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

May 26, 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) REGARDING "FIRE PROTECTION REPORT" (TAC NO. ME3091)**

Reference: NRC letter to TVA dated May 23, 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," Round 4 (TAC NO. ME3091)

The purpose of this letter is to respond to the referenced NRC request for information pertaining to WBN Unit 1/Unit 2 Fire Protection Report. Enclosure 1 to this letter provides TVA's responses to NRC's questions, except for NRC Questions RAI FPR II-41; RAI FPR VIII-17; and RAI FPR MSO-3. TVA will submit the response to this request by June 7, 2011.

Enclosure 2 provides the new regulatory commitments contained in this letter. 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 26th day of May 2011.

Sincerely,

David Stinson
Watts Bar Unit 2 Vice President

Enclosures:

1. Response to NRC's Draft "Request for Information Regarding Fire Protection Report (TAC NO. ME3091), Watts Bar Nuclear Plant (WBN) Unit 2 - Received in Email Dated May 24, 2011"

2. Regulatory Commitments

cc (Enclosures):

U. S. Nuclear Regulatory Commission
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ENCLOSURE 1

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

References: 1. NRC letter to TVA dated May 23, 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," Round 4 (TAC NO. ME3091)

2. TVA letter to NRC 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

3. TVA letter to NRC dated November 5, 2010, "Watts Bar Nuclear Plant (WBN) Unit 2 - Fire Protection Program (TAC NO. ME0853) - Commitment to Provide Multiple Spurious Operation (MSO) Evaluation

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

NRC's numbering system will be referenced to identify each question. Some NRC questions have been subdivided for clarity of response.

1. NRC Question (RAI FPR II-6.1)

In TVA's response to RAI FPR II-6, the carbon dioxide fire suppression systems at Watts Bar Nuclear Plant (WBN) were divided into two groups: those for "Appendix R fire protection" and those for "property protection only."

However, it appears that a number of these "property protection" systems are relied on as part of the justification of acceptability of "deviations," for example, Part VII, sections 4.6 and 5.2 of the FPR.

***[1]** Describe the differences in the treatment of the two groups of systems as far as maintenance, testing, surveillances, etc. **[2]** Additionally, describe any differences in the TVA response to a system actuation between the two populations.*

TVA Response:

[1] The Operational Requirements (OR) and the Testing and Inspection Requirements (TIR) for the CO_2 suppression systems are documented in the FPR, Part II, Section 14.4. As documented in the FPR, the OR and TIR are applicable to the following rooms in the Control Building and the Diesel Generator Building:

1. Auxiliary Instrument Rooms (Unit 1 and 2)
2. Computer Room
3. Diesel Generator Rooms
4. Diesel Generator Electrical Board Rooms
5. Diesel Generator Fuel Oil Pump Room
6. Diesel Generator Lube Oil Storage Room

There are no differences in the treatment of the two groups of systems as far as maintenance, testing, surveillances, etc.

[2] There are no differences in the TVA response to a system actuation in either of the two populations.

2. NRC Question (RAI FPR II-42)

Identify all the electrical raceway fire barrier system materials (Thermo-Lag, HEMYC, etc.) used or planned to be used to provide separation for or protect Unit 2 safe shutdown cables or equipment.

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

TVA Response:

Thermo-Lag is not used in the Reactor Buildings but is used in other areas of the plant which require a Electrical Raceway Fire Barrier System (ERFBS). Thermo-Lag with fire resistance rating of 1-hour is used in areas with automatic fire suppression and detection. If the area is not provided with automatic suppression, the Thermo-Lag ERFBS is 3-hour fire rated. The ERFBS have previously been thoroughly reviewed and approved by NRC (Reference SSER 18, section 3.7).

The Unit 1 radiant energy shields (RES) are 3M products, M-20A (used in secondary containment/ Annulus) and M-20C (used inside primary containment). The RES for Unit 1 have been reviewed and approved by NRC (Reference SSER 18, section 6.2). 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.

WBN does not use HEMYC.

3. NRC Question (RAI FPR IV-4)

[1] *Provide the criteria for the decision to abandon the Main Control Room (MCR) and transfer control of the plant to the Auxiliary Control Room.* ***[2]*** *Detail the assumptions that support the above criteria.*

[3] *Discuss how the potential for cable damage and cable faults in the period between the start of the fire and the decision to abandon the MCR is addressed in the safe shutdown analysis.*

[4] *Discuss the shutdown of both Units for the case of a fire in the Control Building where the decision to abandon the MCR has not been made.* ***[5]*** *Include discussion of the potential for cable and equipment damage and cable faults.*

TVA Response:

[1] Reliance on SRO/Shift Manager judgment is based on the fact that the safe shutdown analysis and procedures are prescriptive rather than reactive. 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). This definition of the analytical t = 0 is appropriate because the manual actions are required to stabilize the plant or maintain it in a stable condition after reactor trip. The manual actions are not required to maintain the operating status of plant equipment prior to tripping the reactor because the reactor is considered to be in a stable operating condition prior to the decision to initiate reactor trip. Once trip is initiated, the preventive OMAs are performed to prevent spurious equipment operation and to ensure safe shutdown can be accomplished. Since the actions are preventive rather than reactive, they are performed per procedure rather than using process instrumentation or other indication to diagnose a need for the action.

A confirmed challenging fire in a control building room containing a concentration of control circuits such as the auxiliary instrument room, cable spreading room, or main control room would lead to a rapid decision to abandon the main control room and activate the auxiliary control system. A fire in other rooms with few or no Fire Safe Shutdown (FSSD) equipment or circuits may not require tripping the unit(s) and abandoning the control room.

FSSD equipment malfunction or spurious operation directly attributable to fire damage would result in declaration of an Appendix R event and MCR abandonment.

[2] 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.

[3] The potential for cable faults is addressed by fuse and breakers that clear the fault before auto-ignition of the insulation on the cables (see Part II, references 4.2.37 thru 4.3.44). Only nine of the rooms in the Control Building have cable trays and these rooms have automatic suppression and detection. The circuits in the trays are low voltage control and instrumentation circuits, except for those in room 708.0-C2 (Corridor on elevation 708.0). The insulation on the cables routed in the trays are the major contributor to the in situ combustible load for each room (54% to 99.9%), except for 692.0-C12 (44%). There are no major combustible loads associated with a significant ignition source that would develop into a fire large enough to generate a fire in the cable trays. The circuits in the other rooms are routed in conduits. A postulated fire in the Control Building would be slow developing, detected and alarmed in the Main Control Room (MCR), and would be controlled/extinguished either by portable extinguishers by first responders or by installed automatic suppression systems. The MCR staff will have adequate time to assess the potential severity of the fire, enter into abandonment procedures, and address any spurious equipment operation the postulated fire might cause. A detailed discussion of the control building FSSD analysis was provided in the response to RAI FPR IV-1 in enclosure 1 to TVA letter dated May 6, 2011.

