Tennessee Valley Authority, Post Office Box 2000, Spring City, TN 37381-2000

June 8, 2010

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 2
NRC Docket No. 50-391

Subject: **WATTS BAR NUCLEAR PLANT (WBN) UNIT 2 – REQUEST FOR ADDITIONAL INFORMATION REGARDING INDIVIDUAL PLANT EXAMINATION (TAC NO. ME3334)**

Reference:
1. TVA letter dated February 09, 2010, "Watts Bar Nuclear Plant (WBN) – Probabilistic Risk Assessment Individual Plant Examination Summary Report" (ML100491535)
2. NRC letter dated April 19, 2010, "Watts Bar Nuclear Plant, Unit 2 – Request for Additional Information Regarding Individual Plant Examination (TAC NO. ME 3334)" [ML101060365]

The purpose of this letter is to provide responses to the NRC request for additional information regarding the Probabilistic Risk Assessment (PRA) Individual Plant Evaluation (IPE) Summary Report that was submitted to the NRC for WBN Unit 2 in a letter (Reference 1). Enclosure 1 provides the NRC requests for additional information from NRC Letter (Reference 2) and TVA's responses. Enclosure 2 provides the NRC verbal request for additional information from NRC and TVA's responses. Enclosure 3 provides the NRC request for additional information from NRC in a telecommunication on April 30, 2010 and TVA's responses. In the NRC verbal requests for additional information there were similar requests that were documented previously and therefore these were included in Enclosure 1 and Enclosure 2 as subsequent verbal requests.

The new commitment is shown in Enclosure 4. I declare under penalty of perjury that the foregoing is true and correct. Executed on the 8th day of June, 2010.

If you have any questions, please contact me at (423) 365-2351.

Sincerely,

M. Bajestani

Masoud Bajestani
Watts Bar Unit 2 Vice President

Enclosures:

1. Responses to Written NRC Request for Additional Information
2. Responses to Verbal NRC Request for Additional Information
3. Responses to Telecommunication NRC Request for Additional Information
4. List of Commitments Due to Subsequent Verbal NRC Request

cc (Enclosures):

U. S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, Georgia 30303-1257

NRC Resident Inspector Unit 2
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

1. *NRC Request*

   TVA states that the IPE was performed using RA-Sb-2005. However, it appears that the peer review that was performed used RA-Sa-2009. Clarify which version of the standard was used to conduct the peer review. If RA-Sa-2009 was used, how were the differences addressed? For example, if a requirement changed from 2005 to 2009 version, or a new requirement added, which specific findings and observations (F&Os) address these changes? If not included in the submittal, provide the F&Os.

   TVA Response

   When TVA began the process of developing the WBN Unit 2 PRA model, RA-Sb-2005 was the standard in effect at that time. TVA continued to use this standard for the WBN Unit 2 PRA model. The peer review team used RA-Sa-2009 in the peer review so that the WBN PRA model would be judged according to the latest version of the standard in effect at the time of the peer review. RA-Sa-2009 incorporates lessons learned from industry review since the issuance of RA-Sb-2005. The major differences between the two versions of the American Society of Mechanical Engineers (ASME) standard are in nomenclature of the requirements, both High Level Requirements (HLRs) and Supporting Requirements (SRs), and regrouping of internal flooding elements (e.g., reformatting and positioning of documentation in different sub-elements of internal flooding). There are no F&Os based upon differences between the two documents. F&Os provided in the submittal are all based on RA-Sa-2009. If the peer team determined there was issue with the way a SR as discussed in RA-Sa-2009 was implemented, a finding or suggestion was issued in accordance with the guidance provided in Nuclear Energy Institute (NEI) 05-04 Revision 2.

   The 50 F&O Findings were contained in the letter to the NRC (Reference 1) in Appendix A. See Question 4 below for more discussion on F&O Findings versus F&O Suggestions.

2. *NRC Request*

   When the peer review was performed, did the peer review members take into account the NRC's staff positions on the requirements in the ASME standard as described in Regulatory Guide (RG) 1.200? If not, what is the basis for not considering the NRC's position?

   TVA Response

   Yes, the peer team review considered the NRC staff's position on RG 1.200, Revision 2 as part of the evaluation process.

3. *NRC Request*

The standard provides specific requirements for a peer review, and the NRC staff took a few exceptions to these in RG 1.200. How were the NRC exceptions to the peer review requirements addressed?

