NRR-PMDAPEm Resource

From: Kim, James
Sent: Thursday, July 13, 2017 12:32 PM
To: MATZKE, ERICK P
Cc: BLOME, BRADLEY H
Subject: Final RAI for Fort Calhoun Ultimate Strength Design for Aux. Bldg LAR (MF8525)

Final Request for Additional Information

On June 28, 2017, the U.S. Nuclear Regulatory Commission (NRC) staff sent Fort Calhoun Station (FCS) the draft Request for Additional Information (RAI). This RAI relates to the amendment to revise Updated Safety Analysis Report (USAR) to change the structural design methodology for the Auxiliary Building at FCS.

On July 13, 2017, a teleconference between FCS and NRC staff was held to discuss the information requested by the NRC staff was understood and any additional clarifications on the RAI were required. Based on the teleconference, FCS determined that the information requested by the NRC staff was clearly understood and any other additional clarifications on the RAI was not necessary. FCS agreed to provide a response to this **final** RAI shown below by September 29, 2017. The NRC staff also informed the licensee that a publicly available version of this final RAI would be placed in the NRC's Agencywide Documents Access and Management System.

REQUEST FOR ADDITIONAL INFORMATION (RAI)
REGARDING LICENSE AMENDMENT REQUEST 16-04
REVISING CURRENT LICENSING BASIS TO USE
ACI ULTIMATE STRENGTH REQUIREMENTS
FORT CALHOUN STATION, UNIT 1
DOCKET NO.: 50-285

Reference:

1. Letter from Shane M. Marik, Omaha Public Power District, to NRC Document Control Desk, "License Amendment Request (LAR) 16-04; Revise Current Licensing Basis to Use ACI Ultimate Strength Requirements" dated October 25, 2016 (ML16299A275)

Structural Engineering Branch (ESEB) – RAI 1

Background:

Table 1 in Section 2.1.1 of the LAR (Reference 1) notes that ACI 318-63 is the current licensing basis (CLB) design code of record for Fort Calhoun Station (FCS). The CLB requires the use of working stress design (WSD) method for normal service conditions, and ultimate strength design (USD) method for no loss-of-function and special load cases. The LAR proposes to revise the CLB to use the USD method from ACI 318-63 for normal service load conditions for future design and evaluation of the Auxiliary Building. Section 4.2 of the LAR notes that several operating nuclear power plants constructed in the era that FCS was built use the ACI 318-63 USD method for normal operating/service load combinations.

Class 1 concrete structures, including earlier-vintage plants that have adapted ACI 318-63 or ACI 318-71 as the licensing basis code-of-record, have typically been licensed to load combinations (normal operating/service condition and extreme (no loss of function and special cases) condition) with load factors associated with design loads in the combination based on the NRC staff position documented in NUREG-0800 Standard Review Plan (SRP) 3.8.4 and Regulatory Guide (RG) 1.142 (which currently endorses ACI 349-97 with

conditions). The factor assigned to each load in a load combination is influenced by the degree of accuracy to which the load effect can be calculated, the variation expected in the load during the life of the structure, the probability of simultaneous occurrence, and assumptions and approximations in the structural analysis calculations.

Issue:

The second and third load combinations (associated with footnote (2) in LAR Table 5) use the existing USAR USD equations for the no loss-of-function condition (extreme condition) and modify the equation by replacing the differential pressure component with the live load, and the differential temperature component with the soil load. The LAR notes that the resulting equation is "similar" to ACI 318-71 equation 9-2 (the load factors are not the same as equation 9-2). It is unclear to the staff why it is appropriate to modify in this fashion the loads in existing USD equations for extreme load conditions to develop load factors for the proposed USD service load combinations. It is also unclear why it is appropriate to selectively choose numerically inconsistent load factors from later editions of ACI 318 without reconciling the other related code provisions, and/or existing NRC staff positions in the SRP and RG 1.142.

The LAR notes that other operating nuclear plants use the ACI 318-63 USD method for normal operating/service load conditions; however, the LAR does not cite specific precedent where the NRC has previously approved the load factors for USD service load combinations proposed in Table 5 of the LAR. The NRC staff is not aware of past precedent that used the proposed load factors.

Request:

Provide technical justification for the proposed load factors associated with USD service load combinations in the second and third equations (associated with footnote 2) in LAR Table 5 (i.e., justify acceptability of substituting service loads into an equation associated with unusual or extreme load conditions).

If the response discusses ACI 318-71 equation 9-2 clearly explain why it is appropriate to selectively use load factors from three different codes in the proposed USAR (ACI 318-63, ACI 318-71, and ACI 349-97) without reconciliation with other related code provisions or an existing staff position.

If the response basis relies on precedent based on operating nuclear power plants that used ACI 318-63 USD service load combinations, provide details identifying previous case history and explain how the proposed load factors for the second and third USD service load combinations in FCS's LAR is consistent with that of the precedent plant.

Regards,

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