

March 24, 2009

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

Gentlemen:

In the Matter of  
Tennessee Valley Authority

)  
)

Docket No. 50-390

**WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 – DENIAL OF NON-CITED VIOLATION (NCV) 05000390/2008005-04, CARBON DIOXIDE SYSTEM IN FIRE AREA 48 FAILED TO MEET DESIGN CRITERION**

References:

1. NRC's letter, "Watts Bar Nuclear Plant - NRC Integrated Inspection Report 05000390/2008005, 05000391/2008005, and 05000390/2008501 and Exercise of Enforcement Discretion," dated February 12, 2009. (ADAMS Accession No. ML090440261)
2. NUREG-0847, Supplement Number 18, "Safety Evaluation Report related to the operation of Watts Bar Nuclear Plant, Units 1 and 2, Docket Nos. 50390 and 50-391," dated October 1995
3. TVA's letter, "Request for Correction to NUREG-0847, Supplement 18, Related to WBN Carbon Dioxide Fire Suppression System," dated March 13, 2009
4. TVA's letter, "Denial of Non-Cited Violation (NCV) 05000390/2008005-04, Carbon Dioxide System in Fire Area 48 Failed to meet Design Criterion," dated March 23, 2009

This letter supersedes in its entirety TVA's letter dated March 23, 2009, "Denial of Non-Cited Violation (NCV) 05000390/2008005-04, Carbon Dioxide System in Fire Area 48 Failed to meet Design Criterion" (Reference 4). Updated information is provided in a revised version of Enclosure 1. TVA regrets any inconvenience this may have caused.

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The events leading to the NRC's issuance of NCV 05000390/2008005-04 in Inspection Report 05000390/2008005, dated February 12, 2009 (Reference 1), demonstrated there was a misstatement in Supplement 18 to the WBN Safety Evaluation Report (SER) (Reference 2). TVA understands the need to correct this misstatement and has submitted a request to the NRC, under separate cover, to have the SSER corrected (Reference 3).

A further problem exists, however, in the fact that NRC has relied upon this misstatement in SSER 18 in forming the basis for the subject violation. For the reasons set forth in Enclosure 1 to this letter, TVA does not believe that circumstances warrant, or support, the issuance of a violation. TVA has evaluated the technical adequacy of the 45% percent concentration in two documents; 1) Functional Evaluation 43182, and 2) Fire Protection Program Change Regulatory Review (NEI 02-03). These documents are provided in Enclosures 2 and 3, respectively.

In a March 13, 2009 teleconference, TVA and NRC Region II representations discussed aspects of TVA's concern with the subject NCV. As part of the teleconference, an extension of 1 week to the normal 30-day response time was verbally granted. This response is being provided in accordance with that schedule.

There are no regulatory commitments in this letter. If you have any questions concerning this matter, please call Mike Brandon, WBN Unit 1 Licensing and Industry Affairs Manager at (423) 365-1824.

Sincerely,

Mike Skaggs

Enclosures  
cc: See Page 3

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Enclosures

cc (Enclosures):

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

U.S. Nuclear Regulatory Commission  
Mr. John G. Lamb, Senior Project Manager  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation  
MS O-8 H1A  
Washington, DC 20555-0001

U.S. Nuclear Regulatory Commission  
Region II  
Sam Nunn Atlanta Federal Center  
61 Forsyth St., SW, Suite 23T85  
Atlanta, Georgia 30303

## ENCLOSURE 1

### WATTS BAR NUCLEAR PLANT UNITS 1 REPLY TO NON-CITED VIOLATION (NCV) NCV 05000390/2008005-04

#### **Description of NCV 05000390/2008005-04**

“Watts Bar Unit 1 License Condition 2F requires that the licensee implement and maintain in effect all provisions of the approved fire protection program, as approved in Supplements 18 and 19 of the SER (NUREG-0847). These documents incorporate the requirements of 10 CFR 50, Appendix R, Section III.G.3. This section of Appendix R requires a fixed fire suppression system for the auxiliary instrumentation room area since it contains safe shutdown equipment and alternative safe shutdown was selected for this area. The Watts Bar CO<sub>2</sub> gas suppression system was required to be designed in accordance with NFPA 12, 1973 Edition and the SSER No.18. NFPA 12, 1973, specified that an acceptable CO<sub>2</sub> system deliver and hold a minimum gas concentration of 50 percent and the SSER stated that this concentration must be held for 15 minutes.

