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Docket No.: 52-025

ND-11-1984

U.S. Nuclear Regulatory Commission  
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Washington, DC 20555-0001

Southern Nuclear Operating Company  
Vogtle Electric Generating Plant Units 3 and 4  
Reply to a Notice of Violation

Ladies and Gentlemen:

By letter dated September 16, 2011, the U.S. Nuclear Regulatory Commission (NRC) issued Inspection Report Number 05200011/2011-009 concerning the August 17-18, 2011 inspection. The purpose of this inspection was to determine if construction activities associated with Site Specific (SS) ITAAC 3.8.5.1.1 conducted under the Vogtle Electric Generating Plant (VEGP) Units 3 and 4 Early Site Permit (ESP) and Limited Work Authorization (LWA) were in compliance with the Commission's rules and regulations and with the conditions of the ESP.

The inspection report identified one Severity Level IV Violation 05200025/2011009-01 as a result of the inspection. The enclosure to this letter provides the SNC reply to the Notice of Violation.

If you have any questions regarding this letter, please contact Mr. Howard Mahan at (205) 992-5721.

TEO1  
NRO

Mr. B. L. Ivey states he is a Vice President of Southern Nuclear Operating Company, 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. L. Ivey

Sworn to and subscribed before me this 12<sup>th</sup> day of October, 2011

Notary Public: Ann G. Baker

My commission expires: 2/26/12

BLI/RWP

Enclosure: Reply to a Notice of Violation



cc: Southern Nuclear Operating Company

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**Southern Nuclear Operating Company**

**ND-11-1984**

**Enclosure**

**Reply to a Notice of Violation**

### **Reply to a Notice of Violation**

This enclosure provides Southern Nuclear Operating Company's (SNC) reply to the Notice of Violation (NOV) submitted to SNC by the U.S. Nuclear Regulatory Commission (NRC) in a letter dated September 16, 2011. The NOV was generated from NRC inspections ending on August 18, 2011 that were performed with the purpose of determining whether construction activities associated with Site Specific (SS) Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) 3.8.5.1.1 conducted under the SNC Vogtle Electric Generating Plant (VEGP) Units 3 and 4 Early Site Permit (ESP) and Limited Work Authorization (LWA) were in compliance with the NRC's rules and regulations and conditions of the ESP. The NRC inspection occurring between August 17-18, 2011 focused on addressing Unresolved Item (URI) 05200011/2011-002-001, "Waterproof Membrane Joint Detail Not Tested in Qualification Program," documented in NRC Integrated Inspection Reports 05200011/2011-02, 05200025/2011-04, and 05200026/2011-002. To close the subject URI, the NRC inspections involved the selected examination of procedures and representative records, observations of activities, and interviews with personnel.

The NOV cites SNC with one Severity Level 4 Violation involving the failure to assure that material qualification testing associated with the waterproof system simulated field conditions. The Violation, identified as 05200025/2011009-01, and SNC's reply to the Violation is provided below.

#### **Violation 05200025/2011009-01 states:**

Condition 3.G. of the SNC VEGP "Early Site Permit and Limited Work Authorization", states, in part, that SNC may perform the following activities under this LWA: installation of engineered backfill, retaining walls, lean concrete backfill, mudmats, and a waterproof membrane as described in the applicant's site safety analysis report (SSAR).

Section 3.8.5.1.1, "Waterproof Membrane," of the SNC VEGP SSAR states, in part, that prior to the procurement of the membrane material, a qualification program will be developed to demonstrate that the selected material will meet the waterproofing and friction requirements. The qualification program will include testing to demonstrate that the ITAAC design commitment in Table 3.8.5.1-1 for friction coefficient has been met. Testing methods will simulate field conditions to demonstrate that a minimum 0.7 coefficient of friction is achieved by the mudmat waterproof membrane structural interface. Section 1.1, "Purpose," of Domestic AP1000 Project Specification SV0-AT01-Z0-001, "Nuclear Island Waterproofing Membrane," Revision 4, states, in part, that the membrane between the mudmats must transfer horizontal shear forces due to seismic (Safe Shutdown Earthquake) loading. This function is Seismic Category 1 and Seismic Category 1 components shall meet the same requirements as those of safety related components [10 CFR Part 50, Appendix B]. Criterion III, "Design Control," of Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," states, in part, that where a test program is used to verify the adequacy of a specific design feature in lieu of other verifying or checking processes, it shall include suitable qualifications testing of a prototype unit under the most adverse design conditions.

