

SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS
RELATED TO AMENDMENT NO. 14 TO THE COMBINED LICENSE NO. NPF-91
AND LICENSE NO. NPF-92
SOUTHERN NUCLEAR OPERATING COMPANY, INC.
GEORGIA POWER COMPANY
OGLETHORPE POWER COMPANY
MUNICIPAL ELECTRIC AUTHORITY OF GEORGIA
CITY OF DALTON, GEORGIA
VOGTLE ELECTRIC GENERATING PLANT UNITS 3 AND 4
DOCKET NOS. 52-025 AND 52-026

1.0 INTRODUCTION

By letter dated June 19, 2013, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13171A009), and revised by a letter dated August 27, 2013 (ADAMS Accession No. ML13240A217), Southern Nuclear Operating Company (SNC/licensee) requested that the U.S. Nuclear Regulatory Commission (NRC/Commission) amend the combined licenses (COLs) for the Vogtle Electric Generating Plant Units 3 and 4 (VEGP), COL Numbers NPF-91 and NPF-92, respectively. The license amendment request (LAR) proposes to depart from the Updated Final Safety Analysis Report (UFSAR) Tier 2* and associated Tier 2 material incorporated into the UFSAR related to the design of structural wall modules used to construct containment internal structures and portions of the auxiliary building. The licensee also stated that the proposed changes would revise Tier 2* text in the UFSAR to acknowledge the types of interferences (other than wall openings and penetrations) that may cause a change in the design spacing of shear studs and design and spacing of wall module trusses in a local area, to remove the term "maximum" in reference to design spacing, to revise a note to clarify that the stud spacing is specified as a design value, to add the tolerance for stud spacing, and to clarify the welding requirements for the modules.

In the letter dated August 27, 2013 (ADAMS Accession No. ML13240A217), the licensee provided additional information that revised the application, did not expand the scope of the application as originally noticed and did not change the NRC staff's original proposed no significant determination as published in the *Federal Register* on August 6, 2013 (78 FR 47792).

2.0 REGULATORY EVALUATION

Appendix D, "Design Certification Rule for the AP1000 Design," of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Section VIII.B.6 requires NRC approval for departures from Tier 2* information. Because the proposed amendment request involves changes to Tier 2* information NRC approval is required before making the Tier 2* changes addressed in this departure. 10 CFR Part 52, Appendix D, VIII.B.5.a require prior NRC approval for Tier 2 information departures that involve changes to Tier 2* information.

The NRC staff considered the following regulatory requirements in reviewing the license amendment request (LAR) that included the proposed UFSAR changes.

10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criterion (GDC) 1, "Quality Standards and Records," requires that structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of safety functions to be performed.

10 CFR Part 50, Appendix A, GDC 2, "Design Bases for Protection Against Natural Phenomena," requires that structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunamis, and seiches without loss of capability to perform their safety functions.

10 CFR Part 50, Appendix A, GDC 4, "Environmental and Dynamic Effects Design Basis," requires that structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-cooling accidents.

3.0 TECHNICAL EVALUATION

The design of the AP1000 steel-concrete (SC) composite wall modules used for the containment internal structures (CIS) and portions of the auxiliary building is described in UFSAR Subsection 3.8.3.1.3. The SC composite wall modules are constructed of steel faceplates connected by trusses and welded to the faceplates. The modules are filled with concrete. The primary purpose of the trusses is to stiffen and support the faceplates during handling, erection, and concrete placement. The nominal thickness of the steel faceplates is 0.5 inch and the nominal spacing of the trusses is 30 inches. Shear studs are welded to the inside faces of the module faceplates to develop full composite action between the concrete and steel faceplates. The shear studs and trusses are designed in accordance with the provisions of the American Institute of Steel Construction (AISC), Standard AISC N690-1994, "Specification for the Design, Fabrication, and Erection of Steel Safety Related Structures for Nuclear Facilities." AISC N690-1994 references the American Welding Society (AWS) D1.1 for structural welding.