TVA Response

The peer review process as discussed in NEI 05-04, Revision 2, includes a review of NRC's exceptions to the peer review requirements. The following discussion is from page 13 of the NEI 05-04, Revision 2:

"At the beginning of the review for each technical element, the reviewer(s) should review the HLRs for the element and preview the individual SRs. In Appendix A of RG 1.200, Rev. 1, the NRC has provided a Regulatory Position relative to some of the specific SRs in the ASME PRA Standard. The peer reviewer(s) should consider these NRC clarifications and qualifications, where applicable, during the review, and note the extent to which the PRA element(s) being reviewed address these positions. The reviewer(s) should provide an assessment relative to the NRC's clarifications and qualifications, particularly those in Table A-1 (Appendix A) of RG 1.200."

The peer review team is composed of members who are knowledgeable in the technical elements of a PRA, are familiar with the plant design and operation, and are independent with no conflicts of interest that may influence the outcome of the peer review.

Based on verbal discussion with the NRC, TVA will provide information regarding how the model and the peer review process addressed the items in the Regulatory Guide 1.200 Revision 2 tables related to internal events including internal flooding for which the NRC position was stated as "Qualification."

4. *NRC Request*

As discussed in RG 1.200, meeting the standard involves both meeting the technical requirements and the peer review requirements as endorsed in RG 1.200. Should this be accomplished, the NRC staff stated in RG 1.200 that a detailed staff review would be obviated, allowing the staff to focus on, for example, assumptions. In this regard, the staff finds the information in the submittal on the peer review to be very brief. Thus address the following:

a) The submittal states there are 112 F&Os, but there appears to be 50 F&Os submitted. Even taking into account that some of the F&Os address more than one supporting requirement (SR), the number still does not add up to 112 F&Os.

In a subsequent verbal request for additional information the following request was communicated: Explain why TVA stated there are 112 F&Os but only submitted 50. Explain why TVA segregated out some and did not provide them to the NRC. Explain old A&B findings (which were considered "open") versus what is now considered an F&O. Explain the numbering scheme.

TVA Response

It is important to note that in the NEI 05-04 process F&Os are of two types, "Findings" and "Suggestions." "Findings" are those F&Os roughly comparable to the A&B level findings in the NEI 00-02 process. Previous applications such as Mitigating Systems Performance Index (MSPI) required that the A&B level findings from the NEI 00-02 process be provided; therefore TVA provided corresponding level findings from the NEI 05-04 process. The 50 F&Os submitted were "Findings" listed in the peer review report. There were 62 "Suggestions" listed in the report which were not provided, making for 112 total F&Os.

(Reference NEI 05-04 Revision 2, Pages 13-15, provides more detail)
"As the SRs are purposefully open to some interpretation, there may need to be some discussion to determine the appropriate assignment of a Capability Category, or even determine if a SR is considered to be "met." The reviewers must consider the "whole" of the PRA and not be overly focused on a specific discrepancy. To declare that a SR is not "met," a preponderance of evidence must be observed. In cases where a SR description includes an example, the reviewers should be cautioned that conformance with the example is not necessary to meet that SR. Determination of the status of a SR should be guided by the following approach from RG 1.200:
... *[If] there are a few examples in which a specific requirement has not been met, it is not necessarily indicative that this requirement has not been met. If, the requirement has been met for the majority of the systems or parameter estimates, and the few examples can be put down to mistakes or oversights, the requirement would be considered to be met. If, however, there is a systematic failure to address the requirement (e.g., component boundaries have not been defined anywhere), then the requirement has not been complied with.*

During the review of a SR (whether covered by the NEI 00-02 checklist or not), if the reviewers identify any issues/problems that impact the capability of the PRA, they will document these problems using a F&O form equivalent to that presented in Appendix A of this report. The F&Os specify the PRA element and SR of concern, and describe the PRA level of compliance with the criteria. The issue documented may be a weakness (finding), a strength (best practice), or a simple observation (suggestion). It should be noted that even in cases where a SR has been assessed to meet Capability Category (CC) II or III, the review team may document an F&O finding. Such findings are typically for non-systematic discrepancies that the PRA peer review team judges require correction. The F&O includes an assessment of the importance of the observation on the level of capability of the SR, and, for weaknesses, a proposed

resolution for the weakness. The importance of each observation is classified as a:

Finding – an observation (an issue or discrepancy) that is necessary to address to ensure:

- the technical adequacy of the PRA (relative to a Capability Category),
- the capability/robustness of the PRA update process, or
- the process for evaluating the necessary capability of the PRA technical elements (to support applications)

Suggestion – an observation considered desirable to maintain maximum flexibility for PRA applications and consistency with industry practices. Failing to resolve a suggestion should have no significant impact on the PRA results or the integrity of the PRA. Some examples of a suggestion include:

