

NUCLEAR REGULATORY COMMISSION

Docket Nos. 50-424 and 50-425

Southern Nuclear Operating Company, Inc.

Vogtle Electric Generating Plant, Units 1 and 2

Exemptions

I. Background.

Southern Nuclear Operating Company, Inc. (SNC, the licensee) is the holder of Renewed Facility Operating License Nos. NPF-68 and NPF-81, which authorize operation of Vogtle Electric Generating Plant (Vogtle), Units 1 and 2, respectively. The licenses provide, among other things, that the facility is subject to all applicable rules, regulations, and orders of the U.S. Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect. The facility consists of two pressurized-water reactors (PWRs) located in Burke County, Georgia.

In 1996, the NRC identified Generic Safety Issue (GSI)-191 associated with the effects of debris accumulation on PWR sump performance during design-basis accidents (Agencywide Documents Access and Management System (ADAMS) Accession No. ML030160807). As part of the actions to resolve GSI-191, the NRC issued Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors," dated September 13, 2004 (ADAMS Accession No. ML042360586), to holders of operating licenses for PWRs. In GL 2004-02, the NRC staff requested that these licensees perform an evaluation of the emergency core cooling system (ECCS) and the containment spray system (CSS) recirculation functions considering the potential for debris-laden coolant to be circulated by the ECCS and the CSS after a loss-of-coolant accident (LOCA) or high-energy line break inside containment and, if appropriate, take additional actions to ensure system function. The GL required that these licensees provide a

written response to the NRC, pursuant to title 10 of the *Code of Federal Regulations* (10 CFR) section 50.54(f), describing the results of their evaluation and any modifications made, or planned, to ensure that the ECCS and the CSS remain functional.

II. Request/Action.

By letter dated August 17, 2020 (ADAMS Accession No. ML20230A346), as supplemented by letters dated December 17, 2020, and February 15, 2021 (ADAMS Accession Nos. ML20352A228 and ML21046A094, respectively), SNC requested for the NRC to grant exemptions under 10 CFR 50.12, "Specific exemptions," from certain requirements in 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," for Vogtle, Units 1 and 2. The request for exemptions from SNC relates to using a specific risk-informed methodology to evaluate the effects of debris on long-term core cooling in lieu of a deterministic methodology.

III. Discussion.

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50 when (1) the exemptions are authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security and (2) special circumstances are present. Under 10 CFR 50.12(a)(2)(ii), special circumstances are present when application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule. Under 10 CFR 50.12(a)(2)(iii), special circumstances are present when compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the

regulation was adopted, or that are significantly in excess of those incurred by others similarly situated.

SNC submitted a request for exemptions under 10 CFR 50.12 for Vogtle, Units 1 and 2 from certain requirements of 10 CFR 50.46(a)(1) as it relates to using specific deterministic methodology to evaluate the effects of debris generated from breaks on long-term core cooling. SNC stated that the scope of the requested exemptions applies to all debris effects addressed in the risk-informed element of the Vogtle methodology described in SNC's July 2018 submittal responding to GL 2004-02 (ADAMS Accession Nos. ML18193B163 and ML18193B165). SNC stated that the addressed debris effects are those associated with breaks that potentially generate and transport debris amounts that exceed the Vogtle-specific analyzed debris limit.

SNC is requesting exemptions related to these breaks to allow evaluation of the debris effects using a risk-informed methodology in lieu of a deterministic methodology. The licensee stated that the key elements of the exemption request are that (1) the exemptions will apply only to the effects of debris as described in Enclosures 2 and 3 of the submittal dated July 2018 and (2) the exemptions will apply to any breaks that can generate and transport debris that is not bounded by Vogtle-specific analyzed debris limits, provided that the delta core damage frequency (Δ CDF) and delta large early release frequency (Δ LERF) remain within the acceptance guidelines identified as Region III in Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Revision 3, dated January 2018 (ADAMS Accession No. ML17317A256).

By letter dated September 30, 2019, "Final Staff Evaluation for Vogtle Electric Generating Plant, Units 1 and 2, Systematic Risk-Informed Assessment of Debris Technical Report" (ADAMS Accession No. ML19120A469), the NRC staff found that the subject technical report enclosed with SNC's July 2018 submittal was acceptable for use in plant-specific licensing applications for Vogtle in accordance with the limitations and conditions section and applicability provided in the enclosed NRC staff evaluation. Except for downstream effects –

fuel and vessel, and licensing basis, the NRC staff concluded that the technical report contained sufficient information to address the information requested in GL 2004-02.

