

To be included as a part of the Region IV Inspection Report

Structural Analysis of ISFSI Pad at South Texas Project 1 & 2

By: Bhasker (Bob) P. Tripathi, P. E. [US NRC- DSFM] Date: 3-15-2016

Background and Scope:

At the South Texas Project Electric Generating Station (STP), two above ground reinforced concrete Independent Spent Fuel Storage Installation (ISFSI) pads will be built to support up to ninety (90) HOLTEC HI-STORM FW casks on each pad. The two ISFSI pads each [172.5'L x 156.0'W x 3.0' thick], spaced 80' apart from each other are designed using concrete with minimum compressive strength $f'_c = 4,000\text{psi}$, and ASTM Grade 60 reinforcing bar of $f_y = 60\text{ksi}$. The ISFSI pads are designed as a foundation to meet the requirements of ACI 349-06 to resist the seismic forces from the free-standing casks during the Safe Shutdown Earthquake (SSE), and other applicable design loads. The seismic forces from the casks include the cask inertia in the vertical direction and seismic impact force from the uplift of the cask.

Conclusions:

The U.S. Nuclear Regulatory Commission (NRC) staff found that the reinforced concrete ISFSI pad at STP was designed for loads and load combinations specified in NUREG-1536, and ACI 349-06. The resisting bending moments and shear capacities of the 3' thick pad using rebar #11 @ 6" at top and bottom each way were greater than the calculated design bending moments and shear in the pad resulting from the applicable design loads. The factor of safety (FS) for soil bearing pressure was $1.004 > 1.0$. The staff verified that the Sargent & Lundy (S & L) analysis and design methodology, complied with the ACI 349-06, and found that the factors of safety (including the cask sliding and overturning) were all above 1.0. The review was *based on demonstration of reasonable assurance* that the licensee's assumptions used in the following documents were appropriate; and that these assumptions were consistent with the NRC IP 60856, and in compliance with, specifically 10 CFR Part 72.212(b)(5)(ii) requirements.

The NRC staff's conclusions are based on review of the following documents:

- 1) Sargent & Lundy Calculation: CC09979, Rev. 0, "Generation of Consistent Response Spectra Time Histories".
- 2) Sargent & Lundy Calculation: CC09980, Rev. 0, "Soil Liquefaction Potential".
- 3) Sargent & Lundy Calculation: CC09981, Rev. 0, "Generation Strain-Dependent Soil Properties".
- 4) Sargent & Lundy Calculation: CC09982, Rev. 0, "Soil-Structure Interaction (SSI) Analysis of the ISFSI Pad",
- 5) Sargent & Lundy Calculation: CC09983, Rev. 1, "ISFSI Geotechnical Parameters".
- 6) Sargent & Lundy Calculation: CC09988, Rev. 2, "Analysis, and Design of ISFSI Pad".