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

July 21, 2011

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

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – REQUEST FOR ADDITIONAL INFORMATION REGARDING FINAL SAFETY ANALYSIS REPORT AMENDMENT RELATED TO SECTION 9.5.1 "FIRE PROTECTION SYSTEM" GROUP 6 (TAC NO. ME3091)

Dear Mr. Bhatnagar:

By letters dated July 16, August 9, 20, and 30, November 5, and December 1, 18, and 20, 2010; and January 14, March 16 (two letters), March 31, May 6, 18, and 26, and June 7 and 17, 2011, Tennessee Valley Authority (TVA) responded to requests for additional information (RAIs) relating to the Fire Protection Report for Watts Bar Nuclear Plant (WBN). The U.S. Nuclear Regulatory Commission (NRC) staff has been reviewing the information provided by TVA in support of the operating license application for WBN Unit 2.

After reviewing the responses provided by TVA and the Fire Protection Report, the NRC staff has determined that additional information is needed to complete its review.

The requested information in these questions was discussed in a meeting held on June 30, 2011. Based on these discussions, TVA stated to NRC staff that responses would be completed by July 29, 2011. If the response will not be completed by that date, a written request to the NRC for an extension, including justification, is required.

If you should have any questions, please contact me at 301-415-1457.

Sincerely,

Justin C. Poole, Project Manager
Watts Bar Special Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-391

Enclosure: RAI

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFROMATION

WATTS BAR NUCLEAR PLANT, UNIT 2

FIRE PROTECTION REPORT

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-391

A public meeting was held on June 30, 2011, between the U.S. Nuclear Regulatory (NRC) staff and representatives from Tennessee Valley Authority (TVA) regarding the ongoing review of the Watts Bar Nuclear Plant (WBN) Unit 2 Fire Protection Report (FPR). During the meeting, the NRC staff discussed a draft version of the following questions and stated that the questions would be incorporated into a request for additional information (RAI). There are two questions below (II-44 and II-45) which were not part of the draft but were verbally discussed during the meeting. Some of the questions relate to information provided by TVA in response to prior RAIs. Information to address the following questions is needed by the staff to complete the review.

RAI FPR I-1

Identify the meaning of the "*" notation in the "Combustible Load, Fire Severity" column of Table I-1, "Summary Compliance Fire Protection," of the as-designed FPR. One example of the notation is in the "676.0-A15 - U2 Containment Spray Pump 2B-B" entry.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR I-2

A sampling review of Table I-1, "Summary Compliance Fire Protection," of the as-designed FPR has identified the following:

- Deviations / Evaluations identified in Table I-1 that are not reflected in Part VI.
  - Examples: Fire Areas 15-1 and 15-2
- Cable protection indicated in Part VI not indicated in Table I-1.
  - Example: Fire Area 15-2
- Manual actions identified in Part VI not indicated in Table I-1.
  - Example: Fire Area 15-2

Resolve these conflicts, and provide assurance that other, similar conditions have been identified and corrected.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

Enclosure

RAI FPR II-23.1

The TVA response to RAI FPR II-23 in its letter of May 6, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11129A158), did not address where the responsibilities of the former "General Manager, Operations Services" were moved to when TVA Corporate Management was reorganized.

These responsibilities were specifically approved by the NRC in Supplemental Safety Evaluation Report (SSER) 18. It does not appear that these responsibilities were specifically distributed among the remaining identified positions.

Describe where each of these responsibilities will reside for Unit 2 operation.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR II-25.1

The TVA response to RAI FPR II-25 in its May 6, 2011, letter does not appear to address item 3 of the RAI, which states, in part:

> The following text was removed from 8.1.c:
>
> > WBN may alter specific features of the approved Fire Protection Report provided: (a) such changes do not otherwise involve a change in a license condition or the technical specification or result in an unreviewed safety question, and (b) such changes do not result in failure to complete the Fire Protection Program as approved by NRC.

Provide a justification for this change. Is it TVA's position that it may make changes as described in the deleted text without NRC approval? If so, describe the regulatory basis for changing license conditions, technical specifications, etc., without NRC approval.

RAI FPR II-29.1

RAI II-29 deals with the removal of information regarding the process in place to perform fire door modifications from Part II, Section 12.10.4, "Fire Doors," of the as-designed FPR. In the letter dated May 6, 2011, TVA states, in part:

> The FPR was never intended to provide all of the detailed information concerning the Fire Protection Program, but rather to provide detailed information, when required, and as a roadmap to direct the users of the FPR to other controlled documents, such as supporting calculations, procedures, drawings, etc. [emphasis added]

Because detailed information was removed and no roadmap was added, there is nothing that would "direct the users of the FPR to other controlled documents, such as supporting calculations, procedures, drawings, etc." in the current section.