[4] A challenging control building fire leading to the decision to shutdown both units would require abandoning the MCR due to the high concentration of control circuits. The decision to abandon the MCR would be based on the potential for cable damage and equipment malfunction. Smaller, less challenging fires that do not require control room abandonment would be addressed through normal operating procedures for both units.

[5] Refer to TVA Response [3] above.

4. NRC Question (RAI FPR V-12)

Enclosure 2 to TVA's March 31, 2011, letter included a description of the criteria used to ensure that Unit 2 operator manual actions (OMAs) are feasible and reliable.

1. *In the section titled, "Unit 2 OMA Feasibility and Reliability," element 2, which describes the environmental factors considered, does not include a description of how these factors demonstrate feasibility and reliability.*

   ***[1]** Provide a technical explanation of how the environmental factors are used to establish feasibility and reliability. **[2]** Where environmental factors impact the performance of the operator manual actions, provide a technical justification of how the manual actions have been demonstrated to be feasible and reliable.*

   TVA Response:

   [1] Environmental factors resulting from a fire are evaluated and compared to the OMA control location and the available paths to that location from the control room to ensure that the operator can safely and reliably reach the location to perform the action.

   [2] Potential adverse effects that could delay operator progress or require special equipment are identified and compensated for in the evaluation by allowing additional time to obtain and use the special equipment such as Self-Contained Breathing Apparatus (SCBA) and hand held lanterns. If the control location is in the room of fire origin and the OMA must be performed in about 1-hour, a specific rigorous analysis is prepared and documented in Part VII of the FPR.

2. ***[1]** Provide a description of the minimum defense-in-depth features (combustible controls, combustible loading, detection, suppression, etc.) that are available in the fire area of origin where manual actions are relied upon.*

   ***[2]** For areas that lack robust defense-in-depth, such as no detection, suppression, etc., provide a description of how that reduced defense-in-depth is compensated by other defense-in-depth features. For example, if an area lacks suppression perhaps a more robust detection system or more than the 100 percent time margin is available.*

TVA Response:

[1] Realizing that preventing fires, limiting their severity, ensuring rapid detection and rapid extinguishment through defense-in-depth is the most important element of OMA feasibility and reliability, an evaluation of defense-in-depth has been included in FPR Part V, Section 2.1, OMA Feasibility and Reliability.

[2] The feasibility and reliability acceptance criteria in FPR Part V, Section 2.1.2 requires additional time allowance (greater than 100% margin) if the room of fire origin is lacking any aspect of defense-in-depth.

3. *The RAI response discusses an assumption of 100 percent time margin for OMAs.*

   However, a 100 percent margin may not be sufficient for manual actions of short diagnosis plus performance time. For example, an easily diagnosed and performed action may occur in 3 minutes, which would equate to an allowable time of 6 minutes. This 3 minute margin may not be sufficient to demonstrate reliability.

   Provide a description of how reliability is assured for short diagnosis plus performance times.

   TVA Response:

   To prevent future misapplication of the 100% time margin assumption the feasibility and reliability acceptance criteria in FRP Part V, Section 2.1.2 was modified in the May 18, 2011 FPR submittal to restrict the use of the 100% time margin to local OMAs that have an allowable performance time of at least 10 minutes and do not require special equipment such as SCBA or involve potential delays such as RCA entry. Specific performance time uncertainty allowances have been defined that can be added to the demonstrated performance time for situations where the 100% margin is not credited.

   It is clarified that allowable performance times are determined from the safe shutdown analysis rather than by doubling the diagnostic/performance time as implied by the question.

4. *The section of the RAI response titled, "Safe Shutdown Procedures," states, in part:*

   > *The decision to declare an Appendix R fire and to trip the unit(s) is left to the judgment of the Unit SRO [Senior Reactor Operator]/Shift Manager and must be based on the magnitude of the fire and its potential effect on the System Structures and Components necessary to achieve and maintain cold shutdown.*

   ***[1]** Confirm that the procedures are based on both magnitude and effect. **[2]** Also, confirm that hot shutdown capability is considered in addition to cold shutdown capability.*

[3] *Also, provide the basis for the assurance that the judgment of the Unit SRO/Shift Manager will be timely enough to perform preventive manual operator actions to assure that safe shutdown capability can be maintained during and after a fire.*

TVA Response:

[1] The procedure (AOI 30.1,, Plant Fires) is based on both the magnitude of the fire and the effects the fire could have on FSSD equipment and circuits.

[2] Fire damage effects on the hot shutdown capability are considered in addition to the effects on cold shutdown capability.

[3] Reliance on SRO/Shift Manager judgment is based on the fact that the safe shutdown analysis and procedures are prescriptive rather than reactive. 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). This definition of the analytical t = 0 is appropriate because the manual actions are required to stabilize the plant or maintain it in a stable condition after reactor trip. The manual actions are not required to maintain the operating status of plant equipment prior to tripping the reactor because the reactor is considered to be in a stable operating condition prior to the decision to initiate reactor trip. Once trip is initiated, the preventive OMAs are performed to prevent spurious equipment operation and to ensure safe shutdown can be accomplished. Since the actions are preventive rather than reactive, they are performed per procedure rather than using process instrumentation or other indication to diagnose a need for the action.

There are very few situations where reactive action must be taken based upon fire damage to equipment or cables rather than trip initiation. In these situations the normal plant system operating procedure provides the reactive response while the FSSD procedure is preventive (action taken before fire damage causes a need for the action). For example:

1. Electrical power distribution board fire – The normal response and the safe shutdown action are the same; de-energize the board prior to extinguishing the fire.
2. Spurious start of a containment air return fan. The fan must be stopped.

