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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF REGULATORY  
INQUIRY AND  
ADJUDICATION STAFF

In the Matter of	)	
	)	
PRIVATE FUEL STORAGE, LLC	)	Docket No. 72-22-ISFSI
	)	
(Independent Spent	)	
Fuel Storage Installation)	)	

NRC STAFF'S RESPONSE TO APPLICANT'S MOTION FOR SUMMARY  
DISPOSITION OF UTAH CONTENTION GG - FAILURE TO DEMONSTRATE  
CASK-PAD STABILITY DURING SEISMIC EVENT FOR TRANSTOR CASKS

INTRODUCTION

Pursuant to the Atomic Safety and Licensing Board's "Order (Schedule for Summary Disposition Motion Responses)," dated January 3, 2000 and 10 C.F.R. § 2.749, the staff of the Nuclear Regulatory Commission (Staff) hereby files its response to the "Applicant's Motion For Summary Disposition of Utah Contention GG -- Failure to Demonstrate Cask-Pad Stability During Seismic Event For TranStor Casks," (Motion) filed by Private Fuel Storage, L.L.C. (PFS or the Applicant) on December 30, 1999.<sup>1</sup> For the reasons set forth below and in the attached Affidavit of Henry Lee (Lee Aff.), the Applicant's Motion should be granted.<sup>2</sup>

<sup>1</sup> The Staff is aware of information potentially material and relevant to Contention GG. See Letter from Jay Silberg to the members of the Licensing Board, dated January 21, 2000. BNFL, in a letter dated January 10, 2000, requests that the Staff "cease review of the TranStor™ storage system license application and return the application to BFS in its entirety," and comments that the applicant will "advise NRC of our plans for resubmittal of the TranStor™ storage system application at a future date."

<sup>2</sup> An unsigned copy of Dr. Lee's affidavit is being provided today. The Staff, however, will be submitting Dr. Lee's signed and notarized affidavit within the next few business days when Dr. Lee is available to sign it.

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**BACKGROUND**

The State of Utah filed Utah Contention GG ("Failure to Demonstrate Cask-Pad Stability During Seismic Event for TranStor Casks") on January 8, 1998. "State of Utah's Request for Consideration of Late-Filed Contention GG," dated January 8, 1998. On April 22, 1998, the Licensing Board admitted a portion of Utah Contention GG. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 210-211 (1998). As admitted by the Licensing Board, the contention states as follows:

**CONTENTION:** The Applicant has failed to demonstrate that the TranStor storage casks and the pads will remain stable during a seismic event, and thus, the application does not satisfy 10 C.F.R. §§ 72.122(b)(2) and 72.128(a), in that Sierra Nuclear's consultant, Advent Engineering Services, Inc., used a nonconservative "nonsliding cask" tipover analysis that did not consider that the coefficient of friction may vary over the surface of the pad and did not consider the shift from the static case to the kinetic case when considering momentum of the moving casks.

*PFS, LBP-98-7, 47 NRC at 257 (1998).*

On September 23, 1999, the Applicant submitted a revised cask stability analysis for the TranStor storage casks. See Letter from John L. Donnell (PFS) to Document Control, U.S. NRC, dated September 23, 1999. The analysis was prepared for PFS by Holtec International, the vendor of the HI-STORM storage cask. See "TranStor Dynamic Response to 2000 Year Return Seismic Event," Holtec Report No. HI-992295, attached to Donnell Letter. In Revision 7 to the Safety Analysis Report (SAR), the Applicant updated its SAR to include a discussion of the revised analysis. See SAR pp. 8.2-9 - 8.2-10.

In its motion for summary disposition of Utah Contention GG, the Applicant asserts that the State's contention has been rendered moot by the revised analysis of the stability of the TranStor cask during a seismic event. Motion at 3. Specifically, the Applicant states that the revised analysis

directly addresses the issues that form the bases of Utah Contention GG-- variance of the coefficient of friction over the surface of the pad, and the shift from the static case to the kinetic case when considering momentum of the moving casks. *Id.* at 4-5. Further, the Applicant asserts that by placing no restraints on the cask movement and allowing them to slide in response to seismic forces, the TranStor analysis addresses the State's concern that the previous analysis was a "nonsliding cask' tipover analysis." *Id.* at 7. Accordingly, the Applicant concludes that Utah Contention GG is now moot and, therefore, summary disposition of Utah Contention GG should be entered in PFS' favor. *Id.*

For the reasons set forth below and in the attached Affidavit of Henry Lee, the Staff supports the Applicant's Motion and recommends that it be granted.