The concrete-filled structural wall modules are designed as reinforced concrete structures in accordance with the requirements of American Concrete Institute (ACI) code ACI-349, "Building Code Requirements for Nuclear Safety Related Structures." Module-to-module welds are full-penetration welds such that full capacity of the steel plates is developed across the joint. After the wall modules are welded together, concrete is poured in-between the steel faceplates, which

serve as forms. Once the concrete in the wall modules cures, the concrete, trusses, faceplates, and shear studs act as a lateral force resisting system, behaving as a shear wall, to resist design basis demands.

The LAR proposes to revise Tier 2* and Tier 2 material in UFSAR Subsections 3.8.3.1, 3.8.3.1.3, 3.8.3.5.3.6, and 3.8.3.6.1 to recognize changes in the design spacing of studs and trusses located adjacent to internal module obstructions such as leak chases, reinforcements, embedments, backup structures, and internal conduit and piping. Specifically, the proposed changes include, (1) removal of the term “maximum” in reference to design spacing, (2) addition of a design tolerance for shear stud spacing, and (3) addition of a discussion on the prevention of SC specific failure modes.

Further, the LAR proposes to revise Note 2 to Figure 3.8.3-8, Sheet 1 of 3, to include a tolerance for the design stud spacing. Note 2 of Figure 3.8.3-8 is designated as Tier 2* information, and indicates size and spacing of welded shear studs. The licensee is proposing to add a 10-percent construction tolerance for the design spacing of welded studs for stainless steel (SS) plates and carbon steel (CS) plates. In Enclosure 1, the licensee states that this tolerance considers SC failure modes and is consistent with the stud spacing tolerance in AWS D1.1, Paragraph 7.4.5. Moreover, the licensee is proposing to revise UFSAR Section 3.8.3.6.1 to include this additional referenced section in AWS D1.1 which supports the proposed tolerance.

In addition to the above, the LAR proposes to revise UFSAR Subsection 3.8.3.1.3 and the weld notation on Figure 3.8.3-8, Sheet 1 of 3, from the specific square groove weld to the more general complete joint penetration (CJP) weld designation.

To perform its evaluation, the staff considered the licensee’s design criteria described in UFSAR Subsection 3.8.3, “Concrete and Steel Internal Structures of Steel Containment,” which requires that containment internal structures be designed in accordance with AISC N690-94 and ACI 349-01 code provisions. Staff also reviewed relevant sections of AWS D1.1 to perform its evaluation of stud welding tolerances.

The staff focused its review on the potential effects of these changes on the structural behavior of the SC composite module walls. Staff reviewed the changes to UFSAR Subsection 3.8.3.5.3.6 which addresses the SC-specific failure mode of plate buckling and found them to be acceptable on the basis that the cited AISC provisions apply to thin steel plate members of a composite section such as those used in the design of the CIS. Staff review also notes that the LAR identifies no departures from the UFSAR Section 3.8.3 commitment to design shear studs and trusses in accordance with relevant ACI-349 and AISC-N690 code provisions. Accordingly, the staff finds the proposed design tolerance for shear studs and truss spacing and truss design to be acceptable on the basis that these variations will occur in close proximity to obstructions and that the design in these areas will remain in accordance with the licensing basis commitments including the aforementioned codes and standards.

Staff review of the addition of a 10-percent tolerance to stud design spacing, as described in the LAR, finds the tolerance acceptable on the basis that for the designated design spacing, the tolerance falls within the limits allowed by AWS D1.1 Section 7.4.5.

Staff performed a review of the licensee’s proposal, described in the LAR to remove the term “maximum” in reference to the design spacing in UFSAR Sections 3.8.3.1 and 3.8.3.1.3. Staff review finds that the proposed design change eliminates a potential conflict resulting from the case of the as-built design spacing satisfying the proposed spacing tolerance, but exceeding a

maximum specified value. Staff also finds that that removal of the term “maximum” in reference to the design spacing is consistent with the application of tolerances for fabrication, assembly and erection of the SC wall modules and is therefore acceptable.