5. NRC Question (RAI FPR VII-2)

Part VII, Section 3.3 "Adequacy of HPFP [high pressure fire protection] Pumps," of the as-designed FPR states, in part,

> *The fire suppression system design criteria incorporated into the hydraulic calculations include the required fire protection water flow and pressure for the most hydraulically remote location of each system, hose stream*

*application (500 gpm), and those portions of the RSW [raw service water] loads that are not automatically isolated from the fire protection water system upon fire pump start due to a fire in safety-related areas. Four conditions are evaluated in the calculations to demonstrate hydraulic capabilities with clean pipe and corroded pipe to reflect a 40 year service life with and without a single impairment. Clean pipe calculations were based on actual pipe inside diameters and a Hazen-Williams C-factor of 100. Corroded pipe calculations were based on actual pipe inside diameters minus 8/10ths of an inch and a C-factor of 55 (i.e., the expected condition at the end of a 40 year service life). [emphasis added] [pg. VII-36 of the January 14, 2011, version] {**1**}*

and

*The results of corroded pipe calculations demonstrate that approximately the highest hose stations of four standpipe systems (serviced by 8 FCVs[flow control valves) may not be capable of providing their design basis flows at 40 years. These systems are, however, capable of providing design basis flows for a number of years and will be trended to ensure functionality. [emphasis added] [pg. VII-36 of the January 14, 2011, version] {**2**}*

and

*To address the adequacy of the specific standpipe systems that may not provide design basis flows at 40 years, WBN will perform start-up flow tests on the specific systems to assure that adequate flow and pressure can be delivered. This start-up testing will become the hydraulic baseline for the systems. Flow tests will be conducted once per cycle to ensure the systems can meet design basis requirements. The data will be trended to promote corrective actions prior to the systems becoming inoperable. [emphasis added] [pg. VII-36 of the January 14, 2011, version] {**3**}*

and

*WBN will trend the performance of the HPFP system, and the specific standpipe systems that may not provide design basis flow for 40 years, to promote corrective actions prior to the systems becoming inoperable. [emphasis added] [pg. VII-37 of the January 14, 2011, version] {**4**}*

Part II, section 12.1 "Water Supply," of the as-designed FPR, states, in part:

*The HPFP system is normally pressurized by the raw cooling water (RCW) system when the fire pumps are not running. The RCW system is automatically isolated when a fire pump starts. [emphasis added] [pg. II-28 of the January 14, 2011, version] {**5**}*

and

> *The high pressure fire protection system is shared with the raw service water (RSW) system. Automatic isolation valves are provided to isolate selected large raw service water loads from the HPFP system when any fire pump is started. Specific RSW loads are automatically isolated from the fire protection water system when the fire pump(s) start due to a fire in safety-related areas to reduce the RSW load on the fire protection system to ensure adequate flow and pressure is available. [emphasis added] [pg. II-28 of the January 14, 2011, version] {**6**}*

NRC Information Notice 2006-17 "Recent Operating Experience of Service Water Systems Due to External Conditions" states, in part (concerning WBN):

> *The licensee identified silt accumulation in portions of systems providing raw cooling water for both essential and nonessential purposes and for high pressure water for fire protection. These accumulations were identified in both stagnant and active cooling water lines, typically in system low points and in piping with low water velocity. In 1999 and 2002, clam accumulations resulted from missed biocide treatments. The licensee implemented periodic ultrasonic testing and flushing to identify and minimize blockages due to silt and clam accumulations. The initial frequency of ultrasonic testing was every 6 months, later shortened to every 3 months. However, the licensee determined that this program did not cover all susceptible lines and components. [emphasis added] [pg. 3] {**7**}*

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

1. *Identify the year that the fire water system went into service (that is the beginning of its service life). Excerpt {1} above.*

   TVA Response:

   There is not one year that the fire water system came into service. The earliest date that a portion of the yard loop came into service was approximately 1977. Various parts of the fire water system were brought into service between 1977 and 1995. The B train high pressure fire protection header from the intake pumping station to the auxiliary building was replaced in its entirety in 2005 (DCN 51296 Revision A).

2. *Identify the pipe types used in the fire water system (the FPR discusses cement lined cast iron (outer loop) and unlined steel), and the maintenance program and degradation history of each.*

   TVA Response:

   The majority of the piping, both interior and buried, is unlined carbon steel. The remaining buried piping is cement lined ductile iron piping. The unlined carbon steel has experienced microbiologically induced corrosion (MIC) nodules as would be expected with raw water piping. Pin-hole leaks in this piping are repaired as found. The repair normally includes the replacement of a section of piping at the leak location. The buried

unlined piping has experienced some degradation of the exterior coating and a section of piping replaced. There have been no leaks or failures of the buried cement lined ductile iron piping as of this time. A periodic flow test of portions of the system ensures the required hydraulic capability of the system is maintained.

3. *Identify the standpipe systems described in the quoted text above, and also identify the locations of the affected hose stations and the safe shutdown or safety-related equipment that they protect. Excerpts {2} and {3} above.*

TVA Response:

The System Description, N3-26-4002, "High Pressure Fire Protection System", discusses three standpipe systems that calculations indicate may not be acceptable over time due to corrosion. These three systems are the standpipes on the Auxiliary Building roof el. 816, the Diesel Generator Building (DGB) roof, el. 773, and the top elevation of the Intake pumping station, el. 741. The hose stations on the Auxiliary Building and DGB roofs are not required for protection of fire safe shutdown or safety related equipment. The standpipes on the highest elevation of the IPS are required for protection of the Essential Raw Cooling Water (ERCW) pump motors, ERCW traveling screens motor and screen wash pumps and motors, and the electric fire protection pumps and motors.

During the development of the response to this RAI item, a discrepancy between the system description and the current Unit 1 FPR was identified and documented in the Corrective Action Program (Service Request: SR 375516). This Service Request was initiated to correct the statement in FPR Part VIII, Section 3.3 stating that the four standpipe systems are serviced by 8 FCV's. There are actually three rather than four standpipe systems.