Contrary to the above, since receipt of the operating license on February 7, 1996, until the present, the CO<sub>2</sub> system for the auxiliary instrumentation room was not designed in accordance with the 1973 Edition of NFPA 12 and SSER No. 18, in that, the CO<sub>2</sub> system was unable to deliver and maintain a minimum gas concentration of 50 percent in the upper portion of the room for 15 minutes. Because this finding is of very low safety significance and has been entered into the licensee’s corrective action program as PER 125632, this finding is being treated as an NCV, consistent with Section VI.A.1 of the NRC’s Enforcement Policy: NCV 05000390/2008005-04, Carbon Dioxide System in Fire Area 48 Failed to Meet Design Criterion.”

#### **TVA Response**

TVA denies the violation.

#### **Basis for Denial of the Violation**

TVA’s Fire Protection Plan describes the design basis for the Auxiliary Instrument Rooms protected by CO<sub>2</sub>. The Plan provides as follows: “Auxiliary Instrument Rooms - Deep seated fires. Must achieve 30% concentration within 2 minutes, 50% concentration within 7 minutes, and maintain at least 45% concentration for at least 15 minutes.”

TVA arrived at this level of “soak time,” (i.e., at least 45% concentration for at least 15 minutes) as a result of an exchange of correspondence with NRC in 1995 (References 1 and 2). In Reference 1, Item 1 of NRC’s Request for Additional Information (RAI) asked TVA to justify how the current CO<sub>2</sub> system design met Section 2232 of NFPA 12-1973<sup>1</sup>.

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<sup>1</sup> NFPA-12, Section 2232 does not require a specific soak time of 15 minutes or of any specific duration. This section of the code only states:

“...required extinguishing concentration shall be maintained for a sufficient period of time to allow the smoldering to be extinguished and the material to cool...In any event, it is necessary to inspect the hazard immediately thereafter to make certain that the extinguishment is complete and to remove any material involved in the fire.”

## ENCLOSURE 1

### WATTS BAR NUCLEAR PLANT UNITS 1 REPLY TO NON-CITED VIOLATION (NCV) NCV 05000390/2008005-04

In Reference 2, TVA's response to Item 1 included the following commitment:

"TVA will revise the system design description for the CO<sub>2</sub> system supplying the auxiliary instrument rooms (Units 1 and 2) to include a minimum soak time. The soak time will be to maintain CO<sub>2</sub> concentration greater than 45% for at least 15 minutes. The revision will be completed by June 30, 1995."

NRC's SSER 18 (Reference 3) correctly recited the Fire Protection Plan's design basis that "the system must achieve a 30-percent concentration within 2 minutes and a 50-percent concentration within 7 minutes after system discharge." However, the SSER went on to state that, "In addition, the leakage from the room must be limited to and the system must maintain at least a 50-percent concentration for 15 minutes." This last statement appears for the first time in SSER 18 and is inconsistent with TVA's RAI response which commits to maintain a CO<sub>2</sub> concentration greater than 45% for at least 15 minutes. TVA failed to identify this misstatement as it should have when the SER was issued in 1995. TVA understands the need to correct this discrepancy and has submitted a request to the NRC, under separate cover (Reference 4), to have the SER corrected.

The fact remains, however, that WBN's CO<sub>2</sub> gas suppression system was designed for and can achieve a 50% concentration after discharge in accordance with NFPA 12, 1973 Edition. It will also, as committed, maintain a concentration greater than 45% for at least 15 minutes. These statements constitute WBN's current licensing basis for Auxiliary Instrument Rooms Carbon Dioxide Suppression System. The technical adequacy of this basis was revalidated and is supported by an Engineering Functional Evaluation (Enclosure 2) and Fire Protection Program Change Regulatory Review (Enclosure 3).

