

## WBN2NonPublic Resource

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**From:** Boyd, Desiree L [dlboyd@tva.gov]  
**Sent:** Tuesday, August 09, 2011 12:08 PM  
**To:** Epperson, Dan; Poole, Justin; Raghavan, Rags; Milano, Patrick; Campbell, Stephen  
**Cc:** Crouch, William D; Hamill, Carol L; Boyd, Desiree L  
**Subject:** TVA letter to NRC\_8-5-11\_Response to NRC 6th Round RAI Fire Protection Report  
**Attachments:** 8-5-11\_Response to NRC 6th Round RAI Fire Protection Report\_Final.pdf

*Please see attached TVA letter that was sent to the NRC.*

*Thank You,*

~\*~\*~\*~\*~\*~\*~\*~\*~\*

*Desiree L. Boyd*

**WBN 2 Licensing Support**

**Sun Technical Services**

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**423-365-8764**

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

August 5, 2011

10 CFR 50.4

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 (RAI) GROUP 6 REGARDING “FIRE  
PROTECTION REPORT” (TAC NO. ME3091)**

- Reference: 1. NRC Letter to TVA dated July 21, 2011, “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)”
2. TVA Letter to NRC dated July 22, 2011, “Watts Bar Nuclear Plant (WBN), Unit 2 – Corrosion Related Portion of NRC’s Request for Information Regarding Final Safety Analysis Report Amendment Related to Section 9.5.1 ‘Fire Protection System’ Round 6 (TAC NO. ME3091)”

The purpose of this letter is to respond to the remaining NRC’s RAIs pertaining to WBN Unit 1/Unit 2 Fire Protection Report contained in Reference 1. At NRC’s request, TVA has already provided responses to the corrosion related RAIs in its letter dated July 22, 2011 (Reference 2). This letter also responds to NRC’s questions received during the July 28, 2011 public meeting that was held to discuss the Group 6 Fire Protection System RAIs. New questions received from NRC during the public meeting have been added to the corresponding RAIs and identified as: “NRC Follow-up Questions provided in July 28, 2011 Public Meeting.” In some cases the Reference 2 responses have been revised/amplified to provide clarification based on the meeting. In all of these cases, TVA’s response addresses the original and the follow-up questions. It should be noted that the revised responses to those “corrosion related” questions that were previously submitted in Reference 2 have been added such that the revised responses address the follow-up questions for those RAIs.

Enclosure 1 to this letter provides TVA’s responses to NRC’s Group 6 questions, as well as revised responses to address NRC’s follow-up questions. Enclosure 2 provides the new Regulatory Commitments contained in this letter.

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In addition, as requested by NRC, Enclosure 3 provides a summary listing of fire protection commitments contained in TVA's submittals. This summary listing contains a description of the commitment, the status (open or closed), as well as pertinent references (initiating, closing, etc.,).

If you have any questions, please contact William Crouch at (423) 365-2004.

I declare under the penalty of perjury that the foregoing is true and correct. Executed on the 5<sup>th</sup> day of August, 2011.

Respectfully,

A handwritten signature in black ink, appearing to read 'David Stinson', with a stylized flourish at the end.

David Stinson  
Watts Bar Unit 2 Vice President

Enclosures:

1. Response to NRC's Request for Information Regarding "Fire Protection Report"
2. Regulatory Commitments
3. Summary Listing of Fire Protection Commitments

cc (Enclosures):

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## **ENCLOSURE 1**

### **Response to NRC's Round 5 Request for Additional Information Regarding "Fire Protection Report"**

- Reference: 1. NRC Letter to TVA dated July 21, 2011, "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)"
2. TVA Letter to NRC dated July 22, 2011, "Watts Bar Nuclear Plant (WBN), Unit 2 – Corrosion Related Portion of NRC's Request for Information Regarding Final Safety Analysis Report Amendment Related to Section 9.5.1 'Fire Protection System' Round 6 (TAC NO. ME3091)"

The following provides TVA's response to the referenced NRC requests for additional information (RAI) pertaining to the WBN Unit 2 Fire Protection Report (FPR).

NRC's numbering system will be referenced to identify each question. Some NRC questions have been subdivided for clarity of response. Additionally, new questions received from NRC during the July 28, 2011 public meeting have been added to the appropriate RAI and identified as: "NRC Follow-up Questions provided in July 28, 2011 Public Meeting." In some cases, the Reference 2 responses have been revised/amplified to provide clarification based on the meeting. In all of these cases, TVA's response addresses NRC's original RAI and the follow-up questions.

#### **1. NRC Question (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.

#### **TVA Response:**

The following will be added at the end of the table and will be included in the next FPR submittal.

\* Combustible load fire severity is assumed to be comparable to the corresponding Unit 1 room. At the completion of construction, a walkdown of these rooms will be conducted to verify the in situ combustibles located in the rooms, and the Table will be revised as necessary.

#### **2. NRC Question (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.*

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- *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*

*[1] Resolve these conflicts and [2] 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.*

#### **TVA Response:**

- [1]** FPR Part I, Table I-1 and Part VI, Sections 3.21.1 and 3.22.1 have been revised to correct these conflicts and will be included in the next FPR submittal.
- [2]** Table I-1 and other applicable parts of the FPR were reviewed to ensure consistency between the parts of the report, and corrections have been incorporated into each part of the FPR and will be included in the next FPR submittal.

### **3. NRC Question (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.*

#### **TVA Response:**

The responsibilities delegated to the General Manager, Operations Services, by the Senior Vice President for Nuclear Operations were reassigned to the individual Site Vice Presidents. The General Manager is a former corporate position that no longer exists. The General Manager was responsible for the development and assessments of the Fire Protection programs at the sites. As defined in Part II, Section 7.2, the Site Vice President is responsible for the development, implementation and administration of the Fire Protection Program. Assessments are a part of the administration of the program and are addressed

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by the self-assessment program addressed in NPG-SPP-02.1, "NPG Self-Assessment and Benchmarking Program."

When Unit 2 becomes operational, it will be transferred from the responsibility of the Nuclear Generation, Development and Construction Operating Group to the Nuclear Power Group and thus to the WBN Site Vice President.

TVA has determined that the FPR does not require revision.

#### **4. NRC Question (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 [FPP] as approved by NRC.*

*Provide a justification for this change. Is it TVA's position that 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.*

#### **TVA Response:**

Changes to the FPR are made in accordance with License Condition F of WBN's current operating license, issued February 9, 1996, which states:

TVA shall implement and maintain in effect all provisions of the approved fire protection program as described in the Fire Protection Report for the facility, as approved in Supplements 18 and 19 of the SER (NUREG-0847) subject to the following provision:

TVA may make any changes to the approved fire protection program without prior approval of the Commission, only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

This License Condition is a higher tier requirement than the FPR and thus the wording is not required in the FPR.

The requirement to evaluate changes to a licensee's FPR under 10 CFR 50.59 was excluded by the amendment to the 10 CFR 50.59 rule on October 4, 1999. Therefore, FPR revision 27 deleted the words associated with the need to evaluate in accordance with



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10 CFR 50.59. In lieu of the 10 CFR 50.59 process, TVA adopted the evaluation process as documented in FPDP-3, "Management of the Fire Protection Report," which established the process to ensure compliance with the fire protection license condition. In addition, TVA implemented NEI 02-03, "Guidance for Performing a Regulatory Review of Proposed Changes to the Approved Fire Protection Program," to be aligned with the rest of the industry. This NEI has been incorporated into a corporate procedure, NPG-SPP-03.6, "Fire Protection Program Change Regulatory Reviews," which is in accordance with the applicable sections of NEI 02-03. The evaluation process ensures TVA remains compliant with License Condition F of the WBN operating license.

NRC's review of NEI 02-03 documented in letter dated August 27, 2003, indicated that the Staff had no comments, but made the following two points regarding the change process:

- Changes to the Approved Fire Protection Program (AFPP) must be in accordance with the applicable rules and the plant's specific licensing basis.
- The guidance may be used to evaluate changes to the AFPP, but changes that would result in noncompliance with the rules require NRC approval.

NRC concluded that: "Using published guidance, such as NEI 02-03, for evaluating changes to the AFPP (Approved Fire Protection Program) should ensure consistent evaluations and will improve the efficiency and effectiveness of the regulatory process."

Based on the above discussion, TVA's position remains unchanged from the License Condition F contained in the initial Unit 1 Operating License (i.e., TVA would seek NRC approval for those changes determined to require prior approval in accordance with the NEI 02-03 process).

#### **5. NRC Question (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 user 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 user of the FPR to other controlled documents, such as supporting calculations, procedures, 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.*

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

#### **NRC Follow-up Questions provided in July 28, 2011 Public Meeting:**

*To be a roadmap the FPR needs to document references listed in FPR, Part II, Section 4.0, at the associated text write-up. Provide a roadmap of references to the associated text.*

#### **TVA Response:**

A review of the first four sections of the FPR, Part II, provides the commitments WBN was designed to, as well as, reference to some of the design level documents. These references include design input and output documents (e.g., calculations, system descriptions, drawings, etc.) which are to be used for the detailed information. These first four sections can be utilized as a "roadmap" to identify these commitments, as well as to the referenced specific design details that satisfy these commitments. The other sections, like Section 12, provide an overview of how the committed documents were satisfied by the design, but were not meant to be a point-by-point comparison similar to FPR, Part VIII, "Conformance to Appendix A to BTP 9.5-1 Guidelines."

In addition, the FPR does not attempt to establish the processes by which equipment is maintained and/or modified. These processes, such as NPG-SPP-06.1, "Work Order Process," for maintenance of the plant equipment in accordance with design output, and NPG-SPP-09.3, "Plant Modifications and Engineering Change Control," for modification to plant equipment under configuration control via design output, are fundamental to all plant equipment under configuration control. Plant employees are trained in the use and adherence to these processes before working on equipment under configuration control to ensure safe operation of the plant.

To be specific, the information removed from FPR, Part II, Section 12.10.4, "Fire Doors," stated the following:

Modifications to fire doors must be within accepted criteria or approved by a Fire Protection Engineer.

This information is addressing modification which is covered by NPG-SPP-09.3, "Plant Modifications and Engineering Change Control." Under the modification process the design change notice indicating that fire protection is affected will receive a review that includes a Fire Protection Engineer. At the time of Unit 1 fuel load, this process to have a Fire Protection Engineer review and approve every design change notice was not as defined as it has become now with the advent of guidance from the NRC and NEI. Thus, this removed statement duplicated information that was proceduralized and required by other guidance and was no longer needed.

The remaining information of this paragraph provides the bases for special requirements placed in the implementing documents (e.g., NPG-SPP-06.1 and/or sub tier procedures) to ensure the maintenance process achieves the committed level of review.

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In conclusion, the FPR is a part of the FSAR by reference and as such there is not a direct tie (e.g., cross reference) between the FPR statements to the implementing documents as there is not a direct tie from FSAR statements and associated implementing document. But the unique and specific requirements needed for the Fire Protection program are stated in the FPR to ensure maintenance of the program and provide a single source of review to ensure changes to the program meet regulatory commitments.

TVA has determined that the FPR does not require revision.

#### **6. NRC Question (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.*

#### **TVA Response:**

The process of returning inoperable equipment, fire protection or safety related, to Operable status is controlled by established procedures. The process begins with the initiation of a service request in accordance with NPG-SPP-01.14, "Service Request Initial Review" by the individual observing the deficient condition. The service request is reviewed by a group knowledgeable in the areas of Operations, Corrective Action Program, Work Management and/or Engineering to determine if a work order and/or a corrective action document should be initiated for the condition. The material conditions aspects of the service request will be addressed by the work order that is initiated.

The work order will then be reviewed by the work order review group which has a minimum required attendance of Operations, System Engineering, Maintenance, and Security. This group will determine the priority of the work order in accordance with the established procedural guidelines of NPG-SPP-07.1, "On Line Work Management."

Through this process, Operations will address the time out of service allowed by the FPR, as well as the effect on protection of safe shutdown equipment.

Should the equipment not be restored as Operations deems appropriate, then other processes are in place to allow Operations to place emphasis on the correction of the deficiency, including placing the work order in the Team Alignment Package, which is reviewed by the WBN management team each week day.

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Should the deficiency not be corrected within the time specified by the FPR, then another service request is initiated which will become a corrective action document to address the reportability reviews in accordance with 10 CFR 50.72 and 10 CFR 50.73. This second service request causes plant management, especially Operations, attention and review of the work order status to determine why the work was not completed within the time frame required in the FPR.

The above process is the same process for all plant equipment whether it is safety related, Tech. Spec., Fire Protection, etc., to ensure management review and to prioritize the work based on risk.

TVA has determined that the FPR does not require revision.

#### **7. NRC Question (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.*

- **[1]** *Confirm that no Function A fire detectors are installed in inaccessible areas outside of containment.*
- **[2]** *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.*

#### **TVA Response:**

- [1]** There are Function A fire detectors located in inaccessible areas outside of the Unit 1 or Unit 2 Containments.
- [2]** The FPR will be clarified to update the verbiage for these fire detectors and will be included in the next FPR submittal.

#### **8. NRC Question (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 Regulation Part*

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*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:*

- *[1] 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.*
- *[2] 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.*
- *[3] 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.*
- *[4] 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.*

#### **TVA Response:**

- [1] The Appendix R analysis has developed a shutdown logic diagram for a postulated fire and identified the process "end devices" and instrument loops that are required for safe shutdown. The equipment is arranged in functional groups called "keys" and is logically inter-tied such that it supports the shutdown logic diagram. Spurious actuations and the need to shut the plant down from the Auxiliary Control Room System have been considered. A complete list of equipment and electrical cable required for safe shutdown has been compiled. The analysis has: (1) determined the safety functions required to achieve safe shutdown following a postulated fire, and (2) identified the process systems and devices which must operate to accomplish the safety functions or must not fail in a manner which would otherwise defeat the safety functions. The analysis for an Appendix R Fire event considers (1) no other design basis events are considered to occur as initiating events or during the subsequent shutdown duration concurrently with a postulated fire except for the loss of offsite power, (2) all equipment is assumed to be in its normal configuration and operating within the limits provided for by the unit Technical Specifications when the fire is postulated, (3) safe shutdown circuits, equipment, instrument sense lines, and associated circuits are assumed to be damaged if they are in the zone of influence of the fire, and (4) no equipment failures other than those directly attributable to the fire are considered. It is noted that the Appendix R equipment listed on Table 14.10 is required for Fire Safe Shutdown (FSSD) and shall be Operable (or in its FSSD condition) when the unit is in modes 1, 2, and 3. With one or

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more required pieces of equipment in Table 14.10 inoperable (or not in its FSSD condition), it must be restored to operable status (or its FSSD condition) within 30 days.

Appendix R requires a plant to analyze/identify the equipment required to mitigate fires in the various areas of the plant. Based on this analysis, WBN identifies a single FSSD path for each fire area. Consequently, for any given fire, the redundant equipment is maintained free of fire damage. Appendix R does not require a plant to identify/protect/compensate for a FSSD path that is temporarily out of service. If a portion of a safe shutdown path cannot perform its function, the plant enters the processes described in Question 6 (RAI FPR II-31.1) above in order to restore the fire protection capability in a timely manner. This process minimizes the risk due to equipment out of service by ensuring timely management attention.

- [2] See response to sub question [1] above for NRC Question (RAI FPR II-39.1)
- [3] Testing and maintenance of safety-related and non-safety-related equipment is performed on a train/channel basis. There are two trains of equipment, A train and B train, and four channels, I, II, III, and IV. Equipment that is not trained or channel specific is working in the associated train/channel week of associated equipment or area. These break up into a 13 week rolling work week schedule of A train, Channel I; A train, Channel III; B train, Channel II; and B train, Channel IV. Note that the 13th week is a non-train, non-channel week. The 13 week rolling work week schedule is reviewed periodically starting at 26 weeks out for several aspects including risk and inoperable opposite train equipment. Inoperability of safety-related equipment relied upon for fire protection purposes is controlled in accordance with the plant's Technical Specifications. Similarly, plant process (e.g., main steam PORV nitrogen tanks that are not Technical Specification driven but are relied upon for FSSD) and fire protection equipment which is not addressed by the plant's Technical Specifications is controlled in accordance with FPR Part II, Section 14.0. If Operations determines the risk is too great or if there is a concern about opposite train equipment, the work is deferred or Engineering is consulted for alternate capabilities.
- [4] The process of returning inoperable equipment, fire protection or safety-related, to Operable status is controlled by established procedures. The process begins with the initiation of a service request in accordance with NPG-SPP-01.14, "Service Request Initial Review," by the individual observing the deficient condition. The service request is reviewed by a group knowledgeable in the areas of Operations, Corrective Action Program, Work Management and/or Engineering to determine if a work order and/or a corrective action document should be initiated for the condition. The material conditions aspect of the service request will be addressed by the work order that is initiated. The work order will then be reviewed by the work order review group which has a minimum required attendance of Operation, System Engineering, Maintenance, and Security. This group will determine the priority of the work order in accordance with the established procedural guidelines of NPG-SPP-07.1, "On Line Work Management."

Throughout this process, the appropriate System Engineer will be addressing the equipment reliability via the System Health Report required by NPG-SPP-09.16.1,



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"System, Component and Program Health." Such a condition could result in a concern in several different areas on the System Health Report such as:

1. Operator Work Arounds
2. Control Room Deficiencies
3. Auxiliary Unit Operator (AUO) Round Deficiencies
4. Disabled Annunciators
5. Top Equipment Issues
6. Recurring Equipment Problems
7. Critical Component Failures
8. Deferred Preventative Maintenance

Another method is Operations could enter the activity in the Team Alignment Package that the site management reviews every week day.

TVA has determined that the FPR does not require revision.

#### **9. NRC Question (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.*

#### **TVA Response:**

Piping located in Category I structures has been analyzed to meet the requirement of pressure boundary requirements during a seismic event and thus would be capable of supplying water for firefighting following a seismic event.

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#### **10. NRC Question (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 of "\*" 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.*

#### **TVA Response:**

The information from Revision 41 of the FPR is correct. The rooms that are "Inaccessible only during a resin transfer" should have a single "\*." The rooms that are "Refer to Part VII for engineering evaluations," should have a double "\*\*." This has been corrected and will show the correct information in the next "As-Designed" FPR submittal.

#### **11. NRC Question (RAI FPR II-44)**

*Part II, Section B.14.2.f of the as-designed FPR, states, in part: "Flow test 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.*



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

#### **NRC Follow-up Questions provided in July 28, 2011 Public Meeting:**

*Part II, Section B.14.2.f of the as-designed FPR states flow tests are made at flows representative of those expected during a fire. Sprinkler system hydraulic calculations include an allowance for fire hose flow with the sprinkler system flow. How does the flow test account for the additional flow for the fire hose?*

#### **TVA Response:**

The HPFP system is designed to be common to all areas of the site to support fighting any fire that was to occur onsite. Thus, the HPFP system is interconnected in several locations resulting in multiple loops to ensure proper operation of the system. To test this common system, individual flow points have been selected on the HPFP system, which results in flow through the Train A and Train B HPFP headers.