The NRC staff performed an integrated review of the risk-informed approach proposed to be used in lieu of a deterministic methodology by the requested exemptions, considering the five key principles of risk-informed decision-making set forth in RG 1.174. The five key principles are: (1) the proposed change meets the current regulations unless it is explicitly relates to a requested exemption; (2) the proposed change is consistent with the defense-in-depth philosophy; (3) the proposed change maintains sufficient safety margins; (4) when proposed changes result in an increase in risk, the increases should be small and consistent with the intent of the Commission's policy statement on safety goals for the operations of nuclear power plants (51 FR 30028); and (5) the impact of the proposed change should be monitored using performance measurement strategies.

The NRC staff finds that the proposed risk-informed approach meets the five key principles in RG 1.174. The proposed risk-informed approach is consistent with the defense-in-depth philosophy, maintains sufficient safety margins, and is monitored using performance measurement strategies. The proposed risk-informed approach also explicitly relates to a requested exemption. Finally, the Vogtle risk evaluation results show that the risk associated with post-accident debris effects is within RG 1.174, Region III acceptance guidelines as a "Very Small Change," and, therefore, is consistent with the intent of the Commission's policy statement on safety goals for the operations of nuclear power plants.

A. The Exemptions are Authorized by Law.

The exemptions to use a risk-informed methodology would allow SNC to show compliance with 10 CFR 50.46(a)(1) when considering debris in containment generated and transported during a postulated LOCA. This regulation was promulgated under Section 161 of the Atomic Energy Act of 1954, as amended (AEA), and this regulation is consistent with the

Commission's authority under Section 161 of the AEA. Because the application of a risk-informed methodology to show compliance with 10 CFR 50.46 would not violate the AEA or the Commission's regulations, the exemptions are authorized by law.

B. The Exemptions Present no Undue Risk to the Public Health and Safety.

The provisions of 10 CFR 50.46 establish criteria for the ECCS performance. SNC submitted a request for exemptions under 10 CFR 50.12 for Vogtle, Units 1 and 2 from certain requirements of 10 CFR 50.46(a)(1) as it relates to using specific deterministic methodology to evaluate the effects of debris generated from breaks on long-term core cooling. The licensee justified its requested exemptions by stating that they are consistent with the purpose of the requirements in that the use of the proposed risk-informed approach would account for the effects of debris on the ECCS cooling performance and would support a high probability of successful ECCS performance, based on the risk results meeting the acceptance guidelines of RG 1.174. Additionally, the licensee stated that the Vogtle, Units 1 and 2 risk quantification showed that the changes in Δ CDF and Δ LERF are below the threshold for RG 1.174, Region III, "Very Small Changes," without significant plant modifications. The licensee stated that the proposed risk-informed approach would provide an equivalent level of assurance for sump performance without incurring significant cost and occupational dose associated with removing, replacing, or reinforcing insulation in containment.

The NRC staff finds that the risk associated with the requested exemptions is consistent with the guidance in RG 1.174 for the use of probabilistic risk assessment and with the Commission's policy statement on safety goals for the operations of nuclear power plants; therefore, the requested exemptions present no undue risk to the public health and safety.

C. The Exemptions are Consistent with the Common Defense and Security.

The requested exemptions would allow the use of a risk-informed methodology to allow SNC to resolve a generic safety concern for PWRs associated with the potential clogging of the ECCS and CSS strainers during certain design-basis events. The proposed change would be adequately controlled by safety acceptance criteria and technical specification requirements and is not related to security issues. Because the common defense and security is not impacted by the requested exemptions, the requested exemptions are consistent with the common defense and security.

D. Special Circumstances are Present.

The requested exemptions from 10 CFR 50.46(a)(1) would allow SNC to use a risk-informed methodology in lieu of a deterministic methodology to show conformance with the ECCS and CSS performance criteria accounting for debris in containment for LOCAs. In its request, SNC cited the special circumstances criteria of 10 CFR 50.12(a)(2)(ii) and (iii) and stated that application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule and that compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated.

The licensee stated that the intent of 10 CFR 50.46(a)(1) is to ensure that ECCS cooling performance design requirements imposed by 10 CFR 50.46 are determined by a rigorous method that provides a high level of confidence in ECCS performance. SNC stated that its proposed risk-informed approach accounts for the effects of debris on the ECCS cooling performance and supports a high probability of successful ECCS performance based on the risk results meeting the acceptance guidelines of RG 1.174.

The licensee also stated that in order to meet a deterministic threshold value for sump debris loads, the debris sources in containment would need to be significantly reduced. SNC stated that the amount of radiological exposure received during the removal and/or modification of insulation from the Vogtle, Units 1 and 2 containments is dependent on the scope of the changes. The licensee stated that the expected total dose for replacing insulation in Vogtle, Units 1 and 2 is estimated generically to be about 200 roentgen equivalent man (rem) (100 rem per unit) based on the South Texas Project pilot submittal.

The licensee concluded that the special circumstances described in 10 CFR 50.12(a)(2)(ii) and (iii) would apply to its requested exemptions.

