



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 11, 2017

Mr. G. T. Powell
Executive Vice President and CNO
STP Nuclear Operating Company
South Texas Project
P.O. Box 289
Wadsworth, TX 77483

SUBJECT: SOUTH TEXAS PROJECT, UNITS 1 AND 2 – CLOSEOUT OF GENERIC LETTER 2004-02, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED-WATER REACTORS" (CAC NOS. MC4719 AND MC4720)

Dear Mr. Powell:

The U.S. Nuclear Regulatory Commission (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 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML042360586), requesting that licensees address the issues raised by Generic Safety Issue (GSI) 191, "Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance."

The purpose of GL 2004-02 focused on nuclear power plant licensees demonstrating compliance with Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors." Specifically, the GL requested licensees to perform an evaluation of emergency core cooling system (ECCS) and containment spray system (CSS) recirculation and, if necessary, take additional action to ensure system function in light of a potential susceptibility to blockage during design-basis accidents. The focus of the assessment was on those accidents requiring recirculation operation of the ECCS or CSS, and on potential adverse effects due to debris blockage of flowpaths necessary for ECCS and CSS recirculation and containment drainage.

GL 2004-02 requested holders of operating licenses for pressurized-water reactors to perform a mechanistic evaluation, using an NRC-accepted method, to demonstrate that debris, which may be generated during a high energy line break, will not adversely affect the recirculation function of the ECCS and CSS following postulated accidents. The GL also requested that holders of operating licenses for pressurized-water reactors implement plant modifications required to ensure the recirculation function, and provide information regarding planned actions and the schedule for completing the requested evaluation.

Specifically, the GL requested that licensees provide information, pursuant to 10 CFR 50.54(f), including the following:

- a. A description of the method used to analyze the susceptibility of the ECCS and CSS recirculation functions to the adverse effects of post-accident debris blockage and operation with debris-laden fluid.

- b. A statement of whether the licensee plans to perform a containment building walkdown surveillance in support of the analysis, including the methodology planned for the walkdown. The GL also requested that a justification be provided if no containment walkdown surveillance will be performed.
- c. Confirmation that the ECCS and CSS recirculation functions under debris loading conditions are or will be in compliance with the applicable regulatory requirements. The submittal should be based on the configuration of the plant that will exist once all modifications required for regulatory compliance have been completed.
- d. A general description of and implementation schedule for all corrective actions, including any plant modifications that the licensee identified while responding to the GL.
- e. A description of the method that was used to perform the analysis.

The GL allowed the submittal to reference a guidance document (e.g., Regulatory Guide 1.82, Revision 3, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," November 2003 (ADAMS Accession No. ML033140347)), industry guidance, or other methods previously submitted to, and accepted by the NRC. The documents submitted or referenced were requested to include the following information:

- i. The results of any containment walkdown surveillances performed to identify potential debris sources and other pertinent containment characteristics.
- ii. The minimum available net positive suction head margin for the ECCS and CSS pumps assuming an unblocked sump screen.
- iii. The submerged area of the sump screen at this time and the percent of submergence of the sump screen (i.e., partial or full) at the time of the switchover to sump recirculation.
- iv. The maximum head loss postulated from debris accumulation on the sump screen, and a description of the primary constituents of the debris bed that result in this head loss. In addition to debris generated by jet forces, debris created by the resulting containment environment (thermal and chemical) and CSS washdown should be considered in the analyses. Examples of this type of debris are disbonded coatings in the form of chips and particulates and chemical precipitates caused by chemical reactions in the pool.
- v. The basis for concluding that the water inventory required to ensure ECCS or CSS inventory would not be held up or diverted by debris blockage at choke-points in the ECCS sump return flowpaths.
- vi. The basis for concluding that adequate core and containment cooling would be assured in the case of debris blockage at flow restrictions in the

