which his opinion is sought is such that it probably will aid the trier of the question to determine the truth.” Illinois Power Co. (Clinton Power Station, Units 1 and 2), LBP-75-59, 2 NRC 579, 588 (1975), aff. ALAB-340, 4 NRC 27 (1976). Dr. Khan’s career has focused on various aspects of seismic analysis, including the finite element analysis of free standing objects in high seismic areas.<sup>5</sup> Dr. Khan has analyzed the seismic response of free standing spent nuclear fuel racks and rigid blocks in high seismic areas. Id., Khan Tr.<sup>6</sup> at 22-24. Moreover, Dr. Khan reviewed various cask

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<sup>4</sup> Deposition transcript of Krishna P. Singh and Alan I. Soler (March 6, 2002).

<sup>5</sup> As described in Dr. Khan’s testimony, he has extensive experience in performing seismic analysis of structures and equipment; he has over 22 years’ experience using response spectral data and finite element analysis to predict seismic performance of various structures, systems, and components, including those at nuclear plants, and to predict seismic response. State of Utah Testimony of Dr. Mohsin R. Khan and Dr. Farhang Ostadan on Unified Contention Utah L/QQ (Cask Stability) (April 1, 2002) (“Khan & Ostadan Tstmy”) at A.7.

<sup>6</sup> Deposition transcript of Dr. Mohsin R. Khan (March 5, 2002).

seismic scoping analyses performed by various vendors for the Diablo Canyon and Humboldt Bay nuclear power plants. Khan Tstmy. at A.7., Khan Tr. at 23. Dr. Khan is eminently qualified as an expert in cask stability analysis. There is no basis for PFS's challenge to Dr. Khan's credentials and PFS's motion should be denied.

Dr. Khan, a well-qualified expert by virtue of his education and experience, will aid the Licensing Board in determining the truth (*i.e.*, accuracy and validity) of the Holtec cask stability analysis proffered by PFS in support of its design. The purpose of Dr. Khan's analysis was to evaluate Holtec's seismic cask stability results by independently modeling portions of HI-STORM 100 cask sliding and tipover under seismic motion from a 2,000-year earthquake. Khan & Ostadan Tstmy at 6. Another purpose the State had in having Dr. Khan conduct his analysis was to show that the results of a cask stability analysis can change significantly when the input parameters are changed within acceptable bounds. Ostadan & Bartlett Dynamic Analysis Tstmy. at 11.

In its motion PFS emphasizes that Dr. Khan has not "previously selected a 'contact stiffness' value for purposes of analyzing the sliding or tipping of a free-standing object (such as a storage cask)." Motion at 4. This argument is baseless. The contact stiffness value used to model cask stability is important only at the PFS site where the free standing casks and pads are allowed to slide unconstrained under ground motion accelerations of 0.7 g or greater.<sup>7</sup> Based on Dr. Khan's professional experience, he questioned the small movements predicted by Holtec's analysis under high seismic conditions. As a result, Dr.

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<sup>7</sup> At lower ground motions, free-standing casks are expected to move small distances. Similarly, anchored casks at sites in a high seismic area such as Diablo Canyon are also not expected to move. Thus, the resultant impact of an incorrect contact stiffness value in substantially underestimating the cask movement does not affect the results at those sites.

Khan varied the contact stiffness input values which question the accuracy of Holtec's results. Similar to Dr. Khan's experience, Holtec's site specific analysis for the PFS site is effectively Dr. Soler's only experience in selecting contact stiffness values for purposes of analyzing the sliding or tipping of a free-standing object (such as a storage cask) at ground motion accelerations of 0.7 g or greater.<sup>8</sup> Pointedly, PFS's Motion raises the question that its own witnesses lack the experience necessary to model the free standing HI-STORM 100 casks at the PFS site.

In its motion, PFS selectively quotes from Dr. Khan's deposition transcript. Motion at 3-5. PFS minimizes Dr. Khan's deposition testimony where he describes his experience in modeling free standing spent fuel racks in a high seismic area, Diablo Canyon. Khan Tr. at 37-38. PFS's failure to acknowledge Dr. Khan's direct experience in modeling free standing spent fuel racks sets up an inconsistent standard for evaluating the cask stability witnesses – the mathematical code, Dynamo, used by Holtec to analyze the free standing casks at PFS for a 2,000-year DBE, was adapted from the code used to analyze spent fuel racks. Singh/Soler 2002 Tr. at 24-26. Furthermore, much of PFS's witnesses' experience also rests on analyzing spent fuel racks. Singh/Soler Tstmy. at A.28. There should be no double standard for the qualifications of the cask stability witnesses.

PFS's claims this is a maiden voyage that it too perilous for Dr. Khan to undertake. Motion at 5. Whether or not it is a maiden voyage, the adroit captain of this ship has all the necessary experience and training to assist the Board in understanding which way the wind

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<sup>8</sup> Any experience Dr. Soler gained in the selection of contact stiffness values at Diablo Canyon or Humbolt Bay is irrelevant because the casks at Diablo Canyon will ultimately be anchored and the contact stiffness values have little, if any, effect on the analysis.

blows in Holtec's cask stability analysis.

