April 28, 2000

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF'S NOTICE CONCERNING CONTENTION UTAH K,
AND STATEMENT OF POSITION CONCERNING CONTENTION UTAH L

On February 2, 2000, the Licensing Board issued an "Order (General Schedule Revision)" ("Order"), in which it revised the schedule for litigation of various contentions in this proceeding. As set forth therein, the date established for the NRC Staff ("Staff") to file its position on Contentions Utah K (Offsite Hazards) and Utah L (Geotechnical) was extended to April 28, 2000, due to the Staff's need to obtain further information from Private Fuel Storage, L.L.C. ("PFS" or "Applicant") relative to those contentions (*see* Order at 4 n.3, and Attachment A thereto).

The Staff wishes to advise the Licensing Board and parties that it is unable to file a statement of its position on Contention Utah K at this time, inasmuch as it has not yet received certain outstanding information and any related revised analysis that may be required from the Applicant concerning the aircraft hazards which are the subject of Contention Utah K. Upon receipt of that information and any related revised analysis, the Staff will be in a position to estimate the time required for it to complete its review and to state a final position with respect to those issues; at this time, however, the Staff does not expect that a revision to the schedule for litigation of Contention Utah K will be required.

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The Staff will advise the Licensing Board and parties as to when its review of these remaining issues is expected to be concluded, as soon as it is able to do so.

With respect to Contention Utah L, the Staff has completed its review of the matters raised in that contention. In accordance with the Licensing Board's Order, the Staff herewith files a statement of its position concerning Contention Utah L, as set forth in the Attachment hereto.

Respectfully submitted,

Sherwin E. Turk
Counsel for NRC Staff

Dated at Rockville, Maryland
this 28th day of April 2000

Attachment

NRC Staff Position Concerning
Utah Contention L (Geotechnical)

Utah Contention L:

> The Applicant has not demonstrated the suitability of the proposed ISFSI site because the License Application and SAR do not adequately address site and subsurface investigations necessary to determine geologic conditions, potential seismicity, ground motion, soil stability and foundation loading.

The "basis" statements for this contention include the following matters:

1. Surface Faulting.
2. Ground Motion.
3. Characterization of Subsurface Soils:
    a) Subsurface investigations;
    b) Sampling and analysis;
    c) Physical property testing for engineering analysis.
4. Soil Stability and Foundation Loading.

NRC Staff Position:

The NRC Staff ("Staff") has reviewed the matters raised by this contention, concerning the license application submitted by Private Fuel Storage, L.L.C. ("PFS" or "Applicant"), for construction and operation of an Independent Spent Fuel Storage Installation ("ISFSI") on the Reservation of the Skull Valley Band of Goshute Indians. Based on its review, the Staff concludes that the Applicant has adequately addressed the site and subsurface investigations necessary to determine geologic conditions, potential seismicity, ground motion, soil stability and foundation loading for construction and operation of its facility at the proposed site. The bases for this conclusion are set forth below with respect to each of the subissues raised by the State in this contention.[1]

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[1] The Staff notes that the Applicant has submitted a request for exemption from the deterministic criteria established in 10 C.F.R. § 72.102(f)(1), in favor of a probabilistic approach as described in 10 C.F.R. §100.23 (Parkyn, 1999). This issue is outside the scope of Contention Utah L.

1. Surface Faulting

Utah Contention L, subissue 1, refers to the estimates of faulting and vibratory ground motion, as presented in the Safety Analysis Report ("SAR") submitted by PFS with its license application in June 1997. In particular, the State of Utah ("State") contended that the Applicant's original SAR did not adequately evaluate the proposed site for tectonic structures underlying the site with regard to their potential for surface fault-displacements, as required in NRC regulations in 10 C.F.R. Part 100, Appendix A, § IV(b)(2). In support of this portion of the contention, the State asserted that original seismic-reflection surveys indicated faults beneath the proposed site that displace Quaternary sedimentary deposits that range in age between 500,000 and 10,000 years. As such, these faults would be considered capable, as defined in Appendix A, since Appendix A, § III (g)(1) defines capable faults as those faults that exhibit movement once in the last 35,000 years or repeated movements within the last 500,000 years.

The State contended that undetected faults beneath the site could produce greater vibratory ground motion than predicted by the Applicant (and for which the facility was designed) and could produce damaging surface rupture directly beneath the facility. In addition, the State contended that potentially active but undetected faults in the surrounding region (some with recurrence intervals as large as 130,000 years), and particularly those that may be buried beneath the "Hickman Knolls Horst Block" could produce vibratory ground motions not accounted for in the Applicant's seismic hazard assessment.