Resolve the conflict between the RAI response in the May 6, 2011, letter and the contents of the FPR section. Provide assurance that other, similar instances have been identified and resolved, and that the level of detail in Part II is handled consistently between sections.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR II-31.1

The TVA response to RAI FPR II-31 in the May 6, 2011, letter states that once a piece of inoperable equipment is placed in the corrective action program, "management attention" will drive TVA to return that piece of equipment to operable status. Reliance on a concept such as "management attention," which is poorly defined and outside of an established process, does not fully address the RAI.

Describe the process in place to ensure that equipment is returned to operable status in a timely manner.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR II-37.1

The TVA response to RAI FPR II-37 in the May 6, 2011, letter states, in part: "Section 14.1.1 addresses the areas outside of containment and 14.1.2 addresses the areas inside containment."

However, Section 14.1.1 applies only to accessible areas. Also, Section B.14.1.2 still supports the earlier version.

- Confirm that no Function A fire detectors are installed in inaccessible areas outside of containment.

- Correct the Basis entry to align with the correct configuration.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR II-39.1

In the prior RAI FPR II-39, the staff asked about the compensatory actions to be taken in the initial period of inoperable status for safe shutdown equipment listed in Table 14.10. While the TVA response in the May 6, 2011, letter states that the current configuration was approved by the NRC in SSER 18 (ADAMS No. ML070530364), Appendix A to the Branch Technical Position (BTP) and Appendix R to Title 10 of the *Code of Federal Regulations* Part 50 require licensees to be able to achieve and maintain safe shutdown after a fire. In light of this, the NRC staff has these follow-up requests:

- Describe the process in place that ensures the plant can achieve and maintain safe shutdown after a fire, for the scenario where one or more pieces of equipment are inoperable, and the remaining redundant piece of equipment is damaged by the fire.

- Describe the process in place that ensures the plant can achieve and maintain safe shutdown after a fire, when all redundant equipment, as listed in Table 14.10, is inoperable at the same time. One example would be all power operated relief valve (PORV) N2 supply tanks are concurrently depressurized.

- Describe the process in place to take into consideration equipment inoperability when planning maintenance or testing activities on a piece of equipment that is redundant to one that is inoperable. Describe any expected compensatory measures for this sort of scenario.

- Describe the process in place to prevent a piece of required equipment from repeatedly being declared inoperable. Describe the process used to identify this condition and to prevent reoccurrence.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR II-41.1

RAI FPR II-41 noted that there is no information in Part II, Section 12.2 "Standpipes, Hose Stations, and Hydrants," of the as-designed FPR, regarding the seismic qualification of the standpipes and hose stations installed to protect areas containing Unit 2 safe shutdown equipment.

The TVA response to RAI FPR II-41 (in the June 7, 2011, TVA letter) does not fully cover the seismic requirements for standpipes and hose stations.

These seismic requirements are in place not only to ensure that no required equipment is damaged by water leaks, but also to ensure that fire-fighting capability is maintained after an earthquake.

Provide details regarding the seismic qualification of the standpipe and hose station systems, as well as the water supply system that supplies it, that are installed in areas containing Unit 2 safe shutdown equipment.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR II-43

In Part II of the as-designed FPR, the key of the "Inaccessible Areas" Table has been reversed.

Revision 41 of the FPR [pg. II-11]:

* Inaccessible only during resin transfer.
(FPR-Preparer)
**Refer to Part VII for engineering evaluation.

As-designed FPR [pg II-12]:

**Inaccessible only during resin transfer.
* Refer to Part VII for engineering evaluation.

The instances or "*" or "**" in the body of the table were not changed.

In the March 31, 2011, letter, TVA described this change as "Corrected the application of the notes. No effect on FSSD [Fire Safe Shutdown]." Examination of the balance of the FPR indicates that the original configuration was correct. For example, it is clear that the rooms marked with "**" in the as-designed version are inaccessible permanently, not just during resin transfer.

The reviewers are concerned about this change since it appears unrelated to any NRC question. Additionally, if the change is correct, this indicates that the current Unit 1 FPR is in error.

