

Responses to Request for Supplemental Information

Docket No. 72-1051

Application for Site-Specific ISFSI License for the HI-STORE Consolidated Interim Storage Facility

RSI 2-9: Provide the following information:

- a) Details of laboratory and/or field characterization of the subsurface materials conducted to develop site design parameters including the acceptable standard used to measure each parameter. Subsurface materials should be characterized using, as a minimum, the following parameters, as described in Section 2.5.6 of NUREG-1567; for example, grain size classification, Atterberg limits, water content, unit weight, soil classification (based on Unified Soil Classification Scheme), shear strength, relative density, shear modulus, Poisson's ratio, bulk modulus, damping and shear modulus degradation with strain, consolidation characteristics, seismic wave velocities, blow count in Standard Penetration Test and/or Cone Penetration Test, porosity, and strength under cyclic loading. Any improvement necessary (e.g., reinforcement piling) of the material(s) used for the foundations should be described in detail and accompanying analyses should demonstrate that the required parameter value(s) can be achievable with adequate margin. Additionally, standard(s) used to measure each parameter should be provided.

Table 4.3.3 of the SAR shows that the materials placed in different regions (Space A, B, C, and D) of the storage pad meet or exceed the design specifications; however, no information has been provided how the site-specific parameter values have been developed. The number and locations of the samples used, method of sample collection, type(s) of laboratory and field tests conducted, scatter of the results, etc., are not provided. Moreover, no information on the Cask Transfer Facility foundation area was provided in the SAR. This information should be provided, as specified in Section 2.4.6.4 of NUREG-1567 and in Sections 2.6.4.2, 2.6.4.4, and 2.6.4.7 of Regulatory Guide 3.48.

- b) Geological profiles that show the relationships of major foundations at the CIS facility to the subsurface strata, including groundwater. Additionally, provide maps and profile drawings showing the extent and dimensions of the excavations and backfill planned at the site including the compaction criteria for the engineered backfill. The criteria should be substantiated with representative laboratory or field test records.

Table 1.0.1 and Section 2.6.1 of the SAR show that the facility will be constructed by excavating below the grade to a maximum of 7.6 m [25 ft]. However, no information has been provided that identifies the corresponding strata for each important to safety structure. In addition, it is not clear whether the excavation will be partially or fully backfilled with natural or engineered materials. This information should be provided, as specified in Section 2.6.4.3 of Regulatory Guide 3.48 and Section 2.4.6.4 of NUREG-1567.

This information is necessary to determine compliance with 10CFR72.24(a), 72.103, and 72.122(b).

Holtec Response:

The HI-STORE SAR Chapter 2 has been revised to add additional figures, tables, and discussion about the geotechnical investigation completed between August and December of 2017. This investigation is detailed in the HI-STORE geotechnical report which has been added to SAR Chapter 19 as reference

2.1.24. This investigation and report details the materials in spaces A, B, C, & D. Soil parameters are detailed in the boring logs and tables added to the chapter.

Figure 2.1.8 was added to show a plan view of the investigations in relation to the actual HI-STORE CIS site layout. Figures 2.5.3 through 2.5.5 show the elevations of the facility foundations in relation to the geotechnical investigations. All excavation will be fully backfilled to final project grade. The backfill material will be selected to meet the requirements of table 4.3.3 to ensure continued compliance with existing certification of the HI-STORM UMAX.

RSI 2-10: Provide a map (or maps) showing the locations of all borings, trenches, seismic lines, piezometers, geologic profiles, and excavations used to characterize the site to develop the design specifications of the storage pads and the Cask Transfer Facility (e.g., Table 4.3.3). Outlines of the important to safety structures at the HI-STORE CIS site should be superimposed on the maps.

No information has been provided regarding the locations for sample collection in addition to other site characterization activities. This information should be provided, as per Section 2.6.4.3 of Regulatory Guide 3.48 and Section 2.4.6.4 of NUREG-1567.

This information is necessary to determine compliance with 10 CFR 72.24(a), 72.103, and 72.122(b).

Holtec Response:

Revisions have been made to SAR Chapter 2 to include new figures in Sections 2.1, 2.5, and 2.6 to detail the locations and results of investigations performed at the HI-STORE CIS site, based on the geotechnical report included with these responses.