4. *Describe the results of the trending that is identified above. Discuss whether the trend is better or worse than that first calculated. In the discussion identify details of pipe type, typical flow seen, and systems affected. Excerpts {2}, {3}, and {4} above.*

TVA Response:

These three sets of standpipes are specifically tested by 0-FOR-26-2, "3 Year High Pressure Fire Protection Hydraulic Performance Verification." Data from 0-FOR-26-2 testing shows some degradation, but these hose stations continue to meet the acceptance criteria of ≥ 500 GPM flow (≥100 GPM for the IPS) at 65 psig nozzle pressure. The original calculations only addressed new conditions and 40-year conditions so there is not a comparison available for the test information. The data collected for the first performance and the most recent performance of 0-FOR-26-2 is:

Date	Valves	Flow (GPM)	Pressure (PSI)
August 1995	Auxiliary Bldg Roof (0-ISV-26-654 & -655)	560	65.3
August 1995	DGB Roof (0-ISV-26-565 & -566)	560	77.6

Date	Valves	Flow (GPM)	Pressure (PSI)
August 1995	IPS (0-ISV-26-1710 & -1711)	395	65
January 2008	Auxiliary Bldg Roof (0-ISV-26-654 & -655)	500	67.3
August 2010	DGB Roof (0-ISV-26-565 & -566)	500	81.1
August 2010	IPS (0-ISV-26-1710 & -1711)	230	95

The piping at these flow points is unlined carbon steel which normally does not see any flow during normal operation. The hose stations for the standpipes on the Auxiliary and Diesel Generator Building roofs are not associated with a specific system. For the standpipes at the upper level of the IPS, the protected systems are ERCW and fire protection.

It is noted that during the review for this question a discrepancy was identified between FPR Part VII, Section 3.3 and FPR Part II, Section 12.1 regarding the frequency of the testing. This issue was identified in the TVA Corrective Action Program under Service Request 375516.

5. *Discuss the corrective actions that are planned or have been taken to resolve identified fire water distribution issues. Describe the root cause for any past or ongoing corrective actions (pipe replacement due to corrosion, pin hole leaks, pipe thinning, etc.; water treatment (due to microbiologically influenced corrosion); etc.) and provide assurance that the fire water system will maintain operability over the life of Unit 2, for all pipe types and uses related to the fire water system. Excerpts {3} and {4} above.*

TVA Response:

The root cause analysis for fire protection distribution issues has determined that the root cause is due to the use of raw water. The raw water systems at WBN, including Fire Protection, Essential Raw Cooling Water, and Raw Cooling Water, are treated by the same chemical treatment program to address typical raw water issues including MIC. MIC tends to create pin-hole leaks in the piping and as these leaks are found the piping section is replaced. In addition, selected sections of piping in the fire protection system are monitored for wall thinning using non-destructive test methods and piping sections are replaced as required. These programs will ensure the distribution system will be capable of performing its function throughout the life of the plant.

6. *Discuss the affect the additional system lifetime (due to Unit 2 operation) will have on trending and needed corrective actions. Excerpts {1}, {2}, {3}, and {4} above.*

TVA Response:

The addition of Unit 2 will have no effect on the High Pressure Fire Protection (HPFP) system performance. The wet portions of the piping supplying the safety-related part of the plant have always been in service since Unit 1 fuel load. Adding Unit 2 does not change the testing and inspection or the trending program. The testing, inspection and

trending program will be maintained during the life of the plant to ensure the fire protection system maintains full capability.

7. *Discuss the typical RSW loads that the fire water system sees when the fire water system is not operating (i.e., when the fire pumps are not operating). Discuss the affect that this flow has on pipe degradation in the fire protection water supply system. Excerpts {1}, {5}, and {6} above.*

TVA Response:

The following table identifies the normal raw water loads:

DESCRIPTION	GPM
Office and Service Building	
a) Radio Chem Lab A/C	100
b) Power Stores Office A/C	20
c) Laundry Room Chiller	18
d) Office Building Chiller	540
e) Power Stores Heat Pump	28
f) Hot Shop Water Chiller	156
Makeup Water Treatment Plant	440
Turbine Building	
Auxiliary Boiler Feed Pump Seal Coolers	10
Intake Pumping Station	
Hypochlorite Equipment	27
Control Building	
Communications Room A/C	22

The above piping is periodically tested to ensure adequate wall thickness as described in questions 4. and 5. above.

The following table identifies the raw water loads that will remain during a fire with normal fire pump alignment:

DESCRIPTION	RAW WATER LOADS FOR FIRES IN SAFETY RELATED AREAS
	GPM
Office and Service Building	
a) Radio Chem Lab A/C	0
b) Power Stores Office A/C	0
c) Laundry Room Chiller	18
d) Office Building Chiller	0
e) Power Stores Heat Pump	28
f) Hot Shop Water Chiller	0

DESCRIPTION	RAW WATER LOADS FOR FIRES IN SAFETY RELATED AREAS
	GPM
Makeup Water Treatment Plant	0
Turbine Building Auxiliary Boiler Feed Pump Seal Coolers	10
Intake Pumping Station Hypochlorite Equipment	27
Control Building Communications Room A/C	22
TOTAL FLOW REQUIRED	105

The HPFP system is one unified system for two units. The HPFP system has been previously reviewed by NRC (see SSER 18, Appendix FF, section 4.1) and stated "This testing will maintain confidence in the structural integrity of the high-pressure fire protection piping." It was also stated "On the basis of its review, the staff concludes that the fire water supply system conforms to the guidelines of Section C.2 of Appendix A to BTP APCSB 9.5.1 and, therefore, is acceptable." WBN is confident that the testing and inspection program for the HPFP system provides adequate information to detect any negative trending of the condition of the system and correct it before it would impact ability of the system to perform its required function (see FPR Part II, reference 4.2.4).

8. *Describe the actions taken to resolve the issues identified in NRC Information Notice 2006-17. Provide assurance that all susceptible lines and components are covered by appropriate testing and maintenance activities. Excerpt {7} above.*

TVA Response:

The corrective action document associated with the issues addressed in NRC IN 2006-17 reviewed the High Pressure Fire Protection System relative to the importance of the function of the different parts of the system as well as the susceptibility to the problems addressed in the IN. The resulting corrective actions included doing ultrasonic check for silt build up in portions of the piping that are safety related. In addition, the Fire Protection System is different from the Essential Raw Cooling Water and the Raw Cooling Water Systems in the design of the pumps' intake for the other two systems is directly off the river intake but the supply for the fire pumps is via an arrangement of off-set openings that provide a settling effect to reduce the silt uptake.

6. NRC Question (RAI FPR VII-3)

A change was made to Part VII, Section 2.5, "Partial Fire Wall Between CCS [Component Cooling System] Pumps," of the as-designed FPR to add the following text to the second paragraph under "Justification" [pg. VII-10 of the January 14, 2011, version]:

> *… associated with each of the two Unit 1 AFW [auxiliary feedwater] pumps (there is approximately 12 feet separating the closest pumps – 1A-A AFW pump from 1AA CCS pump. The fire safe shutdown analysis considered both pumps lost for a fire near them). [emphasis added]*

It appears that this change was made between Revision 40 and the January 14, 2011, version of the FPR.