Part II, Section B.14.2.f provides additional information to the testing requirements provided in the Testing and Inspection Requirements (TIR) 14.2.f. The testing of TIR 14.2.f requires flow tests of the system. The TIR bases, B.14.2.f, calls for this testing to compare the friction loss characteristics of the piping to previous tests. To address B.14.2.f, WBN uses multiple representative flow points in different areas of the HPFP system to give an indication of the condition of the HPFP system piping.

The allowance for fire hose flow is not addressed in the flow tests for sprinkler systems with installed test headers that are tested as a part of TIR 14.2.f. The hose station flow paths from the main header are hydraulically separate from the main header to sprinkler flow paths and thus the hose stations do not impose hydraulic loads on the sprinkler paths. Due to the relative size of the main header compared to the branches for the hose station and/or sprinklers, operation of the sprinklers and hose stations does not challenge the flow capability of the main header.

A more detailed discussion is provided in TVA's letter to the NRC dated July 22, 2011, titled "Watts Bar Nuclear Plant (WBN) Unit 2 - Corrosion Related Portion Of NRC's Request For Additional Information (RAI) Round 6 Regarding 'Fire Protection Report' (TAC No. ME3091)." Specifically, TVA's response to NRC Question (RAI FPR VII-2.2) addressed how the system is tested and trended to determine the status of the system/piping.

TVA has determined that the FPR does not require revision.

#### **12. NRC Question (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.*

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*[1] 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.*

#### **TVA Response:**

The FPR, Part II, Section 12 and Figures II-1A to II-24A provides the design overview of the HPFP system including relative position of equipment, set points, pump capacity, logic, etc., to support the following operational discussion. Additional details are provided in the FPR, Part II, Reference 4.2.4.

Attached is a simplified sketch of the majority of the HPFP system. This sketch does not show the loop that serves the Training Center and the warehouses to the north of the Protected Area. The A train, the B train, and the main common headers are shown. In addition, there is a loop inside the Turbine Building and a loop inside the Auxiliary Building. The Turbine and Auxiliary Building loops are intertied in two diverse locations at the interface of the Turbine and Auxiliary Buildings. The Turbine Building loop is connected to the yard loops at two locations and has one connection to the Service Building. During normal operation, the system is interconnected with all sectionalizing valves open.

Unlined carbon steel piping is used for the buried trained headers and all interior piping. The buried carbon steel piping is provided with an exterior coating to protect from corrosion. The buried common headers use cement lined ductile iron piping.

During the design bases flood, sectional valves are closed to ensure the Train A and B headers are established to support the safety function of the fire protection system to provide Auxiliary Feedwater. The buried trained headers enter the Auxiliary Building on opposite sides and connect to the Auxiliary Build HPFP header loop. When the sectional valves are closed for flood mode, the ties to the Turbine Building are isolated and the supply from the buried trained headers is sectionalized to A train and B train and both can supply Auxiliary Feedwater.

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During normal day-to-day operation, there are select service water flows to specific equipment such as HVAC chillers, the demineralized water purification process equipment, auxiliary boiler feed pump seal cooler, and water treatment equipment. The larger users are automatically isolated on a fire pump start so that the maximum raw service water demand during a fire with two electric fire pumps started is 105 GPM. In addition, there are service water connections located in several buildings such as the Turbine Building, Condenser Circulating Water Pumping Station, Intake Pumping Station (IPS), Security Backup Power Building and Hypochlorite Building. These connections are used on as-needed bases (e.g., temporary cooling for plant equipment), and are controlled via the fire protection impairment permit process, NPG-SPP-18.4.6, "Control of Fire Protection Impairments."

The electric fire pumps start based on a signal from the fire detection system, a manual start from the MCR or associated 480V shutdown board, a signal from the reactor building hose stations, or a signal from the transformer deluge systems' electrical circuit. The electric fire pumps draw water directly from the Tennessee River via the IPS. The treatment of this water is discussed in RAI FPR VII-2.1. The diesel fire pump starts based on low system header pressure and draws water from the Unit 1 Cooling Tower basin. The normal pressure of the system with a fire pump running is about 135 PSI at elevation 729.

The normal make-up (in lieu of a jockey pump) for the HPFP system when a fire pump is not running is the Raw Cooling Water (RCW) system normally at about 80-90 PSI at elevation 729. This system also has pumps at the IPS and the water is treated as discussed in RAI FPR VII-2.1. The intertie is between the HPFP Turbine Building loop and the RCW system on elevation 685 in the Turbine Building. When a fire pump starts, two check valves in series between the HPFP and RCW systems close to prevent over pressurization of the RCW system by the HPFP system.

During normal operation with HPFP fed by the RCW system in the Turbine Building, the loads are:

1. The demineralized water purification process (shown on the Figure II-45.A as "ADD WTP") is located in the yard such that the feed is via Turbine Building to yard to ADD WTP.
2. The main HVAC loads are in the Service Building and the Main Office Building, and the feed is via Turbine Building to Service Building.
3. One HVAC load in the Control Building is fed by the Turbine Building loop.
4. The auxiliary boiler feed pump seal cooler is fed by the Turbine Building loop.
5. The as-needed service water connections are fed via the Turbine Building through the yard loops to the individual buildings.

(Note the routes suggested are the most hydraulically direct path from the supply to the load. Since the system has multiple loops, there could be minor flow via other paths.) These loads are summarized in the FPR, Part II, Section 12, and the details of the demands of these loads are provided in a calculation referenced in the System Description.

TVA has determined that the FPR does not require revision.

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#### **13. NRC Question (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).*

**[1]** *Add the above calculation to the FPR Part II, Section 4.0, "References."*

**[2]** *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.*

#### **TVA Response:**

**[1]** FPR Part II, Section 4.2, "TVA Documents," has been revised to reference the following:

4.2.66 WBPEVAR9509001 – "Appendix R-Multiple High Impedance Fault Analysis"

This reference, as well as adding a sentence to the text of the FPR to refer to this reference will be included in the next "As-Designed" FPR submittal.

**[2]** No other similar instances of references not being listed in Part II, Section 4 were identified. Additional reviews and updates of the FPR are currently being performed, and if additional references are used, they will be included in a future FPR submittal.

#### **14. NRC Question (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*

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*been evaluated: ground fault, differential relaying, and protective relaying.  
[emphasis added]*

**[1]** *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.*

**[2]** *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.*

#### **TVA Response:**

**[1]** The evaluation of fire hazards due to a fire-induced open circuit in the secondary of CTs installed in high energy panels (i.e., 6.9kV switchgear) included non-required as well as required power systems as may be seen by the content of other paragraphs of Section 7.5. The CT circuits associated with boards being placed in service as part of Unit 2 completion have the same design features to prevent secondary fires from open circuits as those already in service for Unit 1. The sentence containing the subject statement will be revised to provide clarification as follows: "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 and non-required power systems have been evaluated." This revision will be included in the next FPR submittal.

**[2]** The methodology used for the fire hazards analysis for CTs as a potential source of secondary fires due to open circuiting of the secondary circuit generally consists of performing an evaluation to identify CTs that are constructed such that an open secondary circuit could cause ignition of the transformer and to further identify those CTs susceptible to ignition which have secondary circuits extending outside of the fire area to verify they are either isolated or protected. The evaluation includes but is not limited to review of the design configurations of CT circuits as follows:

- (a) Verify by review of design documentation the CT secondary circuit is contained wholly within the fire area containing the switchgear, or
- (b) Verify by review of design documentation those CT circuits which extend beyond the fire area containing the switchgear are isolated by transducers such that an open circuit downstream of the isolation device would not cause failure of the CT, or
- (c) Verify by review of design documentation that the CT is used in a differential protective relay circuit such that an open circuit condition would initiate a protective relay actuation to trip the feeder breaker for the power circuit and thereby remove current to the CT.

This information will be incorporated into Part III, Section 7, and included in the next FPR submittal.

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#### **15. NRC Question (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.*

**[1]** *Provide a list of the design changes with the actual or scheduled completion dates.*

**[2]** *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.*

#### **TVA Response:**

**[1]** The following is a list of the design change packages that have been issued to ensure that the Unit 2 circuits are adequately protected with fuses/breakers that prevent a circuit from being an associate circuit (Type 1-Common Power Supply or Type III-Common Enclosure) of concern:

<b>EDCR No.</b>	<b>Title/Work Scope</b>
53217	Replace the Technical Support Center Regulating Voltage Transformer
53287	Replace Safety Related Class 1E Motor Control Center (MCC) Buckets (i.e., Motor Starters, Circuit Breakers, Relays, Internal Wiring and Other Components) and Feeder Breakers in the Existing Compartments of 480 REAC MOV BD 2A1-A (2-MCC-213-A1-A)
53288	Replace Safety Related Class 1E Motor Control Center (MCC) Buckets (i.e., Motor Starters, Circuit Breakers, Relays, Internal Wiring and Other Components) and Feeder Breakers in the Existing Compartments of 480 REAC MOV BD 2A2-A (2-MCC-213-A2-A)
53290	Replace Safety Related Class 1E Motor Control Center (MCC) Buckets (i.e., Motor Starters, Circuit Breakers, Relays, Internal Wiring and Other Components) and Feeder Breakers in the Existing Compartments of 480 V CNTL & AUX BLDG VENT BDS 2A1-A, 2A2-A, 2B1-B & 2B2-B.
53291	Replace Quality Related Motor Control Center (MCC) Starter Buckets, Feeder Breakers and Internal Wiring in the Existing MCC Components for Common Board MCCs



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<b>EDCR No.</b>	<b>Title/Work Scope</b>
53292	Replace Safety Related Class 1E Motor Control Center (MCC) Starter Buckets Feeder Breakers, Relays, Internal Wiring and Other Components in the Existing Compartments of 480 REAC MOV BD 2B1-B (2-MCC-213-B1-B)
53293	Replace Safety Related Class 1E Motor Control Center (MCC) Buckets (i.e., Motor Starters, Circuit Breakers, Relays, Internal Wiring and Other Components) and Feeder Breakers in the Existing Compartments of 480 V REAC MOV BD 2B2-B (2-MCC-213-B2-B)
53296	Replace Safety Related Class 1E Motor Control Center (MCC) Buckets (i.e., Motor Starters, Circuit Breakers and Internal Wiring) and Feeder Breakers in the Existing Compartments of 480V REAC VENT BD 2A (2-MCC-232-A-A) and 480V REAC VENT BD 2B
54103	Replace Obsolete RCP UV Time Delay Relays In (4) RCP Relay Panels With ATC Model 3280. Relays 2-62-068-0008, 2-62-068-0031, 2-62-068-0050 And 2-62-068-0073 Located in Panels 2-PNL-202-2/1A, 2-PNL-202-2/1B, 2-PNL-202-2/2A And 2-PNL-202-2/2B, Respectively
52606 (DCN)	Move the Safety-related Unit 1/Unit 2 Interface Points in 125V DC Battery Boards I, II, III and IV from the Load Side of the Breakers to the Breakers Themselves
54795	Install 480 Non-Safety Related Fuses in the Turbogenerator Control System; 6.9KV Unit Power; 480V Unit Power; Turbine Building Motor Operated Valve Power; Turbine Building Vent Power and Local Instrument Control Panel
54796	Install fuses for the Heater Drains and Vent; Air-Conditioning (Cooling-Heating); Sample and Water Quality; Generator Bus Cooling; Ice Condenser Waste Disposal; Spent Fuel Pit Cooling; Fuel Handling and Storage; Radiation Monitoring; 6.9KV Reactor Cooling Pump Power and Auxiliary Building Power; 24 kV Power (Includes Main Transformer); Process Computer Systems
54797	Install fuses for the Control Rod Drive System; Auxiliary Building Common Motor Control; 6.9KV Shutdown Power; 480V Shutdown Power; Reactor Motor Operated Valve Power; Control and Auxiliary Vent Power; Heat Trace; and Permanent Hydrogen Mitigation System.
54798	Install fuses for the Fuel and Waste Handling Power; Chemical and Volume Control Power; CCW Pump Station Power; Reactor Vent Power; Yard Lighting; 120-V AC Vital Power; 125-V DC Vital Power; 120-V AC Instrument Power; 120V AC Computer Power
54799	Install Fuses for the Main Relay Boards; Code Call, Paging, Intercom, & Evacuation Alarm; Communications Room; Balance of Plant Instrument (All "R" Panels); Local Instrument Control Panel (All "L" Panels Except Those in System 13); Main & Auxiliary Control (All "M" panels); Control Building Conduit & Cable Trays; Auxiliary Building Conduit & Cable Trays; Diesel Generator Building Conduit & Cable Trays.
54819	Install Fuses for the Generator Cooling; Station Drainage; Feedwater Control; Turbogenerator Control; Primary Makeup Water; Reactor Protection and Condenser Tube Cleaning Systems.

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Each of these design change packages will be implemented in accordance with their associated system turnover schedule.

- [2] The design changes in the above list will be implemented prior to the associated system being declared operable to support Unit 2 fuel load or startup, as applicable.

TVA has determined that the FPR does not require revision.

#### **16. NRC Question (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.*

#### **TVA Response:**

For a control building fire, the WBN Unit 2 analysis considers the following conditions concurrently after the operators transfer control from the control room to the auxiliary control system:

- 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.

Before control of the plant is achieved through the auxiliary control system, the analysis considers one spurious actuation or signal may occur. The analysis does not consider a fire



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that results in spurious actuation of the redundant valves in any one high-low pressure interface line nor does it consider loss of all automatic functions (signals, logic) prior to transfer of control to the ACR.

As described in the response to RAI FPR IV-1 (TVA letter dated 5-6-2011) and in the response to RAI FPR IV-4 (TVA letter dated 5-26-2011), the control building is considered an "alternative shutdown" area and the FSSD analysis is in accordance with section 5.4 of Regulatory Guide (RG) 1.189, Rev. 2, "Fire Protection for Nuclear Power Plants." Accordingly, for the time period between fire initiation and transfer of control to the auxiliary control system a single spurious actuation or signal is considered, but after plant control is transferred to the ACS, single and multiple spurious actuations and loss of all automatic functions (signals, logic) are considered. The analysis conforms to RG 1.189, Section 5.4.1 (next to last paragraph) which states,

"The licensee should consider one spurious actuation or signal to occur before control of the plant is achieved through the alternative of dedicated shutdown system for fires in areas that require alternate or dedicated shutdown. After the operators transfer control from the control room to the alternative or dedicated shutdown system, single or multiple spurious actuations that could occur in the fire-affected area should be considered, in accordance with the plant's approved FPP" (emphasis added).

#### **17. NRC Question (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)."*

*[1] 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). [2] 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.*

#### **TVA Response:**

[1] There are no differences in the t=0 definition for the two cases. This is because a fire that could grow to the point of causing damage that results in an automatic reactor trip would have been assessed by plant personnel as a challenging fire with the potential to damage structures, systems, or components necessary for safe shutdown. The decision to trip the reactor manually would have been reached prior to or about the same time as fire damage actually causing automatic reactor trip.

This is supported by Section E.6 of NEI-00-01 Revision 2, which states that fire damage to safe shutdown components or circuits is not expected to occur for at least 10 minutes after confirmation by plant personnel that the plant is experiencing a challenging fire.

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Additionally, industry test data discussed in Appendix E of NEI-00-01 Revision 2 indicates that fire induced circuit failures will not occur immediately upon exposing cables to fire effects. The test data indicates the average time to failure exceeded 30 minutes for thermoset cables and 15 minutes for thermoplastic insulated cables.

Fire locations subject to high energy rapidly developing fires (e.g. electrical board rooms and transformer rooms) do not contain cables or equipment whose failure could initiate automatic reactor trip. As described in FPR Part V, Section 2.2, "Safe Shutdown Procedures," the plant operators' response to a fire is governed by AOI 30.1, "Plant Fires." The control room is alerted of a fire in its early stages either by the fire detection system or as a result of visual observation by plant personnel. The operator's initial response includes:

- A. Initiate plant fire alarm
- B. Notify Fire Brigade
- C. Announce fire location over PA system
- D. Ensure fire pumps are running
- E. Assemble AUOs in the control room in case the fire cannot be controlled and unit shutdown becomes necessary.

In the unlikely event that fire damage initiated automatic reactor trip, the AUOs would have been assembled with procedure in hand and ready to perform the preventative operator manual actions with no significant delay.

**[2]** N/A.

TVA has determined that the FPR does not require revision.

#### **18. NRC Question (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 to be performed in the fire affected room in about an hour or less are specifically evaluated and documented in FPR Part VII."*

**[1]** Explain the relationship between Sections 2.1.2.2.d and 2.4 of Part V. **[2]** 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.*

#### **TVA Response:**

**[1]** FPR Part V, Section 2.1.2.2.d is one of several acceptance criteria for operator manual actions (OMAs) feasibility and reliability evaluations. This criterion requires that OMAs

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to be performed in the fire affected room in about an hour are to be specifically evaluated and documented in FPR Part VII, Section 8.

FPR Part V, Section 2.4, "Access Routes to Manual Action Locations," is a general statement that there are multiple access routes through large plant areas (e.g., 737-A1). The additional routes are to provide flexibility and assurance that the OMA location can be reached with the fire in any location in a large area.

- [2] All OMAs are evaluated to the criteria in Section 2.1.2.2. Section 2.4 does not govern any OMAs. It is a general statement that access routes have been evaluated for all OMA locations and there are multiple access routes through the large plant areas.

TVA has determined that the FPR does not require revision.

#### **19. NRC Question (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. [1] Confirm that the evaluations have been performed. [2] 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.*

#### **TVA Response:**

- [1] FPR Part V, Section 2.1.2 is revised to remove the ambiguous statement "OMAs for important to safe shutdown components require no further detailed evaluation." Feasibility and reliability evaluations are performed for both important to safe shutdown and required for safe shutdown path component OMAs. The OMA evaluations for the required components are contained in FPR Part VII, Section 8.3, while the important to safe shutdown evaluations are contained in a separate calculation. This split of the documentation was suggested by the NRC reviewers.

Assumption number 3 (also in Section 2.1.2) will be revised to read as follows: "Operator Manual Actions with a required completion time (allowable time) of 120 minutes or greater have adequate time for feasible and reliable performance and can be excluded from performance validation demonstrations."

These changes will be included in the next FPR submittal.