### DISCUSSION

#### A. Legal Standards Governing Motions for Summary Disposition

Pursuant to 10 C.F.R. § 2.749(a), "[a]ny party to a proceeding may move, with or without supporting affidavits, for a decision by the presiding officer in that party's favor as to all or any part of the matters involved in the proceeding. The moving party shall annex to the motion a separate, short, and concise statement of the material facts as to which the moving party contends that there is no genuine issue to be heard." In accordance with 10 C.F.R. § 2.749(b), when a properly supported motion for summary disposition is made, "a party opposing the motion may not rest upon the mere allegations or denials of his answer; his answer by affidavits or as otherwise provided in this section must set forth specific facts showing that there is a genuine issue of fact." In addition, an opposing party must annex to its answer a short and concise statement of material facts as to which it contends there exists a genuine issue to be heard. 10 C.F.R. § 2.749 (a). All material facts

set forth in the moving party's statement will be deemed to be admitted unless controverted in the opposing party's statement. *Id.*

Pursuant to 10 C.F.R. § 2.749(d), "[t]he presiding officer shall render the decision sought if the filings in the proceeding, depositions, answers to interrogatories, and admissions on file, together with the statements of the parties and the affidavit, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a decision as a matter of law."<sup>2</sup>

**B. NRC Staff Supports Summary Disposition of Utah Contention GG**

In the Staff's December 15, 1999, statement of position on contentions, the Staff indicated that its review of Utah Contention GG had not been completed and that the Staff was not able to take a position with respect to it at that time. *See* "NRC Staff's Statement of Its Position Concerning Group I-II Contentions," dated December 15, 1999 at 2. At that time, however, the Staff incorrectly assumed that its review of the TranStor cask must be substantially completed before it could address Utah Contention GG. Upon closer review of the admitted portions of Utah Contention GG, as brought to light by the Applicant's Motion, the Staff is satisfied that it possesses sufficient information to address the contention as admitted. Consequently, the Staff is able at this time to take a position with respect to Utah Contention GG.

The Staff considers that the Applicant's revised analysis, HI-992295, addresses the issues raised in Utah Contention GG: the variation of the coefficient of friction over the surface of the pad and the shift from the static case to the kinetic case. *See* Aff. at ¶¶ 5, 12. The revised analysis

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<sup>2</sup> Pursuant to 10 C.F.R. § 2.749(c), if a party opposing the motion demonstrates in its affidavits that valid reasons exist why it cannot provide facts essential to oppose the motion, the presiding officer may deny the motion, order a continuance to permit affidavits to be obtained, or take such other action as may be appropriate.

considered variation in the coefficient of friction over the surface of the pad by using two different coefficients of friction to bound the highest and lowest coefficients of friction expected to occur between steel-concrete surfaces. Lee Aff. at ¶¶ 9-10. Further, the revised analysis considered the shift from the static case to the kinetic case when considering momentum of the moving casks by determining the lower coefficient of friction, which bounds any coefficient of friction expected to occur due to the shift from the static case to the kinetic case. Lee Aff. at ¶ 11. The Staff submits that the factual assertions submitted by the State of Utah in support of this contention have been rendered moot by the Applicant's revised TranStor cask stability analysis for seismic events.

Based on its review of the Applicant's Motion and the attachments thereto, including the Applicant's revised analysis, the Staff has determined that the Statement of Material Facts attached to the Applicant's Motion is correct. Lee Aff. at ¶ 3. Accordingly, the Staff submits that there no longer exists any genuine issue of material fact with respect to Utah Contention GG, and the Applicant is entitled to a decision in its favor on this contention as a matter of law.

#### CONCLUSION

For the reasons set forth above, the Staff supports the Applicant's Motion for summary disposition of Utah Contention GG and recommends that it be granted.

Respectfully submitted,

*Catherine Marco*

Catherine Marco  
Counsel for NRC Staff

Dated at Rockville, Maryland  
this 21<sup>st</sup> day of January 2000

January 21, 2000

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )  
 )  
PRIVATE FUEL STORAGE, LLC ) Docket No. 72-22-ISFSI  
 )  
(Independent Spent )  
Fuel Storage Installation) )

AFFIDAVIT OF HENRY W. LEE  
CONCERNING UTAH CONTENTION GG

I, Henry W. Lee, having first been duly sworn, do hereby state as follows:

1. My name is Henry W. Lee. I am employed as a senior structural engineer in the Technical Review Section A, Spent Fuel Project Office, Office of Nuclear Materials Safety and Safeguards, U.S. Nuclear Regulatory Commission (NRC) in Washington, D.C. A statement of my professional qualifications is attached hereto.

2. This Affidavit is prepared in response to the "Applicant's Motion for Summary Disposition of Utah Contention GG -- Failure to Demonstrate Cask-Pad Stability During Seismic Event For TranStor Casks" (Motion), filed on December 30, 1999, by Private Fuel Storage L.L.C. (Applicant or PFS).

