

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Michael C. Farrar, Chairman  
Dr. Jerry R. Kline  
Dr. Peter S. Lam

In the Matter of

PRIVATE FUEL STORAGE

(Independent Spent Fuel Storage  
Installation)

Docket No. 72-22-ISFSI

ASLBP No. 97-732-02-ISFSI

May 22, 2003

PARTIAL INITIAL DECISION  
(Regarding Geotechnical Issues)

As we have noted in many previous decisions, Private Fuel Storage (PFS) is a consortium of electric utility companies that applied for an NRC license to build and to operate, on the Reservation of the Skull Valley Band of Goshute Indians some 50 miles southwest of Salt Lake City, an aboveground facility for the temporary storage of spent fuel rods from the nation's nuclear reactors. The Band would derive substantial income from making its Reservation available to the Applicant for the facility, which is intended to serve as the spent fuel's way-station before the coming to fruition of the permanent underground repository long planned for Nevada's Yucca Mountain.

The State of Utah and the Southern Utah Wilderness Alliance (SUWA), among others, challenged a number of aspects of the proposed facility. During a nine-week evidentiary trial, which was held in Salt Lake and at NRC Headquarters and ended in mid-2002, the Applicant PFS -- responding to the State's and SUWA's contentions -- attempted to demonstrate that its proposal was acceptable in terms of meeting certain safety and environmental regulatory

criteria established under federal law, including the Atomic Energy Act and the National Environmental Policy Act (NEPA).

One of those issues, which we resolve today, stemmed from the State's so-called "geotechnical" contentions (denominated Utah L and QQ), involving whether the design of the proposed facility is sufficient to withstand any seismic forces it is likely to face as a consequence of earthquakes that might affect it.<sup>1</sup> Those contentions derive from the Commission's regulations governing site evaluations, under which proposed sites must be examined in terms of the "frequency and severity of external natural and man-induced events that could affect [the facility's] safe operation." 72 CFR § 72.90(b). In terms of seismic forces, this in turn requires the facility be designed to withstand the so-called "design basis earthquake," or "safe shutdown earthquake"<sup>2</sup> (a term used in this field to similar purpose as the "credible accident" concept which underlay our recent decision on aircraft crash likelihood).

For purposes of understanding and deciding the seismic issues, the proposed facility's design can be simply described. Being a facility for storage only, it consists essentially -- insofar as seismic risks are involved -- of a canister transfer building (CTB) and an array of 500 concrete pads on which the spent fuel storage casks would sit. Other onsite structures that support the facility's storage mission raise no seismic risk concerns.

In the CTB, canisters -- sealed at the nuclear power plant at which they originated -- containing spent fuel rods would be transferred from (1) the transportation casks within which they traveled by rail to the facility, to (2) the storage casks which will sit upon the concrete pads.

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<sup>1</sup> Apart from certain issues about potential aircraft accidents that have arisen since our March 10 decision on that subject and that will be considered at two May 29 Board sessions, this Board has remaining before it only one issue, SUWA's environmental contention concerning the placement down Skull Valley of the proposed rail line that would service the facility. For its part, our sister Board has before it several issues about the Applicant's financial qualifications, which it anticipates will be decided shortly.

<sup>2</sup> 10 C.F.R. Part 100, Appendix A, referenced in 10 C.F.R. § 72.102(b).

Those transfers of canisters into the storage casks will be facilitated by the CTB's overhead bridge crane and semi-gantry crane. The application envisions the eventual emplacement of up to 4000 of the storage casks on the concrete pads.

The seismic issues before us concern the stability, during possible earthquakes, of those storage casks, which will be some 20 feet tall and 11 feet in diameter, made of concrete sandwiched between layers of stainless steel. Openings in the top and bottom of the casks are designed to create natural air circulation that would provide the level of cooling then needed by the canisters of spent fuel (which before being transported to Skull Valley would have been cooled for any number of years in pools of water -- and perhaps in dry storage as well -- at the various nuclear power plants at which the fuel originated). Concern was expressed at the hearing about the casks tipping over, either in the CTB (which can hold only five casks at a time) or on the concrete pads, with consequent potential rupturing of the fuel rods or diminution of the natural cooling they need.

A very large, dual-tracked transporter vehicle would straddle and lift a storage cask in order to move it (at 2 miles per hour and 4 inches off the ground) from the CTB to the concrete pad upon which it will sit. The pads -- each 67 feet long and 30 feet wide -- will be made of 3 foot thick reinforced concrete. The pads will be separated from each other by 5 feet in the long direction; in the other direction, they will be separated by 35 feet in order to provide a travel lane for the transporter vehicle to place the casks in a 4 x 2 array on each pad.

