STONE & WEBSTER ENGINEERING CORPORATION

CALCULATION TITLE PAGE

*SEE INSTRUCTIONS ON REVERSE SIDE

▲ 5010 64 (FRONT)

CLIENT & PROJECT PRIVATE FUEL STORAGE, LLC - PRIVATE FUEL STORAGE FACILITY	PAGE 1 OF 6
CALCULATION TITLE (Indicative of the Objective): DYNAMIC SETTLEMENTS OF THE SOILS UNDERLYING THE SITE	QA CATEGORY (✓) ☒ I - NUCLEAR SAFETY RELATED ☐ II ☐ III ☐ _____ OTHER

CALCULATION IDENTIFICATION NUMBER				
J. O. OR W.O. NO.	DIVISION & GROUP	CURRENT CALC. NO.	OPTIONAL TASK CODE	OPTIONAL WORK PACKAGE NO.
05996.01	G(B)	11		

* APPROVALS - SIGNATURE & DATE			REV. NO. OR NEW CALC NO.	SUPERSEDES * CALC. NO. OR REV. NO.	CONFIRMATION * REQUIRED (✓)	
PREPARER(S)/DATE(S)	REVIEWER(S)/DATE(S)	INDEPENDENT REVIEWER(S)/DATE(S)			YES	NO
PAUL J. TRUDEAU 5/20/97 Paul J. Trudeau	THOMAS E SPONSELLER 5/20/97 Thomas E Sponseller	THOMAS E. SPONSELLER 5/20/97 Thomas E Sponseller	0			✓

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	FIRE FILE	✓			

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CALCULATION SHEET

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OBJECTIVE:

Assess the potential for the soils underlying the proposed Private Fuel Storage Facility (PFSF) at the Skull Valley, UT site to experience dynamic settlements due to shaking caused by the design earthquake.

METHOD: Not required—See discussion below.

DISCUSSION:

Dynamic settlements due to the design earthquake are not expected to occur at the PFSF site because of the nature of the subsurface materials. Dynamic settlements, as reported in the geotechnical literature, are based on two different mechanisms, depending on whether the soils are above the groundwater table or below the groundwater table. Silver and Seed (1971) developed a technique for estimating dynamic settlements of dry cohesionless sands above the groundwater table. For such soils, the dynamic settlement mechanism is compaction due to soil grain slip, and it is a function of the magnitude of the cyclic shear strain developed due to the earthquake, the applied number of cycles of this shear strain, and the relative density of the soils.

Figure 1 presents a generalized subsurface profile, which was developed based on the borings that were drilled in late 1996. The groundwater table was not encountered in these borings, the deepest of which were drilled to depths of 100 ft. In addition, seismic refraction surveys indicate that the groundwater table is greater than ~100 ft below grade at the site (see p11 of Geosphere Midwest, 1997).

The top ~30 ft of the profile consists of silt, silty clay, and clayey silt. As documented in Calculation 05996.01-G(B)-05-0, the median blow count for this material is ~14 blows per ft, indicating that it is "stiff", it appears to be weakly cemented, and undrained triaxial tests on this material indicate that it has a cohesion of greater than 2000 psf. Therefore, the technique for estimating dynamic

settlements of soils above the groundwater table is not applicable for these materials, since they are not expected to compact due to soil grain slip.

As indicated on the boring logs in PFSF Report 05996.01-G(B)-2-0 (SWEC, 1997), this material is underlain by very dense, fine sands, which have uncorrected blow counts that commonly exceed 100 blows per ft. The underlying soils, which are below the groundwater table, are greater than 100 ft below grade, and the P-wave velocities (5100 fps to 5900 fps), reported by Geosphere Midwest (1997), indicate that these soils too are very dense. Further, these soil are too far removed from the surface to cause problems if they were to experience dynamic settlement.

CONCLUSIONS:

The soils underlying the proposed site are not susceptible to dynamic settlements due to shaking caused by the design earthquake, because above the groundwater table, they are not cohesionless sands, and below the groundwater table, they are very dense.

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REFERENCES:

- Geosphere Midwest, PFSF Report No. 0599601-G(PO9)-1, Rev 0, "Seismic Survey of the Private Fuel Storage Facility—Skull Valley, Utah," prepared for Stone & Webster Engineering Corp by Geosphere Midwest, Midland, MI, February 1997.