This text seems to be applicable only to Unit 1. Is there a similar configuration for the Unit 2 pumps? If so, provide that information. If not, justify why not.

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

TVA Response:

There is no change to the way the fire safe shutdown analysis has been performed. The change to Part VII, Section 2.5 of the FPR was to provide more information as to the location and separation between the Unit 1 Auxiliary Feedwater (AFW) Pumps and the nearest Component Cooling Water (CCS) Pump. The Unit 1 analysis and the combined plant (Unit 1 and Unit 2) assume that a fire in the area of these pumps (i.e., two motor driven Unit 1 AFW pumps and the nearest CCS pump) will damage all three pumps and that fire safe shutdown will be accomplished without the pumps.

There is no similar configuration on the Unit 2 end of the Corridor (713.0-A1B). The Unit 2 AFW Pumps are located between column lines s-t/A12-A13 (713.0-A1B) and are not near the CCS pumps. The Unit 1 AFW pumps are located at the opposite end of the Corridor (713.0-A1A) between column lines s-t/A3-A4. There is approximately 126 feet separating the Unit 1 AFW pumps from the Unit 2 AFW pumps. The CCS pumps (Unit 1, Unit 2, and Swing) are located between column lines s-u/A1-A3 (713.0-A1A) and there is a wall separating the CCS Train A and Swing pumps from the Train B pumps (see FPR Part VII, Section 2.5 and NRC approved deviation request in SSER 18, Appendix FF, Section 6.5). The Corridor is provided with area wide detection and automatic suppression.

7. NRC Question (RAI FPR VII-4)

It appears that Part VII, Section 2.8 "Reactor Coolant Pump Oil Collection System," of the as-designed FPR is written for single-unit operation. For example the correct number of reactor coolant pumps (if both Units are considered) is eight not four.

Ensure that this and the other evaluations and deviations in Part VII correctly take into consideration dual-unit operation.

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

TVA Response:

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.

8. NRC Question (RAI FPR VII-5)

Part VII, Section 3.4 "Large Fire Dampers," of the as-designed FPR states, in part: "The overall damper size to protect the openings is 98_-inches wide by 24½-inches high." [pg. VII-37 of the January 14, 2011, version of the FPR].

The Revision 5 version of the same text is as follows: "The overall damper size to protect the openings are 98 5/8-inches wide by 24 1/2-inches high." [emphasis added]

It appears that the 5/8 fraction has been dropped in the as-designed version.

Similar situations exist on the next page [VII-38 of the January 14, 2011, version of the FPR] in items 1 and 2.

Correct these errors. Ensure that an extent of condition review has been performed to ensure that other similar instances are identified and corrected.

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

TVA Response:

A review of the past revisions of the FPR revealed that a format change (Revision 10) failed to carry the fraction over during the conversion. This error has now been corrected and was included in Part VII, Section 3.4 in the May 18, 2011 FPR submittal.

It is noted that during the review for this question, the discrepancy was confirmed to exist and has been identified in the TVA Corrective Action Program under Service Request 375516.

9. NRC Question (RAI FPR VII-6)

Part VII, Section 4.1 "Fire Doors," of the as-designed FPR, references, on page VII-41 of the January 14, 2011, version, Figures VI-5 and VI-10.

It is known, from previous RAI responses, that these are erroneous references.

***[1]** Correct these errors. **[2]** Ensure that an extent of condition review has been performed to ensure that other similar instances are identified and corrected.*

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

TVA Response:

[1] This has been addressed previously in TVA's response to NRC RAI FPR III-2, submitted in Reference 2.

[2] The FPR was reviewed to identify any other figure references and corrections were made, as appropriate.

10. NRC Question (RAI FPR VIII-2)

A change was made to Part VIII, entry A.9, "Plant Conformance," of the as-designed FPR so that it now states, in part: "Simultaneous fires are not postulated." [pg. VIII-7 of the January 14, 2011, version]
It appears that this change was made between Revision 40 and the January 14, 2011, version of the FPR.

What is the definition of the term "simultaneous fires"? Is this term intended to indicate fires in separate fire areas, or one fire in one fire area that affects both Units? If it's the latter, provide a justification for excluding these scenarios from the analysis. Also, discuss how multi-compartment fires were considered in the analysis.

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

TVA Response:

Appendix R, Section I, "Introduction and Scope" contains the following table:

Safety function	Fire damage limits
Hot Shutdown	One train of equipment necessary to achieve hot shutdown from either the control room or emergency control station(s) must be maintained free of fire damage by a **single fire**, including and exposure fire.
Cold Shutdown	Both trains of equipment necessary to achieve cold shutdown may be damaged by a **single fire**, including an exposure fire, but damage must be limited so that at least one train can be repaired or made operable within 72 hours using onsite capability.
Design Basis Accidents	Both trains of equipment necessary for mitigation of consequences following design basis accidents may be damaged by a **single exposure fire.**

The term "simultaneous fires" means more than one fire at the same time. The term "simultaneous fires" in the sentence is stating that WBN only postulates a single fire (in compliance with Appendix R) during the analysis. If the postulated fire affects both Units, it is not considered a "simultaneous fire" but is instead considered a single fire that could affect both Units and is evaluated as such.

ENCLOSURE 1

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

11. NRC Question (RAI FPR VIII-3)

A change was made to Part VIII, entry B.1, "Appendix A Guidelines," of the as-designed FPR to change the text from "NFPA [National Fire Protection Association] 4A- Organization for Fire Department" to "NFPA 4A - Organization for Fire Brigade." [emphasis added] [pg. VIII-8 of the January 14, 2011, version]

It appears that this change was made between Revision 40 and the January 14, 2011, version of the FPR.

***[1]** This change is not consistent with the text of Appendix A of the Branch Technical Position. Correct this error. **[2]** Ensure that an extent of condition review has been performed to identify and correct other similar instances.*
This RAI may involve an update to the FPR to incorporate the response to the RAI.

TVA Response:

[1] This error was corrected to read "Organization for Fire Department" and was incorporated into the Unit 1/Unit 2 As-Designed FPR submitted on May 18, 2011.

[2] An extent of condition review was performed and the FPR was updated, as appropriate.