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- [2] Feasibility and reliability evaluations of OMAs involving components in the safe shutdown success path with an allowable completion time less than 120 minutes are included in FPR Part VII, Section 8, for staff review. This change will be included in the next FPR submittal. Feasibility and reliability of important to safe shutdown OMAs and non-time critical (120 minutes or greater) required for safe shutdown OMAs are evaluated using the methodology and criteria of FPR Part V, Section 2.1, and are documented in engineering calculations, but are not included in the FPR. The likelihood of failure of OMAs that do not have to be performed for at least two hours and the consequences of such failure is considered to be very low. Within two hours, additional staffing can be called in to assist the onsite staff, environmental effects due to the fire and fire brigade activities would be under control to have minimal impact, and time would be available to resolve any unexpected equipment operability or accessibility issues. RG 1.189 allows important to safe shutdown OMAs without prior NRC approval; therefore, the associated evaluations are not included in the FPR.

#### **20. NRC Question (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 PORV) 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.*

#### **TVA Response:**

The circuits required for FSSD of the PORVs and associated block valves are only routed through the Cable Spreading Room (CSR) and into control cabinets in the MCR. The CSR is provided with detection and automatic suppression. Circuits terminating in panels in the MCR are provided with adequate circuit fault protection (breakers/fuses) that will clear the fault before the insulation reaches its auto-ignition temperature. In addition, the combination of detectors in the panels and the smell of hot wires that would be detected by the MCR staff, the probability of an unlikely fault becoming a fire is considered to be insignificant.

The circuits on elevation 692.0 of the Auxiliary Building that are routed into the Control Building are from rooms 692.0-A29 and -A30 into 692.0-C9. Room 692.0-C9

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(Communications Room) is provided with detection and automatic suppression. These circuits do not enter the rooms (692.0-C4, -C5 and -C8) without automatic suppression. These circuits either terminate in room 708.0-C4 (Unit 2 Auxiliary Instrument Room) or continue to the CSR (729.0-A1). Both of these rooms are provided with detection and automatic suppression.

There are circuits on Auxiliary Building elevation 757.0 (room 757.0-A21) that are routed into the Control Building (rooms 755.0-C13 and -C20) in conduits that turn down into the CSR. The CSR is provided with detection and automatic suppression. The rooms on 755.0 are provided with detection, but do not have automatic suppression. These two rooms have a low fire severity rating (755.0-C13 has ~26,200 Btu/ft<sup>2</sup> and 755.0-C20 has ~29,300 Btu/ft<sup>2</sup>). The combustible loading is miscellaneous class A combustibles (desk, chairs, tables, relay boards, control panels, etc.) that are dispersed throughout the rooms. There are no credible ignition sources present which make it highly unlikely that a fire could occur; however, if a fire were to occur, it would be detected by the detection system, and MCR staff would be able to confirm it and either quickly extinguish it with portable extinguishers or control it until the fire brigade responds. Portable extinguishers are readily available, and there is a standpipe and hose station available from the stairwell #2 (adjacent to 755.0-C20) for fire brigade use. This provides a high degree of confidence that in the highly unlikely event a fire were to occur, it would be quickly detected and extinguished before it could impact any of the FSSD required circuits, all of which are routed in conduit.

#### **21. NRC Question (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 other instances.*

#### **TVA Response:**

TVA is reviewing the WBN analysis, and as necessary, will make similar changes to Part VI for any additional analysis volumes exhibiting a similar condition in the next FPR revision.

#### **22. NRC Question (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)*

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*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.*

#### **TVA Response:**

The original response to RAI FPR VI-7 confirmed that the Unit 2 reactor building lower compartment area outside the crane wall (2RO) and inside the crane wall (2RI) are in fact subdivided into 90° quadrants, but did not clarify how the quadrants are analyzed with each analysis volume within Fire Area 77. The FSSD analysis evaluates the individual reactor building rooms and the 2RO and 2RI quadrants that communicate with the selected rooms via unprotected openings. This method is very conservative and results in two RO/RI



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quadrants being evaluated in each analysis volume except 2RIR, which is a closed room with no unprotected openings. The room and quadrant combinations for each analysis volume are as follows:

AV	Rooms/Quadrants
118-A	2RA2, 2RF2, 2RO-2 (90°-180°), 2RO-3 (180°-270°)
118-B	2RA3, 2RF2, 2RO-2 (90°-180°), 2RO-3 (180°-270°)
118-C	2RA3, 2RA4, 2RO-4 (270°-360°), 2RO-3 (180°-270°)
118-D	2RA4, 2RF1, 2RO-1 (0°-90°), 2RO-4 (270°-360°)
118-E	2RA1, 2RF1, 2RO-1 (0°-90°), 2RO-4 (270°-360°)
118-F	2RIR
118-G	Upper containment
118-H	2RA2, 2RF2, 2RI-2 (90°-180°), 2RI-3 (180°-270°)
118-J	2RA3, 2RF2, 2RI-2 (90°-180°), 2RI-3 (180°-270°)
118-K	2RA4, 2RF1, 2RI-1 (0°-90°), 2RI-4 (270°-360°)
118-L	2RA1, 2RF1, 2RI-1 (0°-90°), 2RI-4 (270°-360°)

FPR Part III, Table 3-3 and Part VI, Sections 3.84.3.2 thru 3.84.3.12 will be updated to clarify the 2RO and 2RI quadrants included in each analysis volume and these changes will be included in the next FPR submittal.

The specific issues identified by the staff are addressed as follows:

- **Analysis Volume 118C:** 2RA3 and 2RA4 communicate with 2RO on the north and south side of 2RO azimuth 270° respectively, and 2RO-3 (180° - 270°) and 2RO-4 (270° 360°) are connected by a small passage below the fuel transfer canal on elevation 702. An "Appendix R fire" in that small passage could theoretically affect components in both 2RA3 and 2RA4. Such a fire is not a practical concern, but it is considered in accordance with Appendix R rules.
- **Analysis Volume 118D:** We agree, 2RA4 is not adjacent to Quadrant (0-90 degrees). 2RA4 is analyzed with 2RF1 which does communicate with 2RO-1 (0-90 degrees).
- **Analysis Volume 118E:** We agree, Table 3-3 will be revised as shown above to identify the appropriate 2RO quadrants.
- **Analysis Volume 118F:** 2RIR is a separate room with no unprotected openings. The concrete walls are more than adequate radiant energy shields.

#### **23. NRC Question (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 Unit 1 only area since it is part of the Unit 1 reactor building.*

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*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.*

#### **TVA Response:**

The FSSD analysis postulated an Appendix R fire that very conservatively assumes loss of all FSSD components within the Analysis Volume. There are some Auxiliary Control Air System (ACAS) end users (none of which are required for FSSD) in the Unit 1 Annulus (AV-091) that were assumed to be damaged by the postulated fire and result in loss of the ACAS for both units. As a result of this conservative assumption, all ACAS end users were assumed to be lost (including those in the Unit 2 Reactor Building). Additional evaluations of the Annulus identified the specific locations of the end users and the isolation valves for the ACAS headers and determined that there is no credible fire that could cause failure of the end users and the ability to close (from the MCR) the isolation valves (they are separated by at least 30 feet [horizontal distance] and multiple layers of automatic suppression and detection). Therefore, the ACAS is no longer considered to be lost, and the references to the Unit 2 components being affected are being removed. This will be included in the next FPR submittal. Calculation WBPEVAR9602001 will also be revised to document this evaluation.

#### **24. NRC Question (RAI FPR VI-10)**

*The reviewers did not expect to find opposite unit OMAs identified for a fire in 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..."*

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

*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.*



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#### **TVA Response:**

See response to RAI FPR VI-9 above. The assumed loss of the ACAS resulted in the manual action to operate the valves necessary to maintain steam generator inventory control. The evaluation for the Unit 2 Annulus is documented in calculation WBNEEBEDQ00099920110005.

A fire inside primary containment is assumed to damage ACAS end users creating a few small leakage paths. However, since the ACAS is supplied from both the large station air compressors and the ACAS compressors, these leaks will not depressurize the opposite unit ACAS headers. These manual actions are no longer required and will be removed from the associated analysis volumes in the next FPR submittal. There are no fires in one unit that require an OMA for the other unit.

#### **25. NRC Question (RAI FPR VI-11)**

*[1] 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).*

*[2] 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.*

#### **TVA Response:**

[1] The details for the repair of the RHR valves for Unit 1 and Unit 2 will be documented in FPR Part V, Section 3.3, and will be included in the next FPR submittal.

[2] Part VI was reviewed and will be revised as necessary in the next revision to the FPR to ensure the references to "repair procedure" contain a consistent level of detail, and this will be included in the next FPR submittal. During this review, TVA also noted that several references were made to "See Remarks." These references have also been corrected to provide the relevant information.

#### **26. NRC Question (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 [1] a technical justification and [2] 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.*

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*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.*

#### **NRC Follow-up Questions provided in July 28, 2011 Public Meeting:**

- *"The corrosion control program also has selected some of the HPFP piping to be replaced."*
  - *Provide a description of the criteria used for preventative replacement.*
  - *Is the "corrosion control program" the same as the "pipe corrosion program" or are there two programs?*
- *On page E-3, are the numbered items aspects of procedure NPG-SPP-09.15 or NPG-SPP-09.7?*

#### **TVA Response:**

- [1] The corrosion aspects of carbon steel piping and raw water usage is a known industry issue and is addressed by the implementation of a WBN Raw Water Corrosion program that includes engineering design and evaluation, chemical treatment, testing, and pipe replacement.

The HPFP design calculations performed for Unit 1 startup addressed raw water corrosion based on a TVA study issued in 1979 documenting the effects on carbon steel raw water piping used at TVA fossil plants on the Tennessee River system. This study included piping that had been in service for 5 to 25 years when studied in 1979. The study resulted in TVA Mechanical Design Standard DS-M3.5.1, "Pressure Drop Calculations for Raw Water Piping and Fittings." For assumed 40-year life, the design standard can be summarized as reducing the internal pipe diameter by 0.8 inches and using a corrosion resistance (C=55) for carbon steel pipe normally wetted with raw water. This is still the design criteria for TVA plants.

The selection of chemicals to treat the water and maintain the system metallic components to the maximum extent possible are reviewed by Engineering, Chemistry and Environmental personnel to maximize these goals. These responsibilities are defined in TVA Nuclear Power Group Standard Programs and Processes, NPG-SPP-09.7, "Corrosion Control Program." This procedure requires the HPFP system as well as

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the other raw water systems to meet the requirements of the FSAR and subsequent SSERs. Some of the aspects of this procedure to address systems that use raw water include:

1. Program oversight by Corporate Engineering including subject matter expertise;
2. Establishment of site Chemistry as the owner of the raw water treatment program;
3. Site Engineering to identify potential MIC problem areas, consider and recommend changes in plant design to reduce MIC susceptibility, and review and evaluate NDE data observations;
4. Specific, defined, and documented internal inspections for opened raw water systems;
5. Specific criteria for initiation of a corrective action document such as a thru wall leak, failure to treat system areas as planned, excessive deposits, etc.;
6. Engineering evaluation of equipment which does not receive treatment;
7. Monitor raw water system for biological activity by system inspection results;
8. Engineering ensuring raw water system maintenance and inspection and repairs are performed at the minimum frequency specified; and
9. Periodic meetings of a site raw water team (including Design Engineering, System Engineering, Chemistry, Environmental, Maintenance, and Operations as a minimum) to address issues and changes to the program.

Presently, the chemical treatment program injects chemicals to the Essential Raw Cooling Water (ERCW), RCW, and HPFP raw water systems at the IPS pits such that any pump on these systems that is running picks up the chemical. The program adds an oxidizing biocide (e.g., chlorine) year-round to the IPS pits a selected number of hours per day and days per week based on river water temperature, except when non-oxidizing biocide is being injected. This treatment is for slime, MIC, and clams. This oxidizing biocide will remain in solution for a short period of time and will treat piping based on any water use by the piping during this treatment. When the river temperature rises to the 60-70 degree F range, a nonoxidizing biocide is added to the IPS pits, and system specific flushes are undertaken to ensure this non-oxidizing chemical reaches as much of these three systems as possible. This treatment controls Asiatic Clams, Zebra Mussels, and MIC. This non-oxidizing chemical is expected to remain effective for approximately 24 hours in flowing areas and for approximately 3 months in stagnant areas. The non-oxidizing biocide is added for 2 to 3 days for each train. These treatments are repeated no more than 9 weeks apart until the river temperature falls below 60 degrees F. For the HPFP system, the first (spring) and last (fall) non-oxidizing treatments are used to treat the entire system. These two flushes, in accordance with the chemistry program, are specified by the testing and inspection requirements of the FPR. The other non-oxidizing treatments between the spring and fall treatment only treat the parts of HPFP that are using water during this time.

Normally, when the river water temperature is 60 degrees F or greater phosphate is added to sequester iron from existing mounds of corrosion products and zinc is added as a mild steel corrosion inhibitor on a continuous basis.

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The criteria for replacing failed piping are:

1. When the piping has a thru wall leak.
2. When minimum flow requirements cannot be obtained.
3. When pipe wall thickness have reached minimum allowable thickness.

The criteria for replacing piping that has not failed are:

1. When pipe wall thickness is approaching minimum allowable thickness based on the critical nature of the pipe (e.g., ease of access and impact of associated outage).
2. Cost effectiveness of pipe replacement vs. repair.

The Corrosion Control Program also has selected some of the HPFP piping to be replaced before failure (e.g, thru wall leak). Some HPFP piping has been replaced and/or is scheduled for replacement due to it approaching minimum wall thickness. Other HPFP piping was identified to be replaced not based on physical characteristics (e.g., approaching minimum wall or a thru wall leak) but as not having been replaced in a specified period of time and was thus replaced as a preventative measure. The internal inspections of the piping replaced due to time and not degraded physical characteristics revealed less, smaller MIC nodules than expected and the determination that replacement was not warranted at this time.

WBN has replaced 1,715 feet of HPFP piping, which included 1,625 feet of the HPFP Train B header that was replaced in 2005. This replacement was due to the excessive costs the multiple repairs on this piping. The original length HPFP Train B header was > 5,000 feet, but was rerouted to provide a more direct route.

NPG-SPP-09.15, "Buried Piping Integrity Program," addresses the HPFP system as well as other buried piping systems. This program was established in 2009. Some of the aspects of this program as provided by this procedure are:

1. Implementation of the NEI Nuclear Strategic Issues Advisory Committee Underground Piping and Tank Integrity Initiative;
2. Identifies governance and oversight with the corporate program manager;
3. Perform a risk ranking of buried piping including HPFP based on soil samples, piping material, installation methods, consequences of breaks, and failure modes;
4. Provisions for direct inspection technologies such as guided wave technology when buried piping is exposed; and
5. Establishment of an assessment management plan to address repair and/or replacement as appropriated based on conditions, risk, environmental impact, etc.

HPFP is a part of the Buried Pipe Integrity Program, and portions of the HPFP Train A header were recently examined using guided wave technology as a screening tool to identify locations of possible external degradation.

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WBN Buried Piping Plan has been established in support of NEI 09-14, "Guideline for the Management of Underground Piping and Tank Integrity." This plan established the number of locations to evaluate the integrity of the HPFP piping. This plan provides reasonable assurance of structural and/or leakage integrity of buried piping through the results of both indirect inspections and direct examinations. Currently, WBN is in the process of excavating another section of the HPFP Train A header to be proactive and to determine the structural integrity of this portion of HPFP buried piping.

When HPFP piping is opened, a trained person is required to review the piping interior and document the as-found condition of the piping as specified by NPG-SPP-09.7. This documentation includes as a minimum the material and equipment type, interior condition (e.g., silt, turbercles, debris/slime/biomass, shells, and corrosion and pitting).

Testing of fire protection systems includes the following:

1. Sprinkler systems are tripped once per six months as a part of the testing of the fire detection system. This verifies the trim piping is clear to allow automatic actuation of the associated valve.
2. Grids have been established on select sections of HPFP piping, and twice a year non-destructive testing is performed to determine the wall thickness of the piping in the grid area. This data is trended to address wall thinning rates.
3. Two times per year the end hose stations on a riser are flushed to achieve chemical treatment using a non-oxidizing biocide, as described above, to the associated piping. Selected points are tested for residual concentration of the non-oxidizing biocide.
4. Once every three years, selected areas of the HPFP system are flow tested to determine the hydraulic capability of the associated piping. These flow tests include sprinkler systems and hose stations as well as yard fire hydrants. The results of this testing are trended.
5. When repairs are made, piping sections on each side of the repair are examined for wall thinning, corrosion, etc. The results of this examination ensure that the scope of the repair is adequate.

Presently, the program to address exterior corrosion is also addressed by NPG-SPP-09.7. The exterior corrosion of non-buried carbon steel piping is addressed by the use of protective coatings and has not been seen as an extensive problem at WBN. Operating experience has been incorporated into the Corrosion Control Program (note in the previous submittal this was referred to as the Pipe Corrosion Program) as evidenced by:

1. The evolution of the Chemical Treatment Program discussed in the TVA response to RAI FPR VII-1, part 1,
2. The establishment of the additional Buried Piping Program in 2009, and
3. The replacement of the B train header due to multiple leaks in a short period of time.

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[2] The HPFP piping can perform its design function for the 40 year life of Unit 2 since the Chemical Treatment Program prolongs service life, the Buried Piping Program monitors to assist in replacement prediction as required, testing to design requirements is performed, and degradation trending is performed to assist in replacement prediction. The Corrosion Control Program identifies piping that needs to be replaced prior to the piping becoming an issue for WBN. While the system design is based on a 40 year life with full required flow capability, the maintenance/testing/replacement program described above ensures the system will meet its fire protection functional requirements throughout the life of the plant.

TVA has determined that the FPR does not require revision.

#### **27. NRC Question (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.*

*[1] Describe the actual trending results and acceptance criteria being used to determine acceptability of the three hose stations which are expected to fail prematurely.*

*[2] 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.*

*[3] 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.*

*[4] 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.*

#### **NRC Follow-up Questions provided in July 28, 2011 Public Meeting:**

- *Trending of the fire protection system appears to be limited to achieving the acceptance criteria. Provide a discussion of TVA's trending program.*
- *The trending program does not have criteria that specify when piping is to be replaced such as 10% degradation in performance results in replacement. Provide a discussion of the criteria used by the trending program for piping replacement recommendations.*



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- *The trending program is trending old pipe (A-train header) and new pipe (B-train header) together and not distinguishing between the different flow tests relative to when the B-train header was replaced. An example is the DGB piping is being trended based on the same piping for the 1995 and the 2010 tests but the Control Building is being trended based on old piping in 1995 and new piping in 2010. Discuss the above effect on the trending program.*
- *What flushing will be done for the currently wet Unit 1 piping that will supply the Unit 2 systems that will be brought into service for two unit operation.*
- *Are the buried ASME headers being flushed as required by the ASME code?*
- *What sprinkler systems provide protection for safety related equipment at the highest elevations of the WBN buildings?*

#### **TVA Response:**

[1] The acceptance criteria for the three sets of hose stations are:

Location	Flow	Pressure
Auxiliary Bldg Roof (0-ISV-26-654 & -655)	≥ 500 GPM	≥ 65 PSIG
DGB Roof (0-ISV-26-565 & -566)	≥ 500 GPM	≥ 65 PSIG
IPS (0-ISV-26-1710 & -1711)	≥ 200 GPM	≥ 65 PSIG

The following table provides the flow test information for the three sets of hose stations that the calculations predict will not meet the acceptance criteria for the 40 year life of plant. Shown is the data for the first performance of the test procedure to test the flow at these three locations before fuel load of Unit 1 and also is the data for the most recent performance of this same test.