3. I have reviewed the Applicant's Motion and the attachments thereto, in which PFS seeks summary disposition of Utah Contention GG. On the basis of my review of the Applicant's Motion and the documents attached to the Applicant's Motion, I am satisfied that the Statement of Material Facts attached to the Applicant's Motion is correct.

4. The contention asserts a single basis that was admitted for litigation in this proceeding. The contention states:

The Applicant has failed to demonstrate that the TranStor storage casks and the pads will remain stable during a seismic event, and thus, the application does not satisfy 10 C.F.R. §§ 72.122(b)(2) and 72.128(a), in that Sierra Nuclear's consultant, Advent Engineering Services, Inc., used a nonconservative "nonsliding cask" tipover analysis that did not consider that the coefficient of friction may vary over the surface of the pad and did not consider the shift from the static case to the kinetic case when considering momentum of the moving casks.

5. I am satisfied that the Applicant's revised analysis "TranStor Dynamic Response to 2000 Year Return Seismic Event," HI-992295, adequately resolves the issues set forth in the State's contention.

6. The "coefficient of friction" is a measure of the resistance to movement between two contacting surfaces. The value of the coefficient of friction depends on the materials sliding over each other and on the finished condition of the two contacting surfaces. It is customary to prescribe the static coefficient of friction between contacting materials in a "range of values" to bound the possible variations.

7. A typical range of static coefficient of friction values between a metal surface on concrete, masonry, or stone surfaces is 0.3 to 0.7, as given by the various design handbooks stated in paragraph 10 of the Declaration of Dr. Alan Soler, attached to the Applicant's Motion.

8. The value for kinetic coefficient of friction is generally slightly less than the value for static coefficient of friction. The value of kinetic coefficient of friction is taken to be about 25 percent smaller than the value of static coefficient of friction. *See, e.g., Ferdinand Beer and E. Russell Johnston, Jr., Vector Mechanics for Engineers Statics and Dynamics, McGraw-Hill Book*

Company, 1962. The lower bound static coefficient of friction reduced by 25% is 0.225 (e.g.  $0.3 \times 0.75 = 0.225$ ).

9. The Applicant's revised analysis, HI-992295, used two different coefficients of friction, 0.2 and 0.8. The lower coefficient of friction 0.2 emphasizes the potential of the cask to slide, and the higher coefficient of friction 0.8 emphasizes the possibility of cask tip-over.

10. The lower coefficient of friction of 0.2 used in the analysis is less than the lower bound static coefficient of friction reduced by 25 percent. Thus, the HI-992295 analysis has used a coefficient of friction less than the expected lower bound kinetic coefficient of friction between steel and concrete surfaces. The higher coefficient of friction of 0.8 used in the analysis is about 14 percent higher than the upper bound static coefficient of friction of 0.7 between steel and concrete surfaces (e.g.,  $0.8/0.7 \approx 1.14$ ). Therefore, the two coefficients of friction used by Holtec in the revised analysis bound expected variations in the coefficient of friction over the surface of the concrete pad.

11. The Applicant's revised analysis also took into account the effect of the reduction of the coefficient of friction due to the "shift from static case to the kinetic case." The shift from the static case to the kinetic case when considering momentum of the moving casks is considered in the HI-992295 analysis by determining the maximum displacements of the Transtor cask relative to the ISFSI pad based on the lower coefficient of friction 0.2. The lower coefficient of friction of 0.2 used in the analysis is less than the expected lower bound kinetic coefficient of friction of 0.225 between steel and concrete surfaces.

12. Based on the above considerations, I conclude that the revised analysis, HI-992295, has considered the effects of the coefficient of friction varying over the concrete pad and the shift

from static case to the kinetic case. Any variation in the coefficient of friction is within the range analyzed. Therefore the issues raised in Utah Contention GG have been adequately addressed.

13. I hereby certify that the foregoing is true and correct to the best of my knowledge, information and belief.

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Henry W. Lee

Subscribed and sworn to before me this  
\_\_\_\_\_ day of January, 2000.

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Notary public

My commission expires: \_\_\_\_\_

**Henry W. Lee**  
**Senior Structural Engineer**  
**Spent Fuel Project Office**  
**Office of Nuclear Materials Safety and Safeguards (NMSS)**  
**U.S. Nuclear Regulatory Commission**

**B.S. In Hydraulics Engineering, Cheng Kung University, 1963**  
**M.S. In Civil Engineering, University of Missouri at Rolla, 1966**  
**Ph.D. In Civil Engineering, University of Maryland at College Park, 1970**

Dr. Lee has more than thirty years of experience in Structural Engineering. He is a registered professional engineer and he is skilled in structural analysis, computer modeling, and finite element analysis.