12. NRC Question (RAI FPR VIII-4)

A change was made to Part VIII, entry B.5.d, "Alternatives," of the as-designed FPR so that it now states, in part: "As discussed in Part X, NFPA is an outdated code; therefore, refer to Part II of the FPR." [pg. VIII-13 of the January 14, 2011, version]

It appears that this change was made between Revision 40 and the January 14, 2011, version of the FPR.

Is the "NFPA" in the above statement intended to indicate NFPA 27? If so correct the entry. If not, clarify the entry.

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

TVA Response:

TVA also found this error and the Unit 1/Unit 2 As-Designed FPR that was submitted on May 18, 2011 was corrected to read: "NFPA 27."

13. NRC Question (RAI FPR VIII-5)

Provide plant conformance information for the WBN utilization of the standards *identified in the text of Part VIII, entry B.5.d, "Appendix A Guidance," on page VIII-14 of the January 14, 2011, version of the FPR.*

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

TVA Response:

As stated in the "Alternatives" column on page VIII-13, Part X (NFPA Code Evaluation) of the Fire Protection Report provides the details for WBN utilization of the standards identified in the text of Part VIII, entry B.5.d.

14. NRC Question (RAI FPR VIII-6)

A change was made to Part VIII, entry D.4.f, "Plant Conformance," of the as-designed FPR to change the discussion of "access and egress routes" to "access and egress points." [pg. VIII-33 of the January 14, 2011, version]

It appears that this change was made between Revision 40 and the January 14, 2011, version of the FPR.

It is the NRC position that there is a difference between access and egress "routes" and "points."

Provide a justification for this change in light of the text of the Appendix A guidance. This RAI may involve an update to the FPR to incorporate the response to the RAI.

TVA Response:

The Pre-Fire Plans identify the points of entry available for the Fire Brigade to use in responding to a fire by arrows at door(s) and stairwells. The "points" of entry along the route are road signs along the routes. The walkdowns conducted for the Unit 1 local OMAs identified multiple paths (routes) from the Main Control Room to the locations where OMAs are to be performed to ensure adequate emergency lighting. The actual route an operator would take depends on the location of the fire and current plant conditions at the time of the fire. WBN considers the terms routes and points to be interchangeable; therefore, no change to the FPR is required.

15. NRC Question (RAI FPR VIII-7)

A change was made to Part VIII, entry D.5, "Appendix A Guidelines," of the as-designed FPR to change the text from "… two-way voice communication …" to "… two-way voice communications …" [emphasis added] [pg. VIII-35 of the January 14, 2011, version]

It appears that this change was made between Revision 40 and the January 14, 2011, version of the FPR.

***[1]** This change is not consistent with the text of Appendix A of the Branch Technical Position. Correct this error. **[2]** Ensure that an extent of condition review has been performed to identify and correct other similar instances.*

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

TVA Response:

[1] The "s" is deleted in the May 18, 2011 FPR submittal.

[2] WBN does not consider this to be a change in the intent of the guideline and that "an extent of condition review" is not warranted for this item.

16. NRC Question (RAI FPR VIII-8)

A change was made to Part VIII, entry E.3.a, "Remarks," of the as-designed FPR so that it now states, in part: "Where no fixed suppression is installed, the standpipe and hose station or adjacent fire hydrants are considered the primary system and other independent standpipe and hose stations or yard hydrants are the backup." [Emphasis added] [pg. VIII-44 of the January 14, 2011, version]

It appears that this change was made between Revision 40 and the January 14, 2011, version of the FPR.

Identify the Fire Areas and Analysis Volumes where fire hydrants are the primary fire suppression systems. Confirm that the required hydrants are appropriately identified as required in the FPR.

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

TVA Response:

Fire Area 54, Analysis Volume AV-082, Room 742.0-D10 (Conduit Interface Room) is the room that relies on nearby fire hydrants for its primary fire suppression. The hydrants are located near the Diesel Generator Building at each end of the building near the doors to the Conduit Interface Room. The two hydrants are appropriately identified with unique identification numbers and are identified in the FPR, Part II, Table 14.7.

17. NRC Question (RAI FPR VIII-9)

A change was made to Part VIII, entry F.1.b, "Alternatives," of the as-designed FPR so that it now states, in part: "Fire brigade and appropriate operations personnel are trained in the use and location of self-contained breathing apparatus. Refer to Part II of the FPR." [emphasis added] [pg. VIII-53 of the January 14, 2011, version]
It appears that this change was made between Revision 40 and the January 14, 2011, version of the FPR.

The reviewers could not locate this information regarding operations personnel training in Part II of the FPR. ***[1]*** *Provide more detail concerning the location of this information within Part II.* ***[2]*** *If the information does not exist in Part II, resolve the conflict.*

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

TVA Response:

[1] This entry is about SCBA and not about who uses them. The reference back to Part II concerns SCBA. WBN provided additional information to show that other Operations Department personnel (e.g., AUOs, UOs, SROs, etc) are trained in the proper use of SCBA and not just members of the Fire Brigade. Dedicated SCBAs are readily available for both Operations and Fire Brigade personnel who are trained and qualified for use of SCBA.

[2] WBN does not consider this a conflict.

18. NRC Question (RAI FPR VIII-10)

A change was made to Part VIII, entry F.2, "Appendix A Guidelines," of the as-designed FPR to change the text from "…Exposure fire involving combustibles in the general room area. …" to "…Exposure fire from combustibles in the general room area. …" [emphasis added] [pg. VIII-54 of the January 14, 2011, version]

It appears that this change was made between Revision 40 and the January 14, 2011 version of the FPR.

***[1]** This change is not consistent with the text of Appendix A of the Branch Technical Position. Correct this error. **[2]** Ensure that an extent of condition review has been performed to identify and correct other similar instances.*

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

TVA Response:

[1] The text has been changed back to "involving" in the Unit 1/Unit 2 FPR submitted on May 18, 2011.

[2] The intent of the statement is unchanged; therefore, WBN does not agree that an extent of condition review is necessary.

19. NRC Question (RAI FPR VIII-11)

A change was made to Part VIII, entry F.8, "Alternatives," of the as-designed FPR so that it now states, in part: "The turbine oil tank hazards are protected by fixed water spray systems." [emphasis added] [pg. VIII-62 of the January 14, 2011, version]

It appears that this change was made between Revision 40 and the January 14, 2011, version of the FPR.

Provide a technical justification for the change in protected hazards between "turbine oil hazards" and "turbine oil tank hazards."
This RAI may involve an update to the FPR to incorporate the response to the RAI.