Valves	1995 Flow (GPM)	1995 Pressure (PSI)	2010 Flow (GPM)	2010 Pressure (PSI)
Auxiliary Bldg Roof (0-ISV-26-654 & -655)	560	65.3	450 <sup>A</sup>	64.3 <sup>A</sup>
DGB Roof (0-ISV-26-565 & -566)	560	77.6	500	81.1
IPS (0-ISV-26-1710 & -1711)	395	65	230	95

<sup>A</sup> - This test has been determined to have been invalid due to the use of a measurement and test equipment (M&TE) flow measuring device number E23394 that was reading about 45 GPM low when the calibration was verified after the testing. It is unknown when and by how much this M&TE was out of tolerance when used on this test. Due to the age of the M&TE, the vendor did not support its repair, so the M&TE was retired and the failure mechanism is unknown. Without knowing how the M&TE failed, there is no way of determining if the amount of out of tolerance was variable and/or when it

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happened. To accurately determine the capability of the HPFP system, this section of the test will be re-performed summer 2011.

These three sets of hose stations depict the condition of the piping in the Auxiliary Building, Diesel Generator Building (DGB), and IPS structure. The Auxiliary Building hose stations also provide an indication of the condition of the fire protection in the Control Building since the Control Building fire protection is fed from the Auxiliary Building HPFP header loop. In addition to the three sets of hose stations listed above, there is additional testing data that provides additional indications of the condition of the HPFP piping in the following locations:

1. Auxiliary Building has two sprinkler systems in the Auxiliary Building and one in the Control Building. The highest elevation in the Auxiliary Building where sprinkler protection is provided for the protection of safety-related equipment is served by these two Auxiliary Building sprinkler systems. The highest elevation in the Control Building where sprinkler protection is provided for safety-related equipment is served by this Control Building sprinkler system.
2. DGB has a hydrant on the same supply piping and a sprinkler system on adjacent piping. The highest elevation in the DGB where sprinkler protection is provided for safety-related equipment is served by this sprinkler system.
3. The IPS has very limited combustible loading to protect against and the roof is well ventilated to prevent heat build-up if there is a fire. (The entire roof is made of wide flange structural members [W shape beams] mounted on edge, which protects from missiles, but allows smoke removal.)



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None of the following collaborative points have acceptance criteria, and the data collected is for trending only. The following data is for the first performance and the most recent performance of the flow test:

Valves	1995 Flow (GPM)	1995 Pressure (PSI)	2010 Flow (GPM)	2010 Pressure (PSI)
Auxiliary Bldg sprinkler system 0-FCV-26-143 and -322	564	78	665	59
Auxiliary Bldg sprinkler system 0-FCV-26-151 and -326	576	76	696	50
Control Building sprinkler system 0-FCV-26-211	725	109	600	105
DGB hydrant 0-HYD-26-819	560	124	500 <sup>A</sup>	117 <sup>A</sup>
DGB sprinkler system 0-FCV-26-167	600	84	617	72

<sup>A</sup> - This test has been determined to have been invalid due to the use of a measurement and test equipment (M&TE) flow measuring device number E23394 that was reading about 45 GPM low when the calibration was verified after the testing. It is unknown when and by how much this M&TE was out of tolerance when used on this test.

The trending program does not have specified criteria to determine when the trend is negative enough to invoke piping replacement. Typical damage caused by MIC cannot be detected by pressure and flow trending. This type of damage is identified by inspection. Testing ensures that HPFP is capable of performing its design function. Trending provides early identification of degradation which may impact the ability to perform the design function in the future. A negative trend is expected based on the design calculations, as documented in the FPR. At present, the trending program for the HPFP system is looking at the entire system, buried trained headers, buried common headers, as well as the interior piping. Thus, when piping is replaced (e.g., B train header), the results are trended in all sections of the test, as well as the assurance that the HPFP system will continue to be capable of performing its design function.

- [2] Question 1 (RAI FPR VII-2.1) above provides the testing being performed to identify where MIC and other corrosion is a concern, the trending results, the frequency of testing, and the acceptance criteria used to determine when pipe is replaced.

The flow test, 0-FOR-26-2, "3 Year High Pressure Fire Protection Hydraulic Performance Verification," is written to perform the testing like a typical municipal water system flow test where the water supply is established. The difference is during the flow test, the system is set up to reflect fire operation and controlled to ensure those conditions remain valid unlike a municipal water supply that may vary based on unknown water uses.

The following is a summary of this flow test.

Before the flow test begins, one of the preliminary actions is to verify that the valves in the flow paths are open. This is to ensure the headers, trained and

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common, are all interconnected as per design to ensure continuity of testing. Thus the individual flow points test the ability of the HPFP system piping to provide design flow.

The test uses two electric fire pumps for each section except one section. For one section the diesel fire pump is used to verify the header that connects the diesel fire pump to the common yard header. The electric fire pumps were used for the normal water supply because under normal conditions, a fire detection system activation would automatically start two electric fire pumps (see FPR, Part II, reference 4.2.4 and Section 12.1). The verbal report of a fire to the MCR would normally result in the starting of two electric fire pumps in accordance with AOI-30.1, "Plant Fires." The four electric fire pumps have the same capacity and are tested separately every 18 months to ensure they still meet their pump curve.

When the two electric fire pumps are started for the test, the system pressure control valve would limit system pressure to 135 PSI automatically. So, as loads are added and removed from the system, the pressure control valve will adjust to attempt to maintain 135 PSI.

There are service water loads that automatically isolate, and some loads that do not isolate when the electric fire pumps are started for the test. To account for the non-isolated service water loads during the test, an equivalent surrogate flow is established on the system at a hydraulically remote location in the loops supplying the flow test points. Thus, the surrogate load ensures the demand is in place during the test, and should the actual non-isolated service water loads cause increased demand during the flow test, it results in an added conservatism to the flow test.

With the water supply established, the flow test is conducted by measuring the static pressure, residual pressure and partial flow, residual pressure and full flow, and static pressure. The results are then plotted on semi-log graph paper to the 1.85 power.

The ASME program does not have a requirement to perform periodic flushes. The ASME piping is chemically treated as described in RAI FPR VII-2.1 and is a part of the HPFP piping testing described in this RAI response.

**[3]** Additional piping and hose stations will be added in the following areas for Unit 2 operation:

1. Two sprinkler systems in the Unit 2 Reactor Building. These are pre-action sprinkler systems, normally dry with an air supervision of the piping.
2. Two sets of hose stations in the Unit 2 Reactor Building. These hose stations are fed from a sprinkler system type deluge valve, thus they will normally be dry but will not have air supervision.

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3. Sprinkler system for the protection of the charcoal beds in the Unit 2 Containment Purge Air filter housing. This will be a pre-action sprinkler system, but will not have air supervision.

The Unit 2 completion project has a plan in place that will flush the five areas listed above before transfer to Operations as discussed in the FPR, Part X, for compliance with NFPA 13-1975, Section 1-11.1 thru 1-22.4.

In addition, existing Unit 1 hose stations that are presently not required by the FPR to provide protection to operating equipment will be re-classified to providing protection for operating equipment when Unit 2 goes on line. These re-classified hose stations are in the scope of the present Corrosion Control Program for raw water systems for Unit 1 equipment and are being maintained as Unit 1 equipment. This reclassification has been addressed in the as-designed dual unit FPR.

- [4] As evidenced by industry and WBN experience, carbon steel piping is subject to failure mechanisms such as MIC within the 40 year life of the plant. Thus, the Corrosion Control Program is designed to address prevention by chemical treatment, test for worsening conditions using different test methods, and repair problems found regardless of the age of the piping. So, the same program elements are applied to the B train header that was replaced in 2005 as well as the A train header that is still the original piping with the exception of some code piping repairs that have been made. As leaks are found, a determination will be made as to whether the piping continues to meet ASME requirements (inoperable or degraded/non-conforming), and repairs will be made in accordance with ASME code requirements.

The piping to support Unit 2 operation is maintained under the programs described above (Letter Item 1. NRC Question [RAI FPR VII-2.1]) and thus will be capable of fulfilling its design function for the full 40 year life of Unit 2.

TVA has determined that the FPR does not require revision.

#### **28. NRC Question (RAI FPR VII-2.3)**

*[1] 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). [2] Also, identify the length of pipe replaced, the pipe material that was replaced, and what material it was replaced with. [3] 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.*

#### **TVA Response:**

- [1] The replacement of the entire B train HPFP header was not a requirement but was instead performed based on a cost/benefit analysis. The conditions that lead to the replacement of the B train HPFP header was the identification of five leaks within a

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17-month time frame. The location of some of these leaks was approximately 20 feet below grade. The expense and the location of the leaks made it less advantageous to make the repairs in comparison to the re-route and replacement of the line. This resulted in the decision to replace a majority of the buried B train header.

At the time (August 2002) the decision was made to replace a majority of the buried B train header, there was not a buried pipe program, and guided wave testing was not available. The addition of this program and such technology may have called for the replacement of the B train header at an earlier time. The Corrosion Control Program, through physical monitoring, found the leaks on the B train buried header.

- [2] Due to the re-routing of the B train header, approximately 5,000 feet of carbon steel piping (ASTM SA106 Grade B, 0.375 inches wall) was replaced with 1,625 feet of extra strong carbon steel pipe (ASTM SA106 Grade B, 0.5 inches wall) that has an exterior epoxy coating.
- [3] The A train header has exhibited a smaller number of leaks than the B train. The leaks in both the A and B trains have been small leaks, which have not affected the overall integrity of the pipe, nor affected the ability of the system to provide the required fire protection flow. Attempts have been made to determine the difference in the buried A train and B train headers. Differences that were considered included:
1. Construction practices during initial installation;
  2. Use of the headers to support construction activities, such as filling other systems;
  3. Use of the headers to provide construction fire protection;
  4. Operational differences in how valves were positioned;
  5. How chemical treatment was performed on each header.

No definitive explanation could be found to clarify the reason for the difference between occurrence of leaks in the two headers. There is no definitive way to determine if the A train header will have to be replaced or not, but the Corrosion Control Program will continue to treat, test and maintain the A train header to obtain its maximum service life.

The most recent leaks on the buried A train header are examples of leaks found by monitoring by plant personnel. The leak that has been repaired was found by an AUO while doing normal plant (outside the buildings) rounds. The leak that has not been repaired yet was found during post maintenance testing of the repaired leak just mentioned above. The un-repaired leak was observed by plant personnel although the location is physically removed from the location of the repaired leak (approximately 1,300 feet away with two changes in direction plus a hill between the two locations). The monitoring for ground water leaks is performed by a variety of personnel either in the course of their assigned duties (e.g., AUOs are specifically tasked to look for leaks inside the buildings as well as when making periodic rounds outside the buildings) or site personnel performing other duties observing unexpected conditions (some examples include the abovementioned test personnel observing locations well outside the required test boundaries, or in another situation, a leak was found by personnel performing yard maintenance duties).

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The common (nonsafety) related buried header from the IPS is ductile iron, cement lined pipe. This ductile iron pipe has not experienced the MIC issues of the carbon steel pipe due to the cement lining and does not require exterior coatings to protect it from the soils in this area.

#### **29. NRC Question (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.*

*[1] Provide details concerning the raw water treatment program. [2] 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. [3] Describe any corrective actions taken or planned to improve program performance.*

*[4] Describe how the conditions 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.*

#### **TVA Response:**

**[1]** The details of the raw water program were provided in Letter Item 1 (NRC Question [RAI FPR VII-2.1]) above. The HPFP piping was not provided with the extensive program of treatment, testing and maintenance during the construction phase which has resulted in historical concerns and problems that are being addressed at this time. The Corrosion Control Program has evolved since the licensing of Unit 1 and is continually evolving to find and improve the treatment of raw water systems, as evidenced by the addition of the Buried Pipe Program added in 2009. As new or different technologies become available, the raw water program will evaluate the process outlined in NPG-SPP-09.7 or NPG-SPP-09.15 and incorporate, as appropriate.

To better document the raw water program, the following revision for the FPR, Part II, Section 12.1 will be a part of the next revision to the FPR:

Measures were taken to account and compensate for the effects of corrosion on piping due to biological growth, such as MIC nodules by designing normally raw water wetted, unlined carbon steel pipe using calculations that:

1. reduced the pipe diameter to account for diameter reducing inclusions, and
2. lowering the C-factor to C=55 in the Hazen-Williams formula to account for the added roughness.

The water used in both the HPFP and RCW system is chemically treated to address concerns resulting from the use of raw water. WBN has a comprehensive chemical

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treatment program for treating raw water systems. This treatment is a major part of WBN Raw Water Corrosion Program as specified by site procedures. The chemical treatment is used to control corrosion, to control organic fouling, including slime, to minimize the effect of MIC and inhibit growth of Asiatic clams in carbon steel. Buried piping portions of the HPFP system are monitored by the buried piping program in accordance with NEI 09-14, "Guideline for the Management of Underground Piping and Tank Integrity," which provides for the risk ranking of buried piping relative to installed conditions (e.g., design and construction practices, as well as soil) and consequences of a failure and testing of the piping.

Silt from river water is addressed for fire protection in two methods. One method is the design of the IPS. For the fire pumps, water has to travel up two elevations, traverse the basin area that is just under one half the size of the IPS between elevation changes, and then there is a weir at the entrance to the fire pump wet wells. This relative movement of water to reach the fire pump wet wells allows for the majority of the silt to drop out. The other method is the design of the RCW system which provides normal makeup for the HPFP system. The RCW system pumps draw water remotely from the water's entrance to the IPS allowing for silt settlement. The cross tie of the RCW and HPFP is in the Turbine Building close to the service water load on the HPFP system. Thus, silt drawn into the HPFP system is in the paths of these service water loads.

In 1995 (at licensing of Unit 1), a three year evaluation program was implemented to monitor the performance of the HPFP system by yearly testing of the HPFP distribution system. The results of this evaluation determined that testing on a three year basis (instead of yearly) was adequate (See Reference 4.2.60).

- [2] The Chemical Treatment for raw water systems including HPFP is described in response to NRC Question (RAI FPR VII-2.1). This treatment, which is consistent with other nuclear facilities, includes oxidizing biocide, non-oxidizing biocide, phosphate, and zinc. This treatment is effective on the HPFP piping that has been replaced to prevent corrosion, slime, and MIC. On the existing HPFP piping, the phosphate is used to sequester iron from existing corrosion products, the zinc is used to passivate the carbon steel surfaces, and the oxidizing and non-oxidizing biocide will control slime which will help prevent MIC growth. This provides the most effective treatment that a nuclear plant may use to prevent corrosion in raw water systems.

A description of the Chemical Treatment Program will be provided in the FSAR A106 amendment.

The leaks in both the A and B trains have been small leaks, which have not affected the overall integrity of the pipe, nor affected the ability of the system to provide the required fire protection flow, and thus the program is considered effective.

- [3] The corrective actions that have been taken to improve program performance are pipe replacement as a part of the Corrosion Control Program, testing, and the Buried Pipe



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Program (established in 2009). The details and benefits of these actions are described in response to NRC Question (RAI FPR VII-2.1).

- [4]** The condition of the underground piping is monitored by the NPG-SPP-09.15, "Buried Piping Integrity Program," as discussed in Letter Item 1 (NRC Question [RAI FPR VII-2.1], part 1) and the testing, as discussed in Letter Item 2 (NRC Question [RAI FPR VII-2.2], parts 1 and 2).

The Corrosion Control Program cannot reverse the MIC issues of the past, and thus there is no evidence of clean piping without new corrosion. Recently replaced piping has not been destructively tested (e.g., cut open for observation) to determine the status of the piping.

#### **30. NRC Question (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).*

- **[1]** *Describe how the failure discussed in the public meetings affects the previous response to RAI FPR VII-2.*
- **[2]** *Describe the actions taken to confirm that the test failure was a result of faulty test equipment.*
- **[3]** *Provide a detailed summary of the trending information for each of the monitored hose stations.*
- **[4]** *Describe how the determination was made that the corrosion discovered in the Train A header was caused by MIC.*



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#### **TVA Response:**

- [1] The public meeting discussions gave insight to provide additional detailed information for RAI FPR VII-2 provided in TVA letter dated May 26, 2011. The additional details are documented in TVA's responses to NRC questions RAI FPR VII-2.1, RAI FPR VII-2.2, RAI FPR VII-2.3, and RAI FPR VI, I-2.4 provided in this letter.
- [2] As discussed in TVA response to RAI FPR VII-2.3 in TVA letter to NRC dated July 22, 2011, the post calibration of the test equipment indicated the device was reading about 45 GPM below the actual flow. To determine the actual conditions, the test of the hose stations for the Auxiliary Building will be re-performed summer 2011.
- [3] Please see the TVA response to RAI FPR VII-2.3.
- [4] For the two leaks that have been repaired on the buried A train header, as of this time, one was a holiday (failure of external protective coating) and the other is unknown. The leak of unknown cause was in a location that resulted in the decision to reroute the pipe and abandon the leaking segment in place.

#### **31. NRC Question (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.*

#### **TVA Response:**

The information in Section 6.1 refers to the various items that require inspections on a regular basis. Thermo-Lag is a material that requires an inspection on a regular basis. The justification was written to cover each room without specifying the specific items that are in each of the two rooms. The current FSSD analysis does not require any electrical raceways in 757.0-A15 to be protected with Thermo-Lag. There is no conflict since Table I-1 and Part VI, Section 3.83.2.1 are dealing with each room separately and the Part VII, Section 6.1 is written to cover both rooms generically. However, to remove any potential misunderstanding, Section 6.1 will be revised to read as follows:

- 6.1.1 "The Reactor Building Equipment Hatches (757.0-A11 and 757.0-A15) are inaccessible during plant operations; therefore, surveillance of sprinklers, Fire detectors, penetration seals and Thermo-Lag (757.0-A11 only) fire wrap cannot be performed per the regular schedules."

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6.1.2 "The in situ combustible loading in the rooms is comprised of the insulation on the cable trays that traverse the room, the light covers on the lights in the room and Thermo-Lag (757.0-A11 only) on conduits that pass through the room."

This change will be included in the next FPR submittal.