B. Dr. Farhang Ostadan Testimony

PFS moves to strike parts of Answers 31 and 36 of Dr. Ostadan's Dynamic Analysis testimony as outside the scope of Unified Contention Utah L/QQ. Motion at 5. PFS is well aware of the issues Dr. Ostadan has raised – issues that are within the scope of the contention. Furthermore, PFS continually presents a moving target to the State on seismic issues, yet if the State puts more flesh on the bones of its contention, PFS considers it to be outside the scope of the contention. PFS's motion has no merit and should be denied.

Contention Utah QQ was filed after ground motions at the PFS were estimated to be approximately 0.7 g instead of 0.53 g for a 2,000-year return period earthquake. Given the thirty five percent increase in the design basis earthquake, Utah QQ challenges, in part, whether (1) PFS's characterization of seismic loading and design calculations have been correctly and consistently applied to the storage pads and their foundations; (2) PFS's general design approach can safely withstand the effect of earthquakes; (3) the foundation design of the storage pads and the underlying soils, or the stability of the storage casks are adequate to safely withstand the DBE. Utah QQ<sup>9</sup> at 3. Part of the bases for Utah QQ states: "While it has been shown that the effect of soil-structure interaction is important in the seismic response of the cask-pad-cement-treated soil system, PFS has ignored the effect of pad-to-pad interaction for pads spaced only five feet apart in the longitudinal direction." Utah QQ at 10; Ostadan Dec. in support thereof, ¶ 14. There are significant consequences

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<sup>9</sup> State of Utah's Request for Admission of Late-Filed Contention Utah QQ (Seismic Stability) dated May 15, 2001.

of ignoring pad-to-pad interaction. By not taking pad-to-pad interaction into account, the motion and the movement of the casks will be underestimated; the loads acting on the pads will be too low for the design of the pad; and the loads considered by Stone & Webster in its sliding analysis of the pads will also be too low.

NRC case law states that, “where . . . the issue is the scope of a contention, there is no good reason not to construe the contention and its bases together in order to get a sense of what precise issue the party seeks to raise.” Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2), ALAB-947, 33 NRC 299, 372 and n. 310 (1991). As this Board has said, “[a]s would be expected of an issue as complex as geotechnical, matters not clearly articulated in an original basis statement might nonetheless emerge as the proceeding moves along.” LBP 01-39, 54 NRC 497, 516-517. This is precisely what the State has done. In the bases of Utah QQ the State raised the issue of pad-to-pad interaction,<sup>10</sup> and during discovery Dr. Ostadan has given a detailed explanation of the full range of effects of pad-to-pad interaction.<sup>11</sup>

It is important to put the geotechnical contention into context in evaluating whether there is any merit to PFS’s motion. On December 26, 2001 the Board issued a ruling, LBP-01-39, denying PFS’s motion for summary disposition of Utah’s original geotechnical contention (Utah L, Part A) and admitting contention Utah QQ. The Board directed the parties to collaborate and present a restatement of the geotechnical issue in “a statement that

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<sup>10</sup> As recognized by this Board, “at a very early stage one who wishes to participate in the proceeding must go so far as to describe in general terms the nature of the evidence that will be put forward. LBP-01-39, 54 NRC at 507 (*emphasis added*).

<sup>11</sup> As stated by this Board, “discovery provides the opportunity to put more flesh on the bones of [an intervenor’s] contention[ ].” Id. at 508.

combines, in a single document, the thrust of Contentions Utah L (Part A) and Utah QQ in a manner that will help all to prepare in more orderly fashion for the upcoming hearing.” LBP-01-39, 54 NRC at 521. Given the complexity of the issues and the volume of material involved, the parties put forth their best efforts and presented Unified Contention Utah L/ QQ to the Board on January 16, 2002. PFS claims that the restatement forms the “agreed-upon scope of Contention L/ QQ.” Motion at 9. As the Board stated, the purpose of the restatement was to “help all to prepare in more orderly fashion for the upcoming hearing.” LBP-01-39, 54 NRC at 521. By agreeing to the document, the State did not consider itself to be circumscribed solely to the wording of the restatement in the prosecuting of its contention.<sup>12</sup>

In early February PFS and the State sent written discovery to each other; the State and PFS took or defended depositions of seven witness the week of March 4 and of three witnesses March 12 and 15. It was during deposition testimony on March 8 that Dr. Ostadan fully explained his concerns about another aspect of pad-to-pad interaction. PFS complains that Dr. Ostadan’s responses to deposition questions are “at best, an afterthought which is not reflected in prior filings by the State nor in the text of Contention Utah L/ QQ.” Motion at 9. PFS has no grounds to complain about the State’s prior filings given

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<sup>12</sup> As described above, the issue the State has raised is within Utah QQ and the bases thereof. Moreover, experts can and do develop additional theories to support the bases of the contention as the case unfolds just as PFS’s and NRC’s witnesses have developed new theories to defend against the State’s contention.

that PFS did not respond to six<sup>13</sup> of the 15 interrogatories that State propounded on PFS.<sup>14</sup> The State raised its concerns with pad-to-pad interaction in written discovery. PFS took the opportunity during discovery to pin down the State's expert. This is more than can be said about new issues PFS has raised in its prefiled testimony.<sup>15</sup> All parties have to live with the expedited litigation schedule, and PFS's plea that it has no time to prepare for hearing is partly of its own making – the State's past appeals to move the litigation schedule by a day or a week have always been vehemently rejected by PFS.