To provide support to the pads and the CTB, the Applicant proposes to underlay and to surround them with a mixture of soil and cement. Depending on the proportions of each constituent contained therein, the various mixtures are known as "soil-cement" or "cement-treated soil," the former being of more substantial quality and of greater strength.

We have previously described Skull Valley as being framed by the Stansbury Mountains to the East and the Cedar Mountains to the West: our recent decision on the risk of aircraft

crashes (LBP-03-04, 57 NRC\_\_\_ ) provides that and other information about the local geography. For purposes of geotechnical analysis, important nearby features, in addition to the faults associated with those mountains, include the Wasatch Fault, just East of Salt Lake City, as well as two previously-unknown faults (informally named the East and West faults) discovered through the Applicant's investigations.

As will be seen, the State filed a number of contentions that were eventually reshaped into the specific issues which came to hearing before us. In essence, the major issues the State raised involved the following six topics:

- the characterization of the site's subsurface soils, which the State charges was inadequate;
- the proposed uses of soil-cement to overcome foundation sliding, which the State asserts involve novel and untested techniques;
- the assumptions about facility behavior which underlie the seismic design, which assumptions the State says are flawed;
- the stability of the casks during a design basis earthquake, which the State urges has not been adequately demonstrated;
- the exemption from the long-standing "deterministic" standard for predicting ground motion in favor of a "probabilistic" one, which the State challenges as unsupported; and
- the ability of the facility to comply, after a design basis earthquake, with established radiological dose consequences standards, which the State believes will not be met.

On the facts presented, we find that the Applicant has met its burden of proof on all these seismic-related issues. Although the State presented thoughtful, valuable evidence that tested many aspects of the Applicant's presentation, the Applicant's position essentially withstood that scrutiny.

In this decision, we explore at some length all the sub-issues which underlie the main topics outlined above, and explain why we reject the conclusions the State would have us reach. At the same time, we recognize the seriousness of the questions the State raised; the

extensive exploration of those questions in the hearing should provide reassurance to the State's citizens that the merits of the Applicant's proposal have been thoroughly scrutinized. In addition, the State brought to the fore two conflict-of-interest concerns that, although eventually found not to undercut the evidence to which those concerns related, plainly warranted analysis.

We set forth herein all the subsidiary findings needed to address the six major issues that the State raised about the scope and result of the Applicant's seismic investigations and analyses. Our determinations on those six major issues lead inexorably to the ultimate safety findings: based on the preponderance of the evidence in the record and taking into account the nature of the seismic forces the facility is predicted to encounter and the investigations and analyses that have been conducted, the Applicant's proof on the issues in controversy -- which was essentially supported by the NRC Staff based on its lengthy pre-hearing review of the application and related materials -- enables us to say, with the required degree of certainty, that (1) the spent fuel casks would not tip over during a design basis seismic event; and (2) even if one or more casks were to tip over, the spent fuel canister inside would not break or melt. It bears mention as well that, as both the Commission and this Board have previously indicated, even if a canister were to break or melt, the absence of significant dispersive forces would mitigate the consequences of such an event.

Not surprisingly given the complex nature of the contentions and the evidence, our decision today, so briefly summarized above, is a very long one. In Parts I and II, we set forth certain preliminary information about the genesis, development and reshaping of the State's contentions (including the efforts the parties made to put forward a consensus re-statement of those contentions, which arose over a lengthy period of time), and about the facility design and the State's concerns. We then turn in Parts III through VIII to address each of the six major concerns the State raised.

Those first eight parts of the decision -- ending on page 105 -- provide in narrative form an overview of the underlying reasoning that led us to the results we reach. Those eight parts, in turn, are keyed to Part IX, in which we provide a lengthy "Detailed Analysis of Record and Findings of Fact" [hereinafter referred to as "Findings"] that reviews the evidence and includes determinations either providing support for, or resulting from, the opinions and holdings expressed in the earlier, narrative portion of the decision. Finally, in Part X, we recite briefly our formal Conclusions of Law and our Order.

An outline of the entire decision's contents is provided below. A separate table of contents for Part IX begins on page 106.