#### **32. NRC Question (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].*

- **[1]** *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.*
- **[2]** *Describe whether the capability exists to refill the RCP lube oil systems during power operation. If the capability does exist:*
  - *[a] Describe the amount of RCP lube oil added during operation, if any.*
  - *[b] 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.*
- **[3]** *Using Unit 1 operating experience, provide the details of any preventative maintenance activity or modifications that have been utilized to reduce or eliminate oil leaking outside the RCP oil collection system.*
- **[4]** *Describe, in detail, any design differences between the Unit 1 and Unit 2 RCP oil collection system.*
- **[5]** *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.*
- **[6]** *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.*

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#### **TVA Response:**

- [1] Unit 1 has not experienced any significant amount of oil outside the Oil Collection System.
- [2] The capability does exist to refill the RCP lube oil systems during power operation but has not been used or required because of the significant amount of dose that the employees would incur. The capability does not exist to drain the RCP lube oil systems during power operation.
- [3] See response to sub question [1] above. The preventative maintenance (PM) activity that is used on the RCP Oil Collection System is PM 0891W, "Reactor Coolant Pump Oil Collection System Visual Inspection." This PM ensures every 18 months that the system is capable of containing the full volume of the RCP oil. The PM that was created for WBN was based on Operating Experience (OE) from Sequoyah Nuclear Plant. There have not been any modifications since Unit 1 startup based on OE.
- [4] No design differences exist between Unit 1 and Unit 2 RCP Oil Collection Systems.
- [5] See response to sub question [4] above.
- [6] See response to sub question [3] above.

TVA has determined that the FPR does not require revision.

#### **33. NRC Question (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.*

- **[1]** *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.*
- **[2]** *Provide the installation and material details of any RCP or reactor coolant piping insulation that does not meet the above criteria, and* **[3]** *provide a technical justification for acceptability.*
- **[4]** *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.*
- **[5]** *Provide the fire point and auto ignition temperature for the type of RCP oil used at WBN Unit 2. Also, [6] provide a technical justification for acceptability.*

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

#### **TVA Response:**

- [1] The original WBN Specification Number 1475 contains the requirements for reflective metal insulation inside Containment. Section 11.1 of the specification requires the use of a reflective type insulation and all-metal construction. Section 12.1 reinforces the material specification by stating all hardware shall be AISI type 304 austenitic stainless steel. Section 4.6 requires that the insulation shall have separate lap straps on all piping with at least 1-inch overlap on each insulation panel unit and utilize buckle-type construction. Section 11.8 states that all insulation panels shall have quick-release latches. Unit 2 installation under Specification 25402-011-3PS-NNPO-00001 meets the Unit 1 criteria. Unit 2 work has not yet been completed.

The previously mentioned sections of Specification Number 1475 are also found in vendor manual WBN-VTD-D150-0070. Diamond Power Drawings for the Reactor Coolant Pump, Reactor Coolant Cold and Interim Leg are as follows:

590955-031C Shts. 1-4 "RC Pump General Arrangement"  
590955-032C Shts. 1-4 "RC Pump Insulation Development"  
590955-033C Shts. 1-4 "RC Pump Bottom Head Development"  
590955-034C Sht. 2 of 2 "RC Pump Insulation Support Steel"  
590955-034S Sht. 1 of 2 "RC Pump Insulation Support Steel"  
590955-040C Shts. 1-4 "Reactor Coolant Interim Leg"  
590955-042C Shts. 1-4 "Reactor Coolant Cold Leg"

- [2] There is no RCP or reactor coolant piping that does not meet the above criteria.
- [3] See response to sub question [2] above.
- [4] The nearest ignition sources to the RCPs are the RCP Motors. As stated in response to NRC Question (RAI FPR VII-13), Unit 1 has not experienced any significant amount of oil outside the oil collection system.
- [5] The Flash Point of Mobil, ASTM D92 is 478.4<sup>o</sup> F. The fire point and auto ignition temperature has not been determined by Mobil; however, Mobil stated that the fire point is approximately 50 - 75<sup>o</sup> F above the Flash Point (approximately 528.4 - 553.4<sup>o</sup> F) and auto ignition temperature is approximately 150<sup>o</sup> F above the Flash Point (approximately 628.4<sup>o</sup> F).
- [6] The technical justification for acceptability is that the RCP oil is a NFPA 30 Class IIIB liquid, the oil is enclosed in the motor, a RCP Oil Collection System is capable of containing the full volume of the oil, and there is detection and suppression. The RCS piping is operating at a temperature of approximately 557<sup>o</sup> F, which is at the fire point of 553<sup>o</sup> F but below the auto ignition of 628<sup>o</sup> F of the oil used. In addition, the mirror insulation does not aspirate the oil like the fiber insulation. The temperature rating of the

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oil used, the stainless steel overlapping joint straps, and the lack of ignition sources makes the oil used acceptable.

TVA has determined that the FPR does not require revision.

#### **34. NRC Question (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.*

*[1] Discuss the actions that will be taken with regard to manufacturers' recommendations to eliminate or significantly reduce oil misting and [2] 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.*

#### **TVA Response:**

**[1]** The design of the RCP Oil Collection System took into consideration Westinghouse's recommendations to address oil collection system problems, and Westinghouse did not have any recommendations to reduce oil misting. As stated in response to NRC Question (RAI FPR VII-13), Unit 1 has not experienced any significant amount of oil outside the oil collection system.

**[2]** TI-78, "Lubrication Program," requires that an evaluation be performed if the oil type is changed. Based on this procedure, controls are in place to ensure the RCP oil meets the proper criteria, including fire protection.

TVA has determined that the FPR does not require revision.

#### **35. NRC Question (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.*

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#### **TVA Response:**

Embedded means that the duct and collector box were installed prior to the concrete wall being poured and that they are embedded in the concrete.

TVA has determined that the FPR does not require revision.

#### **36. NRC Question (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.*

*[1] Identify the maximum gap for fire door W9 and [2] justify why it is acceptable.*

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

#### **TVA Response:**

**[1]** The maximum gap for fire door W9 is 7/32-inch (1/32-inch over the allowable) and is along the top of the door on the right hand side looking in. The length of the gap is approximately 18¼ inches.

**[2]** The justification for the acceptability of this gap is documented in Part VII, Sections 6.3.2 and 6.3.3 (FPR update submitted to NRC as part of the 1999 U1 UFSAR update). As can be seen in the FPR, the justification and conclusion state there is no credible exposure fire that would impact the door. TVA considers this to still be valid and no update to the FPR is needed.

#### **37. NRC Question (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.*

***[1]** 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. **[2]** Otherwise, add these hydrants to the table or document the operability requirements and testing and inspection requirements that apply to these hydrants. **[3]** 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.*



## **ENCLOSURE 1**

### **Response to NRC's Round 5 Request for Additional Information Regarding "Fire Protection Report"**

#### **TVA Response:**

[1] Appendix A to BTP 9.5-1 states storage tanks that supply water for safe shutdown should be protected from the effects of fire. The refueling water storage tank (RWST) is located in the yard area with the immediate fire exposure being from the grass about 10 feet away from the tank, the instrumentation associated with the tank and the power for the submersible heaters in the tank. The valves for the RWST are located below the tank itself underground and protected from the effects of fire by the ground and tank. The tank is shielded from the nearest road by a concrete wall. Based on this design and the administrative controls provided by NPG-SPP-18.4.7, "Control of Transient Combustibles," the fire hydrants in the immediate area of the Unit 1 and Unit 2 RWST are not identified in the FPR, Part II, Table 14.7. The BTP goes on to say that a tank such as the RWST "should" be provided with a local hose station, but does not require them. Thus TVA took the position to not include a fire hydrant in lieu of a hose station, since the protection was provided by the limited ignition sources and exposure. In addition, the primary water storage tank (PWST) does not supply water for safe shutdown. The as-designed FPR, Part VIII, F.16, "Plant Conformance," will be revised to remove the reference to the PWST, and this revision will be included in the next FPR submittal.

[2] The fire loading in the area of the RWST is low and there is a thermal barrier (i.e., concrete wall between the only normal combustible exposure and the RWST). Based on this information, there is no reason to add the fire hydrants to the FPR, Part II, Table 14.7.

[3] The hydrants near the Unit 1 and Unit 2 RWSTs have the following tests and inspections the same as the hydrants in FPR, Part II, Table 14.7:

1. Flushed in coordination with the chemical treatment program two times per year, one in the spring and one in the fall.
2. Operate/cycle hydrant and isolation valve and ensure smooth proper operation; lubricate caps' threads and hydrant operating mechanism; flush the hydrant and verify drainage; inspect area for obstructions and remove; and ensure caps will hold under pressure two times per year, one in the spring and one in the fall.
3. The hydrant near the Unit 2 RWST is flow tested once every 3 years.

The hydrants contained in the FPR, Part II, Table 14.7, receive the following additional tests and inspections; the other hydrants (i.e., non-FPR) do not:

1. A visual inspection that the hydrants are accessible and no apparent physical damage every 6 months in accordance with TIR 14.7.c.
2. Flow test of hydrants once every 3 years.



## **ENCLOSURE 1**

### **Response to NRC's Round 5 Request for Additional Information Regarding "Fire Protection Report"**

#### **38. NRC Question (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.*

*[1] 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. [2] Otherwise add these hydrants to the table or document the operability requirements and testing and inspection requirements that apply to these hydrants. [3] 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.*

#### **TVA Response:**

- [1] The cooling towers at WBN are of noncombustible construction; therefore, the second paragraph of F.17 does not apply. The manual fire suppression activities around the cooling towers are not an Appendix R requirement since there is no safe shutdown equipment in this area.
- [2] The hydrants will not be added to the table and they have no special operability, testing or inspection requirements that are associated with the ability to safely shut down the plant in the event of a regulatory postulated fire (i.e., an Appendix R fire).
- [3] Fire hydrants listed in the table are required to support manual fire suppression for components required for FSSD. The fire hydrants near the cooling towers are not required to support manual fire suppression for components required for FSSD (i.e., the cooling towers are not required for FSSD nor do they present a hazard to FSSD).

TVA has determined that the FPR does not require revision.

#### **39. NRC Question (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.*

## **ENCLOSURE 1**

### **Response to NRC's Round 5 Request for Additional Information Regarding "Fire Protection Report"**

*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.*

#### **TVA Response:**

See response to Question No. 9, NRC RAI FPR II-41.1.

#### **40. NRC Question (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.*

## ENCLOSURE 1

### Response to NRC's Round 5 Request for Additional Information Regarding "Fire Protection Report"

#### TVA Response:

NPG-SPP-18.4.7, "Control of Transient Combustibles," is the TVA procedure to address control of transient materials for the present operating Unit 1 and the under construction Unit 2. In the procedure, limitations are provided on material type and amount. As an example, a distinction is made between flammable and combustible liquids as to the quantity that can be stored outside an approved storage room due to a work activity. To address this concern the FPR, Part VIII, F.1.B, Plant Conformance column will be revised to read:

Administrative procedures limit the amount and control the type of combustible materials within the area and control hot work activities.

This change will be incorporated into the next submittal of the FPR.

#### 41. NRC Question (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 APCS 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]*

## **ENCLOSURE 1**

### **Response to NRC's Round 5 Request for Additional Information Regarding "Fire Protection Report"**

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

- **[1]** *Describe TVA's understanding of the term "high voltage - high amperage transformers" as used in the Appendix A to BTP 9.5-1 Guidelines.*
- **[2]** *Confirm the insulating liquid used in transformers installed in safety related buildings is noncombustible.*

*If the insulating liquid is not noncombustible,*

- **[3]** *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).*
- **[4]** *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.*

#### **NRC Follow-up Questions provided in July 28, 2011 Public Meeting:**

*The following needs to be addressed in relation to the issue on the indoors transformers' dielectric fluid being changed from a PCB fluid to a silicone fluid:*

1. *Are any transformers in areas where spatial separation is provided and not a physical barrier?*
2. *How quickly will the transformer dike area overflow if the sprinkler system is in operation? In particular if just one or two heads are flowing and exceeding the minimum design density coverage?*
3. *If the transformer's diked area over flows, where will the drainage go, to another train area?*

#### **TVA Response:**

- [1]** As specified in TVA design documents and in industry documents such as ANSI C84.1, "American National Standard for Electric Power Systems and Equipment-Voltage Ratings (60 Hertz)," these 6.9kV transformers are not classified as "high voltage-high amperage." ANSI C84.1 classifies transformers as "medium voltage" when the nominal system voltages are greater than 1,000 volts and less than 100kV. ANSI C84.1 classifies "high voltage" as 100 kV and equal to or less than 230 kV.

## **ENCLOSURE 1**

### **Response to NRC's Round 5 Request for Additional Information Regarding "Fire Protection Report"**

[2] The insulating liquid used in the safety-related buildings is not a PCB noncombustible liquid. The insulating liquid is a high flash point silicone liquid that is combustible but is not flammable in accordance with the definition of flammable and combustible provided by the National Fire Protection Association (NFPA) 30, "Flammable and Combustible Liquids Code." The change from a PCB liquid to a silicone liquid was done before the fuel load of Unit 1 and was documented in the FPR, Revision 4, Part VIII. This change from a PCB fluid to a silicone fluid was to address environmental concerns and reduce economic impact of a spill. The liability of having the PCB liquids was ill advised, as any spill of a PCB liquid has a large economic impact, but one in the radiological controlled area would have had an excessive economic impact.

[3] The locations of silicone oil filled transformers are listed below:

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**Response to NRC's Round 5 Request for Information Regarding "Fire Protection Report"**

Transformer	Location	Fire		Gal of Oil	Released		Gross Dike Area Sq-Ft	Net Oil Contain Volume Cu-Ft <sup>c</sup>	Sprinkler Flow in Dike		Appx time to dike area overflow	Drain in AV
		Area	AV		Oil in Cu-Ft <sup>a,b</sup>	Area Cu-Ft/Min <sup>d</sup>						
1-OXF-68-341D-B	782-A4	75	96	163	21.8	21.8	82	36.6	2.81	5.3 min	N/A	
1-OXF-68-341H												
2-OXF-68-341H	782-A4	75	96	163	21.8	21.8	187	75.7	4.1	13.1 min	N/A	
2-OXF-68-341D-B												
2-OXF-68-341A-A	782-A2	25	51	163	21.8	21.8	78.8	35	2.7	4.9 min	N/A	
1-OXF-68-341F												
2-OXF-68-341F	782-A2	25	51	163	21.8	21.8	186	75.5	4.1	13.1 min	N/A	
1-OXF-68-341A-A												
1-OXF-212-B-B	772-A5	36	63	317	42.4	42.4	263	124	4.1	19.9 min	N/A	
1-OXF-212-B1-B	772-A5	36	63	317	42.4	42.4	393	181	4.1	33.8 min	N/A	
1-OXF-212-B2-B												
1-OXF-212-A1-A	772-A6	37	64	317	42.4	42.4	393	185	4.1	34.8 min	N/A	
1-OXF-212-A2-A												
1-OXF-212-A-A	772-A6	37	64	317	42.4	42.4	378	176	4.1	32.6 min	N/A	
0-OXF-206-A												
2-OXF-212B-B	772-A11	41	68	317	42.4	42.4	396	187	4.1	35.3 min	N/A	

## ENCLOSURE 1

### Response to NRC's Round 5 Request for Information Regarding "Fire Protection Report"

Transformer	Location	Fire Area	AV	Gal of Oil	Released		Gross Dike Area Sq-Ft	Net Oil Contain Volume Cu-Ft <sup>c</sup>	Sprinkler Flow in Dike		Appx time to dike area overflow	Drain in AV	
					Oil in Cu-Ft <sup>A,B</sup>	Oil in Cu-Ft <sup>A,B</sup>			Area Cu-Ft/Min <sup>d</sup>	Area Cu-Ft/Min <sup>d</sup>			
0-OXF-206-B													
2-OXF-212-B1-B	772-A11	41	68	317	42.4	42.4	414	194	4.1		40 min	N/A	
2-OXF-212-B2-B													
2-OXF-212-A2-A	772-A12	42	69	317	42.4	42.4	415	195	4.1		37.2 min	N/A	
2-OXF-212-A1-A													
2-OXF-212-A-A	772-A12	42	69	317	42.4	42.4	288	138	4.1		23.3 min		
0-OXF-228-1	737-A1A	14	36	139	18.6	18.6	39.4	19.7	1.35		0.8 min	Yes	
0-OXF-228-2	737-A1B	14	38	139	18.6	18.6	39.1	19.6	1.35		0.7 min	Yes	
0-OXF-228-3	692-A1	1	2	139	18.6	18.6	36.2	18.1	1.24		N/A	Yes	
0-OXF-228-4	692-A1	1	5	139	18.6	18.6	38.7	19.4	1.32		0.6 min	Yes	
0-OXF-226-A	IPS	60	89	323	43.2	43.2	100	45.6	3.42		0.7 min	Yes	
0-OXF-226-B	IPS	60	89	323	43.2	43.2	100	45.6	3.42		0.7 min	Yes	

**General Notes:**

<sup>A</sup> If a transformer shares a diked area with another transformer it is assumed only one transformer has failed and leaked its contents.

<sup>B</sup> Assumed that one transformer releases all of its oil into the diked area and none is retained in the transformer.

<sup>C</sup> Based on dike curb height of 6 inches. Volume reduced due to blockage (e.g., transformer pedestal or large hanger in dike area).

<sup>D</sup> Sprinkler head flow into dike area based on dike size and GPM/sq. ft. flowing at 30 PSIG.



## ENCLOSURE 1

### Response to NRC's Round 6 Request for Information Regarding "Fire Protection Report"

The above table is based on one sprinkler head flowing and a pump pressure of 135 PSIG at approximately El. 724. The sprinklers heads used at WBN have a K=5.6. The assumptions are:

1. The transformers listed have curbing that will hold the entire dielectric fluid except for one (see discussion below) and are protected with automatic detection and suppression.
2. Transformers grouped together are in the same diked area but only one transformer is expected to release all its dielectric fluid.
3. Only one head is expected to open due to the low rate of heat release (RHR) and the quick extinguishment in accordance with vendor information documented below.
4. The sprinkler flow is based on a head pressure of 30 PSI or 31 GPM for the K=5.6 heads used at WBN. This is equal to 0.256 GPM/sq. ft. for 120 sq. ft. coverage heads. The 30 PSI was selected based on the maximum pressure shown for standard spray sprinkler heads in testing coverage capability. A sprinkler head flow based on pressure, adjusted for elevation, of two fire pumps running maintaining a pressure of 135 PSIG at approximately El. 724 would result in a flow of 57 GPM or 93 feet per second, which is unreasonable.
5. The flow from the head is distributed over 120 sq. ft.
6. The diked area will receive flow coverage at the specified density. If the diked area is greater than 120 sq. ft., only the flow of one head will be expected to flow into the diked area due to the low rate of heat release with the cooling effect of one head flowing.