- editorial and minor technical items
- recommendations for consistency with industry practices (e.g., replacing a given consensus model with a more widely used model)
- recommendations to enhance the PRA's technical capability as time and resource permit
- observations regarding PRA technical adequacy that may affect one or more risk-informed applications

This approach of classifying F&Os replaces the A/B/C/D approached used in the original NEI 00-02 Peer Reviews, and the modification (with combined A/B) recommended in the original version of this document. The finding/suggestion approach should be simpler and less time consuming (for the reviewers) to implement, as making the distinction between a "finding" and a "suggestion" should be more evident (with less controversy). This approach will also prevent any "findings" from being relegated to a "C" category, which may have occurred with some previous Peer Review F&Os. The disposition of F&Os will be the same as previous peer reviews, with the host utility responsible for reconciling the "findings," e.g., placing them in their corrective action program (or the equivalent). In general, a "finding" would correspond to an "A/B" F&O, while a "suggestion" would correspond to C and D F&O, for utilities that may have established a procedure to deal with PRA F&Os."

The numbering scheme matches the Finding number in the peer review report. There were seven members on the WBN peer review team and in general each reviewer was assigned a number, 1 through 7. The facts or observations developed by each reviewer then received a sequential number.

NRC Request

b) The submittal states that nine SRs were judged not applicable, and no justification or identification of these SRs was provided. Which SRs from the standard were judged to be not applicable?

TVA Response

Table 4.3 in the peer review report provides a list of those HLRS and SRs not applicable to WBN 2. They are: DA-C10, DA-C15, DA-C16, DA-D2, DA-D7, DA-D8, IFQU-A4, QU-B2, and MU-D1(HLR-MU-D).

5. *NRC Request*

Subsequent to the receipt of the RAI letter during a phone call TVA was asked to provide a list of peer review team members

TVA Response

The peer review was conducted by Mr. David McCoy of Westinghouse, Bill Hannaman of SAIC, Young In of ERIN Engineering (representing Exelon), Mike Kitlan of Duke Energy Corporation, Hak Kyu Lim of Korea Power Engineering Company, Inc. (KOPEC), James Pak of Dominion, and Ricky Summitt of Ricky Summitt Consulting. Their industry experience is summarized from the peer review report:

Mr. McCoy, the team lead, has over 27 years of experience in the nuclear industry with 16 years of experience in nuclear risk assessment and management. Mr. McCoy has been involved in all aspects of probabilistic risk assessment of nuclear power plants. Mr. McCoy has been a principal risk analyst at a nuclear power plant with the responsibility for the overall development and maintenance of the plant models. Mr. McCoy has diverse experience and solid background in nuclear plant operations, licensing, engineering, and probabilistic risk assessment. He has in-depth experience in risk-informed applications including Technical Specifications, Risk-Informed Inservice Inspection, Maintenance Rule, NRC Significance Determination Process, and Mitigating Systems Performance Indicators. He has also worked with a number of different plants on various PRA model improvements and interpretation of PRA results. He has participated on several previous Westinghouse peer reviews.

Mr. McCoy has been trained in and has used the Electric Power Research Institute (EPRI) Computer Aided Fault Tree Analysis (CAFTA) tool, and has received training as a peer review leader.

Currently, Mr. McCoy is a Technical Manager in the Risk Applications and Methods group at Westinghouse. He has been assigned to other nuclear plants to assist in PRA analyses and is working on the Wolf Creek Generating Station Fire PRA.

Dr. Hannaman holds a Professional Engineering Registration with over 30 years of experience in solving electrical and nuclear engineering safety and operation problems for a wide range of nuclear reactor types, process plants and industrial facilities using reliability and probabilistic risk assessment techniques.

Dr. Hannaman has provided profitable returns in various technical and project management positions with Westinghouse Electric Corporation, General Atomics, NUS Corporation, Science Applications International Corporation, and Data Systems and Solutions. He has published numerous technical papers and reports on human reliability, risk assessment, aging failures, reactor safety, design and operation. Developed and applied human reliability assessment (HRA) methods to consider the impact of operator interactions before and during accident conditions in risk models. Experience includes data collection from operational records and training simulators, database development, analysis and integrating the results into risk and reliability studies to identify cost effective management priorities for enhanced design, safety, operation, and maintenance in a wide range of facilities.

Mr. In has over 29 years of experience in the nuclear industry with 28 years of experience in nuclear risk assessment and management. Mr. In is currently a Risk Management Engineer with ERIN Engineering's Safety and Reliability Group. His technical background includes risk and reliability analysis and development of reliability software and databases. He has served as the project manager of numerous Probabilistic Safety Assessment (PSA) projects and risk analysis studies ranging from the preparation of nuclear power plant risk assessments to regulatory support applications. Mr. In is a subject matter expert for International Atomic Energy Agency (IAEA) in the risk application area and has been serving as the technical coordinator for IAEA Workshops in Korea for the last several years. Prior to joining ERIN, Mr. In worked for several nuclear utilities as a risk management engineer.