Justify the change (including the current FPR configuration for Unit 1) or correct the error.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR II-44

Part II, Section B.14.2.f of the as-designed FPR, states, in part: "Flow tests are made at flows representative of those expected during a fire..."

Provide information regarding how full flow testing of the Train A and Train B high pressure fire protection system headers is accomplished.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR II-45

Based on the presentation at the June 30, 2011, public meeting, there was some confusion for both the reviewers and the TVA participants regarding the specific configuration of the WBN fire water system.

Provide a detailed description of the high pressure fire protection system configuration. The description should include, but not be limited to the following:

- Both safety-related and nonsafety-related portions of the system.
- The piping materials that comprise the various system sections.
- Typical flows experienced by the main sections of the system (for example the common header, yard loop, A and B train headers, etc.).
- Interconnections between the A and B train safety-related headers.
- Nonfire protection loads on the fire water system and from which portion of the system they are fed.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR III-15

Part III, Section 7.4, "Multiple High Impedance Faults," of the as-designed FPR, states in part:

> Sustained high impedance faults, on even one power cable, are considered highly improbable. However, simultaneous Multiple High Impedance Faults (MHIF) has been considered in the evaluation of the electrical power system's capability to supply power to the required fire safe shutdown loads. This evaluation is documented in "Appendix R - Multiple High Impedance Fault Analysis" (reference Calculation WBPEVAR9509001).

Add the above calculation to the FPR Part II, Section 4.0, "References."

Ensure that an extent of condition review has been performed to ensure that other similar instances have been identified and added, if necessary.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR III-16

Part III, Section 7.5, "Current Transformer Secondaries," of the as-designed FPR, states in part:

> When a secondary circuit of a Current Transformer (CT) opens due to a fire at a remote location, ionized gases and/or additional fires in other locations could be generated, resulting in fire propagation to additional fire areas. Fire hazards due to a fire-induced open circuit in the secondary of CTs installed in high energy panels (i.e., 6.9kV switchgear) of the required power systems have been evaluated. Three types of CT circuits used in the auxiliary power system have been evaluated: ground fault, differential relaying, and protective relaying. [emphasis added]

Confirm that the fire hazards due to a fire-induced open circuit in the secondary of CTs installed in high energy panels (i.e., 6.9kV switchgear) of the nonrequired power systems have been evaluated.

Describe the specific methods used for the fire hazards analysis.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR III-17

Part III, Section 7.2, "Associated Circuits by Common Power Supply and Common Enclosures FPR," of the as-designed FPR, states in part:

> These original electrical design practices provided confidence that no associated circuits of concern by common power supply (Type I) or by common enclosure (Type III) exist. As an additional check, a review was conducted of the existing electrical protection and coordination for the safe shutdown power supplies. As expected, most of the circuit protective devices reviewed had been properly

selected and were coordinated. Design changes have been initiated to correct the few remaining deficiencies identified during the review.

Provide a list of the design changes with the actual or scheduled completion dates.

Confirm that all design changes have been completed or will be completed prior to the Unit 2 fuel load.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR IV-4.1

RAI FPR IV-4 asked TVA to detail the assumptions that support the abandonment of the Main Control Room (MCR) and transfer of control to the Auxiliary Control Room (ACR) during a fire event. The TVA response (in the May 26, 2011, TVA letter) stated, in part: "It is assumed that a single spurious equipment actuation or signal may occur prior to control room abandonment and transfer to the Auxiliary Control System [ACS]."

For a control building fire, the reviewers expect the WBN Unit 2 analysis to consider the following conditions simultaneously:

- when offsite power is available and when offsite power is not available;
- the loss of all automatic function (signals, logic) from the circuits located in the fire area in conjunction with one worst case spurious actuation or signal;
- a fire that results in spurious actuation of the redundant valves in any one high-low pressure interface line prior to transfer of control to the ACR.

Provide an explanation for any of the above assumptions that are not part of the WBN Unit 2 analysis for a control building fire and MCR abandonment prior to transfer of control to the ACR.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR V-13

Part V, Section 2.2.2 "Operator Locations Prior to Initiating Manual Actions and t=0 Definition," of the as-designed FPR, states, in part: "The time requirements for completion of manual operator actions are based on defining the initiating time t=0 as the time when the reactor is tripped from the Main Control Room (MCR)."

Describe any differences in the t=0 definition for fires that cause an automatic reactor trip (that is where the reactor is not tripped from the MCR). Provide a technical justification for any differences between the two cases.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR V-14

Part V, Section 2.4 "Access Routes to Manual Action Locations," of the as-designed FPR discusses reentry into large fire areas, but does not include a discussion of timeliness.