I. BACKGROUND .....	10
A. Contention Utah L .....	10
B. Contention Utah QQ .....	16
C. Unified Contention L/QQ .....	18
D. Witness Qualifications .....	25
II. FACILITY DESIGN AND LAYOUT .....	27
A. Design and Location .....	27
B. General State Concerns .....	28
III. CHARACTERIZATION OF SUBSURFACE SOILS .....	30
A. Subsurface Soils at the Proposed Facility .....	30
B. Factors of Safety of Foundation Soil .....	31
C. Importance of the Shear Strength of the Upper Lake Bonneville Clays .....	32
D. Specific State Concerns with the Applicant's Testing of the Subsurface Soils .....	33
1. Density of Soil Borings .....	33
2. Continuous Soil Sampling .....	34
3. Undrained Shear Strength Determination .....	35
4. Additional Tests (Cyclic Triaxial and Triaxial Extension Tests) .....	37
E. Board Conclusions .....	39
IV. USE OF SOIL-CEMENT AND CONSTRUCTION PROCESS .....	40
A. Background and Proposed Uses .....	40
1. Design Description .....	40
2. State's General Concerns .....	40
B. Specific State Challenges .....	41
1. Potential Problems with the Construction Process .....	41
2. Design Problems Affecting the Native Soil and Concrete Storage Pad .....	42
a. Cracking .....	43
b. Moisture .....	43
c. Pad-to-Pad Interactions .....	44
C. Testing of the Soil-cement .....	44
1. Adequacy .....	44
2. Proof of Design and Timing .....	45
D. "Unique" Use of Soil-cement .....	48
E. Young's Modulus .....	49
F. Board Conclusions .....	50
V. SEISMIC DESIGN AND FOUNDATION STABILITY .....	51
A. Overview of the Pad Storage System .....	51
1. Proposed Design Concept for the Pad Storage System .....	51
2. State's General Concerns with the Applicant's Proposed Pad Design System .....	51
B. Specific State Concerns with the Applicant's Pad Stability Analysis .....	52
1. Concerns with the Applicant's Methodology .....	52
2. Cask Sliding as a Design Concept .....	53
3. Flexibility of the Storage Pads .....	53
4. Soil-Structure Interaction Analysis .....	55

a. Geomatrix Analysis of Soil Column .....	55
b. Pad Acceleration .....	56
5. Pad-to-Pad Interaction .....	57
6. Pad Settlement .....	59
7. CTB Analysis .....	60
8. Transfer Operations .....	61
C. Board Conclusions .....	62
VI. CASK STABILITY .....	63
A. General Overview .....	63
B. Drs. Singh and Soler .....	64
1. Asserted Conflict of Interest for Drs. Singh and Soler .....	64
2. Experience of Drs. Singh and Soler .....	65
C. Reliability of the Analysis .....	66
1. DYNAMO Program .....	66
2. VisualNastran Results .....	67
3. Input Parameters .....	70
a. Contact Stiffness .....	70
b. Damping Values .....	71
4. Angle of Rotation .....	73
5. Time Histories .....	74
6. Cold Bonding .....	75
D. Khan Report .....	76
E. State's Request for a Shake Table Analysis .....	77
F. The Staff-Sponsored Sandia Report Conducted by Dr. Vincent Luk .....	79
1. Conflict of Interest with Study's Advisory Panel .....	80
2. Dr. Luk's Relative Experience .....	82
3. Comparison of Dr. Luk's Report and the Holtec Report .....	83
4. State's Concerns with Luk's Model .....	83
G. Board Conclusions .....	86
VII. SEISMIC EXEMPTION REQUEST .....	87
A. Background .....	87
B. Legal Standards Governing the Site-Specific Analysis Necessary to Obtain an ISFSI License .....	87
C. Basis for the Applicant's Exemption Request .....	88
1. Use of a Risk-Informed Seismic Design .....	88
2. Use of Risk Reduction Factors .....	89
a. Risk Reduction Factors -- ISFSI versus a Nuclear Power Plant .....	90
b. Fragility Curves for the SSCs .....	91
c. Risk Reduction Factors of Free-Standing Casks .....	91
d. CTB Foundations and Storage Pads .....	92
e. Transfer Time Estimates .....	94



D. NRC Staff's Justification for Granting Exemption .....	95
1. DOE Standard .....	96
2. INEEL Exemption for TMI facility .....	96
3. The Geomatrix Probabilistic Seismic Analysis .....	97
4. Comparison of the Applicant's Design Proposal with Utah's Standards for Highway Bridges .....	99
E. Board Conclusions .....	99
VIII. COMPLIANCE WITH THE RADIATION DOSE LIMITS .....	100
A. Dose Consequences Analysis Conducted by the Applicant .....	100
1. Time Spent at the Boundary .....	101
2. Tip-over Analysis .....	102
a. Duration of the Event .....	102
b. Multiple Cask Tip-over versus Single Cask Tip-over .....	103
c. Angular Velocity .....	104
d. Deceleration .....	104
3. Dose Calculations .....	104
IX. DETAILED ANALYSIS OF RECORD AND FINDINGS OF FACT .....	106
X. CONCLUSIONS OF LAW .....	370