Mr. Kitlan has over 30 years of diverse Engineering, Operations, Corporate Executive Staff, Regulatory Compliance, and Probabilistic Risk Assessment experience including the last 10 years in PRA. Mr. Kitlan served as the project manager for the Catawba PRA Update and has been assisting the Oconee PRA update in revisions to comply with the current ASME PRA Standard and Regulatory Guide 1.200. He is currently serving as the Project Manager for the Duke Energy fleet-wide implementation of Risk-Informed Technical Specifications Initiative 5b (Relocate Technical Specification Surveillance Frequencies to Licensee Controlled Document and Optimize). In addition, he serves in the Duke Energy Emergency Response Organization, provides on-going support of station programs such as MSPI and provides PRA analysis and insights on emergent plant issues. He was the technical contact interface with the initial peer review team for the McGuire PRA and is the Duke Energy representative to the NEI Risk-Informed Technical Specification Task Force.

Dr. Lim has over 20 years experience in practice and research in Level 1 and 2 PSA for Nuclear Power Plants. Dr. Lim is currently responsible for technical direction of reliability and risk assessment activities at KOPEC. As the leader, he has led several PSA projects for operating plants as well as new plants. As a consultant, Dr. Lim participated in the Kori 3&4 (Westinghouse 3-loop plant in Korea) PSA peer review sponsored by the utility in 2005. Previously, Dr. Lim was involved in the accident sequence analysis, thermo-hydraulic analysis, and level 2 analysis for the following PSA projects: Younggwang 5&6, Kori 1, Ulchin 3&4, Youggwang 3&4, and many other projects. Dr. Lim has also participated in Risk Monitoring System Development Projects.

Mr. Pak has over 27 years experience in the nuclear power industry with over 10 years experience in Probabilistic Risk Assessment. As a fleet lead for the site PRA engineers, Mr. Pak coordinates the daily and emergent work at each site. Mr. Pak's responsibilities include coordinating and developing the RI-ISI Program for Surry Power Station Unit 2 and North Anna Power Station Units 1 & 2 as a project lead engineer, and maintaining and updating the current RI-ISI program for Surry Power Station Units 1&2, North Anna Power Station Units 1&2, and Millstone Power Station Units 2 & 3 as a fleet lead engineer. As a model manager, Mr. Pak updated PRA models for Surry Power Station in 2003 and Millstone Power Station Unit 2 in 2005. Mr. Pak is also responsible for producing PRA products based on the updated PRA model and actively participating in providing PRA inputs to NRC's Significance Determination Process (SDP).

Mr. Summitt is the founder and president of Ricky Summitt Consulting, Inc. He has 30 years of PRA experience in PRA modeling and applications. He has used both deterministic and probabilistic techniques to manage and supply lead technical guidance in the assessment of safety and reliability concerns for both nuclear and chemical projects. He has also conducted HAZOP and other qualitative assessments of chemical facilities to evaluate safety concerns. He has managed and participated in probabilistic risk assessments for pressurized water reactors, boiling water reactors, chemical facilities, and enrichment facilities that addressed both internal and external events.

Mr. McCoy has had no previous involvement in the WBN PRA. Dr. Hannaman has had no previous involvement in the WBN PRA. Mr. In has had no previous involvement in the WBN PRA. Mr. Kitlan has had no previous involvement in the WBN PRA. Dr. Lim has had no previous involvement in the WBN PRA. Mr. Pak has had no previous involvement in the WBN PRA. Mr. Summitt has had no previous involvement in the WBN PRA. This is certified by the reviewer signatures on the cover of this report. This satisfies the independence requirements of Section 1-6.2.2(b) of the ASME/ANS PRA Standard.

1.

a) *NRC Request*

In reviewing the F&Os provided in the IPE submittal on Watts Bar Unit 2, for each finding there is a box labeled "Requirement Met?" Sometimes the box has a check mark and sometimes it does not. Is it correct for the staff to assume that the boxes without the check marks are meant to imply that the referenced Supporting Requirement (SR) from the ASME/ANS PRA Standard was judged by the peer review team not to be met?

TVA Response

Yes.

b) *NRC Request*

If the box is checked, was this "met" finding a result of the peer review team?