During its review, the Staff submitted several requests for additional information ("RAIs") to the Applicant, which addressed the potential for faulting and seismicity. In particular, the Staff asked the Applicant to provide additional evidence for the nature of subsurface features beneath the proposed site in Skull Valley, and additional geological and geophysical information regarding faults in the vicinity of the site.

In response to the Staff's RAIs, the Applicant re-evaluated the seismic and faulting hazards of the proposed site. The Applicant's re-evaluation included extensive and detailed geological and geophysical investigations, including detailed analyses of existing and newly acquired geophysical data, acquisition of more than 6 km of high-resolution S-wave reflection data, detailed boring and trenching studies of faults identified from the new seismic data, detailed geological mapping of Hickman Knolls, and analyses of Quaternary landforms and related features to reassess the nature and timing of late Quaternary (last 150,000 years) deformation in the region. Results of these investigations were documented in Bay Geophysical Associates, Inc. (1999) and Geomatrix Consultants, Inc. (1999a), and subsequent revisions of the SAR, through Revision 10 (PFS, 2000).

The Staff reviewed the complete geological and geophysical record provided by the Applicant in its SAR and responses to the Staff's RAIs, in accordance with guidance provided in NUREG-1567 ("Standard Review Plan for Spent Fuel Storage Facilities"). On the basis of this review, the Staff concluded that the revised seismic and faulting hazard analyses incorporate sufficient geological and geophysical information to adequately assess the seismic and faulting hazards.

2. Ground Motion

In the second basis statement for Utah Contention L, the State contended that the site might be subjected to ground motions greater than those anticipated by the Applicant due to amplitude and duration effects of earthquake-rupture directivity. The State asserted that failure to adequately assess ground motion places risk on the public and the environment and fails to comply with 10 C.F.R. § 72.102(c). To support this basis statement, the State cited Sommerville et al. (1997).

Utah Contention L refers to the Applicant's ground motion estimates as presented in a previous version of the SAR, that was filed by the Applicant in June 1997. Since then, the SAR has been revised based on additional, comprehensive site characterization investigations in response to the Staff's RAIs. Further, a comprehensive probabilistic earthquake ground motion and surface faulting hazard assessment was included in Revision 3 of the SAR (PFS, 1998), along with a supporting technical report (Geomatrix Consultants, Inc. 1999a). Based on results of its revised seismic hazard analyses, the Applicant developed design ground motion values as detailed in Geomatrix Consultants, Inc. (1999b). The design ground motions were determined using the procedure described in Regulatory Guide ("Reg. Guide") 1.165. Prior to implementing the Reg. Guide 1.165 procedure, the site seismic hazard results were modified to account for the near-source effects of rupture directivity and the polarization of ground motions. Adjustments to the seismic hazard results that account for these effects were made using empirical models developed by Somerville et al. (1997), consistent with the methodology referred to by the State in its basis statements for Contention L.

The Staff conducted an independent technical review of seismic and faulting hazard investigations at the site, including near-source effect of rupture directivity (Stamatakos et al., 1999). Seismic issues important to siting the proposed ISFSI were evaluated, and compliance with NRC regulations and regulatory guidance was assessed. The Staff's review included a survey of state-of-the-art literature; analyses of current relevant NRC regulations; and independent analyses of geophysical data, sensitivity of alternative models, and uncertainties in ground-motion estimates. Based on this review, the Staff concluded that the revised ground motion hazard analyses incorporate directivity effects adequate to address the State's concerns. Further, based on its review, the Staff determined that the Applicant's implementation of Sommerville et al. (1997) methodology in considering near-source effect is technically sound and provides reasonable assurance that the ground motion produced by the nearby capable faults, including the East, West, Stansbury and East Cedar Mountain faults, are sufficiently assessed.[2]

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[2]The State recently filed a contention (Contention Utah JJ) addressing co-seismic rupture of the East-West and Stansbury faults. This issue is beyond the scope of Contention Utah L.

3. Characterization of Subsurface Soils

Subissue 3 of Utah Contention L refers to the adequacy of the Applicant's characterization of the subsurface soils as presented in the original version of the SAR that was filed by PFS in June 1997. The State contended that the investigation of subsurface conditions that was presented in the original PFS SAR was not adequately rigorous or detailed. Questions concerning the adequacy of the site investigation were raised by the Staff in several RAIs to the Applicant. Subsequently, the Applicant conducted additional field and laboratory testing that led to substantial improvements in its characterization of the subsurface soils at the site, as documented in recent revisions to the SAR, through Revision 10 (PFS, 2000).