Dr. Lee is currently performing structural evaluations for the licensing of spent nuclear fuel transportation and storage casks. His work includes the evaluation of the structural integrity of casks under the combined loadings of normal, off-normal, postulated design basis accident and extreme natural phenomena events, which include cask stability analysis under design basis seismic events. He has provided input for the preparation of NUREG-1567, Standard Review Plan for Spent Fuel Dry Storage Facilities; NUREG-1536, Standard Review Plan for Dry Cask Storage Systems; NUREG-1617, Standard Review Plan for Transportation Packages for Spent Nuclear Fuel. He has reviewed both the HI-STAR 100 Cask Storage application and the HI-STAR 100 Transportation Package application. He has also prepared many Safety Evaluation Reports for licensing actions involving the storage and transportation of spent nuclear fuel.

**PROFESSIONAL CHRONOLOGY:** Bridge Design Engineer, State of Illinois, 1966-1967; Research Assistant, University of Maryland, 1967-1970; Senior Structural Engineer, Ewell, Bombhardt Associates Inc., 1970-1972; Assistant Professor, South Dakota State University, 1972-1973; Research Engineer, Gilbert Associates Inc., 1973-1978; Structural Engineer, Structural Engineering Branch, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, 1978-1980; Structural Engineer, Transportation Certification Branch, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, 1980-1989; Senior Structural Engineer, Transportation Certification Branch, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, 1989-1995; Senior Structural Engineer, Spent Fuel Project Office, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, 1995-Present.

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Docket No. 72-22-ISFSI

OFFICE OF THE SECRETARY  
OF ENERGY  
REGULATORY AND  
ADJUDICATIONS STAFF

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF'S RESPONSE TO APPLICANT'S MOTION FOR SUMMARY DISPOSITION OF UTAH CONTENTION GG - FAILURE TO DEMONSTRATE CASK-PAD STABILITY DURING SEISMIC EVENT FOR TRANSTOR CASKS" in the above captioned proceeding have been served on the following through deposit in the Nuclear Regulatory Commission's internal mail system, with copies by electronic mail, or by deposit in the United States mail, first class, as indicated by an asterisk, with copies by electronic mail, this 21st day of January, 2000.

G. Paul Bollwerk, III, Chairman  
Administrative Judge  
Atomic Safety and Licensing Board  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555  
(E-mail copy to GPB@NRC.GOV)

Atomic Safety and Licensing Board  
Panel  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dr. Jerry R. Kline  
Administrative Judge  
Atomic Safety and Licensing Board  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555  
(E-mail copy to JRK2@NRC.GOV)

Office of the Secretary  
ATTN: Rulemakings and Adjudications  
Staff  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555  
(E-mail copy to  
HEARINGDOCKET@NRC.GOV)

Dr. Peter S. Lam  
Administrative Judge  
Atomic Safety and Licensing Board  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555  
(E-mail copy to PSL@NRC.GOV)

Office of the Commission Appellate  
Adjudication  
Mail Stop: 16-C-1 OWFN  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

James M. Cutchin, V  
Atomic Safety and Licensing Board  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555  
(E-mail to JMC3@NRC.GOV)

Jay E. Silberg, Esq.\*  
Ernest Blake, Esq.  
Paul A. Gaukler, Esq.  
SHAW, PITTMAN, POTTS &  
TROWBRIDGE  
2300 N Street, N.W  
Washington, DC 20037-8007  
(E-mail copy to jay\_silberg, paul\_gaukler,  
and ernest\_blake  
@shawpittman.com)

Denise Chancellor, Esq.\*  
Fred G. Nelson, Esq.  
Laura Lockhart, Esq.  
Utah Attorney General's Office  
160 East 300 South, 5th Floor  
P.O. Box 140873  
Salt Lake City, UT 84114-0873  
(E-mail copy to dchancel@State.UT.US)

Connie Nakahara, Esq.\*  
Utah Dep't of Environmental Quality  
168 North 1950 West  
P. O. Box 144810  
Salt Lake City, UT 84114-4810  
(E-mail copy to cnakahar@state.UT.US)

Danny Quintana, Esq.\*  
Danny Quintana & Associates, P.C.  
68 South Main Street, Suite 600  
Salt Lake City, UT 84101  
(E-mail copy to quintana  
@Xmission.com)

Joro Walker, Esq.\*  
Land and Water Fund of the Rockies  
2056 East 3300 South, Suite 1  
Salt Lake City, UT 84109  
(E-mail copy to  
joro61@inconnect.com)

John Paul Kennedy, Sr., Esq.\*  
1385 Yale Ave.  
Salt Lake City, UT 84105  
(E-mail copy to [john@kennedys.org](mailto:john@kennedys.org))

Diane Curran, Esq.\*  
Harmon, Curran, Spielberg &  
Eisenberg  
1726 M Street, N.W., Suite 600  
Washington, D.C. 20036  
(E-mail copy to  
dcurran@harmoncurran.com)

*Catherine L. Marco*

Catherine L. Marco  
Counsel for NRC Staff