**[4]** These transformers are provided with curbing of sufficient height to capture the entire volume of dielectric fluid should it leak out of the transformer except for one transformer. As part of preparing the response to this RAI, it was identified that one curb will have a 3.7 gallon spill over into the floor and flow to the floor drain approximately six feet in front of the transformer. WBN has initiated a corrective action program document (SR 412174) to document this condition. The area around these transformers is protected with smoke detection that annunciates to a constantly attended location and a pre-action sprinkler system. This dielectric fluid is a Dow 561 silicone transformer liquid and is an acceptable substitute for a PCB fluid based on the following from the vendor information:

1. The dielectric fluid has a high flash point (650 degrees F) combustible liquid and was included in the combustible loading calculation.
2. The silicone fluid reaches maximum sustained RHR after ignition, and the RHR is maintained for 10 to 15 minutes at which time the RHR decreases with time even if extinguishment is NOT attempted. The decreasing RHR is not like a typical hydrocarbon that reaches steady state until the hydrocarbon is consumed. This decreasing RHR with time is the result of the progressive formation of a crust of ash and silica that forms over the surface during a pool fire.

## ENCLOSURE 1

### Response to NRC's Round 6 Request for Information Regarding "Fire Protection Report"

3. The silicone fluid RHR is 10 to 18 times lower than the average value for hydrocarbons. An independent test lab documented the RHR for the 561 transformer fluid was 109 kW/sq. m., but for a high FP hydrocarbon it was 1,270 kW/sq. m.
4. Silicone fluid fires are extinguished in 20 to 30 seconds with a water application of 0.15 gpm/sq. ft. The sprinkler systems designed to provide protection for these transformers are designed to have a minimum water coverage of 0.16 gpm/sq. ft. Thus, for the transformer dikes that contain the oil, the sprinkler system will extinguish any burning silicone fluid before the diked area overflows. For the one area that will overflow if the transformer's entire contents are spilled and less than four gallons overflows to the floor drain, the material will still be in the sprinkler coverage area and be extinguished.
5. The smoke from a silicone fluid fire is typically 3 to 5 times less dense than high-fire-point hydrocarbon smoke.
6. As an example of the reduced risk of the silicone fluid, the Dow vendor's manual discusses a Factory Mutual study that determined the separation requirements for a typical fluid-insulated distribution transformer fire from a wooden structure. See the following table for the separation recommendations:

Fluid	FM suggested separation from a wooden structure
Silicone	8 ft.
High Molecular Weight Hydrocarbon	39 ft.
Mineral Oil	49 ft.

7. These transformers were filled with a PCB (Askarel) dielectric fluid, thus the silicone fluid's flash point is not lowered by contamination by the PCB material as would happen if the previous liquid had been a mineral oil.

TVA has determined that the FPR does not require revision.

#### **42. NRC Question (RAI FPR X-4)**

*A sampling review of the 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."*

## ENCLOSURE 1

### Response to NRC's Round 6 Request for Information Regarding "Fire Protection Report"

*[1] Resolve these conflicts and [2] 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.*

#### **TVA Response:**

- [1] The following has been added at the end of the compliance matrix for NFPA 13 and will be included in the next FPR submittal.

#### **Section 1-11.5 Deviation**

The 2 inch main drain test was not performed at Watts Bar because the design did not account for how to move the water from inside the safety related structures. The main purpose of the 2 inch main drain test is to ensure valves in the supply line are not closed due to mis-positioning or valve failure. At Watts Bar the mis-positioning is addressed by the rigid controls placed on configuration control and procedure use and adherence. The design will not allow for a meaningful 2 inch main drain test; however, operational controls are greater than normal industry installations and the installed equipment is less susceptible to blockage failure and WBN considers this acceptable.

#### **Section 3-12.1.5 Deviation**

Flange joints on risers are not provided on each floor. The piping design and installation are in accordance with TVA seismic criteria that exceed the intent of this section.

#### **Section 3-14.2.1 thru 3.4 Deviation**

Hangers in concrete are in accordance with TVA structural criteria that exceed the intent of this section.

The referenced sections that use an "Alternative" means of complying with the code are adequately addressed in the remarks section. Fire protection piping in safety related areas at WBN is designed in accordance with ANSI B 31.1, "Power Piping" per guidance in BTP-APCSB 9.5-1, which exceeds the criteria in this section of the code.

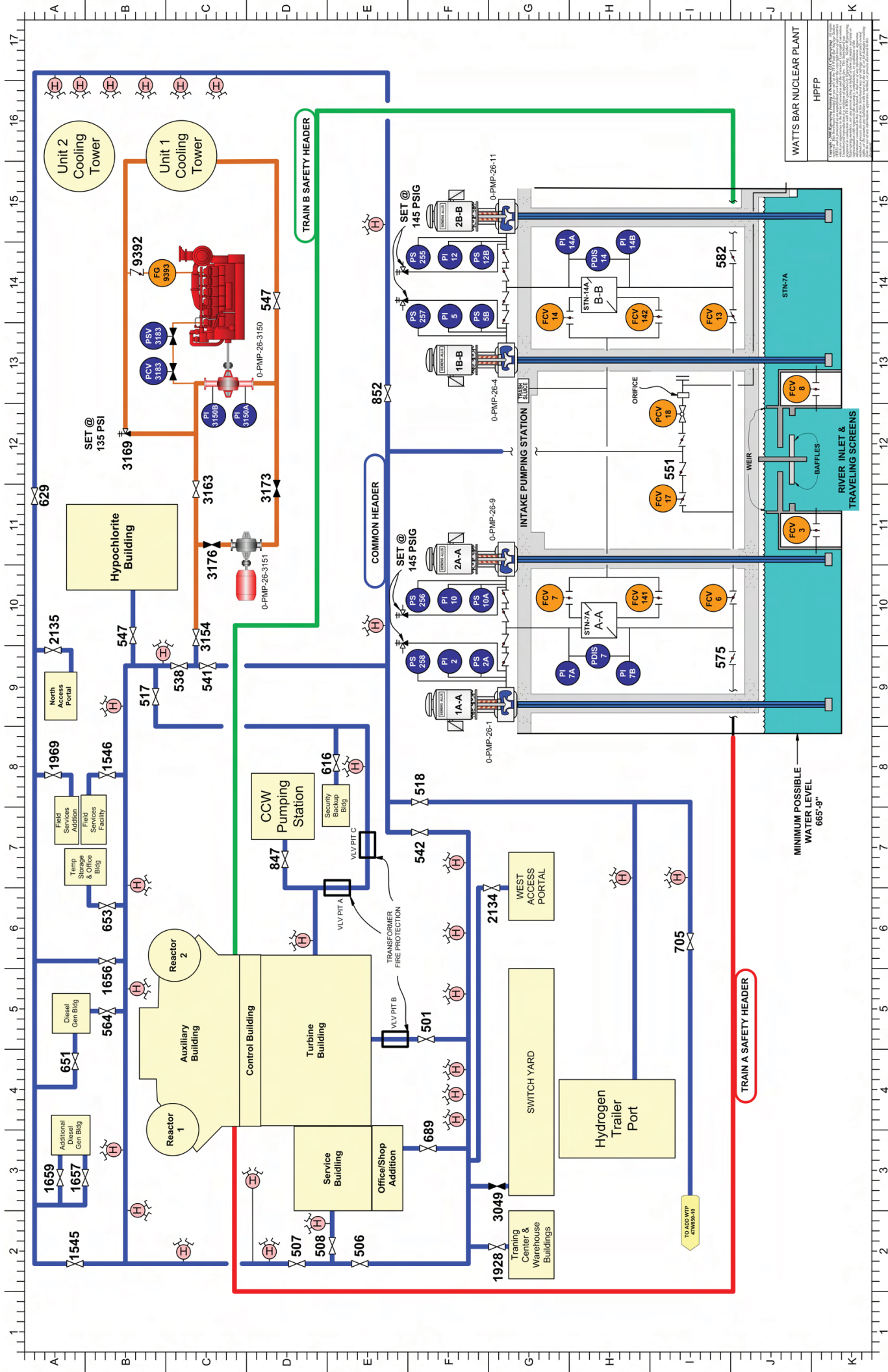
- [2] A review of the codes evaluated in Part X (i.e., NFPA 12, 13, 14, 20, 24, 30, 72D, & 72E) concluded that only items 1-11.5, 3-12.1.5, 3-14.2.1 thru 3-14.3.4 for NFPA Code 13 were not addressed at the end of the compliance matrix. TVA concluded that the items 3-14.5 and 3-14.1.5 thru 3-14.1.8 identified as "Alternatives" are adequately addressed in the "Remarks" column, which is consistent with the other items identified as "Alternatives." Additionally, the other sections of the codes evaluated in Part X that are identified as "Alternative" are also adequately addressed.

**ENCLOSURE 1**

**Response to NRC's Round 6 Request for Information Regarding "Fire Protection Report"**

**ATTACHMENT**

**Simplified Sketch of the HPFP System**



WATTS BAR NUCLEAR PLANT  
HPFP

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## **ENCLOSURE 2**

### **Response to NRC's Round 6 Request for Information Regarding "Fire Protection Report"**

#### **Regulatory Commitments**

1. The following will be added at the end of the table and will be included in the next FPR submittal: (Letter Item # 1, NRC Question RAI FPR I-1)

\* Combustible load fire severity is assumed to be comparable to the corresponding Unit 1 room. At the completion of construction, a walkdown of these rooms will be conducted to verify the in situ combustibles located in the rooms, and the Table will be revised as necessary.

2. FPR Part I, Table I-1 and Part VI, Sections 3.21.1 and 3.22.1 have been revised to correct these conflicts and will be included in the next FPR submittal. (Letter Item # 2, NRC Question RAI FPR I-2)
3. Table I-1 and other applicable parts of the FPR were reviewed to ensure consistency between the parts of the report, and corrections have been incorporated into the FPR and will be included in the next FPR submittal. (Letter Item # 2, NRC Question RAI FPR I-2)
4. The FPR will be clarified to update the verbiage for these fire detectors and will be included in the next FPR submittal. (Letter Item # 7, NRC Question RAI FPR II-37.1)
5. The information from Revision 41 of the FPR is correct. The rooms that are "Inaccessible only during a resin transfer" should have a single "\*." The rooms that are "Refer to Part VII for engineering evaluations" should have a double "\*\*." This has been corrected and will show the correct information in the next "As-Designed" FPR submittal. (Letter Item # 10, NRC Question RAI FPR II-43)
6. FPR Part II, Subsection 4.2, "TVA Documents," has been revised to reference the following:  
  
4.2.66 WBPEVAR9509001 – Appendix R-Multiple High Impedance Fault Analysis  
  
This reference, as well as adding a sentence to the text of the FPR to refer to this reference will be included in the next "As-Designed" FPR submittal.  
(Letter Item # 13 NRC Question RAI FPR III-15)
7. The evaluation of fire hazards due to a fire-induced open circuit in the secondary of CTs installed in high energy panels (i.e., 6.9kV switchgear) included non-required as well as required power systems as may be seen by the content of other paragraphs of Section 7.5. The sentence containing the subject statement will be revised to provide clarification as follows: "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 and non-required power systems have been evaluated." This revision will be included in the next FPR submittal. (Letter Item # 14, NRC Question RAI FPR III-16)
8. The methodology used for the fire hazards analysis for CTs as a potential source of secondary fires due to open circuiting of the secondary circuit generally consists of performing an evaluation to identify CTs that are constructed such that an open secondary circuit could cause ignition of the transformer and to further identify those CTs susceptible to



## **ENCLOSURE 2**

### **Response to NRC's Round 6 Request for Information Regarding "Fire Protection Report"**

#### **Regulatory Commitments**

ignition which have secondary circuits extending outside of the fire area to verify they are either isolated or protected. The evaluation includes but is not limited to review of the design configurations of CT circuits as follows:

- a. Verify by review of design documentation the CT secondary circuit is contained wholly within the fire area containing the switchgear, or
- b. Verify by review of design documentation those CT circuits which extend beyond the fire area containing the switchgear are isolated by transducers such that an open circuit downstream of the isolation device would not cause failure of the CT, or
- c. Verify by review of design documentation that the CT is used in a differential protective relay circuit such that an open circuit condition would initiate a protective relay actuation to trip the feeder breaker for the power circuit and thereby remove current to the CT.

This information will be incorporated into Part III, Section 7 and included in the next FPR submittal. (Letter Item # 14, NRC Question RAI FPR III-16)

9. The following design changes will be implemented prior to Unit 2 fuel load or startup, as applicable:

EDCR 53217; EDCR 53287; EDCR 53288; EDCR 53290; EDCR 53291; EDCR 53292; EDCR 53293; EDCR 53296; EDCR 54103; DCN 52606; EDCR 54795; EDCR 54796; EDCR 54797; EDCR 54798; EDCR 54799; and EDCR 54819

(Letter Item # 15, NRC Question RAI FPR III-17)

10. FPR Part V, Section 2.1.2 is revised to remove the ambiguous statement "OMAs for important to safe shutdown components require no further detailed evaluation." Feasibility and reliability evaluations are performed for both important to safe shutdown and safe shutdown path component OMAs. The OMA evaluations for the safe shutdown path are contained in FPR Part VII, Section 8.2, while the important to safe shutdown evaluations are contained in a separate calculation. This split of the documentation was suggested by the NRC reviewers.

Assumption number 3 (also in Section 2.1.2) will be revised to read as follows, "Operator Manual Actions with a required completion time (allowable time) of 120 minutes or greater have adequate time for feasible and reliable performance and can be excluded from performance validation demonstrations."

These changes will be included in the next FPR submittal (Letter Item #19, NRC Question RAI FPR V-15)

11. Feasibility and reliability evaluations of OMAs involving components in the safe shutdown success path with an allowable completion time less than 120 minutes are included in FPR Part VII, Section 8 for staff review. This change will be included in the next FPR submittal. (Letter Item # 19, NRC Question RAI FPR V-15)



## **ENCLOSURE 2**

### **Response to NRC's Round 6 Request for Information Regarding "Fire Protection Report"**

#### **Regulatory Commitments**

12. TVA will review the WBN analysis and, as necessary, will make similar changes to Part VI for any additional analysis volumes exhibiting a similar condition in the next FPR revision. (Letter Item #21, NRC Question RAI FPR VI-6.1)
13. FPR Part III, Table 3-3 and Part VI, Sections 3.84.3.2 thru 3.84.3.12 will be updated to clarify the 2RO and 2RI quadrants included in each analysis volume, and these changes will be included in the next FPR submittal. (Letter Item #22, NRC Question RAI FPR VI-7.1)
14. Evaluations of the Annulus identified the specific locations of the end users and the isolation valves for the ACAS headers and determined that there is no credible fire that could cause failure of the end users and the ability to close (from the MCR) the isolation valves (they are separated by at least 30 feet (horizontal distance) and multiple layers of automatic suppression and detection). Therefore, the ACAS is no longer considered to be lost and the references to the Unit 2 components being affected are being removed. This will be included in the next FPR submittal. Calculation WBPEVAR9602001 will also be revised to document this evaluation. (Letter Item # 23, NRC Question RAI FPR VI-9)
15. A fire inside primary containment is assumed to damage ACAS end users creating a few small leakage paths. However, since the ACAS is supplied from both the large station air compressors and the ACAS compressors, these leaks will not depressurize the opposite unit ACAS headers. These manual actions are no longer required and will be removed from the associated analysis volumes in the next FPR submittal. (Letter Item # 24, NRC Question RAI FPR VI-10)
16. The details for the repair of the RHR valves for Unit 1 and Unit 2 will be documented in FPR Part V, Section 3.3 and will be included in the next FPR submittal. (Letter Item # 25, NRC Question RAI FPR VI-11)
17. Part VI was reviewed and will be revised as necessary in the next revision to the FPR to ensure the references to "repair procedure" contain a consistent level of detail and this will be included in the next FPR submittal. During this review, TVA also noted that several references were made to "See Remarks". These references have also been corrected to provide the relevant information. (Letter Item # 25, NRC Question RAI FPR VI-11)
18. To accurately determine the capability of the HPFP system, this section of the test will be re-performed summer 2011. (Letter Item # 27, NRC Question RAI FPR VII-2.2)
19. Additional piping and hose stations will be added in the following areas for Unit 2 operation. (Letter Item # 27, NRC Question RAI FPR VII-2.2)
  - a. Two sprinkler systems in the Unit 2 Reactor Building. These are pre-action sprinkler systems, normally dry with an air supervision of the piping.
  - b. Two sets of hose stations in the Unit 2 Reactor Building. These hose stations are fed from a sprinkler system type deluge valve, thus they will normally be dry, but will not have air supervision.

## **ENCLOSURE 2**

### **Response to NRC's Round 6 Request for Information Regarding "Fire Protection Report"**

#### **Regulatory Commitments**

- c. Sprinkler system for the protection of the charcoal beds in the Unit 2 Containment Purge Air filter housing. This will be a pre-action sprinkler system, but will not have air supervision.
  - 20. To better document the raw water program, the following revision for the FPR, Part II, Section 12.1 will be a part of the next revision to the FPR (Letter Item # 29, NRC Question RAI FPR VII-2.4)
  - 21. A description of the Chemical Treatment Program will be provided in FSAR A106 amendment. (Letter Item # 29, NRC Question RAI FPR VII-2.4)
  - 22. To determine the actual conditions, the test of the hose stations for the Auxiliary Building will be re-performed summer 2011. (Letter Item # 30, NRC Question RAI FPR VII-2.6)
  - 23. There is no conflict since Table I-1 and Part VI, Section 3.83.2.1 are dealing with each room separately and the Part VII, Section 6.1 is written to cover both rooms generically. However, to remove any potential misunderstanding, Section 6.1 will be revised to read as follows:
    - 6.1.1 "The Reactor Building Equipment Hatches (757.0-A11 and 757.0-A15) are inaccessible during plant operations; therefore, surveillance of sprinklers, Fire detectors, penetration seals and Thermo-Lag (757.0-A11 only) fire wrap cannot be performed per the regular schedules."
    - 6.1.2 "The in situ combustible loading in the rooms is comprised of the insulation on the cable trays that traverse the room, the light covers on the lights in the room and Thermo-Lag (757.0-A11 only) on conduits that pass through the room."
- This change will be included in the next FPR submittal. (Letter Item #31, NRC Question RAI FPR VII-12)
- 24. The primary water storage tank (PWST) does not supply water for safe shutdown. The as-designed FPR, Part VIII, F.16, Plant Conformance will be revised to remove the reference to the PWST, and this revision will be included in the next FPR submittal. (Letter Item #37, NRC Question RAI FPR VIII-13.1)
  - 25. NPG-SPP-18.4.7, "Control of Transient Combustibles," is the TVA procedure to address control of transient materials for the present operating Unit 1 and the under construction Unit 2. In the procedure, limitations are provided on material type and amount. As an example, a distinction is made between flammable and combustible liquids as to the quantity that can be stored outside an approved storage room due to a work activity. To address this concern the FPR, Part VIII, F.1.B, Plant Conformance column will be revised to read:

Administrative procedures limit the amount and control the type of combustible materials within the area and control hot work activities.