The NRC staff evaluated the exemption request and summarized its evaluation of the proposed risk-informed approach in a safety evaluation (ADAMS Accession No. ML20268A070). Since 10 CFR 50.46(a)(1) requires a deterministic approach, an exemption is an appropriate means to grant the licensee relief to use an alternative, risk-informed approach. The underlying purpose of the regulation is to protect the public health and safety in the event of a LOCA by establishing criteria for the ECCS. In its safety evaluation, the NRC staff concluded, in part, that the licensee adequately demonstrated that the change in risk attributable to debris in postulated LOCAs is very small. The NRC staff also concluded that the licensee's proposal for demonstrating compliance with the ECCS and the CSS performance requirements meets the risk acceptance guidelines in RG 1.174, because the approach is related to a permissible exemption request, is consistent with defense-in-depth philosophy, maintains sufficient safety margins, results in a small increase in risk, and the impact of the approach is monitored by the licensee using performance measurement strategies. Therefore, the NRC staff finds that the licensee's use of the proposed risk-informed approach to consider the impacts of debris meets the underlying intent of 10 CFR 50.46 to ensure that a licensee demonstrates that the ECCS and the CSS will provide adequate cooling for the reactor core and containment, as well as containment atmosphere cleanup, following postulated design-basis accidents.

The NRC staff also finds that the licensee demonstrated that using the required deterministic approach as opposed to the proposed risk-informed approach would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated.

Based on the above, the NRC staff concludes that the special circumstances described in 10 CFR 50.12(a)(2)(ii) and (iii) are present for the requested exemptions.

E. Environmental Considerations

The regulations in 10 CFR 51.21, “Criteria for and identification of licensing and regulatory actions requiring environmental assessments,” generally provide that NRC licensing and regulatory actions require an environmental assessment (EA) except those identified in 10 CFR 51.20(b) as requiring an environmental impact statement, those identified in 10 CFR 51.22(c) as categorical exclusions, and those identified in 10 CFR 51.22(d) as other actions not requiring environmental review. These regulations also provide that the NRC may, in special circumstances, prepare an EA on an action covered by a categorical exclusion. Typically, exemptions are identified in 10 CFR 51.22(c) as categorical exclusions; however, because the requested exemptions propose a novel risk-informed approach to the requirements in 10 CFR 50.46(a)(1), the NRC staff determined that special circumstances were present and prepared an EA. As discussed in the EA and the associated Finding of No Significant Impact published in the *Federal Register* on April 7, 2021, 2021 (86 FR 18076) and in accordance with 10 CFR 51.31(a), the Commission has determined that granting the requested exemptions will not have a significant effect on the quality of the human environment.

IV. Conclusion.

Accordingly, the Commission has determined, pursuant to 10 CFR 50.12, that the requested exemptions are authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security and that special circumstances are present. Therefore, the Commission hereby grants SNC's request for exemptions under 10 CFR 50.12 for Vogtle, Units 1 and 2, from 10 CFR 50.46(a)(1) to allow the use of a risk-informed methodology in lieu of a deterministic methodology to show conformance with the ECCS and CSS performance criteria accounting for debris in containment for LOCAs.

V. Availability of Documents.

The documents identified in the following table are available to interested persons through one or more of the following methods, as indicated.

DOCUMENT	ADAMS ACCESSION NO. / FEDERAL REGISTER CITATION
SNC letter, "Exemption Request and License Amendment Request for a Risk-Informed Resolution to GSI-191," dated August 17, 2020.	ML20230A346
SNC letter, "Response to Request for Additional Information Regarding Risk-Informed Resolution to GSI-191," dated December 17, 2020.	ML20352A228
SNC letter, "Supplement to Request for Exemption to Support Risk-Informed Resolution to Generic Letter 2004-02," dated February 15, 2021.	ML21046A094
NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," dated September 13, 2004.	ML042360586
Regulatory Guide 1.174, Revision 3, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," dated January 2018.	ML17317A256

NRC Safety Evaluation, Vogtle, Units 1 and 2 – Amendments for a Risk-Informed Resolution to GSI-191, dated July 30, 2021.	ML20268A070
SNC Letter, “Vogtle Electric Generating Plant – Units 1 & 2, Supplemental Response to NRC Generic Letter 2004-02,” dated July 10, 2018.	ML18193B163 and ML18193B165
NRC letter, “Final Staff Evaluation for Vogtle Electric Generating Plant, Units 1 and 2, Systematic Risk-Informed Assessment of Debris Technical Report,” dated September 30, 2019.	ML19120A469
NRC, “Safety Goals for the Operations of Nuclear Power Plants; Policy Statement; Republication,” dated August 21, 1986.	51 FR 30028

Dated: July 30, 2021.

For the Nuclear Regulatory Commission.

/RA/

Caroline L. Carusone, Deputy Director,
Division of Operating Reactor Licensing,
Office of Nuclear Reactor Regulation.