Part V, Section 2.1.2.2.d, states: "OMAs [operator manual actions] to be performed in the fire affected room in about an hour or less are specifically evaluated and documented in FPR Part VII."

Explain the relationship between Sections 2.1.2.2.d and 2.4 of Part V. Also, provide an explanation of which manual actions are governed by Section 2.1.2.2.d and which are governed by Section 2.4 of Part V.
This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR V-15

Part V, Section 2.1.2 "Acceptance Criteria," of the as-designed FPR states, in part: "OMAs for important to safe shutdown components require no further detailed evaluation."

This section also contains a list of the assumptions that may apply to the manual action Feasibility and Reliability analysis. The third assumption states: "Operator Manual Actions with a required completion time (allowable time) of 120 minutes or greater are considered feasible and reliable and do not require further evaluation."

The FPR provides references to evaluations and criteria that apply to OMAs. Confirm that the evaluations have been performed. If evaluations have been performed but not included in the FPR, provide an explanation of why they are not needed in the FPR.

If evaluations were not performed, provide a justification for not performing any evaluations.

RAI FPR V-16

In Part V, Section 2.3 "Manual Actions Prior to Main Control Room Abandonment," of the as-designed FPR, credit is taken for, "automatic detection and suppression systems, which would also result in detection of the fire in its early stages." However, some areas of the control building, such as some battery board rooms and the relay room, do not have suppression.

Deviation 2.3 in Part VII of the as-designed FPR discusses alternative shutdown areas that lack suppression, but does not specifically justify that components (such as the PORVs) wouldn't be damaged or spuriously operate for a fire in these areas before effective suppression could be applied.

Provide a technical justification that demonstrates that, for areas without automatic suppression in the control building, a fire would not damage or spuriously operate equipment important to safe shutdown. For example, justify that the PORVs will not open, prior to closing the PORV block valves from the MCR for a fire in the areas of the control building that lack automatic suppression.

RAI FPR VI-6.1

RAI VI-6 deals with whether two analyses were performed for exactly the same plant areas in two locations in Fire Area 1. In a letter dated June 17, 2011, TVA confirmed that this was the case and identified changes to be made to the description of the analysis methodology and to the descriptions of the involved analysis volumes.

Confirm that no other instances of this situation exist in the WBN analysis, or make the same changes for the other instances.

RAI FPR VI-7.1

RAI VI-7 deals with the partitioning of containment (Fire Area 77) into analysis volumes. In its letter dated June 17, 2011, TVA confirmed that the lower containment was intended to be divided into quadrants for the analysis. Lower containment is also divided into inside and outside the crane wall portions. TVA's response states, in part:

> The division of the Reactor Buildings into quadrants allowed WBN to determine the postulated fire's impact on the steam generators (one steam generator per quadrant) and associated valves and instrumentation to ensure that redundant components are, by using the separation criteria of Appendix R, Section III.G.2.d, e or f, kept free of fire damage.

Using this methodology, it would be expected that the following analysis volume divisions would be created for the lower containment (based on Figure II-40A of the as-designed FPR):

1. Unit 2 Accumulator Room (2RA) 4, Unit 2 Fan Room (2RF) 1, Lower Containment (Inner or Outer) Quadrant (270-360 degrees)

2. 2RF1, 2RA1, Unit 2 Instrument Room (2RIR), Lower Containment (Inner or Outer) Quadrant (0-90 degrees)

3. 2RIR, 2RA2, 2RF2, Lower Containment (Inner or Outer) Quadrant (90-180 degrees)

4. 2RF2, 2RA3, Lower Containment (Inner or Outer) Quadrant (180-270 degrees)

This results in four pairs of analysis volumes.

However, the actual division of lower containment appears to deviate from the concept presented in the RAI response. The NRC staff identified the following issues:

- **Analysis Volume 118C**: 2RA3 does not appear to be adjacent to either 2RA4 or Quadrant (270-360 degrees);

- **Analysis Volume 118D**: 2RA4 is not adjacent to Quadrant (0-90 degrees);

- **Analysis Volume 118E**: A Lower Containment Quadrant is not identified in the FPR; although the interaction is identified in Part VI, Section 3.84.3.6, of the as-designed FPR;

- **Analysis Volume 118F**: This analysis volume consists solely of the Instrument Room. However, no rated fire barriers are identified in the FPR to justify such isolation. The Instrument Room is also not a part of any of the other analysis volumes.

