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

August 12, 2011

Mr. Ashok Bhatnagar
Senior Vice President
Nuclear Generation Development
and Construction
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – REVIEW OF INDIVIDUAL PLANT EXAMINATION SUBMITTAL – INTERNAL EVENTS AND INTERNAL FLOOD (TAC NO. ME3334)

Dear Mr. Bhatnager:

In a letter dated February 9, 2010 (see Agencywide Documents Access and Management System Accession No. ML100491535), as supplemented by letters dated June 6, and August 12, 2010 ((ML101600559 and ML102280585, respectively), the Tennessee Valley Authority (TVA) submitted its Individual Plant Examination (IPE) for internal events and internal flood for Watts Bar Nuclear Plant (WBN), Unit 2.

The U.S. Nuclear Regulatory Commission (NRC) staff's review of the WBN Unit 2 IPE submittal was focused strictly on whether the intent of Generic Letter (GL) 88-20, "Initiation of the Individual Plant Examination for Severe Accident Vulnerabilities – 10 CFR [Title 10, *Code of Federal Regulations*] 50.54(f)," had been met. Specifically, the intent of GL 88-20 is for the licensee to perform a systematic examination of the plant to identify any plant-specific vulnerabilities. The review process for TVA's IPE submittal was based on the framework described in Regulatory Guide 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," and consisted of three general steps. TVA first used the American Society of Mechanical Engineers/American Nuclear Society Probabilistic Risk Assessment (PRA) Standard (as endorsed by the NRC) to construct a technically acceptable PRA. Next, TVA had its PRA model peer reviewed to evaluate and document how well the model meets the PRA standard. Finally, the NRC staff reviewed TVA's submittal, focusing only on the key assumptions and areas identified by the peer review team as being of concern and the areas determined by the staff to be relevant to the application.

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Because the construction of WBN Unit 2 is not yet complete, TVA developed the WBN Unit 2 PRA model for the IPE based on the assumption that the WBN Unit 2 plant will be identical to the WBN Unit 1 plant. The findings and conclusions from the NRC staff's review rely on (1) TVA's plans, as stated in the original IPE submittal dated February 9, 2010, to confirm that "Prior to [WBN] Unit 2 start up, it will be confirmed that the [WBN] Unit 2 PRA model matches the as-built, as-operated plant" and (2) the list of commitments that were submitted with the response dated August 12, 2010, to the staff's request for additional information (RAI) being incorporated into TVA's program for managing and acting upon these commitments.

As such, it was expected that TVA's WBN Unit 2 evaluation would include, but not be limited to, determinations of whether the model assumptions represent:

- Actual components comprising a given system.
- Actual spatial layout of equipment.
- Normal and emergency configurations of the plant.
- Normal, emergency, and test and maintenance procedures and practices as performed by WBN Unit 2 personnel.
- Engineering aspects of the plant design.

This evaluation should reveal any differences between the model assumptions and the as-built and as-operated configuration of WBN Unit 2. Moreover, the evaluation should assess the impact of those changes needed to match the WBN Unit 2 IPE PRA model to the as-built and as-operated WBN Unit 2 plant, and those changes should be qualified by the degree of the impact on the model results. In addition, TVA provided a list of commitments in its RAI responses that, when fully implemented, will resolve concerns raised by the NRC staff.

TVA defined the term "vulnerability" as the exceeding of the NRC Safety Goals subsidiary values of $1x10^{-4}$/reactor-year for the total core damage frequency and $1x10^{-5}$/reactor-year for the total large early release frequency. By this definition, TVA identified no vulnerabilities for WBN Unit 2; therefore, no enhancements were identified to specifically address vulnerabilities.

Although no vulnerabilities were identified, TVA did identify several plant improvements as part of the severe accident mitigation alternatives (SAMAs) analysis and committed to implement four SAMAs. These SAMAs included: (1) a review of station blackout procedures for improvements in direct current (DC) load shedding, (2) enhancement of procedural guidance for the use of cross-tied component cooling or service water pumps, (3) enhancement of procedural guidance for the use of essential raw cooling water for reactor coolant pump thermal barrier cooling, and (4) one SAMA that enhances a procedure for the temporary control of alterations to reduce fire risk associated with temporary cables.

GL 88-20 states that the "maximum benefit from the IPE would be realized if the licensee's staff were involved in all aspects of the examination" and recommends that each licensee "use its staff to the maximum extent possible in conducting the IPE by having utility engineers . . . involved in the analysis as well as in the technical review."

Based on the NRC staff's discussions with TVA during the review process, the NRC staff believes that TVA could enhance TVA staff's understanding of the WBN Unit 2 PRA model. Although the NRC staff understands that TVA will fix the problems identified by the peer review, the NRC staff concluded that TVA could take actions to better gain (1) an overall appreciation of severe accidents that could occur at WBN Unit 2, (2) an understanding of the most likely severe accident sequences, (3) a quantitative understanding of core damage and fission product release, and (4) the ability to implement safety improvement opportunities that would help prevent or mitigate severe accidents.

Based on its review, the NRC staff finds TVA's definition of vulnerability and its conclusion that no severe accident vulnerabilities exist at WBN Unit 2 to be reasonable. Consequently, the NRC staff finds the WBN Unit 2 IPE to be consistent with the intent of GL 88-20, subject to the completion of the applicable commitments and TVA's plan to confirm, prior to WBN Unit 2 startup, that the WBN Unit 2 PRA model matches the as-built, as-operated plant. The NRC staff review was not intended to validate the accuracy of TVA's findings (or quantification estimates) that stemmed from the examination. Therefore, the enclosed technical evaluation report does not constitute NRC approval or endorsement of any IPE material for purposes other than those associated with meeting the intent of GL 88-20.

If you have any questions regarding the NRC staff review, please contact Patrick Milano at (301) 415-1457.

Sincerely,

/RA/

Stephen J. Campbell, Chief
Watts Bar Special Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-391

Enclosure: Technical Evaluation Report

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