- Silver, M. and Seed, H. B., 1971, "Volume Changes in Sands During Cyclic Loading," Proceedings of the American Society of Civil Engineers, Journal of the Soil Mechanics and Foundations Division, Vol 97, SM9, September.

- SWEC (1997), PFSF Report No. 05996.01-G(B)-2 Rev 0, "Geotechnical Data Report," Stone & Webster Engineering Corporation, Boston, MA, 1997.

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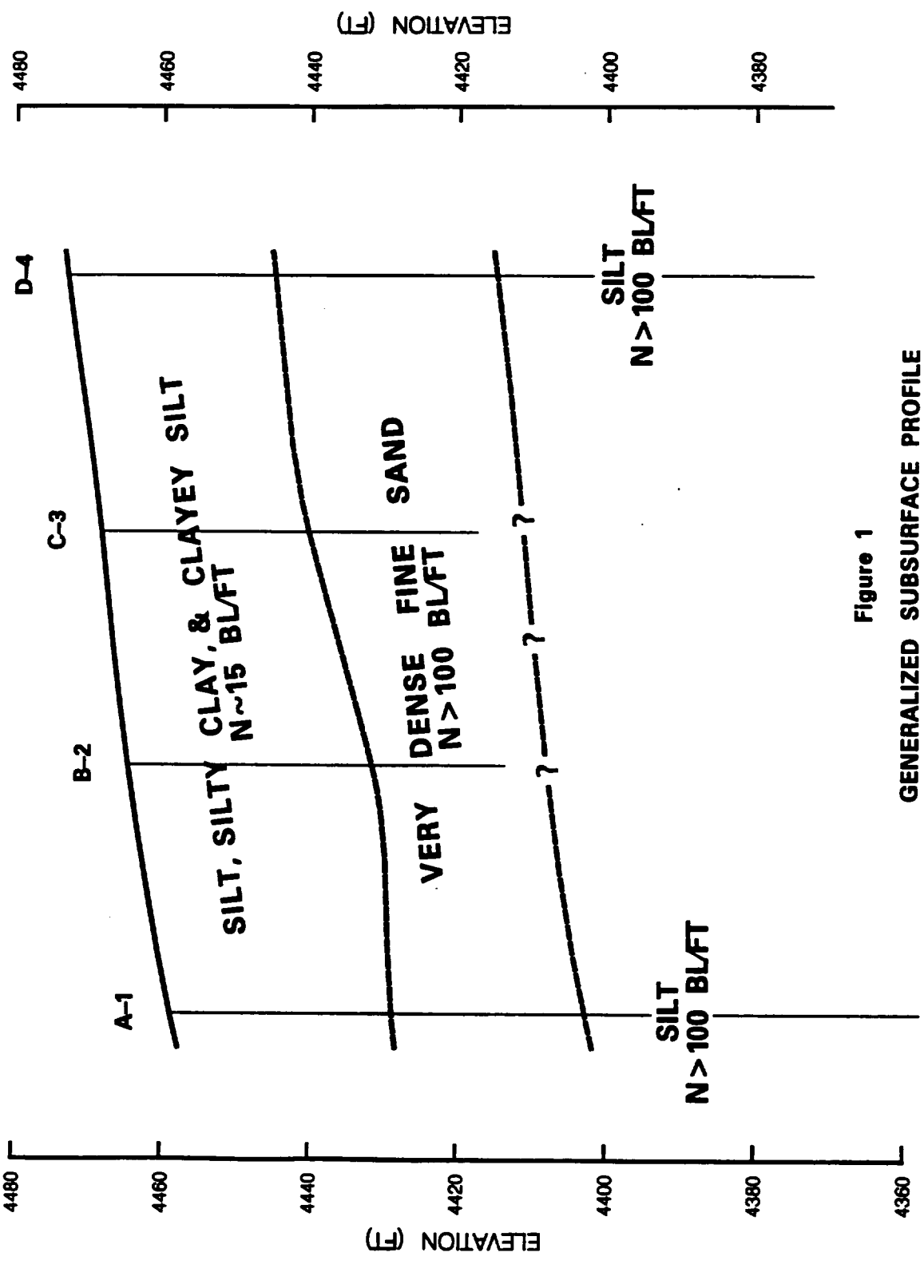

Figure 1

GENERALIZED SUBSURFACE PROFILE