Reconcile the differences between the methodology described in the RAI response and above identified issues.

RAI FPR VI-9

Part VI, Section 3.67.3.1 of the as-designed FPR is the safe shutdown analysis for the Unit 1 annulus (Analysis Volume AV-091). The reviewers did not expect to find Unit 2 equipment affected by a fire in this Analysis Volume, which they expected to be a Unit 1 only area since it is part of the Unit 1 reactor building.

Provide more detail on, and an explanation for, this configuration.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VI-10

The reviewers did not expect to find opposite unit OMAs identified for a fire in the other unit's reactor building, which they expected to be single unit areas. For example, Unit 1 OMAs for fires in the Unit 2 reactor building.

In other instances, the text description identified potential damage to opposite unit systems for a fire in the other unit's primary containment. For example, Part VI, Section 3.67.3.4, states, in part: "A fire in Analysis Volume 92C could potentially affect systems and components necessary to maintain the Unit 1 and Unit 2 steam generator inventory control functions..."

Analysis Volume	Description	Opposite Unit Item
091	Unit 1 Annulus	OMAs
092C	Unit 1 Primary Containment	Potential System Damage
092D	Unit 1 Primary Containment	Potential System Damage
117	Unit 2 Annulus	OMAs

Provide more detail on and an explanation for these configurations.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VI-11

Provide a level of detail concerning the repair procedure for 2-FCV-74-2-B (found in Part VI, Section 3.19.5.1 of the as-designed FPR [Analysis Volume AV-036]) similar to that found in the description of the repair procedures for 1-MTR-30-176-B (found in the same section).

Provide this level of detail for all other repair procedures that currently lack this detail in Part VI.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VII-2.1

The TVA response to RAI FPR VII-2, part 6 (in the May 26, 2011, TVA letter), does not fully answer the question regarding the additional service life caused by the late licensing of Unit 2.

Provide a technical justification and summary evaluation that demonstrates that the fire water system will maintain functionality for all hose stations and suppression systems for the lifetime of the Unit 2 license.

The technical justification should include, but not be limited to:

- The testing to be performed to identify where microbiologically induced corrosion (MIC) or other corrosion is a concern.
- The frequency of the testing.
- The acceptance criteria used to determine when pipe replacement is required.
- How operational experience regarding corrosion is incorporated into the pipe corrosion program.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VII-2.2

The TVA response to RAI FPR VII-2, parts 3 and 4 (in the May 26, 2011, TVA letter), describes the current pipe corrosion testing program as focused on the three hose stations identified by the initial calculation as failing before the initial fire water system service life expired.

Describe the actual trending results and acceptance criteria being used to determine acceptability of the three hose stations that are expected to fail prematurely.

Describe the testing being performed to identify where MIC or other corrosion is a concern, the frequency of testing, the trending results, and the acceptance criteria used to determine when pipe replacement is required.

Identify the additional piping and hose stations added to service for Unit 2 operation, or confirm that no new piping or hose stations have been added for Unit 2 operation.

Describe how the additional service life (caused by the later licensing of Unit 2) will affect the scope of the pipe corrosion testing program. If the scope will be unchanged, provide a justification for the unchanged scope.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VII-2.3

Describe the conditions necessitating the replacement of the B train high pressure fire protection header identified in TVA's response to RAI FPR VII-2 (in the May 26, 2011, TVA

letter). Also, identify the length of pipe replaced, the pipe material that was replaced, and what material it was replaced with. Explain the conditions that would prevent the same problem from affecting the A train header or the common (nonsafety) header, thus necessitating its replacement as well.

RAI FPR VII-2.4

The TVA response to RAI FPR VII-2, part 5 (in the May 26, 2011, TVA letter), mentions a water treatment program to address problems due to the use of raw water, but does not provide details of the program or discuss the effectiveness of the program.

Provide details concerning the raw water treatment program. Justify the effectiveness of the raw water treatment program at WBN in light of the continued problems with corrosion, wall thinning, MIC, biofouling, etc., experienced by the fire water system. Describe any corrective actions taken or planned to improve program performance.