RSI 2-11: Provide the following information:

1. An assessment of potential for liquefaction of the subgrade based on site-specific material characteristics and in situ measurements.

Subsurface strata under the storage pads and below the Cask Transfer Facility may be prone to liquefaction during a seismic event. Excessive lateral spreading from the liquefaction event may cause extensive damage to the important to safety structures, systems, and components. This information should be included, as per Section 2.6.4.8 of Regulatory Guide 3.48 and Section 2.4.6.4 of NUREG-1567.

2. An assessment demonstrating that the subgrade of the storage pads (specifically material in Space D and Space C and below Space C of Figure 4.3.1) and the foundation of the Cask Transfer Facility have sufficient bearing capacity to withstand both static and dynamic loads.

The subgrades below the important to safety structures at the CIS facility should be able to withstand the bearing pressure from the structures above. Based on site-specific material properties, assessments should be made to show that the soil, backfill, or any engineered materials placed have sufficient bearing capacities to withstand the loads without failure. This assessment should be included, as specified in Section 2.4.6.4 of NUREG-1567 and Sections 2.6.4.10, 2.6.4.9, and 2.6.4.11 of Regulatory Guide 3.48.

3. Assessments of potential settlements of the foundations of the storage pads and the Cask Transfer Facility to demonstrate that the important to safety structures at the CIS facility would not sustain excessive settlement from both static and dynamic loads. The assessment should also consider the differential settlements due to spatial variations of material characteristics. The estimated settlements should be compared with the allowable settlement based on the design assumptions of the proposed facility.

Section 4.3.2.1 of SAR states that long-term settlement of the HI-STORE facility storage pads has been computed; however, no information has been provided on long-term settlement of the Cask Transfer Facility. Moreover, it is not clear whether the estimated settlement also includes contribution from any dynamic load. Storage pads and the Cask Transfer Facility foundations may suffer excessive settlement post construction and during a seismic event. In addition, due to variation of the properties of the subgrade materials, settlement may not be spatially uniform. Excessive differential settlement may cause damage to the over-lying structures. This information should be included, as specified in Section 2.4.6.4 of NUREG-1567 and Section 2.6.4.9 and 2.6.4.10 of Regulatory Guide 3.48.

4. An assessment of the lateral pressure to be experienced by the Cask Transfer Facility from in-situ adjacent materials during a seismic event.

The Cask Transfer Facility is a below-grade structure (SAR Section 5.3.3.1). The exterior structural walls of the facility will experience earth pressure induced by a seismic event, which needs to be evaluated. Additionally, during excitation, separation of structural wall and soil interface is possible. The assessment should discuss why the estimated values are conservative. This assessment should be included as specified in Section 2.4.6.4 of NUREG-1567 and Sections 2.6.4.9 and 2.6.4.10 of Regulatory Guide 3.48.

5. An assessment demonstrating that the proposed storage pad design at the CIS facility would not fail due to sliding under dynamic loading. Sliding may occur during a seismic event at the interface between Space A and Space C or along a critical failure surface within the material in Space C (Figure 4.3.1). The assessment should establish that the shear resistance provided would be able to prevent sliding of the pads.

This information is necessary to determine compliance with 10 CFR 72.24(a), 72.103, and 72.122.

Holtec Response:

An assessment of the potential for liquefaction was performed as a part of the geotechnical investigation (documented in the geotechnical report included with these responses). A discussion of this assessment and its conclusion that there is no potential liquefaction at the HI-STORE CIS site has been added to SAR Chapter 2.

The results of the geotechnical assessment also concluded that, as discussed in response to RSI 2-9, the geotechnical parameters at the site are bounded by those used in the HI-STORM UMAX certification. The discussion in SAR Chapter 4 has been updated to clarify this. The bounding geotechnical conditions indicate that there is acceptable margin in the settlement and bearing of the ISFSI.

Criteria has been added in SAR Chapter 4 to define the qualification requirements for lateral pressure in a seismic event. The provisions of Chapter 8 of ASCE 4 will be applied to generate the load.

The HI-STORE ISFSI uses a HI-STORM UMAX system and is as such a below grade system. Space A is supported by the material in Space C and confined by the materials in Space B. Space C is also fully confined by the materials in Space D. The HI-STORM UMAX certification considers less favorable soils and a higher seismic acceleration. As such the sliding of the facility is not a concern.