2.0 VARIANCES

A *variance* is a plant-specific deviation from one or more of the site characteristics, design parameters, or terms and conditions of an ESP or from the site safety analysis report (SSAR).

The following sections provide requests for variances from the proposed site characteristics for the Grand Gulf ESP. The requests comply with the requirements of 10 CFR 52.39 and 10 CFR 52.93. To support a decision whether to grant a variance, each variance request provides the technical justification and supporting cross-references to the Unit 3 FSAR information that meet the technically relevant regulatory acceptance criteria.

In accordance with 10 CFR 52.79(b)(2) and 10 CFR 52.39(d), where the Unit 3 FSAR references the Grand Gulf ESP and does not demonstrate that the design of Unit 3 falls within the ESP site characteristics, or where the Unit 3 FSAR does not incorporate the ESP SSAR information by reference without the need for certain changes, this COLA includes the following requests for variances[1]:

GGNS ESP VAR 2.0-1:	Design Response Spectra
GGNS ESP VAR 2.0-2:	Minimum Shear Wave Velocity of Soil at the Proposed Plant Foundation Level
GGNS ESP VAR 2.0-3:	Accident Analyses
GGNS ESP VAR 2.3-1:	Determination of Roof Loads Due to Extreme Winter Precipitation
GGNS ESP VAR 2.4.1-1:	Distance to Closest Surface Water
GGNS ESP VAR 2.4.12-1:	Highest Ground Water Elevation
GGNS ESP VAR 2.5-1:	Geology, Seismology, and Geotechnical Engineering
GGNS ESP VAR 2.5-2:	Stability of Subsurface Materials and Foundations

[1] NOTE: Only new requests for variance, GGNS ESP VAR 2.5-1 and 2.5-2 are included in this submittal. Other requests for variances provided in Revision 0 of Part 7 are not impacted by these changes and are not included here.

Variance: GGNS ESP VAR 2.5-1 – Geology, Seismology, and Geotechnical Engineering

Request

A variance is requested from the ESP SSAR Section 2.5.1.1.1.1, Loess Hills Subprovince, and 2.5.1.2, Site Geology. Specifically, this variance addresses replacement of material in SSAR Sections 2.5.1.1.1.1, and 2.5.1.2, including Subsections 2.5.1.2.1 through 2.5.1.2.5, with revised updated information from the COL stage investigations.

Justification

The following table provides a listing of the SSAR 2.5.1.2 sections for which content is being replaced, and the source of the replacement content is indicated.

SSAR Section	Replaced with FSAR Revision 0, Section:
2.5.1.2	2.5.4.1.1
2.5.1.2.1	2.5.4.1.1.1
2.5.1.2.2	2.5.4.1.1.2
2.5.1.2.3	2.5.4.1.2
2.5.1.2.4	2.5.4.1.3

The information for the above SSAR 2.5.1.2 sections in the table above was previously provided in Revision 0 of FSAR Section 2.5.4. In FSAR Revision 1, this information is relocated into FSAR Section 2.5.1.2. As a result of SSAR 2.5.1.2 text replacement, SSAR Figures 2.5-28, 2.5-29, 2.5-30, 2.5-31, and 2.5-33 through 2.5-37, and SSAR Table 2.5-7 are deleted.

FSAR Section 2.5.1.2.5 is retitled “Seismicity and Faulting” and information is added to address the SRP Section 2.5.1 information request on this topic. SSAR Section 2.5.1.2.5 content is superseded by updated information developed during the COL investigations and analyses; that updated information is presented in FSAR Section 2.5.4. See also variance requests GGNS ESP VAR 2.0-2 and GGNS ESP VAR 2.5-2.

Revision 1 of FSAR Section 2.5.1.2 provides the information to describe the results of the COL investigations and analyses, specifically regarding updated information on stratigraphy and lithology of the Site Location as expected by the Standard Review Plan, NUREG-0800, Section 2.5.1, Basic Geologic and Seismic Information. Relocating the information from FSAR Section 2.5.4, into FSAR Section 2.5.1 provides a clearer presentation of the stratigraphy and lithology based on COL stage investigations, replacing the SSAR Section 2.5.1 discussion (as described above), which was based on a more limited set of data for the Unit 3 Site Location. Superseding SSAR 2.5.1.2.5 is justified based on the updated COL investigations, and the topics of SSAR 2.5.1.2.5 are properly addressed in FSAR Section 2.5.4.