Describe how the condition of underground piping will be monitored, as well as acceptance criteria.
This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VII-2.5

The TVA response to RAI FPR VII-2 (in the May 26, 2011, TVA letter) identifies a discrepancy between FPR Part VII, Section 3.3 and FPR Part II, Section 12.1 regarding the frequency of testing. Describe the discrepancy and identify what the "correct" value is.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VII-2.6

In its response to RAI FPR VII-2 in the letter dated May 6, 2011, TVA states, in part 4 of the response, that the three sets of standpipes tested by procedure 0-FOR-26-2, "3 Year High Pressure Fire Protection Hydraulic Performance Verification," have shown some degradation; but that flow and pressure from the hose stations continue to meet acceptance criteria. The response includes the data collected during flow testing from the auxiliary building roof in January 2008 and from the diesel generator building roof and intake pumping station in August 2010.

During the public meetings with the staff held on June 30 and July 12, 2011, TVA stated that there was a failure identified during the flow testing performed in August 2010. TVA also stated in the July 12 meeting that the failure may have been caused by faulty test equipment.

TVA stated at the meeting on June 30, 2011, that the failure led it to identify leakage in the Train A high pressure fire protection safety-related header caused by microbiologically induced corrosion (MIC).

- Describe the how the failure discussed in the public meetings affects the previous response to RAI FPR VII-2.

- Describe the actions taken to confirm that the test failure was a result of faulty test equipment.

- Provide a detailed summary of the trending information for each of the monitored hose stations.

- Describe how the determination was made that the corrosion discovered in the Train A header was caused by MIC.

RAI FPR VII-12

It appears that the description of the Reactor Building Equipment Hatches (757.0-A11 and 757.0-A15) in Part VII, Section 6.1.2 "Discussion and Justification," of the as-designed FPR is in conflict with the information in the balance of the FPR. For example, the description identifies Thermo-Lag installations in each of these rooms, but both Table I-1 and Part VI, Section 3.83.2.1, indicate that none is installed in room 757.0-A15.

Resolve these conflicts and provide assurance that other, similar conditions have been identified and corrected.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VII-13

Part VII, Section 2.8 "Reactor Coolant Pump Oil Collection System," of the as-designed FPR states, in part:

> In designing the oil collection system, it is not feasible in all instances to prevent minor amounts of oil from becoming entrained in the ventilation air and escaping the collection system. This oil becomes a thin film on piping and supports in the vicinity of the RCPs [reactor coolant pumps].

- Using Unit 1 operating experience, describe in detail all Unit 1 locations, outside the oil collection system, where RCP oil has been found. Provide the estimated amount of oil discovered and if the oil was a fine film or pooling.

- Describe whether the capability exists to refill the RCP lube oil systems during power operation. If the capability does exist:

  - Describe the amount of RCP lube oil added during operation, if any.

  - Describe whether the capability exists to drain the oil collection system during operation, thus ensuring that the collection system remains capable of containing the full volume of RCP oil.

- Using Unit 1 operating experience, provide the details of any preventive maintenance activity or modifications that have been utilized to reduce or eliminate oil leaking outside the RCP oil collection system.

- Describe, in detail, any design differences between the Unit 1 and Unit 2 RCP oil collection system.

- Describe any physical or operational design differences between Unit 1 and Unit 2 that could change the surrounding environment of the RCPs and affect the function of the RCP oil collection system.

- Identify the methods and procedures that Unit 2 will use to monitor the effectiveness of the RCP oil collection system during start up and operation. This includes possible changes to RCP maintenance and modification to the RCP oil collection system.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VII-14

Part VII, Section 2.8 "Reactor Coolant Pump Oil Collection System," of the as-designed FPR describes the design of the oil collection system and the significant airflow environment where the system has to function. The installation and design of the stainless steel mirror insulation and certain properties of the RCP oil is also discussed.

- Confirm that only noncombustible, nonpermeable stainless steel mirror insulation is installed on the RCPs and reactor coolant piping in the vicinity of the RCPs, and that all mirror insulation panels are fitted together with overlapping seams and secured in place. Provide the installation and material details of any RCP or reactor coolant piping insulation that does not meet the above criteria, and provide a technical justification for acceptability.

- Describe in detail the nearest ignition sources to the RCPs and locations similar to where Unit 1 RCP oil has been found outside the oil collection system.

- Provide the fire point and auto ignition temperature for the type of RCP oil used at WBN Unit 2. Also, provide a technical justification for acceptability.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VII-15

Part VII, Section 2.8 "Reactor Coolant Pump Oil Collection System," of the as-designed FPR states, in part:

> In designing the oil collection system, it is not feasible in all instances to prevent minor amounts of oil from becoming entrained in the ventilation air and escaping the collection system. This oil becomes a thin film on piping and supports in the vicinity of the RCPs.