IX. DETAILED ANALYSIS OF RECORD AND FINDINGS OF FACT .....	109
A. Site Design and Layout .....	109
1. Design and Location .....	109
2. The Geologic Setting of the Proposed Facility .....	113
B. Characterization of Subsurface Soils .....	120
1. Subsurface Soils at the Proposed Facility .....	120
2. Factors of Safety for the Applicant’s Design .....	122
3. Importance of the Shear Strength of the Upper Lake Bonneville Clays ...	124
4. Specific State Concerns with the Applicant’s Testing of the Subsurface Soils .....	125
a. Density of Soil Borings .....	125
b. Continuous Soil Sampling .....	132
c. Undersampling .....	135
d. Additional Tests (Cyclic Triaxial and Triaxial Extension Tests) ...	139
C. Use of Soil-cement and Construction .....	144
1. Background and Proposed Uses .....	144
a. Design Description .....	144
b. General State Concerns .....	146
2. Specific State Challenges .....	147
a. Potential Problems with the Construction Process .....	147
b. Design Problems Affecting the Native Soil and the Cement Pad ..	150
(i) Cracking .....	150
(ii) Moisture .....	152
(iii) Pad-to-Pad Interactions .....	154
3. Testing .....	157
a. Adequacy .....	157
b. Proof of Design and Timing .....	162
4. Precedent .....	166
5. Young’s Modulus .....	167
D. Seismic Design and Foundation Stability .....	170
1. Overview of the Pad Storage System .....	170
a. Proposed Design Concept for the Pad Storage System .....	170
b. Overview of State’s General Concerns .....	170
2. Specific State Concerns with the Applicant’s Pad Stability Analysis .....	173
a. Concern with the Applicant’s Methodology .....	173
b. Cask Sliding as a Design Concept .....	175
c. Flexibility of the Storage Pads .....	177
d. Soil-Structure Interaction Analysis .....	181
(i) Geomatrix Analysis of the Soil Column .....	181
(ii) Pad Acceleration .....	183
e. Pad-to-Pad Interaction .....	188
f. Pad Settlement .....	196
g. CTB Analysis .....	201
h. Transfer Options .....	203

E. Cask Stability .....	207
1. General Overview .....	207
2. Singh/Soler .....	215
a. Asserted Conflict of Interest for Drs. Singh and Soler .....	215
b. Experience .....	217
3. Reliability of Analysis .....	219
a. Dynamo Program .....	219
b. VisualNastran Results .....	225
c. Input Parameters .....	231
(i) Contact Stiffness .....	231
(ii) Damping Values .....	241
d. Angle of Rotation .....	247
e. Time Histories .....	249
f. Cold Bonding .....	251
4. Khan Report .....	252
5. State's Request for a Shake Table Analysis .....	256
6. The Staff-Sponsored Sandia Report Conducted by Dr. Vincent Luk .....	260
a. Conflict of Interest Involving Study's Advisory Panel .....	270
b. Dr. Luk's Relative Experience .....	272
c. Comparison of Dr. Luk's Report and the Holtec Report .....	275
d. Luk's Modeling .....	278
e. Young's Modulus .....	284
F. Seismic Exemption Request .....	287
1. Background .....	287
2. Legal Standards for Governing the Site-Specific Analysis Necessary to Obtain an ISFSI License .....	289
3. Classification of Hazardous Curves .....	292
4. Basis for Applicant's Exemption Request .....	300
a. Use of a Risk-Informed Seismic Design .....	300
b. Use of Risk Reduction Factors .....	302
(i) Risk Reduction Factors at the ISFSI v. at a Nuclear Power Plant .....	305
(ii) Fragility Curves for the SSCs .....	309
(iii) Risk Reduction Factors of Free-Standing Casks .....	309
(iv) CTB Foundations and Storage Pads .....	316
(v) Time Transfer Estimates .....	322
5. NRC Staff's Justification for Granting Exemption .....	323
a. DOE Standard .....	336
b. INEEL Exemption for TMI .....	338
c. Geomatrix Probabalistic Seismic Analysis .....	341
d. Comparison of the Applicant's Design Proposal with State Standards for Highways and Bridges .....	348
G. Compliance with the Radiation Dose Limits .....	351
1. Dose Consequences Analysis Conducted by Applicant .....	352
a. Time Spent at Boundary .....	356
b. Tip-over Analysis .....	359
(i) Duration .....	359