- ECCS and CSS flow paths downstream of the sump screen (e.g., a high-pressure safety injection system throttle valve, pump bearing or seal; fuel assembly inlet debris screen; or containment spray nozzles).
- vii. Verification that close-tolerance subcomponents in pumps, valves and other ECCS and CSS components are not susceptible to plugging or excessive wear due to extended post-accident operation with debris-laden fluids.
 - viii. Verification that the strength of any trash racks is adequate to protect the sump strainers from missiles and other large debris. The submittal should also provide verification that all trash racks and sump screens are capable of withstanding the loads imposed by expanding jets, missiles, the accumulation of debris, and pressure differentials caused by post-loss-of-coolant accident blockage under predicted flow conditions.
 - ix. If an active approach (e.g., back-flushing, powered screens) is selected in lieu of or in addition to a passive approach to mitigate the effects of the debris blockage, describe the approach and associated analyses.
- f. A description of the existing or planned programmatic controls that ensure that potential sources of debris introduced into containment (e.g., insulations, signs, coatings, and foreign materials) are assessed for potential adverse effects on the ECCS and CSS recirculation functions.

On June 19, 2013 (ADAMS Accession No. ML131750250), STP Nuclear Operating Company (STPNOC, the licensee) submitted a license amendment request to resolve the concerns addressed in GL 2004-02, specifically for South Texas Project, Units 1 and 2 (STP), using a risk-informed approach. The license amendments were necessary because the risk-informed methodology is a departure from the method of evaluation described in the plants' licensing basis as provided in the updated final safety analysis report (UFSAR), and also because changes to the STP Technical Specifications were needed to identify operability limitations on the systems considering the impacts of debris. The licensee also requested exemptions from the regulations under 10 CFR 50.46(a)(1)(i), and 10 CFR 50 Appendix A, General Design Criterion (GDC) 35, "Emergency core cooling," GDC 38, "Containment heat removal," and GDC 41, "Containment atmosphere clean-up," stating the regulations require a deterministic approach.¹

To close GL 2004-02 for STP, the NRC staff reviewed and assessed the licensee's submittals requesting approval of a risk-informed methodology for the evaluation of debris for compliance with 10 CFR 50.46. The submittals associated with the license amendment and exemption requests were responsive to the NRC staff's requests to close GL 2004-02.

On July 11, 2017 (ADAMS Accession No. ML17037C871), the NRC staff granted exemptions from 10 CFR 50.46(a)(1)(i) and 10 CFR 50 Appendix A GDCs 35, 38, and 41 requirements to use a deterministic or bounding analysis regarding the effects of debris following certain

¹ Note that a final rule to revise 10 CFR 50.46 is under consideration by the Commission that would likely support the use of a risk-informed approach without the need for exemptions.

postulated accidents, and instead authorize STPNOC to use a risk-informed method to resolve the concerns addressed in GL 2004-02.¹

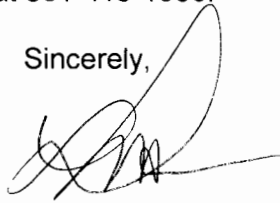
Also, on July 11, 2017 (ADAMS Package Accession No. ML17019A001), the NRC staff issued Amendment Nos. 212 and 198 to STP, Units 1 and 2, respectively, allowing the use of a risk-informed approach for resolving the effects of debris on ECCS and CSS recirculation function following design-basis accidents.

Based on its conclusions in the exemptions *Federal Register* notice and safety evaluation for the license amendments, the NRC staff finds that STPNOC provided adequate information as requested by GL 2004-02. The NRC staff finds the information provided demonstrates that debris will not inhibit ECCS or CSS performance and the intended system functions in accordance with 10 CFR 50.46 to assure adequate long-term core cooling following a design-basis accident.

Based on the above, the NRC staff finds the licensee's responses to GL 2004-02 to be adequate and considers GL 2004-02 closed for STPNOC. No further information or action is requested of the licensee.

If you have any questions, please call me at 301-415-1906.

Sincerely,

A handwritten signature in black ink, appearing to be 'L. Regner', written over a horizontal line.

Lisa M. Regner, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

cc: Listserv

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