Discuss the actions that will be taken with regard to manufacturers' recommendations to eliminate or significantly reduce oil misting and the controls in place to assure RCP oil of different (more combustible) properties will not be used in the future.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VII-16

The terms "embedded duct" and "embedded collector box" are used throughout Part VII, Section 6.2 "Justification for Fire Damper Surveillance Requirements," of the as-designed FPR, and its subsections.

Explain what "embedded" means in this context.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VII-17

Part VII, Section 6.3.1 "Statement of Condition," of the as-designed FPR, states, in part: "A portion of the gap between the door and frame of fire door W9 exceeds the maximum 3/16-inch clearance," but does not continue to identify the extent of the nonconforming condition.

Identify the maximum gap for fire door W9 and justify why it is acceptable.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VIII-13.1

The reviewers intended RAI FPR VIII-13 to cover testing and operability requirements of fire hydrants. However, the RAI was ambiguously worded. The TVA response to RAI FPR VIII-13 (in the May 26, 2011, TVA letter) thus did not answer the intended question, but instead an alternate interpretation. This follow-up seeks to correct this miscommunication.

Confirm that all hydrants, as identified in Part VIII, entry F.16, of the as-designed FPR, that are used to provide "protection to the refueling water storage tanks and the primary water storage tanks" are listed in Part II, Table 14.7. Otherwise, add these hydrants to the table or document the operability requirements and testing and inspection requirements that apply to these hydrants. If these hydrants are not added to Table 14.7, describe the differences in operability requirements and testing and inspection requirements of these hydrants and those in the Table.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VIII-14.1

The reviewers intended RAI FPR VIII-14 to cover testing and operability requirements of fire hydrants. However, the RAI was ambiguously worded. The TVA response to RAI FPR VIII-14 (in the May 26, 2011, TVA letter) thus did not answer the intended question, but instead an alternate interpretation. This follow-up seeks to correct this miscommunication.

Confirm that all hydrants, as identified in Part VIII, entry F.17, of the as-designed FPR, that are used to provide "support manual fire suppression activities around the cooling towers" are listed in Part II, Table 14.7. Otherwise add these hydrants to the table or document the operability requirements and testing and inspection requirements that apply to these hydrants. If these hydrants are not added to Table 14.7, describe the differences in operability requirements and testing and inspection requirements of these hydrants and those in the Table.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VIII-17.1

RAI FPR VIII-17 requested conformance information regarding detailed guidance regarding seismically qualified standpipes and hose stations. The TVA response to RAI FPR VIII-17 (in the June 7, 2011, TVA letter) did not supply this information, instead referring to an earlier RAI response.

Provide plant conformance information for the detailed guidance regarding seismically qualified standpipes and hose stations in the paragraph that begins: "The standpipe system serving such hose stations..." at the end of entry E.3.d, in Part VIII "Appendix A Guidance," of the FPR, and reproduced below.

> The standpipe system serving such hose stations should be analyzed for SSE [safe-shutdown earthquake] loading and should be provided with supports to assure system pressure integrity. The piping and valves for the portion of hose standpipe systems affected by this functional requirement should at least satisfy ANSI [American National Standards Institute] B31.1, "Power Piping." The water supply for this condition may be obtained by manual operator actuation of valve(s) in a connection to the hose standpipe header from a normal Seismic Category I water system such as Essential Service Water System. The cross connection should be (a) capable of providing flow to at least two hose stations (approximately 75 gpm/hose station), and (b) designed to the same standards as the seismic Category I water system; it should not degrade the performance of the Seismic Category I water system.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VIII-20

A change was made to Part VIII, entry F.1.B, of the FPR to change the "Plant Conformance" entry from:

> Administrative procedures limit the amount of combustible materials within the area and control hot work activities. [emphasis added]

to:

> Administrative procedures control the type of combustible materials within the area and control hot work activities. [emphasis added]

It appears that this change was made between Revision 40 and the as-designed version of the FPR.

The NRC position is that administrative procedures for combustible control should have both of these attributes (limiting the amount and controlling the type of combustible materials), as described in Regulatory Guide 1.189, Revision 2 regulatory position 2.1.

