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August 28, 2015
Docket No.: 52-025

ND-15-1637
10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Southern Nuclear Operating Company
Vogtle Electric Generating Plant Unit 3
Preliminary Amendment Request (PAR):
Supplemental Requirements for Mechanical Coupler Weld Acceptability (PAR-15-010)

Ladies and Gentlemen:

The U.S. Nuclear Regulatory Commission (NRC) issued the Vogtle Electric Generating Plant (VEGP) Unit 3 and Unit 4 combined licenses (COLs) (License Nos. NPF-91 and NPF-92) to Southern Nuclear Operating Company (SNC) on February 10, 2012.

By letter dated August 21, 2015, SNC submitted a request for a license amendment (LAR-15-010, SNC correspondence ND-15-0904) to revise VEGP Units 3 and 4 Updated Final Safety Analysis Report (UFSAR) to specify supplemental requirements for confirming the acceptability of mechanical couplers with combined partial joint penetration (PJP) welds and fillet welds.

SNC is submitting a Preliminary Amendment Request (PAR), PAR-15-010, to minimize further construction delays for Unit 3 during the NRC's evaluation of the related license amendment request (LAR). The determination of whether the NRC has any objection to SNC proceeding with construction based on the proposed plant licensing basis changes identified in the LAR is requested on or before September 21, 2015. Construction of VEGP Units 3 and 4 seismic Category I and II structures containing non-accessible mechanical couplers subject to the changes proposed in LAR-15-010 is currently on hold and delayed determination regarding this PAR will result in continued delay in the construction completion of VEGP Unit 3 structures.

A description of the proposed change and the reason for the change are contained in Enclosure 1 to this letter. This PAR has been developed in accordance with guidance provided in the most recent revision to the Interim Staff Guidance on Changes during Construction Under 10 CFR Part 52, COL-ISG-25 [ML15058A377], and corresponds accurately and technically with the above-mentioned LAR-15-010. The technical scope of this PAR is consistent with the technical scope of the submitted LAR. Section 7 of Enclosure 1 identifies the scope of the "no objection" sought in this PAR.

This letter does not contain any NRC commitments. Should you have any questions, please contact Mr. Jason Redd at (205) 992-6435.

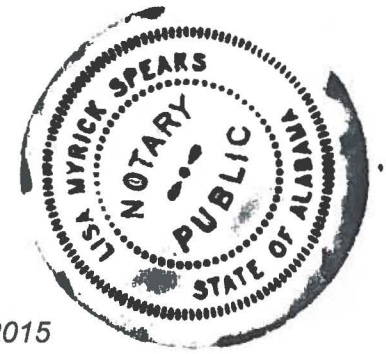
Mr. Brian H. Whitley states that: he is the Regulatory Affairs Director of Southern Nuclear Operating Company; he is authorized to execute this oath on behalf of Southern Nuclear Operating Company; and to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

B. H. Whitley

Brian H. Whitley



BHW/NH/ljs

Sworn to and subscribed before me this 28th *day of* August *2015*

Notary Public: Lisa Myrick Spears

My commission expires: June 18, 2019

Enclosure 1: Vogtle Electric Generating Plant (VEGP) Unit 3 – Preliminary Amendment Request Regarding Supplemental Requirements for Mechanical Coupler Weld Acceptability (PAR-15-010)

cc:

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File AR.01.02.06

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Other
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Mr. S. Roetger, Georgia Public Service Commission
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Mr. K. C. Greene, Troutman Sanders
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Mr. R. Grumbir, APOG
Mr. J. R. Bouknight, South Carolina Electric & Gas Company
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Southern Nuclear Operating Company

ND-15-1637

Enclosure 1

Vogtle Electric Generating Plant (VEGP) Unit 3

Preliminary Amendment Request
Regarding
Supplemental Requirements for Mechanical Coupler Weld Acceptability
(PAR-15-010)

(This Enclosure consists of four pages, including this cover page.)