(ii) Multiple Cask Tip-over v. Single Cask Tip-over . . . . .	361
(iii) Angular Velocity . . . . .	362
(iv) Deceleration . . . . .	364
c. Dose Calculations . . . . .	365
2. Complete Air Inlet Blockage Under HI-STORM 100 Certificate of Compliance . . . . .	368
X. CONCLUSIONS OF LAW . . . . .	370

## X. CONCLUSIONS OF LAW

The Licensing Board has considered all of the material presented by the parties on Contention Utah L/QQ (Geotechnical). Based upon a review of the entire evidentiary record in this proceeding and the proposed findings of fact and conclusions of law submitted by the parties, and in accordance with the views set forth in Parts I through IX above -- which we believe are supported by a preponderance of the reliable, material and probative evidence in the record -- the Board has decided the matters in controversy concerning this contention and reaches the following legal conclusions in favor of the Applicant:

There is reasonable assurance the spent fuel casks would not tip over during a design basis seismic accident. See Findings E.5-.8, .21, .52, .54, .168, .171-.74; F.62-.64.

If a spent-fuel storage cask were to tip over, there is reasonable assurance the spent fuel canister inside would not break or melt. See Findings E.9; F.65; G.6-.9, .36-.38, .49-50.

In any event, as has been previously noted by the Commission and the Board, even if the spent fuel canister were to break or melt, the absence of significant dispersive forces would mitigate the consequences of the accident. CLI-00-13, 52 NRC 23, 31 (2000). See also Findings F.34, .102.

Additionally we find the Applicant has met its burden in each of the following aspects of the contention:

Section C of Contention Utah L/QQ. Pursuant to 10 C.F.R. §§ 72.102(c) and (d), the Applicant has demonstrated that the program it implemented to determine the characteristics of the soils at the site provides reasonable assurance that the soil conditions are adequate for the proposed foundation loading.

Section D of Contention Utah L/QQ. Pursuant to 10 C.F.R. § 72.122(b)(2), the Applicant has demonstrated that the design of the structures, systems, and components important to safety at the facility provides reasonable assurance that anticipated earthquake phenomena will not impair their capability to perform their intended safety functions.

Section E of Contention Utah L/QQ. Pursuant to 10 C.F.R. § 72.7, both the Applicant and the Staff have provided adequate justification to support the conclusion that the Staff's grant of the Applicant's exemption request -- i.e., to use a PSHA methodology and a 2000-year design basis earthquake -- was authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest.

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For the reasons set forth herein, it is, this 22nd day of May, 2003, ORDERED that:

1. Contention Utah L/QQ (Geotechnical) is RESOLVED in favor of the Applicant PFS.
2. Pursuant to 10 C.F.R. § 2.760(a), this Partial Initial Decision will constitute the FINAL ACTION of the Commission within forty (40) days of this date unless a petition for review is filed in accordance with 10 C.F.R. § 2.786(b), or the Commission directs otherwise.

3. Within fifteen (15) days after service of this partial initial decision (which shall be considered to have been served by regular mail for the purpose of calculating that date), any party may file a petition for review with the Commission on the grounds specified in 10 C.F.R. § 2.786(b)(4). The filing of a petition for review is mandatory in order for a party to have exhausted its administrative remedies before seeking judicial review. Within ten (10) days after service of a petition for review, any party to the proceeding may file an answer supporting or opposing Commission review. The petition for review and any answers shall conform to the requirements of 10 C.F.R. § 2.786(b)(2)-(3).

THE ATOMIC SAFETY  
AND LICENSING BOARD\*

[Original Signed By]

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Michael C. Farrar, Chairman  
ADMINISTRATIVE JUDGE

[Original Signed By]

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Jerry R. Kline  
ADMINISTRATIVE JUDGE

[Original Signed By]

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Peter S. Lam  
ADMINISTRATIVE JUDGE

Rockville, Maryland

May 22, 2003

\* Copies of this Partial Initial Decision were sent this date by Internet e-mail transmission to counsel for (1) Applicant PFS; (2) Intervenors Skull Valley Band of Goshute Indians, OGD, Confederated Tribes of the Goshute Reservation, Southern Utah Wilderness Alliance, and the State of Utah; and (3) the NRC Staff.