NRC's violation states that "Watts Bar Unit 1 License Condition 2F requires that the licensee implement and maintain in effect all provision of the approved fire protection program, as approved in Supplements 18 and 19 of the SER (NUREG-0847)" and that "the SSER stated that this concentration [50%] must be held for 15 minutes." TVA has demonstrated that this is a misstatement in the SSER and is outside of WBN's current licensing basis. TVA does not believe it is proper to engage in enforcement on the basis of a misstatement in the SSER. Nor does TVA believe that citing to a violation of a license condition cures the problem when the sole basis for the violation is a misstatement in the SSER which the license condition mentions as approving TVA's Fire Protection Report. The fact remains that the SSER misstates TVA's licensing basis, and the SSER cannot alone establish such a basis. Moreover, TVA is in compliance with the terms of the license condition as well, since WBN's Auxiliary Instrument Rooms CO<sub>2</sub> Suppression System fully conforms to the terms of the Fire Protection Report.

#### **TVA's Views Regarding Current Licensing Basis are Consistent with NRC's Views**

TVA believes that its views regarding what constitutes a valid current licensing basis are in accordance with NRC's own views. We acknowledge that, in addition to NRC requirements applicable to a certain plant, a plant's current licensing basis includes licensee's written

## ENCLOSURE 1

### WATTS BAR NUCLEAR PLANT UNITS 1 REPLY TO NON-CITED VIOLATION (NCV) NCV 05000390/2008005-04

commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis. The licensee's commitments remaining in effect are those made in docketed licensing correspondence, which include licensee commitments documented in NRC safety evaluations or licensee event reports (based on the Introduction of Revision 1 of Nuclear Reactor Regulation (NRR) Office Instruction LIC-100, "Control of Licensing Basis for Operating Reactors"). As such, it is clear that commitments such as the one made in TVA's May 26, 1995, letter (Reference 2) may be properly restated in an SSER and be considered part of WBN's current licensing basis.

However, it is also the case that SERs cannot alone establish a current licensing basis. NRC recognizes that SERs are valuable in that they provide the bases for the staff's decisions. However, "The staff should not attempt to establish licensing bases information in SEs or SERs. The staff can stress the importance of certain licensing bases information and can cite regulations, regulatory commitments, or other established licensing bases information in its safety evaluations. It is important that the licensees provide the licensing bases information so that there is no confusion following the licensing action and to avoid a perception of staff-imposed backfits (see 10 CFR 50.109)." (Excerpted from Section 6 of Revision 1 of NRR Office Instruction LIC-100, "Control of Licensing Basis for Operating Reactors")

#### **Conclusion**

TVA's May 26, 1995, letter (Reference 2) and TVA's approved Fire Protection Plan properly describe WBN's current licensing basis for WBN's CO<sub>2</sub> system for the Auxiliary Instrument Room and compliance with the NFPA 12-1973 (including soak time). This portion of the CO<sub>2</sub> system has been maintained at all times in a configuration that provides the committed concentrations and soak time and it has been fully qualified during the period Unit 1 has been operational. TVA does not believe it is proper to cite, as the sole basis for a violation, a misstatement contained only in SSER 18 regarding soak time for the Auxiliary Instrument Room. Accordingly, TVA denies the subject violation.

#### **References**

1. NRC's letter dated May 10, 1995 - Watts Bar Unit 1 - Request for Additional Information (RAI) Regarding Carbon Dioxide Automatic Fire Suppression Systems (TAC NO. M63648)
2. TVA's letter, "Watts Bar Nuclear Plant (WBN) - Reply to Request for Additional Information Regarding Carbon Dioxide Automatic Fire Suppression Systems," dated May 26, 1995 (ADAMS Accession No. ML073230886)
3. NUREG-0847, Supplement Number 18, "Safety Evaluation Report related to the operation of Watts Bar Nuclear Plant, Units 1 and 2, Docket Nos. 50390 and 50-391," dated October 1995
4. TVA's letter, "Request for Correction to NUREG-0847, Supplement 18, Related to WBN Carbon Dioxide Fire Suppression System," dated March 13, 2009

## ENCLOSURE 2

### WATTS BAR NUCLEAR PLANT UNITS 1 FUNCTIONAL EVALUATION FOR CO<sub>2</sub> FOR UNIT 1 AUXILIARY INSTRUMENT ROOM

#### 1.0 Description

Problem Evaluation Report (PER) 125632 was written based upon NRC's NUREG-0847, Supplemental Safety Evaluation Report (SSER) 18 specifies a Carbon Dioxide (CO<sub>2</sub>) concentration in the Auxiliary Instrument Room Unit 1 at 15 minutes of 50% vs. the Fire Protection Report (FPR) concentration of 45%. The NRC inspectors believe that although the CO<sub>2</sub> system appears to be capable of performing its function in the Auxiliary Instrument Room, the actual analysis to demonstrate the 45% concentration could be enhanced to address what fires could possibly be generated in this area. The 50% value in the SSER appears to be an editorial error since all docketed correspondence just prior to the issuance of the SSER stated the system is designed to 45% concentration. The NRC considers this item to be a violation of WBN License Condition 2.F, "Approved Fire Protection Program."