## **ENCLOSURE 2**

### **Response to NRC's Round 6 Request for Information Regarding "Fire Protection Report"**

#### **Regulatory Commitments**

This change will be incorporated into the next submittal of the FPR. (Letter Item # 40, NRC Question RAI FPR VIII-20)

26. The following has been added at the end of the compliance matrix for NFPA 13 and will be included in the next FPR submittal.

#### **Section 1-11.5 Deviation**

The 2 inch main drain test was not performed at Watts Bar because the design did not account for how to move the water from inside the safety related structures. The main purpose of the 2 inch main drain test is to ensure valves in the supply line are not closed due to mis-positioning or valve failure. At Watts Bar the mis-positioning is addressed by the rigid controls placed on configuration control and procedure use and adherence. The design will not allow for a meaningful 2 inch main drain test; however, operational controls are greater than normal industry installations and the installed equipment is less susceptible to blockage failure and WBN considers this acceptable.

#### **Section 3-12.1.5 Deviation**

Flange joints on risers are not provided on each floor. The piping design and installation are in accordance with TVA seismic criteria that exceed the intent of this section.

#### **Section 3-14.2.1 thru 3.4 Deviation**

Hangers in concrete are in accordance with TVA structural criteria that exceed the intent of this section.

(Letter Item # 42, NRC Question RAI FPR X-4)

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
1.	1.	TVA is in the process of finalizing the Fire Protection Report (FPR) to address both the fire protection related modifications and the other modifications. This review will be completed in December, 2010. TVA will submit the complete Unit 1/2 FPR by December 17, 2010.	<b>CLOSED</b> The As-Designed version of the FPR was submitted to the NRC via TVA to NRC letter dated December 18, 2010 (Reference 3 of this enclosure).
2.	1.	TVA will provide a separate markup, description, and justification of the changes made since NRC approved the report. This information will be provided by August 30, 2010.	<b>CLOSED</b> TVA to NRC letter dated August 30, 2010 (Reference 13 of this enclosure) provided the committed information.
3.	1.	Portions of the report address programmatic aspects (e.g., fire brigades, fire watches, etc.) that are not affected by the operation of Unit 2. These parts will be submitted to the NRC by August 6, 2010.	<b>CLOSED</b> Enclosure 1 of TVA to NRC letter dated August 9, 2010 (Reference 14 of this enclosure) provided the committed information.
4.	1.	Table 1 provides a description of the dual unit MSO scenarios identified by the above described analysis. TVA will provide a description of how safe shutdown is ensured for each scenario by August 20, 2010.	<b>CLOSED</b> TVA to NRC letter dated August 20, 2010 (Reference 2 of this enclosure) provided the committed information.
5.	1.	The baseline list of OMAs is expected to require only very minor revisions due to the other non-fire protection related modifications. TVA will provide the baseline list by August 6, 2010.	<b>CLOSED</b> Enclosure 2 of TVA to NRC letter dated August 9, 2010 (Reference 14 of this enclosure) provided the committed information.
6.	2.	The resolutions contained in Appendix B of the MSO Evaluation Report shall be implemented prior to Unit 2 fuel load.	<b>OPEN</b>

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
7.	2.	PWROG Scenario 13a: "Charging Pump Runout" shall be confirmed to be within the bounds of CCP operation during the large break LOCA analysis prior to Unit 2 fuel load.	OPEN
8.	3.	TVA will issue the as-constructed FPR for WBN Units 1 and 2 by October 1, 2011.	OPEN
9.	3.	If the FPR re-analysis determines that any other fire areas are affected, TVA will submit the necessary revisions by February 28, 2011.	<b>CLOSED</b> TVA to NRC letter dated March 16, 2011 (Reference 5 of this enclosure) submitted a revised FPR that resulted from the re-analysis.
10.	3.	TVA is in the process of fixing administrative errors in the FPR and will re-submit Parts V and VI by January 14, 2011.	<b>CLOSED</b> TVA to NRC letter dated January 14, 2011 (Reference 15 of this enclosure) submitted the corrected version of the FPR.
11.	4.	The As-designed FPR will be provided by March 16, 2011 except for Part V, which will be provided by April 29, 2011. [RAI FPR General - 2 Item A] ----- This tracks the portion due March 16, 2011.	<b>CLOSED</b> TVA to NRC letter dated March 16, 2011 (Reference 5 of this enclosure) submitted a revised FPR. The second paragraph of the cover letter states, "Enclosure 1 contains the entire As-Designed Unit 1/Unit 2 FPR except Part V, as explained below ..."

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
12.	4.	<p>The As-designed FPR will be provided by March 16, 2011 except for Part V, which will be provided by April 29, 2011. [RAI FPR General - 2 Item A]</p> <p>-----</p> <p>This tracks the portion due April 29, 2011.</p>	<p><b>CLOSED</b></p> <p>TVA to NRC letter dated May 18, 2011 (Reference 7 of this enclosure) stated, "In response to Item I.2, NRC Question (RAI FPR General-2) [A], TVA submitted in Reference 1 the Unit 1/Unit 2 'As-designed' FPR, except for Part V. Enclosure 1 of this letter provides the updated Unit 1/Unit 2 'As-designed' FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development. Part VII, Section 8.0, will be transmitted to NRC within two weeks of receipt from the vendor."</p> <p>Reference 1 to this letter is Reference 4 for this enclosure.</p>
13.	4.	<p>The changes between Unit 1/Unit 2 As-designed FPR that was submitted in TVA's letter to NRC, dated January 14, 2011 and the Unit 1/Unit 2 As-designed FPR will be marked via Revision Bars in the file. Justification will be provided for changes not directly related to Unit 2 operation by March 25, 2011. [RAI FPR General - 2 Item B]</p>	<p><b>CLOSED</b></p> <p>TVA to NRC letter dated March 31, 2011 (Reference 16 of this enclosure) stated, "In response to NRC Question (RAI FPR General-2), TVA submitted in Reference 1 the Unit 1/Unit 2 As-designed FPR that was marked with revision bars depicting the differences between the Unit 1/Unit 2 As-designed FPR (submitted January 14, 2011) and the Unit 1/Unit 2 Final As-designed FPR. Enclosure 1 provides the justification for non-editorial changes which are not directly related to Unit 2 operation, including changes resulting from Unit 1 FPR Revision 41 that was issued on February 22, 2011. TVA has compared the As-Designed FPR (submitted on March 16, 2011) to FPR Revision 41 which is the current issued version. Differences not directly attributable to the addition of Unit 2 are listed and justified in Enclosure 1. Some obvious editorial and grammatical differences are not specifically listed."</p> <p>Reference 1 to this letter is Reference 4 for this enclosure.</p>

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
14.	4.	The digital copy of Revision 41 of the FPR will be included as part of the Unit 1/2 As-designed FPR submittal. [RAI FPR General - 2 Item C]	<p><b>CLOSED</b></p> <p>TVA to NRC letter dated March 16, 2011 (Reference 5 of this enclosure) submitted a revised FPR that resulted from the re-analysis.</p> <p>The letter included, "In addition, as committed to in Reference 2, TVA is submitting documents in accordance with the following commitments:</p> <ol style="list-style-type: none"> <li>1. The digital copy of Revision 41 of the FPR will be included as part of the Unit 1/Unit 2 As-designed FPR submittal. The WBN Unit 1 FPR, Revision 41 was issued on February 22, 2011. [RAI FPR General-2 Item C]"</li> </ol> <p>"Enclosure 3 contains the digital copy of Revision 41 of the FPR."</p>
15.	4.	TVA will provide a side-by-side comparison between the WBN Unit 1/Unit 2 As-designed FPR that was submitted in TVA's letter to NRC, dated January 14, 2011 and the WBN Unit 1/Unit 2 FPR As-designed version following issuance of the next revision, scheduled for March 16, 2011. The WBN Unit 1, Revision 41 was issued on February 22, 2011. [RAI FPR General - 3]	<p><b>CLOSED</b></p> <p>TVA to NRC letter dated March 16, 2011 (Reference 5 of this enclosure) submitted a revised FPR that resulted from the re-analysis.</p> <p>The letter included, "In addition, as committed to in Reference 2, TVA is submitting documents in accordance with the following commitments:</p> <ol style="list-style-type: none"> <li>2. TVA will provide a side-by-side comparison between the WBN Unit 1/Unit 2 As-designed FPR that was submitted in TVA's letter to NRC, dated January 14, 2011 and the WBN Unit 1/Unit 2 FPR As-designed version following issuance of the next revision of the Unit 1/Unit 2 FPR, scheduled for March 16, 2011. [RAI FPR General- 3]</li> </ol> <p>"Enclosure 4 contains a side-by-side comparison between the WBN Unit 1/Unit 2 As-designed FPR that was submitted in TVA's letter to NRC, dated January 14, 2011 and the current version of the WBN Unit 1/Unit 2 FPR "As-designed version ..."</p>



## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
16.	4.	Attachment 2 contains Figures II-1A thru II-26A, which are the as-designed installed fire detection and suppression system drawings. These drawings will be annotated to reflect changes made to the figures and provided to NRC by March 16, 2011. [RAI FPR General-4]	<p><b>CLOSED</b></p> <p>TVA to NRC letter dated March 16, 2011 (Reference 4 of this enclosure) responded to RAI FPR General-4 (item 2 of Enclosure 1) as follows:</p> <p>“The as-designed installed suppression systems for both Unit 1 and 2 (includes all Unit 2 and common Unit 1/2) are depicted on Figures II-1A thru II-26A (Attachment 2). The only changes to the Unit 2 suppression and detection systems were in the Unit 2 Annulus where 30 new sprinkler heads were added. Additionally 18 new smoke detectors were added to various fire zones in the Unit 2 Reactor Building. Figures representing the as-constructed plant configuration will be provided after construction completion.”</p> <p>Per Figure II-7A, there are 73 Unit 1 sprinkler heads and 100 Unit 2 sprinkler heads in the Reactor Building Annulus area. WBN Drawing 2-47W850-9, Rev. 1, which is the equivalent Unit 2 "configuration control drawing" to Figure II-7A, shows 70 heads for Unit 2, in this area. Therefore, Figure 11-7A (as-designed) already includes the 30 additional sprinkler heads that will be added prior to Unit 2 operation in the Unit 2 Annulus Area, as identified in the above response (above).</p> <p>Since smoke detectors are a level of detail that is not included in these FPR Figures, the 18 additional detectors discussed in the above response would not be reflected on these Figures.</p> <p>Since all of the As-Designed Fire Protection information is already included in the Drawings that were in TVA to NRC letter dated March 16, 2011 (Reference 4 of this enclosure), this item is closed.</p>
17.	4.	Figures representing the as-constructed plant configuration will be provided after construction completion. [RAI FPR General - 4]	<p><b>OPEN</b></p>

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
18.	4.	Response to RAI FPR V-1 will be provided by March 25, 2011.	<b>CLOSED</b>  TVA to NRC letter dated March 31, 2011 (Reference 16 of this enclosure) responded to this item as follows:  "The purpose of this letter is to provide documents that TVA committed in Reference 1 to submit to NRC by March 25, 2011. Reference 1 provided TVA's response to NRC's request for information pertaining to Unit 2 FSAR amendment, Section 9.5.1, 'Fire Protection System,' dated February 9, 2011 (Reference 2) and NRC's questions received in February 11, 2011 and March 3, 2011 emails. The following provides the applicable portions of NRC's requests that are addressed by the information that TVA committed to provide by March 25, 2011: ..."  "3. NRC Question (RAI FPR V.1):  [A] Provide a description of the criteria and assumptions used to ensure that Unit 2 manual actions (including manual actions for alternate or dedicated shutdown) are feasible and reliable. This should include the criteria and assumptions for feasible and reliable diagnosis time, implementation time, and time margin for the other operator manual actions not explicitly described in Part V."  In response to NRC Question (RAI FPR V-1), Enclosure 2 provides a description of the criteria used to ensure that Unit 2 operator manual actions (including manual actions for alternate or dedicated shutdown) are feasible and reliable. It should be noted that additional information related to the evaluation of Unit 2 manual actions against these criteria will be provided as part of the response to NRC Question (RAI FPR V-2) that TVA committed to submit by April 29, 2011. These criteria will not be applied to Unit 1.
19.	4.	Response to RAI FPR V-2 will be provided by April 29, 2011. [RAI FPR V-2]	<b>CLOSED</b>  TVA to NRC letter dated July 1, 2011 (Reference 11 of this enclosure) provided the response to RAI FPR V-2.

Enclosure 3

Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
20.	4.	Upon performing the final plant walkdowns as prescribed in FPR Sections 2.1.1, 2.4.3, and 2.3, TVA will review the information and submit the results for NRC approval if they differ from the assumptions and details provided in Part V or the other parts of the FPR. Otherwise, TVA will inform the NRC when the walkdowns are complete and that no revisions to the FPR were required. [RAI FPR V-3]	OPEN
21.	4.	The requirement for a portable lantern for the affected AUO from this equipment cage will be evaluated during the Unit 2 walkdowns of operator manual actions to ensure that existing lighting is adequate. [RAI FPR V-10]	<b>CLOSED</b>  TVA to NRC letter dated May 18, 2011 (Reference 4 of this enclosure) provided the following response to RAI FPR V-10 (item 12 of Enclosure 4):  “TVA’s response to this comment has been revised as shown:  ‘... The requirement for a portable lantern for the affected AUO from this equipment cage will be evaluated during the Unit 2 walkdowns of operator manual actions to ensure that the existing lighting is adequate <b>and that the timeline includes getting the lantern.</b> ’  This change has been incorporated into the updated Unit 1/Unit 2 As-Designed FPR provided in Enclosure 1 and captured as a commitment (Enclosure 5).”  The new commitment is item 2 on Enclosure 5 and reads as:  “The operator manual action timelines shall include the time required for getting the lantern. (Enclosure 4, Question 12. <u>NRC Question (RAI FPR V-10))”</u>  This new commitment is item 37 of this enclosure.

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
22.	4.	The FPR will be revised to clarify that this reduction only applies to areas and/or equipment affecting the unit in Modes 5, 6, and core empty and does not apply to areas where the other unit is in Modes 1 to 4 inclusive. [RAI FPR II-8]	<b>CLOSED</b> TVA to NRC letter dated May 18, 2011 (Reference 4 of this enclosure) provided the following Augmented TVA Response to RAI FPR II-8: "This change has been incorporated into the updated Unit1/Unit 2 As-Designed FPR provided in Enclosure 1."
23.	4.	The barriers separating the Unit 2 Reactor Building from the Refueling Floor will be configured and controlled the same as the Unit 1 Reactor Building Equipment Hatch. [RAI FPR VII-1]	<b>OPEN</b>
24.	5.	FPR Part V is undergoing revision in accordance with the commitment made in Reference 2 to incorporate criteria and assumptions used to ensure that Unit 2 manual actions (including manual actions for alternate or dedicated shutdown) are feasible and reliable. FPR Part V will be submitted to NRC by April 29, 2011.	<b>CLOSED</b> TVA to NRC letter dated May 18, 2011 (Reference 7 of this enclosure) provided responses to RAIs concerning the FPR. The second sentence of the third paragraph of the second page of the letter stated, "Enclosure 1 of this letter provides the updated Unit 1/Unit 2 'As-designed' FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development."  The change delineated in the commitment was made by this version of the As-Designed FPR.

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
25.	6.	<p>TVA's response to Letter Item 3. [NRC Question RAI FPR II-13] states:</p> <p>[1] Part II, Section 14.3.1.b.1 of the FPR should say "For either Reactor Building...."</p> <p>[2] A review of the FPR revealed three other places where the discussion concerns both units:</p> <ol style="list-style-type: none"> <li>1. Table 14.3, item 14.3.c should read "... Unit 1 and 2 Containment Purge Air Exhaust Filters, ..."</li> <li>2. Part III, Section 4.7, third paragraph should read "The CCS system provides cooling for the following safe shutdown equipment per unit." The CCS system equipment is for both units.</li> <li>3. Part IV, Section 3.3, second sentence should read "The number in ( ) is the number available for shutdown." This deletes the reference to Unit 1 only.</li> </ol> <p>These changes will be incorporated into the next revision to the Unit 1/Unit 2 As-Designed FPR.</p>	<p><b>CLOSED</b></p> <p>TVA to NRC letter dated May 18, 2011 (Reference 7 of this enclosure) provided responses to RAIs concerning the FPR. The second sentence of the third paragraph of the second page of the letter stated, "Enclosure 1 of this letter provides the updated Unit 1/Unit 2 'As-designed' FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development."</p> <p>The changes delineated in the commitment were made by this version of the As-Designed FPR.</p>
26.	6.	<p>For dual unit operation, CCS Pump 2B-B will be returned to its Unit 2 functional role and will be included in the Technical Specification Bases Section 3.7.7. (Letter Item 4. [NRC Question RAI FPR II-14])</p>	<p><b>OPEN</b></p>

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
27.	6.	Table 14.1 contains detectors that are for protection of components and areas required for fire safe shutdown. The detection zone 413 contains the detectors provided for the Motor Driven Main Feedwater Pump located in the Turbine Building. The Motor Driven Main Feedwater Pump is not required for fire safe shutdown; therefore, this line item for zone 413 is deleted from Table 14.1. These changes will be incorporated into the next revision to the Unit 1/Unit 2 As-Designed FPR. (Letter Item 6. [NRC Question RAI FPR II-16])	<b>CLOSED</b>  TVA to NRC letter dated May 18, 2011 (Reference 7 of this enclosure) provided responses to RAIs concerning the FPR. The second sentence of the third paragraph of the second page of the letter stated, "Enclosure 1 of this letter provides the updated Unit 1/Unit 2 'As-designed' FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development."  The change delineated in the commitment was made by this version of the As-Designed FPR.
28.	6.	Part II and Part VI were corrected to show the damper (2-1SD-31-3872) is in the fire barrier separating rooms 713.0-A29 (not 737-A9) and 737.0-A8. These changes will be incorporated into the next revision to the Unit 1/Unit 2 As-Designed FPR. (Letter Item 8. [NRC Question RAI FPR II-18])	<b>CLOSED</b>  TVA to NRC letter dated May 18, 2011 (Reference 7 of this enclosure) provided responses to RAIs concerning the FPR. The second sentence of the third paragraph of the second page of the letter stated, "Enclosure 1 of this letter provides the updated Unit 1/Unit 2 'As-designed' FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development."  The change delineated in the commitment was made by this version of the As-Designed FPR. Note that room 713.0-A29 was correct in Part II as shown on page II-137 of the FPR, and did not require revision.