Dr. Ostadan's concern about pad-to-pad interaction is contained within the scope of Utah L/QQ. This is an important safety issue that goes to the safety and licensing of the PFS facility; it deserves a full airing before the Board. The State requests the Board to deny PFS's motion.

C. Dr. Marvin Resnikoff's Testimony

PFS's motion to strike portions of Dr. Resnikoff's testimony on the computation of radiological doses greater than those allowed under 10 CFR § 72.104(a) (*i.e.*, under normal operation conditions) is without merit. Motion at 3-5. Dr. Resnikoff's answers to Questions 8, 10 and 11, in whole or in part, should not be stricken because they are squarely within the scope of unified Utah L/QQ Section E (formerly Utah L, Part B). Rather PFS's motion is a

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<sup>13</sup> Applicant's Objections and Responses to the State of Utah's Fourteenth Set of Discovery Requests Directed to the Applicant (Feb. 19, 2002), Responses to Interrogatory Nos. 4, 5, 10, 12, 13, 15.

<sup>14</sup> Because of the tight discovery schedule, the parties agreed to forego motions to compel and instead focused their efforts on conducting depositions.

<sup>15</sup> *See e.g.*, State of Utah's Motion in Limine to Strike Applicant's Prefiled Direct Testimony (Unified Contention Utah L/QQ), in particular, State's motion to strike part of the Singh/Soler testimony ( at 3-5). In this regard, the State received Revision 1 to Holtec's report on its cask stability re-runs; the report was changed at the request of "PFS lawyers in preparation for ASLB hearing." HI-2022854, *PFSF Beyond Design Basis Scoping Analysis*, Rev. 1 (April 19, 2002), Revision Log at 3.

direct challenge to the scope of the issues the Commission and Board have admitted for hearing. See LBP-01-3 (referral to Commission), CLI-01-12 (remand to Board for hearing) and reformulation of the contention (basis 1) in the Board's June 15, 2001 Order at 2.<sup>16</sup>

The Rulemaking Plan SECY 98-126 was in effect when PFS submitted its request to conduct a probabilistic seismic hazard analysis ("PSHA") with a 1,000-year return period earthquake on April 2, 1999; when PFS re-formulated its request to conduct a PSHA with a 2,000-year return period earthquake; when the NRC Staff was leaning towards accepting PFS's request in its first Safety Evaluation Report ("SER") dated December 15, 1999; and when the Staff finally recommended approval of the request in the final SER dated September 29, 2000. Under SECY-98-126, a 1,000-year return period earthquake may be used in the PSHA if the applicant's analysis provides that failure of an SSC "will not cause the facility to exceed the radiological requirements of 10 CFR 72.104(a)." SECY-98-126 at 5. Otherwise, an applicant must use a 10,000-year return period earthquake for the PSHA. These are the two options under SECY-98-126.

During the time that PFS's seismic exemption request was under review and at the time the Staff accepted it, SECY-98-126 was in effect and the policy position therein is a relevant and material challenge that is squarely within basis 1 of Section E of Unified Utah L/QQ. Accordingly, the State requests the Board to deny PFS's motion.

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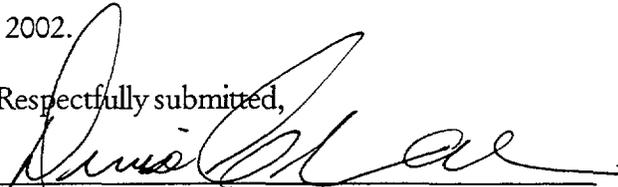
<sup>16</sup> "The requested exemption fails to conform to the SECY-98-126 (June 4, 1998) rulemaking plan scheme, i.e., only 1000-year and 10,000-year return periods are specified for design earthquakes for safety-important systems, structures, and components (SSCs) -- SSC Category 1 and SSC Category 2, respectively-- and any failure of an SSC that exceeds the radiological requirements of 10 C.F.R. § 72.104(a) must be designed for SSC Category 2, without any explanation regarding PFS SSC compliance with section 72.104(a)." Memorandum and Order (June 15, 2001) at 2.

CONCLUSION

There is no merit to any of PFS's motions. Based on the foregoing, the Board should deny PFS's motion to strike the testimony of Drs. Khan, Ostadan and Resnikoff.

DATED this 22<sup>nd</sup> day of April, 2002.

Respectfully submitted,



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CERTIFICATE OF SERVICE

I hereby certify that a copy of STATE OF UTAH'S RESPONSE TO PFS'S MOTIONS TO STRIKE PORTIONS OF THE SEPARATE TESTIMONY OF KHAN, OSTADAN AND RESNIKOFF was served on the persons listed below by electronic mail (unless otherwise noted) with conforming copies by United States mail first class, this 22<sup>nd</sup> day of April, 2002:

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