#### 2.0 Required Function

The primary function of the automatic CO<sub>2</sub> fire suppression systems is to extinguish a fire or control and minimize the effects of a fire until the fire brigade can respond and extinguish it. The automatic total flooding CO<sub>2</sub> suppression systems have been provided for the Auxiliary Instrument Rooms and Computer Room in the Control Building; and the Lube Oil Storage Room, each Diesel Engine Room (4), Fuel Oil Transfer Room, and each 480-V Board Rooms (4) in the Diesel Generator Building.

A signal from either the fire detection system or a push button station activates the area alarms, CO<sub>2</sub> discharge timer which actuates the master control valve and the area selector valve permitting the CO<sub>2</sub> to be discharged into the selected area. In addition, the system can be manually operated via the electro-manual pilot valve for each hazard protected.

Personnel safety is considered by providing the predischarge alarm to notify anyone in the area that CO<sub>2</sub> is going to be discharged and by the addition of an odorizer to the CO<sub>2</sub> to warn personnel that CO<sub>2</sub> has been discharged.

Actuation of the CO<sub>2</sub> system causes selective closure of dampers and doors to the area protected, and shuts down HVAC fans to the protected area. This prevents spread of the fire and ensures that the minimum concentration of CO<sub>2</sub> is maintained. Full discharge tests for representative rooms in conjunction with door fan pressurization tests have been conducted to validate CO<sub>2</sub> concentration and soak times. The duration of the discharge is determined by the area requirements and is controlled by the discharge timer. This system is quality related.

#### 3.0 Evaluation

The following documents were reviewed:

## ENCLOSURE 2

### WATTS BAR NUCLEAR PLANT UNITS 1 FUNCTIONAL EVALUATION FOR CO<sub>2</sub> FOR UNIT 1 AUXILIARY INSTRUMENT ROOM

Date	Document Description
October 1986	Sandia National Laboratory NUREG/CR-3656, "Evaluation of Suppression Methods for Electrical Cable Fires"
April 8, 1992	NRC Information Notice 92-28
April 6, 1995	NRC Inspection Report No. 50-390/95-16, 50-391/95-16
May 1, 1995	NRC Inspection Report No. 50-390/95-26, 50-391/95-26
May 10, 1995	NRC Request for Additional Information (RAI) Regarding Carbon Dioxide Automatic Fire Suppression Systems (TAC No. M63648)
May 26, 1995	TVA Reply to Request for Additional Information (RAI) Regarding Carbon Dioxide Automatic Fire Suppression Systems (TAC No. M63648)

NRC RAI (TAC No. M63648) states that in order to further evaluate these inspection findings and assess the design of these CO<sub>2</sub> suppression systems due to changing minimum required CO<sub>2</sub> concentration 50% to 45% for 15 minutes, the staff has reviewed NFPA-12-1973 and NFPA-12, 1989 edition that considers the results of fire suppression experiments performed by Sandia National Laboratories (NUREG/CR-3656, "Evaluation of Suppression Methods for Electrical Cable Fires," October 1986), and the recommendations of NFPA-12, 1989 edition Section 2232. TVA concluded in response to this RAI that the CO<sub>2</sub> suppression system for the Auxiliary Instrument Rooms is adequately designed for a deep seated fire. The soak time will maintain CO<sub>2</sub> concentration > 45% for at least 15 minutes.

There are significant differences between Sandia Test Number 83 and the WBN Unit 1 Auxiliary Instrument Room configuration that provides assurance that WBN's Unit 1 Auxiliary Instrument Room CO<sub>2</sub> suppression is more robust than the test case.