Figures 2.5-10 and 2.5-27 have been revised to reflect the subsurface conditions as characterized by COL investigations. This revision involves two changes: 1) the word

"buried" was added to the figures to reflect that the Upland Complex units are buried beneath loess, and 2) the surficial map unit labels were revised to indicate that loess is present at the ground surface east of the Mississippi River floodplain. An additional change was made to Figure 2.5-27 to remove cross-section locations I-I' and J-J', as the cross sections are no longer representative of the subsurface conditions characterized by the COL investigations (associated SSAR Figures 2.5-30 and 2.5-31 are deleted as noted above). Figures 2.5.1-215 through 2.5.1-228 represent the revised understanding of subsurface conditions.

In addition, ESP SSAR Section 2.5.1.1.1.1, third paragraph, fourth sentence, is being revised to read, "Loess deposits 30 to 80-ft-thick are present in the Site Vicinity." This revision is based on updated information from COL stage investigations.

This variance is acceptable because the SSAR material is being replaced with updated information from COL investigations and analyses.

Variance: GGNS ESP VAR 2.5-2 – Stability of Subsurface Materials and Foundations

Request

A variance is requested from conclusions in ESP SSAR Sections 2.5.1.2.5, 2.5.1.2.5.1 and 2.5.4.4, which assessed the loess as not suitable for support of safety-related structures or heavy structures, based on the potential for unsaturated loess to experience collapse. This variance provides justification for the use of saturated loess (i.e., loess that is below the saturated zone) as a bearing surface to support a compacted structural fill and ultimately the Seismic Category I Fire Water Storage Complex (FWSC).

Justification

The site characterization for the COL application identified the presence of groundwater within the loess (see FSAR Sections 2.4.12, 2.5.4.6). Loess that is below the groundwater level is saturated and thus does not have a collapse potential. Loess that is saturated was evaluated and determined to be an acceptable material to support a compacted structural fill and the overlying FWSC foundation (see FSAR Section 2.5.4.10). The evaluation considered the bearing capacity and settlement, as compared to the DCD criteria for performance.

At the DCD bearing level (elevation 125.8 ft), the soils present are a combination of undocumented fill and Upper loess. The undocumented fill is not a suitable bearing material for the FWSC because of its variability and placement uncertainty. A portion of the Upper loess is unsaturated and has the potential for collapse upon saturation. For these reasons, removal of the unsaturated zones of the Upper loess and the undocumented fill will be performed. As described in FSAR Sections 2.5.4.5.1.4 and 2.5.4.10, excavation to about elevation 85 feet removes the unsaturated loess. Geotechnical review of the material at the base of the excavation will then be performed as described in FSAR Section 2.5.4.5.4.1, and local additional excavations made or other soil improvements made, as necessary. The removed material will be replaced with compacted sand fill having the characteristics described in FSAR Section 2.5.4.5.3.2. The replacement fill will then be compacted as described in FSAR Section 2.5.4.5.3.3.

The soil profile and properties for analysis of the performance of the FWSC foundation mat are described in Section 2.5.4.10.1 as consisting of the compacted structural fill, saturated loess, dense sand and gravel layers (Upland Complex alluvium and Upland Complex Old alluvium) and hard clays and claystones (Catahoula Formation).

Evaluation of the soil profile for bearing capacity (Section 2.5.4.10.2) shows factors of safety greater than 50 for static bearing capacity and greater than 21 for dynamic bearing capacity. Evaluation of the soil profile for settlement (Section 2.5.4.10.4) under the DCD loading conditions for the FWSC show the DCD criteria for settlement are met with a calculated differential mat settlement, considering the loadings applied during construction, of 0.41 inches compared to the criterion of 0.5 inches.

Therefore, the use of saturated loess as a bearing surface, to support a compacted structural fill below the Seismic Category I FWSC foundation, is acceptable, because the bearing capacity and the settlement were determined to meet the associated DCD criteria.