Contrary to the above, as of August 18, 2011, SNC failed to develop suitable qualification testing of a prototype unit to verify the waterproof membrane coefficient of friction for SS ITAAC 3.8.5.1.1. Specifically, SNC failed to adequately simulate the field conditions in the qualification testing to demonstrate that a minimum of 0.7 coefficient of friction would be achieved by the mudmat waterproof membrane structural interface. Several deviations were identified as evidenced by the following examples:

1. The use of Metaset Flex Sealant in the joints was not tested during qualification testing, but was used in the as-built system.
2. A 7-inch (in.) wide strip of methyl methacrylate reinforcement scrim material was embedded into the as-built waterproof membrane stripe coat, but was not tested during qualification testing.
3. Two additional 8-in. wide layers of membrane material were applied at the joints, creating a minimum thickness 80 mils greater than what was tested during qualification testing.
4. During the waterproof membrane material application and prior to pouring the upper mudmat, specific environmental conditions such as curing temperature, sunlight exposure, rain, weather cycling and aging, were not adequately addressed during qualification testing.

**Reason(s) for the Violation:**

SNC accepts the Violation and offers the following discussion regarding the circumstances which resulted in the Violation:

SNC contractors performed a qualification testing program for the waterproofing membrane system used to waterproof sub-grade structures, systems, and components (SSCs) within the Nuclear Islands of VEGP 3 and 4. The qualification testing of the waterproof membrane was developed and implemented to verify, under a 10 CFR 50 Appendix B program, that it could satisfy a seismic function of transferring shear forces during beyond-design-bases seismic events by achieving a 0.7 coefficient of friction at its interface with the upper and lower Nuclear Island mudmats.

SNC contractors were obligated to establish a qualification testing program for the waterproof membrane to successfully define the physical conditions under which the membrane could meet its performance requirements and confine those conditions within the configuration of the as-installed waterproof membrane at VEGP Units 3 and 4.

In review of the subject matter of this Violation, SNC has concluded there are three primary reasons that contributed to receiving the Violation:

**1) Mudmat-Waterproof Membrane Interface at Saw-Cut Contraction Joints Was Not Addressed in Qualification Testing**

In establishing that qualification testing scope of work, aspects of how the membrane would be installed onsite over saw-cut joints in the bottom concrete mudmat were not tested during coefficient of friction testing. The final testing qualification report was then

issued without the requirement to conduct coefficient of friction testing on samples including the saw-cut joint waterproof membrane overlay. Instead, the project relied upon engineering evaluations to determine the coefficient of friction at saw-cut joint locations to be acceptable.

**2) The Process of Waterproof Membrane Installation On-Site Included Aspects Not Accounted For in the Qualification Testing**

After the final qualification testing report was issued, procurement and installation specifications were created and issued for use in applying the waterproofing membrane system onsite at VEGP Unit 3. Those specifications incorporated the information gathered in qualification testing of the membrane system as design inputs for how the membrane would be installed. However, the installation specification included details instructing how the membrane would be applied that were outside the scope of the qualification testing performed. As the specification was developed, certain features were not related back to the qualification testing work plan to ensure they were also included in qualification testing.

**3) Environmental Factors Not Fully Incorporated into Qualification Testing of the Waterproof Membrane System**

Environmental conditions occurring onsite at VEGP Unit 3 during the application and curing of the waterproof membrane system were not considered in relation to the environmental conditions present at the qualification testing facility where the waterproof membrane qualification testing occurred. Environmental aspects such as solar light exposure, rain, humidity, and temperature were not controlled onsite at VEGP Unit 3 as they were in the qualification testing facility. Temperature and relative humidity levels during waterproof membrane application at VEGP Unit 3 were within vendor recommendations, but the project failed to ensure all environmental conditions that bounded the qualification testing of the membrane were properly translated to account for the environmental conditions at VEGP Unit 3 during membrane application and curing.

Due to the three reasons mentioned above, assurance that the as-installed waterproof membrane-mudmat system at VEGP Unit 3 will achieve its coefficient of friction requirement has not yet been attained. Field conditions at VEGP Unit 3 were not completely simulated in the qualification testing program. Therefore, the Acceptance Criteria of ITAAC 3.8.5.1.1 was not clearly met with the performed installation of the membrane system, which resulted in this Violation/ITAAC-related construction finding.

**Corrective Steps Already Taken and Results Achieved:**

Following the NRC inspection occurring August 17-18, 2011, scheduled work activity to install the VEGP Unit 4 waterproof membrane system was suspended.

A plan to perform supplemental 10 CFR 50, Appendix B controlled, qualification testing, of waterproof membrane to simulate field conditions at VEGP Unit 3 has been initiated.



**Corrective Steps That Will Be Taken To Avoid Further Violations:**

After the supplemental qualification testing plan is fully developed and accepted by SNC, the testing will be executed and a report will document the compliance with the Acceptance Criteria of Unit 3 ITAAC 3.8.5.1.1.

**Date When Full Compliance Will Be Achieved:**

SNC will be in full compliance by February 15, 2012.