- The Sandia Test total time that the CO<sub>2</sub> concentration was above 50% was approximately 4 minutes. The total time there was CO<sub>2</sub> in the room before ventilation was restored was 8 minutes. WBN Unit 1 Auxiliary Instrument Room has CO<sub>2</sub> concentration of 30% within 2 minutes, 50% within 7 minutes, maintains greater than 50% for 10 minutes, and greater than 45% for 15 minutes.
- The Sandia Test cables did not reignite until ventilation was restored to the room. Note that this essentially terminated the test. WBN actuation of the CO<sub>2</sub> system in Unit 1 Auxiliary Instrument Room causes closure of fire dampers and sliding fire doors to prevent air flow into the area of CO<sub>2</sub> discharge. Upon visual confirmation of a fire in this area, the fans are manually shutdown to stop airflow to adjacent areas, and causes additional closure of selected fire dampers. These fans are not restarted until the fire has been extinguished.
- It can be seen from the rapid decay of CO<sub>2</sub> shown in Sandia Figures 36 that the test room was not a tight room. In contrast, the WBN Unit 1 Auxiliary Instrument Room is very tight and are able to maintain the CO<sub>2</sub> for a substantial period of time.



## ENCLOSURE 2

### WATTS BAR NUCLEAR PLANT UNITS 1 FUNCTIONAL EVALUATION FOR CO<sub>2</sub> FOR UNIT 1 AUXILIARY INSTRUMENT ROOM

- Another important consideration is the method of achieving and the length of time required to achieve a deep seated fire for Sandia Test Number 83. The Sandia test used Bunsen burners located directly below the cable trays for 18 minutes to establish fully involved cable trays. The burners were turned off and the trays were allowed to free burn for another minute, and then the ventilation was secured and dampers closed. TVA calculation EPM-DOM-012990, "Combustible Loading Data (CLD)" establishes the Fire Severity Index for the following areas in the Control Building:

Floor Elevation (Ft)	Combustible Load (Btu/ft <sup>2</sup> )	Fire Severity Index	Equivalent Fire Severity (minutes)
692.0	20,963	Insignificant	< 5
708.0	105,902	Moderate	< 120
729.0	529,584	Severe	> 180
755.0	29,817	Low	< 60

Elevations 708.0 and 729.0 have the highest Fire Severity Index based on combustible loading in the Control Building. These areas contain the Unit 1 Auxiliary Instrument Room (708.0-C1), Corridor (708.0-C2), Computer Room (708.0-C3), Unit 2 Auxiliary Instrument Room (708.0-C4), and the Cable Spreading Room (729.0-C1). These areas were evaluated for fire risk as a part of the Electric Power Research Institute (EPRI) Fire Induced Vulnerability Evaluation. TVA calculation WBN-IPE-004, "Zone of Influence" determined that the only ignition source is two air handling units in the Corridor on Elevation 708.0. TVA calculation WBN-IPE-005, "Quantitative Screening - Phase 2 (Detailed Screening)" Corridor (708.0-C2) was screened out since the room did not have any safety related component impacts. Cable Spreading Room (729.0-C1) was screened out due to a lack of significant fire ignition sources and the presence of automatic detection and suppression capability. Based upon this evaluation, all these areas were screened out from a detail review, and were screened out due to a lack of significant fire ignition sources and/or the presence of automatic detection and suppression capability. Based on a review of these calculations, a fire in Unit 1 Auxiliary Instrument Room would be detected in its early stages, would be controlled by the suppression system, and the development of an extensive fire is not expected to occur.

Therefore, this review determines that TVA 1978 designed automatic CO<sub>2</sub> suppression system provided for the Unit 1 Auxiliary Instrument Room at Watts Bar is adequately designed for a deep seated fire. TVA detection and suppression systems would detect and suppress any fire with the potential of the severity needed to induce a deep seated fire. The defense in depth fire protection at Watts Bar ensures that the fire protection provided for the Unit 1 Auxiliary Instrument Room is in compliance with the applicable sections of NFPA 12-1973 and therefore meet the regulatory requirements found in Branch Technical Position (BTP) 9-5.1, Appendix A, paragraph F.6 and 10CFR50, Appendix R, paragraph III.G.3.

This is considered to be a non-conforming condition since there is a conflict between the FPR and the SER. This is not an adverse effect on the design function of the system, and is not a margin management issue. Other degraded or non-conforming conditions and margin management issue were reviewed for adverse aggregate effect, none were identified.