Staff review of the change in UFSAR Figure 3.8.3-8, Sheet 1 of 3, from the specific square groove weld to the more general complete joint penetration weld designation finds the change to be acceptable on the basis that the design and tolerances of CJP welds are covered in the AWS standard, Section D1.1 and that a CJP weld will assure the development of the full strength of the module plates across the joint regardless of which kind of CJP that is utilized.

Conclusions:

The NRC staff has reviewed the LAR. Based on the staff’s technical evaluation, the staff found that:

1. The licensee’s proposed design changes to stud and truss spacing will be performed in accordance with AISC-N690 and ACI 349-01. Local variations are understood by the staff to mean changes in spacing immediately adjacent to obstructions such as leak chases, reinforcements, embedments, backup structures, and internal conduit and piping. These changes are therefore acceptable.
2. The staff determined that local variations in stud and truss spacing are bound by applicable codes included in the licensee’s design basis. The referenced codes and standards control both the maximum and minimum spacing. In carrying out these local variations, the licensee committed to addressing the specific SC failure modes including steel plate buckling. There is no departure taken by the licensee from the codes and standards committed to in the licensing basis and the proposed changes are therefore acceptable.
3. The addition of a 10-percent tolerance on design spacing of studs was found acceptable on the basis that for the designated design spacing, the tolerance falls within the limits allowed by AWS D1.1. The AWS D1.1 standard is part of the current licensing basis.
4. The removal of the term “maximum” in reference to the stud’s design spacing is consistent with the application of tolerances for fabrication, assembly and erection of the SC wall modules and is therefore acceptable.
5. The CJP weld notation is acceptable on the basis that the weld design is addressed in AWS D1.1 and that all CJP are full strength welds capable of developing the full strength of the module plates across the joint.

For the reasons specified above, the NRC staff finds that the proposed amendment meets relevant code provisions. Based on these findings, the NRC staff concludes that there is reasonable assurance that the requirements of GDC 1, GDC 2, and GDC 4 of Appendix A to 10 CFR Part 50, and Appendix D to 10 CFR 52 will continue to be met. Therefore, the staff finds the proposed change to be acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations in 10 CFR 50.91(b)(2), the Georgia State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, "Standards for Protection Against Radiation." The NRC staff has determined that the amendment involves no significant increase in the amounts-and no significant change in the types-of any effluents that may be released offsite. Also, there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (*Federal Register* (FR) Notice 78 FR 47792, published on August 6, 2013). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Under 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

Based on the considerations discussed above, the staff has concluded that there is reasonable assurance that (1) the proposed operation will not endanger public health and safety, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or public health and safety. Therefore, the staff finds the changes proposed in this license amendment acceptable.

7.0 REFERENCES

1. Request for License Amendment– Module Obstructions and Details (LAR-13-006R), letter from Southern Nuclear Operating Company (SNC) dated June 19, 2013 (ADAMS Accession No. ML13171A009), and revised by the letter dated August 27, 2013 (ADAMS Accession No. ML13240A217).
2. Vogtle Electric Generating Plant (VEGP) Updated Final Safety Analysis Report (UFSAR), Revision 1, dated July 3, 2013 (ADAMS Accession No. ML13205A266).
3. AP1000 Design Control Document, Revision 19, June 13, 2012 (ADAMS Accession No. ML11171A087)
4. American Concrete Institute (ACI), Building Code Requirements for Nuclear Safety Related Structures, ACI-349-01
5. American Institute of Steel Construction (AISC), Specification for the Design, Fabrication and Erection of Steel Safety Related Structures for Nuclear Facilities, AISC-N690-1994
6. American Welding Society (AWS), Structural Welding Code, AWS D 1.1-2000