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

November 18, 2011

Mr. Joseph W. Shea
Corporate Manager, Nuclear Licensing
Tennessee Valley Authority
3R Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2 – REVIEW OF THE 10 CFR 50.46 ANNUAL REPORT (TAC NOS. ME5168 AND ME5169)

Dear Mr. Shea:

By letter dated November 30, 2010, as supplemented by letter dated July 28, 2011, Tennessee Valley Authority (the licensee) submitted the annual report of changes or errors discovered in the emergency core cooling system evaluation model for Sequoyah Nuclear Plant (SQN), Units 1 and 2, in accordance with the requirements of paragraph (a)(3)(ii) of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors." On June 28, 2011, the Nuclear Regulatory Commission (NRC) requested for additional information, and the licensee provided responses on July 28, 2011. The NRC staff has reviewed these responses and concluded that the annual report of changes or errors discovered in an acceptable loss-of-coolant accident evaluation model application for the emergency core cooling system for SQN, Units 1 and 2, is acceptable per the enclosed safety evaluation.

If you have any questions, please contact me at 301-415-1564.

Sincerely,

Tanya Ott for

Siva P. Lingam, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

Enclosure: Safety Evaluation

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SAFETY EVALUATION O THE 10 CFR 50.46 ANNUAL REPORT

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

1.0 INTRODUCTION

By letter dated November 30, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML103370242), as supplemented by letter dated July 28, 2011 (ADAMS Accession No. ML11213A010), Tennessee Valley Authority (the licensee) submitted the annual report of changes or errors discovered in the emergency core cooling system (ECCS) evaluation model for Sequoyah Nuclear Plant (SQN), Units 1 and 2, in accordance with the requirements of paragraph (a)(3)(ii) of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors." The subject annual report described the nature and the estimated effect on the limiting ECCS analysis of changes or errors discovered since November 30, 2009, submittal for SQN, Units 1 and 2.

2.0 REGULATORY EVALUATION

The purpose of the annual report of changes or errors discovered in an acceptable loss-of-coolant accident (LOCA) evaluation model application for the ECCS is to meet 10 CFR 50.46(a)(3)(ii) requirements.

In part, 10 CFR 50.46 requires that: (1) ECCS cooling performance must be calculated in accordance with an acceptable evaluation model and must be calculated for a number of postulated loss-of-coolant accidents of different sizes, locations, and other properties sufficient to provide assurance that the most severe postulated loss-of-coolant accidents are calculated; and (2) an ECCS must be designed so that its calculated cooling performance following postulated LOCA accidents conforms to the criteria such as peak cladding temperature (PCT) not exceeding 2200 degrees Fahrenheit (°F), maximun cladding oxidation not exceeding 0.17 times the total cladding thickness before oxidation, maximum hydrogen generation not exceeding 0.01 times the hypothetical amount that would be generated if all of metal in the cladding cylinders surrounding the fuel, coolable geometry that the core remains amenable to cooling, and long-term cooling capability to maintain core temperature at an acceptably low value and to remove decay heat for the extended period of time required by the long-lived radioactivity remaining in the core.

3.0 TECHNICAL EVALUATION

The Nuclear Regulatory Commission (NRC) staff reviewed the annual report of changes or errors discovered in an acceptable LOCA evaluation model application for the ECCS for SQN, Units 1 and 2 and the licensee's response to the NRC request for additional information (RAI) on July 28, 2011, and concluded that the licensee provided sufficient information to address the issues required by 10 CFR 50.46(a)(3)(ii). The annual report is acceptable because:

1. The annual report covering the period until November 30, 2010, provides results from large break loss-of-coolant accident (LBLOCA) evaluation model and small break loss-of-coolant accident (SBLOCA) evaluation model in a summary with a consideration of correction of one error (i.e., changing the interphase drag multiplier "FIJ" from 1.75 to 5 at the steam generator tube sheet entrance to establish liquid entrainment during the reflood phase of a LBLOCA).

   The bias on interphase friction at the steam generator tube sheet entrance is established by comparing calculated results from the S-RELAP5 model of the Upper Plenum Test Facility (UPTF) with established test data (i.e., UPTF Tests 10B and 29B).

2. The specific error and its impact on the results shown in the summary were identified. The impact of 12 °F PCT change for LBLOCA evaluation and 0 °F PCT change for SBLOCA evaluation are small in comparison to the degree of cladding temperature rise evaluated.

   The justification for 0 °F PCT change for SBLOCA evaluation is given in response to NRC RAI 1(d) that depressurization of the reactor coolant system is much slower and break flows are less in a SBLOCA event.

3. Approved methodologies are used for the evaluation of LBLOCA (EMF-2103(P)(A), Revision 0 with Transition Package as documented in ANP-2655P, Revision 001, which uses the S-RELAP5 code) and SBLOCA (BAW-10168(P)(A), Revision 3, which uses the RELAP5/MOD2-B&W Version 27 code).

4.0 CONCLUSION

Based on our review, the NRC staff concludes that the annual report of changes or errors discovered in an acceptable LOCA evaluation model application for the ECCS for SQN, Units 1 and 2, is acceptable.

Principal Contributor: T. Huang

Date: November 18, 2011

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If you have any questions, please contact me at 301-415-1564.

Sincerely,

/RA by TOrf for/

Siva P. Lingam, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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