## ENCLOSURE 2

### WATTS BAR NUCLEAR PLANT UNITS 1 FUNCTIONAL EVALUATION FOR CO<sub>2</sub> FOR UNIT 1 AUXILIARY INSTRUMENT ROOM

#### 4.0 Limitations

No compensatory actions (manual or automatic actions, configuration changes), and no operational mode restrictions are required as a condition of operability. No interim measures are needed.

#### 5.0 Conclusion

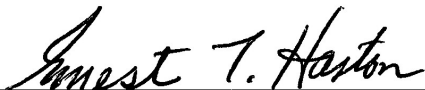
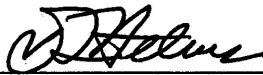

The automatic CO<sub>2</sub> suppression system provided for the Unit 1 Auxiliary Instrument Room is adequately designed for a deep seated fire. The detection and suppression system would detect and suppress any fire with the potential of the severity needed to induce a deep seated fire. Although the design function of this suppression system is maintained, a discrepancy between the FPR and the SER does represent a non-conforming condition, and this condition will be resolved and docketed with the NRC. Therefore, the automatic CO<sub>2</sub> suppression system remains functional.

#### 6.0 References:

- 6.1 WBN Fire Protection Report, Revision 37
- 6.2 N3-39-4002 R9, "CO<sub>2</sub> Storage, Fire Protection, and Purging"
- 6.3 WBN Technical Specifications (TS) and Applicable Bases (None Found Applicable)
- 6.4 WBN Technical Requirements Manual (TRM) and Applicable Bases (None Found Applicable)
- 6.5 Sandia National Laboratory NUREG/CR-3656, "Evaluation of Suppression Methods for Electrical Cable Fires", October 1986
- 6.6 NRC Information Notice 92-28, April 8, 1992
- 6.7 NRC Inspection Report No. 50-390/95-16, 50-391/95-16, April 6, 1995
- 6.8 NRC Inspection Report No. 50-390/95-26, 50-391/95-26, May 1, 1995
- 6.9 NRC Request for Additional Information (RAI) Regarding Carbon Dioxide Automatic Fire Suppression Systems (TAC No. M63648), May 10, 1995
- 6.10 TVA Reply to Request for Additional Information (RAI) Regarding Carbon Dioxide Automatic Fire Suppression Systems (TAC No. M63648), May 26, 1995

#### 7.0 Signatures:

FE 43182 Revision 0

Preparer:	 Ernest T. Haston	Date:	<u>02/17/2009</u>
Reviewer:	 Doug F. Helms	Date:	<u>2/17/09</u>
Reviewer:	 Chris J. Reidl	Date:	<u>2/17/2009</u>

Enclosure 3

PER # 125632 R0

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ATTACHMENT 1

Fire Protection Program Change Regulatory Review (FPPCRR)

1. Station(s) / Unit(s): Watts Bar / 1 Activity Document No: PER 125632

2. Description:

Provide a brief description of, including the reason for, the proposed change (or refer to change package that provides description):

At Watts Bar, a CO2 suppression system has been installed in the Auxiliary Instrument Room to meet the requirements of Appendix R, Section III.G.3. NRC Supplemental Safety Evaluation Report (SSER) No. 18 (NUREG 0847), states that the CO2 system must achieve a concentration of at least 50 percent within seven minutes of initiation and hold that concentration for 15 minutes. This statement may be construed as meaning the concentration values must be achieved at any point in the room where combustibles capable of deep seated fires are located. The basis for these values in the SSER is testing performed by Sandia National Laboratory on deep seated fires and CO2 systems as described in NRC Information Notice 92-28, Inadequate Fire Suppression System Testing, issued April 8, 1992.

The Watts Bar Fire Protection Report (FPR) states that the system is capable of achieving 50 percent concentration within seven minutes and maintaining at least a 45 percent concentration for at least 15 minutes. NFPA No.12 - 1973 (the code of record) specifies 50 percent concentration for deep-seated fires, but does not specify a definite hold time.

Although there is an identified difference between the SSER and the FPR with regard to the concentration at 15 minutes, based on a technical review of the Sandia Test Report, it has been determined that the 45% concentration obtained during the TVA tests is consistent with the Sandia tests and the WBN CO2 system design basis. A review of the docketed correspondence between TVA and the NRC prior to Licensing show that the 45% concentration was NRC reviewed and is our licensing basis.

This evaluation will further document the acceptability of the CO2 system as described in the FPR.