(a) Subsurface investigations

The Staff has reviewed the information presented in § 2.6.1.5, "Facility Plot Plan and Geologic Investigations", of the revised SAR that was filed by PFS in December 1999. Based on its review, the Staff has determined that this information is acceptable for use in other sections of the SAR to develop the design bases of the Facility, perform additional safety analysis, and demonstrate compliance with the regulatory requirements 10 C.F.R. §§ 72.102(c) and (d). The site investigation included 32 borings for sampling and standard penetration testing (20 in the pad emplacement area, 10 in the canister transfer building area, and two along the access road), 39 cone penetrometer tests, and 16 dilatometer tests. The test locations and cross-section lines are given in the site plans in Figures 2.6-2 and 2.6-19 of the SAR. The subsurface soil layering is described through 14 cross sections presented in SAR Figure 2.6-5 (Sheets 1 through 14). The Staff concludes that the subsurface soil characteristics of the site are described satisfactorily by the Applicant so as to resolve the State's concerns.

The State also contended in this subissue that the Applicant should discuss future geochemical effects of the environment (weather and rain water) on the physical and strength characteristics of the soil and rock at the proposed site. Such processes, where they occur, develop slowly and are likely to require much longer time than the anticipated design life of the proposed facility to produce appreciable effects on the engineering properties of the soil and rock. Therefore, the State's concern over possible effects of geochemical processes is not valid.

(b) Sampling and analysis

In this subissue, the State contended that the quantity and quality of soil samples were not sufficient to determine if the soils can adequately support the proposed foundation loading. The Staff reviewed information presented in SAR §§ 2.6.1.11 ("Static and Dynamic Soil and Rock Properties at the Site") and 2.6.1.12 ("Stability of Foundations for Structures and Embankments"), and determined that the information provided by PFS is acceptable and satisfies the regulatory requirements of 10 C.F.R. §§ 72.102(c) and (d). The foundation types proposed for the site (30 ft by 64 ft footing for the cask storage pads, and 165 ft by 265 ft raft for the canister transfer building), belong to the class of wide footings that distribute the super-structure loads over a large soil volume. The behavior of such

foundations is not determined by pockets of weak soil that may occur below the foundation but is governed by the average soil conditions over the large influence zone (*e.g.*, Terzaghi *et al.*, 1996, Figure 51.3). Therefore, the sampling and testing program conducted by the Applicant was evaluated on the basis of its capability to establish the average soil conditions for the design of the proposed foundation types. The design parameters were evaluated using a combination of laboratory and field testing. The cone penetrometer data, which give continuous profiles of properties over the entire depth of the top 25-30 ft soil layer at 39 locations across the site, were sufficient to establish the averages used in the design parameters.

The State also raised a concern under this subissue related to the availability of detailed information on the field and laboratory testing procedures to enable an independent review and assessment of the quality of data collected. This concern related to the quality assurance qualifications of the Applicant and its contractors. The Staff has determined that the quantity and quality of the Applicant's soil samples are sufficient to determine the soil conditions' adequacy to support the proposed foundation loading.

(c) Physical property testing for engineering analysis

In this subissue, the State contended that the static and dynamic soil properties used in the geotechnical analyses and design, as presented in the original version of the SAR, were derived either from a generalization of an insufficient amount of site-specific test data or from an extrapolation of information obtained from the literature. Concerns about the representativeness of the geotechnical data in the SAR were raised by the Staff in its RAIs to the Applicant. In response to the Staff's RAIs, PFS submitted supplemental geotechnical data. In addition to the standard penetration test data and laboratory test data for index properties, compressive strength, and compressibility that were initially submitted in the SAR, PFS provided: (1) penetration resistance and compression and shear wave velocities from field dynamic cone penetrometer testing; (2) soil modulus from field dilatometer testing; (3) compression and shear wave velocities from field seismic refraction survey; (4) index properties and static strength and compressibility data from laboratory testing (Atterberg limits, particle-size gradation, density, specific gravity, triaxial compression, consolidation, and direct shear); (5) dynamic volume change data from cyclic triaxial testing; and (6) data on the variation of shear modulus and damping ratio as functions of strain amplitude. The Staff determined that these data and their use in the geotechnical analyses and design presented in Revision 10 of the SAR (PFS, March 2000) satisfy the requirements for use of site-specific static and dynamic soil properties.

4. Soil Stability and Foundation Loading

In this subissue, the State contended that the geotechnical analyses presented in the SAR do not account for the potential effects of collapsible soils on the predicted settlement. The occurrence of collapsible soils at the site is suggested by the high values of void ratio reported for several specimens in the SAR. Collapsible soils may undergo relatively large decrease in volume when wetted or subjected to dynamic loading. As a result, the occurrence of significant quantities of such soils under the foundation of a structure may

result in relatively high settlements if the foundation soil is wetted or subjected to dynamic loading. However, the following information, presented by PFS (Donnell, 2000) in the revised SAR demonstrated that the risk of significant additional settlement due to soil collapse is negligible:

(1) Results of laboratory testing on five specimens with high void ratio (1.95 to 2.51) indicate that the additional vertical strain that resulted from inundating the specimens with water is only about 0.001 (i.e., an additional settlement of about 0.12 in for a 10-ft thick soil layer).