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
29.	6.	<p>A review of the HVAC configuration control drawings (47A381 series, 47W866 series, and 47W920 series) has been performed to determine the correct identification number and fire resistance rating of the damper. The correct damper number is 1-1SD-31-2516 and correct fire rating of the damper is 3 hours. A review of the damper information contained in Table 14.8.2 against the Damper tables provided in Part VI has also been completed. The information in the tables (Table 14.8.2 and Part VI Damper tables) has been verified and the discrepancies corrected. These changes will be incorporated into the next revision to the Unit 1/Unit 2 As-Designed FPR. (Letter Item 9. [NRC Question RAI FPR II-19])</p>	<p><b>CLOSED</b></p> <p>TVA to NRC letter dated May 18, 2011 (Reference 7 of this enclosure) provided responses to RAIs concerning the FPR. The second sentence of the third paragraph of the second page of the letter stated, "Enclosure 1 of this letter provides the updated Unit 1/Unit 2 'As-designed' FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development."</p> <p>The change delineated in the commitment was made by this version of the As-Designed FPR.</p>
30.	6.	<p>The referenced conflicts and inconsistencies between Part II, Section 14.2 "Water Supply" and the "Fire Pump Inoperability and Compensatory Actions" Table have been reviewed, and Section 14.2 and the Table have been revised to reflect consistency between the two parts. The revised table is included as Attachment 2 to this letter and will be incorporated into the FPR as part of the As-Constructed update of the FPR prior to Unit 2 initial fuel load. (Letter Item 24. [NRC Question (RAI FPR II-34)])</p>	<p><b>OPEN</b></p>



## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
31.	6.	<p>It is TVA's position that only qualified personnel are allowed and required to make the decisions as to which of the three conditions apply to each individual circumstance. Only Sections 14.8.1.a and 14.8.1.b apply to ERFBS and radiant energy shields. Section 14.8.1.c does not apply to ERFBS configurations. Section 14.8.1.c will be clarified to denote that it does not apply to ERFBS and radiant energy shields. (Letter Item 27. [NRC Question RAI FPR II-36])</p>	<p><b>CLOSED</b></p> <p>TVA to NRC letter dated May 18, 2011 (Reference 7 of this enclosure) provided responses to RAIs concerning the FPR. The second sentence of the third paragraph of the second page of the letter stated, "Enclosure 1 of this letter provides the updated Unit 1/Unit 2 'As-designed' FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development."</p> <p>The change delineated in the commitment was made by this version of the As-Designed FPR.</p>
32.	6.	<p>Part III, Sections 2.3 and 3.4.3 provide qualitative statements regarding the need to control RCS pressure to maintain sub-cooling margin such that natural circulation would not be adversely affected by large bubble formation in the reactor vessel. Both statements convey the desired information, but for consistency Section 3.4.3 will be revised to say "minimize void formation" rather than "prevent void formation" and thereby be consistent with Section 2.3. These changes will be incorporated into the next revision to the Unit 1/Unit 2 As-Designed FPR. (Letter Item 33. [NRC Question RAI FPR III-7])</p>	<p><b>CLOSED</b></p> <p>TVA to NRC letter dated May 18, 2011 (Reference 7 of this enclosure) provided responses to RAIs concerning the FPR. The second sentence of the third paragraph of the second page of the letter stated, "Enclosure 1 of this letter provides the updated Unit 1/Unit 2 'As-designed' FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development."</p> <p>The change delineated in the commitment was made by this version of the As-Designed FPR.</p>

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Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
33.	6.	<p>TVA's response to Letter Item 39 [NRC Question RAI FPR III-13] states:</p> <p>[1] Part III, Section 4.7 is incorrect and the third paragraph should read "The CCS system provides cooling for the following safe shutdown equipment per unit." The CCS system equipment is for both units.</p> <p>[2] A review of the FPR revealed three other places where the discussion concerns both units:</p> <ol style="list-style-type: none"><li>1. Table 14.3, item 14.3.c should read: "... Unit 1 and 2 Containment Purge Air Exhaust Filters, ...".</li><li>2. Part IV, Section 3.3, second sentence should read: "The number in ( ) is the number available for shutdown." This deletes the reference to Unit 1 only.</li><li>3. Part II, Section 14.3.1.b.1 of the FPR should say "For either Reactor Building....".</li></ol> <p>These changes will be incorporated into the next revision to the Unit 1/Unit 2 As-Designed FPR.</p>	<p><b>CLOSED</b></p> <p>TVA to NRC letter dated May 18, 2011 (Reference 7 of this enclosure) provided responses to RAIs concerning the FPR. The second sentence of the third paragraph of the second page of the letter stated, "Enclosure 1 of this letter provides the updated Unit 1/Unit 2 'As-designed' FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development."</p> <p>The changes delineated in the commitment were made by this version of the As-Designed FPR.</p>

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Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
34.	6.	<p>TVA's response to Letter Item 42 [NRC Question RAI FPR V-3] states:</p> <p>[1] Part IV, Section 3.3 is incorrect. The second sentence should read "The number in ( ) is the number available for shutdown." This deletes the reference to Unit 1 only.</p> <p>[2] A review of the FPR revealed three other places where the discussion concerns both units:</p> <ol style="list-style-type: none"><li>1. Table 14.3, item 14.3.c should read: "... Unit 1 and 2 Containment Purge Air Exhaust Filters, ..."</li><li>2. Part II, Section 14.3.1.b.1 of the FPR should say "For either Reactor Building...."</li><li>3. Part III, Section 4.7 is incorrect. The third paragraph should read: "The CCS system provides cooling for the following safe shutdown equipment per unit." The CCS system equipment is for both units.</li></ol> <p>These changes will be incorporated into the next revision to the Unit 1/Unit 2 As-Designed FPR.</p>	<p><b>CLOSED</b></p> <p>TVA to NRC letter dated May 18, 2011 (Reference 7 of this enclosure) provided responses to RAIs concerning the FPR. The second sentence of the third paragraph of the second page of the letter stated, "Enclosure 1 of this letter provides the updated Unit 1/Unit 2 'As-designed' FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development."</p> <p>The changes delineated in the commitment were made by this version of the As-Designed FPR.</p>

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
35.	6.	As described in Enclosure 2 to TVA letter to NRC dated March 31, 2011, most of WBN Unit 2 operator manual actions are preventative rather than reactive. That is, they are driven by procedure rather than reacting to changing plant conditions as indicated by instrumentation and alarms. While there are some actions that are taken in response to the fire itself (de-energize electrical board that is on fire), most WBN Unit 2 actions are in response to tripping the reactor. This clarification of T=0 is being included in the ongoing revision of Part V Section 2 which will be included in the next FPR revision. (Letter Item 43 [NRC Question RAI FPR V-11])	<b>CLOSED</b>  TVA to NRC letter dated May 18, 2011 (Reference 7 of this enclosure) provided responses to RAIs concerning the FPR. The second sentence of the third paragraph of the second page of the letter stated, "Enclosure 1 of this letter provides the updated Unit 1/Unit 2 'As-designed' FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development."  The change delineated in the commitment was made by this version of the As-Designed FPR.
36.	7.	In response to Item I.2, NRC Question (RAI FPR General-2) [A], TVA submitted in Reference 1, the Unit 1/Unit 2 As-designed FPR, except for Part V, which TVA committed to submit by April 29, 2011. Enclosure 1 provides the Unit 1/Unit 2 As-designed FPR in its entirety for the sake of completeness, except for Part VII, Section 8.0 which is currently under development. Part VII, Section 8.0 will be transmitted to NRC within two weeks of receipt from the vendor.	<b>CLOSED</b>  TVA to NRC letter dated July 1, 2011 (Reference 11 of this enclosure) provided Part VII, Section 8.0.
37.	7.	The operator manual action timelines shall include the time required for getting the lantern. (Enclosure 4, Question 12. NRC Question (RAI FPR V-10))	OPEN
38.	8..	TVA will submit the responses to NRC Questions RAI FPR II-41; RAI FPR VIII-17; and RAI FPR MSO-3 by June 7, 2011. [Cover letter]	<b>CLOSED</b>  TVA to NRC letter dated June 7, 2011 (Reference 9 of this enclosure) provided the responses to RAIs FPR II-41, FPR VIII-17, and FPR MSO--3.

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
39.	8.	Additionally, it has been determined that the RES M-20A & M-20C materials are no longer available and Unit 2 will be replaced with a compatible material, such as 3M E54, that will provide equal or greater protection than the M-20A & M-20C. [Enclosure 1, Letter Item 2. NRC Question (RAI FPR II-42)]	OPEN
40.	8.	This oversight has been corrected and will be included in the next submittal of the As-designed FPR. A review of Section VII of the FPR has been completed and the other evaluations and deviations correctly take into consideration dual unit operation. [Enclosure 1, Letter Item 7. NRC Question (RAI FPR VII-4)]	OPEN
41.	8.	The Auxiliary Building (Rooms 729.0-A3 and A4) have fire dampers with fusible links in the ventilation system duct work at each point the ventilation system enters rooms 729.0-A3 and A4 to isolate these rooms. The drains for these rooms go to either the Tritiated Drain Collector Tank or the Floor Drain Collector Tank both of which are in the Auxiliary Building. This information will be added to the next revision to the FPR. [Enclosure 1, Letter Item 26. NRC Question (RAI FPR VIII-19)]	OPEN
42.	8.	WBN design criteria WB-DC-30-13, "10CFR50, Appendix R, Type I, II, and III Circuits – Unit 1 / Unit 2" will be revised to define the evaluation methodology and specify the applicable circuit failure criteria in accordance with NEI-00-01 Revision 2 and RG 1.189, Revision 2. [Enclosure 1, Letter Item 29. NRC Question (RAI FPR MSO-1)]	OPEN

## Enclosure 3

### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
43.	8.	The term "backup control stations" should have been "auxiliary control system" and the WBN Unit 2 MSO Report Revision 1 will be revised to state "auxiliary control system." [Enclosure 1, Letter Item 33. NRC Question (RAI FPR MSO-6)]	OPEN
44.	9.	As resolution of this RAI, TVA commits to completing prior to Unit 2 fuel load the modifications and document revisions required to resolve the common MSOs identified in Appendix C submitted in TVA letter to NRC dated August 20, 2010 (Reference 3).	OPEN
45.	10.	Room 713.0-A1C "Corridor, Column Lines U-W/A7-A9" is not a part of Fire Area 1 (analysis volume AV-006). It is in Fire Area 8 (analysis volumes AV-025C and AV-026A). This correction to the FPR has been done and will be reflected in the final As-designed FPR submittal. (Letter Item # 2, Request 1 [NRC RAI FPR VI-5])	OPEN
46.	10.	The pump deck was not included in the analysis (AV-088, AV-089, AV-090) because it has no impact on the analysis. WBN has revised the FPR, Part VI, Section 3.66.2 to document that the RCW Pump Deck is not included in the above listed analysis volumes and will be reflected in the final As-designed FPR submittal. (Letter Item # 2, Request 2 [NRC RAI FPR VI-5])	OPEN
47.	10.	The FPR has been revised to show that room 729.0-A10 in Fire Area 73 is analysis volume AV-112A and this will be reflected in the final As-designed FPR submittal. (Letter Item # 2, Request 3 [NRC RAI FPR VI-5])	OPEN

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Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
48.	10.	The FPR revisions listed in Letter Item # 3 (NRC RAI FPR VI-6) will be included in the next submittal of the Unit 1/Unit 2 As-Designed FPR.	OPEN
49.	10.	As discussed in Letter Item # 6 (NRC RAI FPR VII-9), the final As-designed submittal of the FPR will show a more appropriate reference to FPR Part III, Section 7.2.	OPEN
50.	10.	Door D7A is not part of a required regulatory fire barrier (see figure II-35); therefore, it is not listed in Part II, Table 14.8.1, or in Part VI. There is no conflict. Door D7A was included in Part VII, Section 5.2 for completeness. Since this door is not a regulatory required fire door, it will be removed from Part VII, Section 5.2, and this revision will be included in the next submittal of the Unit 1/Unit 2 As-Designed FPR. (Letter Item # 8, [NRC RAI FPR VII-11])	OPEN
51.	10.	WBN has corrected this error. NFPA 15-1973 is the correct code of record for WBN. The sentence in Section 3.3.1.2, "In accordance with NFPA 13, Section 4-4.1.2, a design density was determined for this unique application based on analysis of the combustibles," has been deleted. In addition, the 3rd paragraph in Section 3.3.1.2 has been revised to reference the correct table number. NFPA 13, Table 2-2.3.1, is changed to Table 3-15.6.1. These FPR revisions will be included in the next submittal of the Unit 1/Unit 2 As-Designed FPR. (Letter Item # 11, [NRC RAI FPR X-3])	OPEN



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Item No.	REF.	COMMITMENT	STATUS / COMMENTS
52.	10.	TVA will complete the resolution actions for the MSO scenarios affecting Unit 2 prior to the Unit 2 fuel load. (Letter Item # 15, [NRC RAI FPR MSO-10])	OPEN
53.	10.	The statement in FPR Part IV, Section 1.0, "fires in the building that could result in abandonment of the main control room (MCR)," is correct. There are fires in the control building that will not result in MCR abandonment. The WBN Unit 2 MSO Report, Revision 1, will be revised to eliminate this apparent contradiction. (Letter Item # 16, [NRC RAI FPR MSO-11])	OPEN
54.	11.	Validation of the Unit 2 OMA performance times will be demonstrated prior to Unit 2 fuel load.	OPEN
55.	11.	Emergency lighting and communications for the Unit 2 OMAs will be demonstrated during the Unit 2 OMA validation walkdowns.	OPEN
56.	11.	The post fire safe shutdown procedures (AOI 30.2) will be revised for dual unit operation prior to Unit 2 fuel load.	OPEN
57.	11.	The feasibility and reliability evaluation will be reviewed and modifications, as needed, incorporated when the combustible loadings are finalized. These actions will be completed prior to Unit 2 fuel load.	OPEN

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### Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
58.	12.	<p>Piping and hose stations will be added in the following areas for Unit 2 operation: [Letter # 2. NRC Question (RAI FPR VII-2.2)]</p> <p>A. Two sprinkler systems in the Unit 2 Reactor Building. These are pre-action sprinkler systems, normally dry with an air supervision of the piping.</p> <p>B. Two sets of hose stations in the Unit 2 Reactor Building. These hose stations are fed from a sprinkler system type deluge valve thus they will normally be dry also but will not have air supervision.</p> <p>C. Sprinkler system for the protection of the charcoal beds in the Unit 2 Containment Purge Air filter housing. This will be a pre-action sprinkler system but will not have air supervision.</p>	OPEN
59.	12.	<p>Existing Unit 1 hose stations that presently are not required by the FPR to provide protection to operating equipment will be re-classified to providing protection for operating equipment when Unit 2 goes on line. [Letter # 2. NRC Question (RAI FPR VII-2.2)]</p>	OPEN
60.	12.	<p>A description of the Chemical Treatment Program will be provided in a future FSAR amendment. [Letter # 4. NRC Question (RAI FPR VII-2.4)]</p>	OPEN

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Summary Listing of Fire Protection Commitments

Item No.	REF.	COMMITMENT	STATUS / COMMENTS
61.	12.	A note will be added to the end of Part VII, Section 3.3 to address the fact the initial three year period for annual performance is complete. This change will be included in the next FPR submittal. [Letter # 5. NRC Question (RAI FPR VII-2.5)]	OPEN

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### Summary Listing of Fire Protection Commitments

REFERENCE FOR COMMITMENT SOURCE	
1.	TVA to NRC letter dated July 16, 2010, "Watts Bar Nuclear Plant (WBN) Unit 2 – Request for Additional Information Regarding Fire Protection Program"
2.	TVA to NRC letter dated August 20, 2010, "Watts Bar Nuclear Plant (WBN) Unit 2 – Fire Protection Program (TAC No. ME0853) – Commitment to Provide Additional Information on Multiple Spurious Operation (MSO) Scenarios"
3.	TVA to NRC letter dated December 18, 2010, "Watts Bar Nuclear Plant (WBN) Unit 2 – Fire Protection Program (TAC No. ME0853) – Submittal of Revised Fire Protection Report"
4.	TVA to NRC letter dated March 16, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 – Request for Additional Information Regarding Final Safety Analysis Report (FSAR) Amendment Related to Section 9.5.1 "Fire Protection System" (TAC No. ME3091)"
5.	TVA to NRC letter dated March 16, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 – Fire Protection Program (TAC No. ME0853) – Commitment to Update Fire Protection Report Due to Re-Analysis and Re-Submit"
6.	TVA to NRC letter dated May 6, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 – Request for Additional Information Regarding 'Fire Protection Report' (TAC No. ME3091)"
7.	TVA to NRC letter dated May 18, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 – Fire Protection Program (TAC No. ME0853) – Submittal of Information to Address Commitment in Support of Response to Fire Protection Report Request for Additional Information (RAI) and Revision to TVA March 16, 2011 RAI Response"
8.	TVA to NRC letter dated May 26, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 - Request for Additional Information (RAI) Regarding 'Fire Protection Report' (TAC No. ME3091)"

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### Summary Listing of Fire Protection Commitments

REFERENCE FOR COMMITMENT SOURCE	
9.	TVA to NRC letter dated June 7, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 - NRC Round 4B Request for Additional Information (RAI) Regarding 'Fire Protection Report' (TAC No. ME3091)"
10.	TVA to NRC letter dated June 17, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 - Request for Additional Information Round 5 Regarding 'Fire Protection Report' (TAC No. ME3091)"
11.	TVA to NRC letter dated July 1, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 - Request for Additional Information (RAI) Regarding Final Safety Analysis Report (FSAR) Amendment Related to Section 9.5.1, 'Fire Protection System' (TAC No. ME3091)"
12.	TVA to NRC letter dated July 22, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 - Corrosion Related Portion of NRC's Request for Additional Information (RAI) Round 6 Regarding 'Fire Protection Report' (TAC No. ME3091)"
13.	TVA to NRC letter dated August 30, 2010, "Watts Bar Nuclear Plant (WBN) Unit 2 - Fire Protection Program (TAC No. ME0853) - Commitment to Provide Summary of Changes to Fire Protection Report (FPR)(TAC No. ME0853)"
14.	TVA to NRC letter dated August 9, 2010, "Watts Bar Nuclear Plant (WBN) Unit 2 - Request for Additional Information Regarding Fire Protection Program (TAC No. ME0853)"
15.	TVA to NRC letter dated January 14, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 - Fire Protection Program (TAC No. ME0853) - Commitment to Correct Administrative Deficiencies Contained in Parts V and VI of Fire Protection Report and Re-Submit"
16.	TVA to NRC letter dated March 31, 2011, "Watts Bar Nuclear Plant (WBN) Unit 2 - Fire Protection Program (TAC No. ME0853) - Submittal of Information to Address Commitment in Support of Response to Fire Protection Report Request for Additional Information (RAI)"