3. Screening:

Answer the following questions; include a reference to the applicable regulatory, licensing basis, or NFPA document(s), and a brief description of why the proposed change does or does not satisfy the referenced document(s).

Note: If acceptance of the feature being changed was based on a commitment to "exceed" an applicable requirement or guidance document, then further evaluation may be necessary.

A. Does the proposed change satisfy applicable fire protection regulatory requirements (i.e., GDC, 10CFR 50.48 and Appendix R), guidance documents (i.e., NUREG 0800, NRC Generic Letters, NFPA Codes, or NRC-approved NEI guidance documents), and/or the fire protection licensing basis (i.e., previously approved alternate compliance strategy, exemption, deviation, SER, docketed correspondence, or NFPA Codes of Record, etc.)?

- Yes
No

## ATTACHMENT 1

**Fire Protection Program Change Regulatory Review (FPPCRR)**Basis for Determination:

Based upon the discussion in Question 2 above, there is a discrepancy between the WBN FPR and the SSER.

If yes, then the proposed change does not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire and NRC approval is not required, check Steps 3.B and 3.C N/A, and proceed to Step 4 B (see Appendix A for additional guidance).

If no, then complete Step 3.B.

- B. Was the plant licensed prior to January 1, 1979

Yes  
 No  
 N/A

If yes, then complete to Step 3.C.

If no, then check Step 3.C N/A and proceed to Step 4 (see Appendix A for additional guidance).

- C. Does the proposed change satisfy the detection, suppression and/or separation requirements within the fire area or zone affected by the change specified in Appendix R Sections III.G.2 and/or III.G.3?

Yes  
 No  
 N/A

If yes, then proceed to Step 4 (see Appendix A for additional guidance).

If no, then NRC approval is required prior to implementing the proposed change. Proceed to Step 5.

**4. Evaluation:**

Does the proposed change adversely affect the ability to achieve and maintain safe shutdown in the event of a fire (provide justification below or attach Generic Letter 86-10 type or equivalent evaluation)?

Yes  
 No  
 N/A [This block not included in original NEI form]

## ATTACHMENT 1

**Fire Protection Program Change Regulatory Review (FPPCRR)**Basis for Determination:

The Fire Hazards and Suppression System in the Unit 1 Auxiliary Instrument Room have been evaluated as noted below:

The following documents were reviewed:

Date	Document Description
October 1986	Sandia National Laboratory NUREG/CR-3656, "Evaluation of Suppression Methods for Electrical Cable Fires"
April 8, 1992	NRC Information Notice 92-28
April 6, 1995	NRC Inspection Report No. 50-390/95-16, 50-391/95-16
May 1, 1995	NRC Inspection Report No. 50-390/95-26, 50-391/95-26
May 10, 1995	NRC Request for Additional Information (RAI) Regarding Carbon Dioxide Automatic Fire Suppression Systems (TAC No. M63648)
May 26, 1995	TVA Reply to Request for Additional Information (RAI) Regarding Carbon Dioxide Automatic Fire Suppression Systems (TAC No. M63648)

## The Sandia Test versus TVA CO2 Test

- Sandia Test Number 83 - the total time that the CO2 concentration was above 50% was approximately 4 minutes. The total time there was CO2 in the room before ventilation was restored was 8 minutes. TVA Unit 1 Auxiliary Instrument Room has CO2 concentration of 30 % within 2 minutes, 50 % within 7 minutes, maintains greater than 50 % for 10 minutes, and greater than 45 % for 15 minutes. Based on this comparison of key CO2 concentration parameters, it is concluded that the design of the Auxiliary Instrument Room provides an equivalent level of fire suppression capability.
- Sandia Test Number 83 - the cables did not reignite until ventilation was restored to the room. Note that this essentially terminated the test. TVA actuation of the CO2 system in Unit 1 Auxiliary Instrument Room causes closure of fire dampers and sliding fire doors to prevent air flow into the area of CO2 discharge. Upon visual confirmation of a fire in this area, the fans are manually shutdown to stop airflow to adjacent areas, and causes additional closure of selected fire dampers. These fans are not restarted until the fire has been extinguished, visual inspections have been performed by the Onsite Fire Department, and the plant has entered into a fire recovery effort. At this time, in the unlikely event the fire reignited, the fire would be immediately suppressed by the fire fighting personnel at the scene
- Sandia Test Number 83 - it can be seen from the rapid decay of CO2 shown in Sandia Figures 36 that the test room was not a tight room. In contrast, the TVA Unit 1 Auxiliary Instrument Room is very tight and is able to maintain the CO2 for a substantial period of time.
- Another important consideration is the method of achieving and the length of time required to achieve a deep seated fire for Sandia Test Number 83. The Sandia test used Bunsen burners located directly below the cable trays for 18 minutes to establish fully involved cable trays. The burners were turned