TVA Response:

Section F.8 deals with "Turbine Lubrication and Control Oil Storage and Use Areas." The information that is now in the "Alternatives" column was in the "Remarks" column. The word "tank" was added in order to be in line with the wording of the guidelines that uses the word "storage." The word "tank" defines the method of "storage." With regards to other Turbine Lubrication and Control Oil hazards, WBN meets the intent of the guidelines for protecting the wall that separates the Control Building from the Turbine Building by providing detection and automatic suppression on the lube oil hazard and seals the penetrations in the Control Building wall (36-inch thick reinforced concrete) with minimum 3-hour rated seals and water curtain protection for the penetrations on the Turbine side.

20. NRC Question (RAI FPR VIII-12)

A change was made to Part VIII, entry F.14, "Alternatives," of the as-designed FPR so that it now states, in part: "Manual hose stations (located in room 729.0-A6) and hand held portable extinguishers are available." [emphasis added] [pg. VIII-62 of the January 14, 2011, version]

However, the analysis in Part VI, section 3.16.1, credits a hose station in room 729.0-A5.

***[1]** Resolve this conflict. **[2]** Ensure that an extent of condition review has been performed to ensure that other similar instances are identified and corrected.*

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

TVA Response:

[1] A standpipe and hose station is available for either room 729.0-A5 or 729.0-A6; however, Part VIII, Section F.14 was revised in the May 18, 2011 FPR submittal to reference 729.0-A5.

[2] WBN does not consider this to be a conflict since hose stations are available in both rooms and thus does not warrant an extent of condition review.

21. NRC Question (RAI FPR VIII-13)

A change was made to Part VIII, entry F.16, "Alternatives," of the as-designed FPR so that it now states, in part: "Yard hydrants are strategically located for providing protection to the refueling water storage tanks and the primary water storage tanks." [emphasis added] [pg. VIII-70 of the January 14, 2011, version]

It appears that this change was made between Revision 40 and the January 14, 2011, version of the FPR.

Confirm that the required hydrants are appropriately identified as required in the FPR. This RAI may involve an update to the FPR to incorporate the response to the RAI.

TVA Response:

The hydrants are uniquely identified and are shown on the High Pressure Fire Protection System flow diagram (1-47W832-1).

22. NRC Question (RAI FPR VIII-14)

A change was made to Part VIII, entry F.17, "Plant Conformance," of the as-designed FPR to add the following text: "Yard hydrants are available to support manual fire suppression activities around the cooling towers." [pg. VIII-70 of the January 14, 2011, version]

It appears that this change was made between Revision 40 and the January 14, 2011, version of the FPR.

Confirm that the required hydrants are appropriately identified as required in the FPR.

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

TVA Response:

The hydrants are uniquely identified and are shown on the High Pressure Fire Protection System flow diagram (1-47W832-1).

23. NRC Question (RAI FPR VIII-15)

Provide the summary evaluation supporting the deviation described in the "Remarks" portion of the D.1.d entry of Part VIII of the as-designed FPR [pg. VIII-19 of the January 14, 2011, version]

Provide a justification regarding why this evaluation is not included in the appropriate section of Part VII of the FPR, or add it to that section.

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

TVA Response:

The location of this evaluation within the Unit 1/Unit 2 As-Designed FPR is the same as the Unit 1 FPR. FPR Part VII, Section 4.0 states that: "Additional alternatives to the guidelines of Appendix A are identified in part VIII of the FPR." The location of this evaluation does not affect the fire safe shutdown of the plant; therefore, moving it to a different location within

the FPR is not required. WBN considers this evaluation to be located in the appropriate location within the FPR.

24. NRC Question (RAI FPR VIII-16)

Part VIII, entry B.3.c, "Appendix A Guidance," of the as-designed FPR states, in part: "Their possible and probable use should be considered in the fire hazard analysis to determine the adequacy of the installed fire protection systems." [pg. VIII-10 of the January 14, 2011, version]

However, no plant conformance information is provided for this portion of the guidance.

Confirm that the possible and probable use of combustible materials (as described earlier in the B.3.c guidance entry) has been considered in the fire hazards analysis to determine the adequacy of the installed fire protection systems.

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

TVA Response:

The possible and probable use of combustible materials in safety-related areas are adequately addressed by the defense-in-depth combination of fire rated barriers (includes fire doors and dampers and fire rated penetration seals), types of automatic suppression (sprinklers, open head spray and CO_2) and detection (ionization and thermal), standpipe and hose stations and a well trained Fire Brigade (dedicated fire department). In addition, transient combustibles are adequately controlled by a Transient Combustible Control procedure.

Part VIII, section B.3.c is revised to address this guideline and is included in the May 18, 2011 FPR submittal.

25. NRC Question (RAI FPR VIII-18)

Provide plant conformance information for the guidance regarding primary and secondary containment in Part VIII, entry F.1.a, "Appendix A Guidance," on pages VIII-51 and -52 of the January 14, 2011, version of the FPR.

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

TVA Response:

The details are in Part VI of the FPR as stated in the "Plant Conformance" column. Additional information and details are provided in WBN system descriptions N3-13-4002, Fire Detection System and N3-26-4002, High Pressure Fire Protection System.

26. NRC Question (RAI FPR VIII-19)

Provide plant conformance information for the guidance regarding ventilation and drainage in radwaste areas in Part VIII, entry F.14, "Appendix A Guidance," at the top of page VIII-69 of the January 14, 2011, version of the FPR.

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

TVA Response:

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.

27. NRC Question (RAI FPR IX-1)

Part IX, entry III.G.2.a, "Plant Conformance," of the as-designed FPR states, in part: "Structural steel required to support a required fire barrier is protected as discussed in Part II of the FPR." [pg. IX-9 of the January 14, 2011, version]

The reviewers could not locate this information in Part II of the FPR. Provide more detail concerning the location of this information within Part II. If the information does not exist in Part II resolve the conflict.

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

TVA Response:

The only structural steel required to support a required fire barrier is the electrical raceway supports that are protected with electrical raceway fire barrier systems. The location concerning this information is found in FPR Part II, Section 12.10.2, "Raceway Protection." The details for protecting the supports are found in Mechanical Design Standard DS-M17.2.2 and General Engineering Specification G-98. NRC previously reviewed and approved these issues as documented in SSER 18 (FPR Part II, Section 4.3.9) and by letter from NRC to TVA dated January 6, 1998 (FPR Part II, Section 4.3.11).