Pursuant to 10 CFR 52.98(c) and in accordance with 10 CFR 50.90, Southern Nuclear Operating Company (SNC) submitted a license amendment request (LAR) to change the Vogtle Electric Generating Plant (VEGP), Units 3 and 4, licensing basis documents associated with Combined License Nos. NPF-91 and NPF-92, respectively. Accordingly, SNC requests the determination of whether the NRC has any objection to proceeding with construction of VEGP Unit 3 seismic Category I and II structures containing mechanical couplers welded to structural steel utilizing combined partial joint penetration (PJP) weld with fillet weld reinforcement with fillet welds satisfying the minimum size requirements for C2/C3J couplers established by the analyses and testing, as identified in the Preliminary Amendment Request (PAR) provided below to be provided by the date shown below.

PAR Request Number:	Station Name:	Unit Number(s):	PAR Request Date:
SNC PAR-15-010	**VEGP**	☒ **3** ☐ **4**	**August 28, 2015**

1. NRC PAR Notification Requested Date (see Block 7 for basis): September 21, 2015

2. License Amendment Request References (as applicable):

☒ **LAR submittal date and SNC Correspondence Number:** August 21, 2015 / ND-15-0904

☐ **Expected LAR submittal date:** _____

3. Brief Description of Proposed Change:

This proposed change would revise the licensing basis, specifically the Combined Licenses' Updated Final Safety Analysis Report (UFSAR) description of supplemental requirements for concrete structures to include a description of supplemental requirements for demonstrating the acceptability of weldable coupler connections of reinforcing bar (rebar) to structural steel, including structural steel shapes, embedded plates, overlay plates, and structural module liner plates.

Weldable mechanical couplers (couplers) are used in the AP1000 design where rebar are attached to structural steel. The couplers are attached to the structural steel using a combined partial joint penetration (PJP) weld with fillet weld reinforcement. The C2/C3J type of coupler is used in containment internal structures, other seismic Category I structures, and the seismic Category II portion of the annex building located adjacent to the nuclear island.

The analysis and design of concrete and structural steel conform to American Concrete Institute (ACI) 349-01, "Code Requirements for Nuclear Safety Related Concrete Structures," (ACI 349-01) and American Institute of Steel Construction (AISC) N690-1994, "Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities," (AISC N690-1994), respectively. The coupler weld strength is evaluated in accordance with AISC N690-1994 and ACI 349-01.

Load combinations from UFSAR Tables 3.8.4-1 and 3.8.4-2, and the corresponding Stress Limit Coefficients (SLCs), are used in the evaluation of coupler weld capacity. The coupler weld capacity for all sizes of C2/C3J couplers is found to be acceptable when compared to demand for all load combinations.

To demonstrate the adequacy of mechanical connections (rebar-coupler), ACI 349-01 requires that a full mechanical connection (rebar-coupler) develop at least 125% of the specified yield strength of the rebar. ACI 349-01 does not provide requirements on weld qualification.

LAR-15-010 proposes a Tier 2* UFSAR change to enhance the supplemental requirements for concrete structures in UFSAR subsection 3.8.4.5.1 to demonstrate 125% of the specified yield

strength of the rebar as follows:

- The required weld capacity of C2/C3J couplers for #4, #5, and #6 rebar sizes is demonstrated through analysis in accordance with AISC N690-1994 requirements, using an SLC of 1.6,
- The coupler connection weld adequacy for C2/C3J couplers for rebar sizes #7 through #11 is demonstrated through testing, as permitted by Section Q1.22.2 of AISC N690-1994. Two sets of testing are performed to demonstrate that the strength of the reinforcing bar is the limiting feature of the coupler reinforcing bar splice and weld system:

  (1) Six static tension tests are performed for each reinforcing bar size on samples of the coupler reinforcing bar splice and weld system, retaining the 90%/95% upper confidence limit of the coupler system static tension test results. Three cyclic tests are also performed as described in ACI 349-01 12.14.3.4.1(b) to confirm that there is not significant coupler system degradation under cyclic demand.