(2) The top 5-7 ft soil layer at the pad emplacement area will be replaced with a low-permeability soil/cement mixture. Further, the ground surface in the pad area will be graded to promote run-off toward the north. This arrangement is expected to make water influx into the pad foundation soil unlikely. Also, the pad emplacement area is at an elevation of at least 4 ft above the probable maximum flood level.

(3) There is no known record of collapsible soils occurring in Skull Valley area. The only known occurrence of collapsible soil in Utah is in Cedar City, which is far from the site. Had there been any known occurrence of collapsible soil in Skull Valley area it probably would have been mentioned in the County Soil Report (a USDA unpublished report), which deals with the suitability of the various soil types for septic-systems construction.

(4) The possibility of soil collapse from dynamic loading was investigated through cyclic triaxial testing of five specimens. The response of the five specimens suggests that the soils would not undergo collapse under dynamic loading that is equivalent to the design earthquake.

The staff has determined that the information presented by PFS (Donnell, 2000) is adequate to demonstrate that the potential for significant additional settlement due to collapsible soils is negligible.

Conclusion

Based on its review of these matters, including the additional information submitted by PFS in its revisions to the SAR, the Staff concludes that the concerns raised in Utah Contention L have been addressed and satisfactorily resolved.

References

Bay Geophysical Associates, Inc., 1999. *High-Resolution Seismic Shear-Wave Reflection Profiling for the Identification of Faults at the Private Fuel Storage Facility, Skull Valley, Utah—Final Report*: Traverse City, MI: Bay Geophysical Associates, Inc.

Donnell, J.L., 2000. *Submittal of Commitment Resolution Information.* Letter (March 28) to M.S. Delligatti, Nuclear Regulatory Commission. La Crosse, WI: PFS.

Geomatrix Consultants, Inc., 1999a, *Fault Evaluation Study and Seismic Hazard Assessment , Private Fuel Storage Facility, Skull Valley, Utah*: San Francisco, CA, Geomatrix Consultants Inc.

Geomatrix Consultants, Inc. 1999b. *Development of Design Ground Motions for the Private Duel Storage Facility, Skull Valley, Utah*: San Francisco, CA, Geomatrix Consultants Inc.

Parkyn, J.D., 1999. *Request for Exemption to 10 CFR 72.102(f)(1) Seismic Design Requirement.* Letter (April 2, 1999) to M. S. Delligatti, Nuclear Regulatory Commission. La Crosse, WI: PFS.

Private Fuel Storage Limited Liability Company. 1998. *Safety Analysis Report for the Private Fuel Storage Facility. Revision 3.* Docket No. 72-22. La Crosse, WI: PFS.

Private Fuel Storage Limited Liability Company. 2000. *Safety Analysis Report for the Private Fuel Storage Facility. Revision 10.* Docket No. 72-22. La Crosse, WI: PFS.

Sommerville, P.G., N.F. Smith, R.W. Graves, and N.A. Abrahamson. 1997. Modification of empirical strong ground motion attenuation relations to include the amplitude and duration effects of rupture directivity. *Seismological Research Letters 68(1)*: 199-222.

Stamatakos, J.A., R. Chen, M. McCann, and A.H. Chowdhury. 1999. *Seismic Ground Motion at the Private Fuel Storage Facility Site in Skull Valley Indian Reservation, Tooele County, Utah - Final Report.* San Antonio, TX: Center for Nuclear Waste Regulatory Analyses.

Terzaghi, K., R.B. Peck, and G. Mesri. 1996. *Soil Mechanics in Engineering Practice, 3rd Edition.* New York: John Wiley & Sons, Inc.

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

CERTIFICATE OF SERVICE

I hereby certify that copies of the "NRC STAFF'S NOTICE CONCERNING CONTENTION UTAH K, AND STATEMENT OF POSITION CONCERNING CONTENTION UTAH L" in the above captioned proceeding have been served on the following through deposit in the Nuclear Regulatory Commission's internal mail system, or by deposit in the Nuclear Regulatory Commission's internal mail system, with copies by electronic mail, as indicated by an asterisk, or by deposit in the United States mail, first class, as indicated by double asterisk, with copies by electronic mail as indicated, this 28th day of April, 2000.

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