28. NRC Question (RAI FPR IX-2)

Part IX, entry III.L.1 "Plant Conformance," of the as-designed FPR states, in part: "No fuel clad damage, rupture of any primary coolant boundary or rupture of the containment boundary will occur because these conditions are prevented from occurring following a fire in the control room and auxiliary instrument room." [pg. IX-15 of the January 14, 2011, version]

Confirm that the above statement is correct for fires in all alternate shutdown areas, not just the control room and (presumed Unit 1) auxiliary instrument room.

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

TVA Response:

This sentence is revised in the May 18, 2011 FPR submittal to read:

> "No fuel clad damage, rupture of any primary coolant boundary or rupture of the containment boundary will occur because these conditions are prevented from occurring following a fire in the Control Building."

The Control Building is the only alternate shutdown area and thus this statement regarding the control building is correct. The auxiliary instrument room is a subset of the control building and is thus addressed by the new wording.

29. NRC Question (RAI FPR MSO-1)

Describe TVA's plans (schedule, level of detail, etc.) to incorporate multiple spurious operation (MSO) information (found, for example, in the "WBN Unit 2 Multiple Spurious Operation Evaluation Report") into the FPR.

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

TVA Response:

FPR Part III, Section 11.0 was added to the FPR in enclosure 1 to letter dated March 16, 2011 (Reference 2) to describe the MSO evaluations. For the long term, TVA plans to convert the MSO evaluations for both units into engineering calculations. Additionally 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.

30. NRC Question (RAI FPR MSO-2)

Section 1.0, "Purpose," of the "WBN Unit 2 Multiple Spurious Operation Evaluation Report," Revision 1 (hereafter referred to as the "WBN Unit 2 MSO Report, Revision 1"), which was submitted to the NRC on November 5, 2010 (ML103160419), states, in part:

> *This report provides the result of the evaluation of Watts Bar (WBN) Unit 2 for issues resulting from the publication of Nuclear Regulatory Commission (NRC) Regulatory Guide 1.189 Rev. 2 (RG 1.189) (Ref. 1). Specifically, Section 5.3 of RG 1.189 discusses an allowable approach to address multiple fire induced circuit failures.*

Section 2.0, "Results," of the WBN Unit 2 MSO Report, Revision 1, states, in part: "Many of the resolutions were identified by the baseline post fire safe shutdown analysis (FSSD) and resulting plant modifications are in process."

Confirm that the resolutions that were identified by the baseline post fire safe shutdown analysis are consistent with the guidance in RG 1.189, which addresses multiple fire induced circuit failures.

Provide a summary evaluation and technical justification for any resolutions, safe shutdown compliance strategies, analyses or operator manual actions in the MSO evaluation that did not utilize the above referenced RG 1.189 approach.

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

TVA Response:

The Unit 2 FSSD analysis resolutions credited in WBN Unit 2 MSO Report, Revision 1 Appendix B and C (Reference 3), considered multiple fire induced circuit failures in accordance with the guidance in RG 1.189, Revision 2.

31. NRC Question (RAI FPR MSO-4)

Appendix A, Section 6.2, "Notes," of the WBN Unit 2 MSO Report, Revision 1, states, in part:

> *Also note that the letdown isolation valves and letdown orifice valves are often interlocked such that the isolation valves will not open without the orifice valves being open. Letdown failure to isolate can be a single spurious operation with interlocked valves.*

Various "Notes" sections addressed possible single spurious actuation for scenarios.

Provide the specific methods used to incorporate any single spurious actuations, not presently analyzed in the FPR, into the post-fire safe shutdown analysis.

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

TVA Response:

The single spurious actuations discussed in the MSO scenario descriptions did not identify any single spurious actuations that were not already included in the FSSD analysis.

32. NRC Question (RAI FPR MSO-5)

Appendix A, Section 53.2, "Notes," of the WBN Unit 2 MSO Report, Revision 1, states, in part:

> *This generic issue may have already been addressed during disposition of NRC Information Notice 92-18. This disposition should be reviewed in the context of multiple spurious operations and multiple hot shorts.*

Appendix A, Section 53.3.2, "Resolution" of the WBN Unit 2 MSO Report, Revision 1, states:

> *For all MOVs [motor operated valves] required to be manually operated to achieve safe shutdown following a fire outside the control building, perform a review to ensure that, if the limit/torque switch could be bypassed, the MOV motor torque will not damage the valve operator such that the valve cannot be manually operated.*

Describe the specific circuit analysis methods used in the above analysis and how the analysis methods meet the RG 1.189 approach to address multiple fire induced circuit failures. Provide a technical justification for any of the circuit analyses not performed in accordance with the RG 1.189 approach.

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

TVA Response:

The MOV analysis identified the control circuit cables located in the fire zone where manual MOV operation is credited. Multiple fire induced circuit failures in accordance with RG 1.189 revision 2 were applied concurrently to the cables in the fire zone. The analysis results identified those valves whose fire induced control circuit failures could spuriously operate the valve and also bypass the torque/end of travel limit switches.

33. NRC Question (RAI FPR MSO-6)

Appendix A, Section 54.3.1., of the WBN Unit 2 MSO Report, Revision 1, states:

> *Based on the baseline FSSD design changes have been issued to provide adequate physical separation between redundant sensing instruments and cables such that fire damage cannot cause a spurious engineering safeguards actuation signal (ESFAS) except for a control building fire. The control building is an alternative shutdown area. For control building fires the control room will be abandoned and safe shutdown achieved from the backup control stations. [emphasis added]*

Typically, post-fire safe shutdown relies on the auxiliary control room to be the central control point when the control room has been abandoned. Based on the FPR Part II, item 14.10.j, the backup control station is for the operation of valves related to steam generators and AFW only. Explain the use of the term "backup control station" in this context. Also,

resolve the apparent conflict between the concepts of shutting the Units down (after MCR abandonment) from the auxiliary control room versus from the "backup control stations."

Ensure that an extent of condition review has been performed to ensure that other, similar instances have been identified and addressed as required.

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

TVA Response:

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." No FPR update is required since FPR Part VI, Section 3.54.21.1 defines the term "auxiliary control system."

Enclosure 2

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

Regulatory Commitments

1. 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]

2. 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)]

3. 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.
    a. [Enclosure 1, Letter Item 7. NRC Question (RAI FPR VII-4)]

4. 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)]

5. 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)]

6. 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)]