Confirm that the procedures for WBN Unit 2 consider both of these attributes. If not, provide a technical justification for this change.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR VIII-21

The NRC determined that the WBN fire protection program was acceptable, in part, due to the use of noncombustible insulating liquid in transformers in safety related buildings. SSER 18 (ADAMS No. ML070530364) states, in part:

> Transformers insulated with Askarel oil (a noncombustible insulating liquid) are located in various areas of the plant without being located in a separate room. Near these transformers are various redundant safety-related cable trays or conduits or both.

and

> The staff finds that the applicant's proposed use of transformers filled with noncombustible insulating liquid conforms to the guidelines of Position D.1.g of Appendix A to BTP (APCSB) 9.5-1 and, therefore, is acceptable.

Element D.1.g of NRC BTP 9.5-1 APCSB, Appendix A (ADAMS No. ML070880458) states in part:

> High Voltage - High amperage transformers installed inside buildings containing safety-related systems should be of the dry-type or insulated and cooled with noncombustible liquid. [emphasis added]

Part VIII of the as-designed version of the FPR states the following in the "Plant Conformance" column of the table:

> High Voltage - High amperage transformers are not installed within building spaces. Transformers installed within safety-related buildings are either dry-type or insulated and cooled with "high fire point" (650°F) liquid. [emphasis added]

The underlined text does not describe conformance, but rather an alternative.

- Describe TVA's understanding of the term "high voltage - high amperage transformers" as used in the Appendix A to BTP 9.5-1 Guidelines.

- Confirm the insulating liquid used in transformers installed in safety related buildings is noncombustible.

If the insulating liquid is not noncombustible,

- Identify the locations where combustible oil filled transformers are installed. Provide the locations to the level of detail of room subdivisions used to assemble analysis volumes (for example, room 692.0-A1 has been subdivided into 692.0-A1A1, -A1A2, -A1A3, -A1AN, -A1B1, -A1B2, -A1B3, -A1BN and -A1C).

- Provide a technical justification for this deviation for each analysis volume containing combustible oil filled transformers. Each justification should include, but not be limited to, consideration of: fire protection features (i.e., detection and suppression), fire rated barriers, nearby safe shutdown equipment or components, smoke effects, diking, and effects on manual actions that require reentry or transit of the area.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

RAI FPR X-4

A sampling review of the National Fire Protection Association document NFPA 13-1975 compliance matrix in Part X of the as-designed FPR identified the following:

- Items 1-11.5 and 3-12.1.5 are identified as "Deviations" in the matrix, but detail is not provided after the matrix for these items.

- Item "3-14.2.1 thru 3.4" is identified as a "Deviation" in the matrix, but detail is not provided after the matrix for this item. Additionally, other similar items (for example "3-14.5" and "3-14.1.5 thru 1.8") are identified as "Alternatives."

Resolve these conflicts and provide assurance that other similar conditions have been identified and corrected.

This RAI may involve an update to the FPR to incorporate the response to the RAI.

July 21, 2011

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

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – REQUEST FOR ADDITIONAL INFORMATION REGARDING FINAL SAFETY ANALYSIS REPORT AMENDMENT RELATED TO SECTION 9.5.1 "FIRE PROTECTION SYSTEM" GROUP 6 (TAC NO. ME3091)

Dear Mr. Bhatnagar:

By letters dated July 16, August 9, 20, and 30, November 5, and December 1, 18, and 20, 2010; and January 14, March 16 (two letters), March 31, May 6, 18, and 26, and June 7 and 17, 2011, Tennessee Valley Authority (TVA) responded to requests for additional information (RAIs) relating to the Fire Protection Report for Watts Bar Nuclear Plant (WBN). The U.S. Nuclear Regulatory Commission (NRC) staff has been reviewing the information provided by TVA in support of the operating license application for WBN Unit 2.

After reviewing the responses provided by TVA and the Fire Protection Report, the NRC staff has determined that additional information is needed to complete its review.

The requested information in these questions was discussed in a meeting held on June 30, 2011. Based on these discussions, TVA stated to NRC staff that responses would be completed by July 29, 2011. If the response will not be completed by that date, a written request to the NRC for an extension, including justification, is required.

If you should have any questions, please contact me at 301-415-1457.

Sincerely,

/RA/

Justin C. Poole, Project Manager
Watts Bar Special Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-391
Enclosure: RAI
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ADAMS Accession No. ML111823580 *per memo dated July 1, 2011

OFFICE	LPWB/PM	LPWB/LA	AFPB/BC	OGC NLO	LPWB/BC
NAME	JPoole	BClayton	AKlein*	DRoth	SCampbell
DATE	7/8/11	7/8/11	7/1/11	7/12/11	7/21/11

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