TVA Response

Yes.

c) *NRC Request*

If this "met" is a finding by the peer review team, why was this finding either an “A" or "B" finding? Or, was the check mark meant to imply that the SR would be considered met by TVA once the resolution is completed? Or considered met by the peer review team? Please clarify.

TVA Response

The term “A” or “B” finding is old term used in the NEI certification process prior to the development of the ASME standard. The new NEI equivalent is “Finding” (See Enclosure 1, Question 4 for further explanation of “Finding”). The check mark in the “met” box is peer review team judgment based on their consensus. A check mark indicates the finding met at least the minimum of capability category I and most were met at minimum of capability category II. For example, a SR could be considered by the peer review team to be met based on preponderance of evidence. But at the same time, a “Finding” could be documented because the requirement had not been met for 100% of the cases (See Enclosure 1, Question 4 for further explanation of “met Finding”). Even though the overall SR is considered met, the outliers would have to be resolved to address the “Finding.” Depending on applications of the model and the impact on risk insights, TVA is prioritizing the resolution of findings commensurate with their significance and resources needed to resolve them.

2.

a) *NRC Request*

Also in reviewing the F&Os, for some, a "possible resolution" is provided and a "Resolution" is provided. Is it correct for the staff to assume that the "possible resolution" is a recommendation by the peer review team, and the "resolution" is what TVA is actually doing to address the F&O?

TVA Response

Yes.

b) *NRC Request*

Please clarify the distinction between "possible resolution" and "resolution".

TVA Response

“Possible Resolution” was developed by the peer review team. “Resolution” is the TVA resolution to the Finding. “Resolution in progress” means that TVA is currently actively working on the resolution of this Finding, but the actual resolution has not yet been completed and verified.

3. *NRC Request*

For many of the F&Os, under "resolution" it states "*resolution in progress.*" However, no resolution is provided. For these F&Os, is it correct for the staff to assume that the resolution in progress is the same as the possible resolution?

TVA Response

In general, yes. TVA has agreed with the possible resolution proposed by the peer team and this will be the actual resolution of the finding. However, in some cases due to the limited review by the peer team, TVA has found that the resolution needs to be expanded beyond the peer teams proposed solution. An example of this can be seen in Finding 1-8 where the peer team noted that the model should include a common cause group for all Essential Raw Cooling Water (ERCW) pumps. While the resolution is not yet complete, TVA noted that this finding is also applicable to the Component Cooling Water pumps and will include this in the resolution of this Finding.

4. *NRC Request*

   For some of the F&Os, the "possible resolution" and the "resolution" do not agree. Please explain why there is a difference, and how the resolution resolves the finding.

   In a subsequent verbal request for additional information the following request was communicated: Explain why in some cases the “Possible Resolution” and “Resolution” do not agree. Explain what is the actual plan for resolution.

   TVA Response

   The “possible resolution” is the peer team’s opinion based on their review of the PSA model during a limited timeframe. Once the TVA PRA staff examines the finding in more detail and looks at the “possible resolution” in relation to other alternate resolutions, TVA may conclude a different or more extensive fix is required. This would become the “resolution” and it may differ from the “possible resolution.” One example was given above in the response to Question 3.

1. *NRC Request*

   Explain the "Requirement Met" box and what it means when it is checked versus not checked since some of the Facts and Observations (F&Os) had the box checked even though it was implied TVA only gave the NRC open findings. Did the peer team find the response acceptable or is more work required to totally resolve the item?

   TVA Response

   The boxes without the check marks mean that the referenced Supporting Requirement (SR) from the ASME/ANS PRA Standard was judged by the peer review team not to be met at least to capability category I. If the box was checked it meant that the peer review team judged the SR to meet at least a capability category I, and most SRs were met at a minimum of capability category I/II or II. The peer review team's suggested possible resolution would resolve the finding. The peer review team did not have a chance to review TVA's planned resolution.

2. *NRC Request*

   Explain the boxes "Possible Resolution" versus "Resolution Provided" and responses that state "Resolution in progress".

   TVA Response

   See Enclosure 2, Question 2 and 3.

3. *NRC Request*

   For F&Os that state "Resolution in progress", what is the schedule for resolution?

   TVA Response

   These F&Os are currently scheduled to be resolved in the next model revision. The schedule will be based on the risk impact to the model and potential applications; but no later than Unit 2 fuel load.

Enclosure 4

List of Commitments

1. TVA will provide information regarding how the model and the peer review process addressed the items in the Regulatory Guide 1.200 Revision 2 tables related to internal events including internal flooding for which the NRC position was stated as "Qualification."
2. In the report it refers to MUE-1. Should this be QUE-1?
3. For findings for which resolution is in progress, provide the plan/actions relative to how the findings will be resolved.