The friction angle used in the effective-stress strength analyses discussed above is less than the friction angle shown for the soils that behave as sandy soils (SBT>5) based on the CPT data presented in Appendix D of ConeTec (1999). These plots illustrate that most of the "Phi" values are between 35° and 40° for these soils, with very few values that are slightly less than 35°. Therefore, assuming that all of the soils underlying the cask storage pads are cohesionless, as represented by the preponderance of soils that behave as "sandy" soils based on the uncorrected CPT SBT data, the factor of safety against a bearing capacity failure will be much greater than 15.

Static Settlements of the Cask Storage Pads

Analyses were performed to estimate the maximum total settlement of the cask storage pads as a result of the weight of the pad and the weight of eight, fully loaded, Holtec HI-STORM casks (356.5 K) in Calculations 05996.02-G(B)-3 (SWEC, 1999e) and 05996.03-G(B)-21 (SWEC, 2001a). The actual bearing pressure for this case was about 1.9 ksf, and the estimated total settlement of the pad was determined to be about 1.7 inches. The maximum total settlement consists of the following three components:

• Elastic settlement	0.5 inches
• Primary consolidation settlement	0.8 inches
• Secondary compression	0.4 inches
• Maximum total settlement	1.7 inches

The maximum differential settlement between the center of the crushed rock aisle and the center of the storage pads is 1-1/2 inches, when the 0.25 inches of immediate settlement of the pad emplacement area is removed. The estimated settlement of the storage pads at the long edge of the pads is approximately half that value, or 3/4 inch. The maximum differential settlement between the long edge of the storage pads and the center of the crushed rock aisle between the storage pads is therefore less than or equal to 3/4 inch (SWEC, 2001a).

The crushed rock surface materials will be installed flush with the top of the storage pads and removed as required in order to accommodate the actual settlement of the pads. Exposed edges of the pads will be chamfered and the compacted aggregate surface material will be feathered to meet the edges of the raised pads for transporter access, as shown in Figure 4.2-7.

This settlement represents an upper-bound estimate of the total compression, because it was developed assuming that the consolidation characteristics that were measured for the clayey soils at a depth of about 10 ft are applicable for the entire upper layer (~25 to 30 ft). The SPT data from the borings and the CPT results indicate that the soils become stiffer within the 10 to 20 ft depth zone. Additional consolidation tests performed on samples obtained from depths of about 25 ft in the Canister Transfer Building area, reported in Attachment 6 of Appendix 2A, indicate that the soils at that depth are less compressible than those used to estimate the settlements presented above. Further, based on the CPT program, most of the soils underlying the pad emplacement area are characterized as soils that ***behave*** as "sandy" soils, rather than as cohesive soils. Such soils are much less compressible than the clayey soils described above. Therefore, assuming that the entire upper layer at the site was comprised of soils whose compressibilities are similar to those measured at a depth of 10 to 12 ft conservatively overestimates the expected settlements.

Effect of Cohesionless Soils Underlying the Cask Storage Pads on Settlements

As discussed above, the soil behavior types determined from the cone penetration test data and reported in ConeTec (1999) must be recalibrated to agree with the soil classifications determined based on samples obtained in the borings and tested in the laboratory. Figure 2.6-30, Sheets 1 through 6, present comparisons of the boring and laboratory soil classifications plotted vs elevation alongside the soil behavior type data from nearby cone penetration tests. These figures illustrate that the soil behavior type values reported in ConeTec (1999) that are greater than 5 (i.e., sandier soils), as well

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In the matter of PFS

Staff	IDENTIFIED ✓
Applicant	RECEIVED ✓
Intervenor ✓	REJECTED
Other	WITHDRAWN
DATE 4-29-02	WITNESS
Clerk pale	