FPL.

L-2015-132
10 CFR 52.3

April 29, 2015

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Re: Florida Power & Light Company
Proposed Turkey Point Units 6 and 7
Docket Nos. 52-040 and 52-041
Response to NRC Request for Additional Information Letter No. 083
(eRAI 7815) SRP Section 03.08.05 – Foundations

References:

1. NRC Letter to FPL dated March, 17, 2015, Request for Additional Information Letter No. 083 Related to SRP Section 03.08.05 – Foundations for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application
2. FPL Letter L-2015-125 to NRC dated April 16, 2015 Response and Response Schedule to NRC Request for Additional Information Letter No. 083 (eRAI 7815) SRP Section 03.08.05 – Foundations

Florida Power & Light Company (FPL) provides, as an attachment to this letter, its response to the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) 03.08.05-3 provided in Reference 1. FPL provided a schedule for the response to RAI 03.08.05-3 in Reference 2. The attachment identifies changes that will be made in a future revision of the Turkey Point Units 6 and 7 Combined License Application (if applicable).

If you have any questions, or need additional information, please contact me at 561-691-7490.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 29, 2015

Sincerely,

William Maher
Senior Licensing Director – New Nuclear Projects

WDM/RFB

Attachment: FPL Response to NRC RAI No. 03.08.05-3 (eRAI 7815)

D097
NRO

cc:
PTN 6 & 7 Project Manager, AP1000 Projects Branch 1, USNRC DNRL/NRO
Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant 3 & 4

NRC RAI Letter No. PTN-RAI-LTR-083

SRP Section: 03.08.05 - Foundations

Question from Geosciences and Geotechnical Engineering Branch 1 (RGS1)

NRC RAI Number: 03.08.05-3 (eRAI 7815)

In its revised response to RAI 6433, Question 03.08.05-1 dated December 11, 2014, the applicant stated that the lean concrete fill beneath the Nuclear Island (NI) structure will be design and constructed using the guidelines of the American Concrete Institute (ACI) 207, "Guide to Mass Concrete." The staff reviewed Section 2.5.4.5.1.2, "Power Block and Site Grade Raising," of the FSAR, Revision 6, and noticed that the applicant provided a description of a thermal control plan for reducing thermal cracking of the lean concrete fill beneath the NI. The FSAR, however, did not describe the design and construction approach for the lean concrete fill to attain the required fill mechanical properties. The information is necessary for the staff to assess the ability of the fill material to perform is function to support the NI. The applicant is requested to describe in sufficient detail the design and construction approaches of the lean concrete fill in Section 2.5.4.1.2 of the FSAR.

FPL RESPONSE:

The mechanical properties of the lean concrete fill will be consistent with the properties used for the design analyses. This is achieved by selecting an appropriate mix design, performing verification testing during construction, and following industry guidance for construction and placement methods.

The selection of lean concrete mix design will be made at the detailed design stage of the project. A mix will be selected that achieves the mechanical properties used in the design analyses. The response to RAI 02.05.04-33 and the associated Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) describe the acceptable compressive strength considering the parameters used for design.

The selected mix will also achieve the specified durability requirements, such as the use of a Type V cement to prevent potential sulfate attack and a maximum water-cementitious materials ratio of 0.45 for the first lift. Further discussion regarding the durability requirements of the lean concrete is provided in the response to RAI 02.05.04-31 and the associated ITAAC.

Construction of the lean concrete fill will follow the guidance in ACI 207 (Reference 1). Although the lean concrete fill is not safety related, the construction and associated testing described below will follow requirements equivalent to NQA-1.

Testing of materials and lean concrete fill during construction will verify that the as-placed concrete properties are consistent with the properties established during the mix design. At a minimum, the construction verification and testing will include:

- Verification of manufacturer's certifications for cementitious materials
- Aggregate testing for gradation, moisture content, and specific gravity
- Fresh concrete testing of slump and placement temperature
- Hardened concrete testing of compressive strength

The lean concrete will be batched and mixed on site and will be placed in a series of successive layers and lifts. One lift consists of several layers.

Within each lift, concrete will be placed in successive layers. Layer thickness will be determined prior to construction based on the maximum aggregate size of the concrete mix. Typical layer thicknesses for mass concrete placement are on the order of 12 inches to 20 inches.

Concrete consolidation will be achieved for each layer by internal vibration from pneumatically driven vibrators. The vibrator size and dynamic characteristics will be selected such that it is suitable for the mixture, layer thickness, and placement rate. Vibration will be systematic and will thoroughly cover and deeply penetrate each layer. To ensure proper consolidation, the vibrators will penetrate the lower layer for approximately 2 inches to 4 inches and be maintained in a nearly vertical position at each penetration during vibration.

The lift thickness and placement schedule will be determined prior to construction based on the requirements in the thermal control plan described in FSAR Subsection 2.5.4.5.1.2. Typical lift heights for mass concrete range from 2.5 feet to 10 feet.