## ATTACHMENT 1

**Fire Protection Program Change Regulatory Review (FPPCRR)**

off and the trays were allowed to free burn for another minute, and then the ventilation was secured and dampers closed. No ignition sources located in the Unit 1 Auxiliary Instrument Room would introduce thermal insult approximating the initial conditions utilized in the test.

- TVA calculation EPM-DOM-012990, "Combustible Loading Data (CLD)" establishes the Fire Severity Index for the WBN.

Elevation 708.0 has a Fire Severity Index of Moderate base on combustible loading calculation. This area contains several rooms, including the Unit 1 Auxiliary Instrument Room (708.0-C1), Corridor (708.0-C2), Computer Room (708.0-C3), and Unit 2 Auxiliary Instrument Room (708.0-C4). The Unit 1 Auxiliary Instrument Room is designed/configured such that it is highly unlikely that a fire could progress past the incipient stages without detection and subsequent suppression by either the automatic CO2 system or the plant fire department. This is based on the following: (1) lack of ignition source(s) with sufficient energy to introduce thermal insult to more than a local area of exposed cable trays; (2) existence of a detection system which ensures prompt detection of a fire in its incipient stages; (3) a room configuration such that rapid development of a cable tray type fire is not likely, specifically, the trays are located several feet below the ceiling thus requiring a large fire to establish a hot gas layer that would impact the trays; and (4) the bounding nature of the CO2 system design relative to the Sandia Tests as discussed in the previous paragraphs.

As a final consideration, a review of the IPE was performed to ensure this area did not introduce risk considerations that would warrant more stringent defense-in-depth controls/features. This review of the IPE and its supporting documentation determined that a fire in the Unit 1 Auxiliary Instrument Room would be detected in its early stages, would be controlled by the suppression system, and the development of an extensive fire is not expected to occur. Based on these considerations, it was determined that this area had a low risk relative ranking for WBN and would not warrant any additional defense-in-depth, above that currently provided by the existing Fire Protection Program.

This review performed and discussed above, determined that the designed automatic CO2 suppression system provided for the Unit 1 Auxiliary Instrument Room at Watts Bar is adequately designed for the hazard it is protecting. While a deep seated fire has been postulated and designed for in this area, the configuration of the room is such that it is not likely to occur. These considerations when coupled with the detection and suppression systems, would serve to reduce the severity of any fire in this area, including a postulated deep seated fire. Therefore, the fire protection plan for the Auxiliary Instrument Room at Watts Bar ensures that the level of fire protection provided for the Unit 1 Auxiliary Instrument Room is in compliance with the applicable sections of NFPA 12-1973 and therefore meet the defense-in-depth design philosophy as found in Branch Technical Position (BTP) 9-5.1 and NUREG 0600. Based on this conclusion, it is determined that the condition discussed in section 1, above, does not introduce any adverse affects relative to the Fire Protection Program for the Auxiliary Instrument Rooms at WBN.

Enclosure 3

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ATTACHMENT 1

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If yes, then the proposed change may not be implemented without prior NRC approval.

If no, then the proposed change does not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire, and NRC approval is not required.

5. Conclusion:

- Proposed change may be implemented without prior NRC approval.
- NRC approval is required prior to implementing the proposed change.

6. I have determined that the documentation is adequate to support the above conclusion.

Preparer:	<u>Ernest T. Haston</u> SFPE Member No. 10253 Print	/	<u><i>Ernest T. Haston</i></u> Signature	/	<u>11/09/2007</u> Date
Reviewer:	<u>Robert R. Kirpatrick</u> SFPE Member No. Print	/	<u><i>Robert R. Kirpatrick</i></u> Signature	/	<u>11/30/2007</u> Date
Reviewer:	<u>Rickey Stockton</u> Print	/	<u><i>Rickey Stockton</i></u> Signature	/	<u>11/30/2007</u> Date