  (2) Static tension testing of the coupler weld to failure using ten representative sample weld configurations from each of the five reinforcing bar coupler sizes is performed to determine the 90%/95% lower confidence limit weld capacity.

The proposed UFSAR Tier 2* change also identifies the factors of safety demonstrated by the coupler connection weld testing, and specifies the minimum fillet weld sizes for C2/C3J couplers established by the analyses and testing, as follows:

C2/C3J Coupler Size	#4	#5	#6	#7	#8	#9	#10	#11
Minimum Fillet Weld Size (inches)	1/4	1/4	1/4	1/4	1/4	5/16	1/4	3/8

The proposed change also includes the addition of Tier 2 text summarizing the tests performed to demonstrate the acceptability of non-conforming fillet weld reinforcement on #9 and #11 couplers identified in module CA20.

4. Reason for License Amendment Request:

These changes are driven primarily by a need to identify and define in the UFSAR the applicable requirements and criteria for analyzing and demonstrating the strength of the combined PJP weld with fillet weld reinforcement used to attach couplers to structural steel.

The analysis and design of concrete and structural steel conform to ACI 349-01, "Code Requirements for Nuclear Safety Related Concrete Structures," and AISC N690-1994, "Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities," respectively. Coupler weld strength is evaluated in accordance with AISC N690-1994 and ACI 349-01.

AISC N690-1994 is the governing code for weld design. Load combinations from UFSAR Tables 3.8.4-1 and 3.8.4-2, and the corresponding Stress Limit Coefficients (SLCs), are currently used in the evaluation of coupler weld capacity. The coupler weld capacity for all sizes of C2/C3J couplers is found to be acceptable when compared to demand for all load combinations when compared to demand calculated in accordance with UFSAR and AISC N690-1994 requirements.

The requirements for mechanical anchorage of reinforcing steel are provided in ACI 349-01. As applicable to the coupler-rebar splice system, a splice made by full mechanical connection must develop 125% of the specified yield strength of the reinforcing steel as required by ACI 349-01 Section 12.14.3.4. Testing of welds is performed to demonstrate that the weld strength exceeds 125% of the specified yield strength of the reinforcing bar. It is also acceptable to demonstrate adequate weld strength by evaluation to AISC N690-1994 Table Q1.5.7.1 stress limits for 125% of the specified yield strength of the reinforcing bar. If the AISC N690-1994 Table Q1.5.7.1 stress

limit analytical approach is used, an SLC of 1.6 is applied. For rebar sizes #4, #5, and #6 C2/C3J couplers, analytical evaluation of the weld using an SLC of 1.6 shows that the weld strength exceeds 125% of the specified yield strength of the rebar. Larger bar size couplers (sizes #7, #8, #9, #10, and #11) are evaluated by testing.

5. Is Exemption Request Required? ☐ **Yes** ☒ **No**

If Yes, Briefly Describe the Reason for the Exemption. Not Applicable

6. **Identify Applicable Precedents:** No precedence identified.

7. Impact of Change on Installation and Testing Schedules:

SNC's requested date for approval of this license amendment as identified in the referenced LAR is October 21, 2015. This date is based primarily upon the time period required for processing a requested license amendment. Construction activities of structural modules adversely affecting the accessibility of couplers meeting the minimum fillet weld requirements and installed in non-accessible locations are currently placed in a "construction hold" status.

As such, this PAR requests a "no objection" finding related to this license amendment by the date identified in Block 1 above (or sooner if reasonably achievable) to allow for appropriate notifications and release of related welding activities currently under the "construction hold" status to allow construction to continue.

Specifically, SNC requests a "no objection" finding to allow concrete fill in Unit 3 structural module CA20 in accordance with the coupler weld change proposed in the revised UFSAR description in LAR-15-010.

A "no objection" finding for the above construction activity would release the associated Unit 3 construction holds.

8. **Impact of Change on ITAAC:** None

9. **Additional Information:** None