Horizontal lift joint surfaces will be prepared between lifts to ensure bond between joints, as described in Reference 1. As late as is feasible, but before placement of the next lift, surface film and contamination will be removed to expose a fresh, clean mortar and aggregate surface. This will be accomplished by means of sandblasting or high-pressure water jet. Green cutting, which is the early removal of the surface mortar with an air-water jet at about the time the concrete approaches final set, may also be used. The clean concrete surface will be approaching dryness and be free from surface moisture at the time new concrete is placed on it.

The lean concrete will be water-cured between lift placements and curing will continue for at least 14 days after placement of the final lift. If pozzolon is used as a cementitious material, curing will continue up to 28 days after placement of the final lift. Surfaces of horizontal construction joints will be kept moist until the wetting will no longer provide beneficial cooling. Curing will be stopped long enough to ensure that the joint surface is free of water but still damp and clean before new concrete is placed.

This response is PLANT SPECIFIC.

References:

1. American Concrete Institute, Guide to Mass Concrete (ACI 207), Detroit, Michigan, 2006.

ASSOCIATED COLA REVISIONS:

The second paragraph of FSAR Subsection 2.5.4.5.1 will be revised in a future COLA revision as follows:

2.5.4.5.1 Source and Quantity of Backfill and Borrow

The deepest excavation is to approximately El. –35 feet. Structural fill is placed around but not below the power block structures extending to as deep as El. ~~–14~~**–16** feet. Lean concrete fill is placed between the bottom of the mudmat at El. ~~–14~~**–16** feet and the bottom of excavation. Lean concrete is unreinforced concrete with a lower ratio of cement to aggregate than structural concrete. The final grade is shown on Figure 2.5.4-201. The grade in profile is shown in Figure 2.5.4-221.

The third paragraph in FSAR Subsection 2.5.4.5.1.2 will be revised in a future COLA revision as follows:

2.5.4.5.1.2 Power Block and Site Grade Raising

Structural fill consisting of excavated fill material is placed around but not below any nuclear island structure. Replacement material below the nuclear islands consists of lean concrete fill. The selection of lean concrete mix design is made at project detailed design. **A mix is selected that achieves the mechanical properties used for the design analyses.** The compressive strength of 1.5 ksi is estimated for lean concrete fill. **The selection of the mix considers the strength requirements as well as the durability requirements to prevent potential sulfate attack.**

New paragraphs will be added at the end of FSAR Subsection 2.5.4.5.1.2 in a future COLA revision as follows:

Construction of the lean concrete fill follows the guidance in ACI 207 (Reference 281). Although the lean concrete fill is not safety related, the construction and associated testing described below follow requirements equivalent to NQA-1.

Testing of materials and lean concrete fill during construction verifies that the as-placed concrete properties are consistent with the properties established during the mix design. At a minimum, the construction verification and testing includes:

- **Verification of manufacturer's certifications for cementitious materials**
- **Aggregate testing for gradation, moisture content, and specific gravity**
- **Fresh concrete testing of slump and placement temperature**
- **Hardened concrete testing of compressive strength**

The lean concrete is batched on site and placed in a series of successive layers and lifts. One lift consists of several layers.

Within each lift, concrete is placed in successive layers. Layer thickness is determined prior to construction based on the maximum aggregate size of the concrete mix.

Concrete consolidation is achieved for each layer by internal vibration from pneumatically driven vibrators. The vibrator size and dynamic characteristics are selected such that it is suitable for the mixture, layer thickness, and placement rate. Vibration of the lean concrete is systematic and thoroughly covers and deeply penetrates each layer. To ensure proper consolidation, the vibrators penetrate the lower layer for approximately 2 to 4 inches and are maintained in a nearly vertical position at each penetration during vibration.

The lift thickness and placement schedule is determined prior to construction based on the requirements in the thermal control plan.

Horizontal lift joint surfaces are prepared between lifts to ensure bond between joints, as described in Reference 281. As late as is feasible, but before placement of the next lift, surface film and contamination is removed to expose a fresh, clean mortar and aggregate surface. This is accomplished by means of sandblasting or high-pressure water jet. Green cutting, which is the early removal of the surface mortar with an air-water jet at about the time the concrete approaches final set, may also be used. The clean concrete surface approaches dryness and is free from surface moisture at the time new concrete is placed on it.

The lean concrete is water-cured between lift placements and curing continues for at least 14 days after placement of the final lift. If pozzolon is used as a cementitious material, curing continues up to 28 days after placement of the final lift. Surfaces of horizontal construction joints are kept moist until the wetting no longer provides beneficial cooling. Curing is stopped long enough to ensure that the joint surface is free of water but still damp and clean before new concrete is placed.

By selecting an appropriate mix design, performing verification testing during construction, and following industry guidance for construction and placement methods, the mechanical properties of the lean concrete fill are consistent with the properties used for the design analyses.

ASSOCIATED ENCLOSURES:

None