



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
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July 13, 2012

Mr. B. L. Ivey  
Vice President, Regulatory Affairs  
Southern Nuclear Operating Company  
PO Box 1295  
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Birmingham, AL 35201

**SUBJECT: U.S NUCLEAR REGULATORY COMMISSION RESPONSE TO SOUTHERN  
NUCLEAR OPERATING COMPANY VOGTLE ELECTRIC GENERATING  
PLANT UNIT 3 LETTER TITLED, "BASEMAT REINFORCEMENT DESIGN  
FULLY MEETS THE USFAR"**

Dear Mr. Ivey:

Thank you for your July 3, 2012, letter (ML12187A575) following up on the June 18, 2012, (ML12173A289) response to the Notice of Violation that was issued in U.S. Nuclear Regulatory Commission (NRC) Inspection Report 05200025/2012-008 dated May 18, 2012.

Based on the information submitted and subsequent discussions held with Southern Nuclear Operating Company on July 10, 2012, the staff finds that the submitted design revision does not meet the current licensing basis as described in the Updated Final Safety Analysis Report (UFSAR). Specifically, anchorage of the basemat layer 1 and 2 reinforcement into the perimeter walls of the nuclear island through the use of a hooked bar with an embedment length less than that required for a standard hook and an extended tail is not in conformance with ACI 349-01, "The Code Requirements for Nuclear Safety Related Concrete Structures" (the code). Compliance with ACI 349-01 is a Tier 2\* requirement for Seismic Category I structures, including the basemat, and a departure from Tier 2\* information requires use of the applicable change process in accordance with 10 CFR 52.98(c)(1).

The staff considers that paragraph 12.12.1 of ACI 349-01 provides for three methods of anchoring negative moment reinforcement: embedment length, hooks, or mechanical anchorage. The submitted design revision for anchoring the layer 1 and 2 reinforcement as described in your letter is not in conformance with the code requirements for any of these methods, nor is it consistent with the intent of Figure 3.H.5-3 of the Design Control Document – that the basemat reinforcement be fully developed at the face of the wall in accordance with the provisions of ACI 349-01 Section 12.5.

B. Ivey

The justification provided in your letter for concluding that the submitted design revision is in compliance with ACI 349-01 appears to be based on a broad interpretation of paragraph 12.1.1 of the code. The staff finds, however, that this paragraph does not allow for the blanket use of alternate means of developing reinforcement not covered by, or meeting the minimum requirements, prescribed in the code. Such systems fall within the purview of Section 1.4 of ACI 349-01, "Approval of special systems of design or construction." This section addresses approval of systems which do not conform to or are not covered by the code.

From a code compliance standpoint, the system described in your letter for anchoring the basemat layer 1 and 2 reinforcement into the perimeter walls - the use of a hooked bar with an embedment length less than that required in Section 12.5 of ACI 349-01 and an extended tail - is analogous to providing anchorage through a combination of straight embedment length and mechanical anchorage. Both systems, while not addressed in the body of the code, would appear to be acceptable in a broad interpretation of paragraph 12.1.1 of ACI 349-01. The latter system is, in fact, explicitly allowed in paragraph 12.6.3 of ACI 318-99, the document on which Chapter 12 of ACI 349-01 is based. This provision of ACI 318-99, however, was not incorporated into ACI 349-01. Moreover, the commentary to ACI 349-01 states in Section R12.6: "Combinations of mechanical anchorage plus additional embedment length of reinforcement, as permitted in paragraph 12.6.3 of ACI 318, should only be used if substantiated by experimental or analytical investigation ...". The use of a hooked bar with an embedment length less than that required in Section 12.5 of ACI 349-01 and an extended tail is likewise not a system covered by the code, and as a result, would require technical justification and approval by the NRC in accordance with Section 1.4 of ACI 349-01, "Approval of special systems of design or construction." The supporting documentation provided in your letter for the use of this alternate system for anchoring the layer 1 and 2 basemat reinforcement into the perimeter walls is not sufficient for acceptance by the NRC at this time, nor has the appropriate change process for approval of a departure from the licensing basis been invoked. For the reasons indicated in this letter, the NRC concludes that the submitted design revision is not in conformance with the licensing basis as described in the UFSAR and the design remains in non-compliance as documented in the above referenced inspection report.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and your response (if any), will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

B. Ivey

Please contact Kathleen O'Donohue at (404) 997-4469 or via electronic mail at [kathleen.O'Donohue@nrc.gov](mailto:kathleen.O'Donohue@nrc.gov) if you have any questions or need assistance regarding this matter.

Sincerely,

***/RA/***

Kathleen O'Donohue, Chief  
Construction Inspection Branch 2  
Division of Construction Inspection

Docket Nos. 52-00025  
Combined License (COL) No. NPF-91 (Unit 3)

cc: (See pages 4-7)

B. Ivey

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Sincerely,

**/RA/**

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Docket Nos. 52-00025  
Combined License (COL) No. NPF-91 (Unit 3)

cc: (See pages 4-7)

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