



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

December 2, 2005

Tennessee Valley Authority
ATTN: Mr. K. W. Singer
Chief Nuclear Officer and
Executive Vice President
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT UNIT 1 RECOVERY - NRC INSPECTION
REPORT 05000259/2005016

Dear Mr. Singer:

On November 4, 2005, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection associated with recovery activities at your Browns Ferry Unit 1 reactor facility. The enclosed inspection report documents the inspection results, which were discussed on November 4, 2005, with Mr. R. Jones and other members of your staff.

This inspection examined activities conducted under your Unit 1 license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license and also with fulfillment of Unit 1 Regulatory Framework Commitments. The inspection focused on the Special Program for Fire Protection. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel. Based on the results of this inspection, no violations or findings of significance were identified. However, the report includes one unresolved item related to the intended use of an extensive number of local operator actions during implementation of fire response procedures for Unit 1 fires. Depending on its resolution, this issue may impact Unit 1 restart activities.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

D. Charles Payne, Chief
Engineering Branch 2
Division of Reactor Safety

Docket No. 50-259
License No. DPR-33

Enclosure: Inspection Report 05000259/2005016
w/Attachment: Supplemental Information

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ADAMS: X Yes ACCESSION NUMBER: _____

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E-MAIL COPY?	YES NO	YES	YES NO	YES	YES NO	YES NO	YES NO

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No: 50-259

License No: DPR-33

Report No: 05000259/2005016

Licensee: Tennessee Valley Authority (TVA)

Facility: Browns Ferry Nuclear Plant, Unit 1

Location: Corner of Shaw and Nuclear Plant Roads
Athens, AL 35611

Dates: October 17 - 21 and October 31 - November 4, 2005

Inspectors: P. Fillion, Senior Reactor Inspector - Lead Inspector
M. Thomas, Senior Reactor Inspector
G. Wiseman, Senior Reactor Inspector (second week)

Approved by: D. Charles Payne, Chief
Engineering Branch 2
Division of Reactor Safety

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EXECUTIVE SUMMARY

Browns Ferry Nuclear Plant, Unit 1
NRC Inspection Report 05000259/2005016

This inspection included aspects of licensee engineering and modification activities associated with the Unit 1 Recovery Special Program for Fire Protection. The inspection program for the Unit 1 Restart Program is described in NRC Inspection Manual Chapter 2509. Information regarding the Browns Ferry Unit 1 Recovery and NRC Inspections can be found at <http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/bf1-recovery.html>.

Inspection Results - Engineering

- Review of updates to the Fire Protection Report made as a result of Unit 1 restart work indicated that Unit 1 is maintaining the same fire protection program and analysis methodology as Units 2 & 3. (Section E1.1.b(1))
- An unresolved item was initiated because NRC Safety Evaluation Reports covering fire protection were not clear on whether local operator actions as utilized by Browns Ferry for post-fire safe shutdown were approved by the NRC as an exemption to 10 CFR 50, Appendix R, Section III.G.2. (Section E1.1.b(1))
- The licensee's current design approach to the analysis of multiple spurious operations is not consistent with published NRC interpretations on this subject in that, at present, the licensee has assumed substantial time delay between two potential spurious operations which together could adversely affect safe shutdown. The licensee stated it is planning a study to apply more stringent criteria in consideration of multiple spurious operations. (Section E1.1.b(3))
- Control of design changes being implemented to bring Unit 1 into compliance with 10 CFR 50, Appendix R, was effective. This conclusion was based on inspector verification of correct implementation of four modifications recommended by calculations. (Section E1.2)
- Follow-up on corrective action program problem reports generated as a result of a previous inspection of Unit 1 restart in the area of fire protection indicated that those issues had been adequately resolved. (Section E1.4)
- In September 2003 and October 2004, the licensee performed self-assessments of the Unit 1 Recovery Special Program for Fire Protection. The scope and results of these self-assessments indicate they helped verify compliance with and effectiveness of the quality assurance program for design control. (Section E1.4)

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REPORT DETAILS

II. Engineering

E1 Conduct of Engineering

E1.1 Review of the Fire Protection Report and Selected Safe Shutdown Topics (37550)

a. Inspection Scope

Inspectors compared the Fire Protection Report (FPR) for Units 2 & 3 to the draft under development for restart of Unit 1 and for combined three unit operation. The purpose of this review was to determine whether any significant changes to the Units 2 & 3 report were being contemplated to accommodate the Unit 1 restart. Exemptions to the requirements for fire protection contained in NRC Safety Evaluation Reports (SERs) were evaluated in light of upcoming Unit 1 operation. In addition, the following safe shutdown analysis topics were reviewed:

- Use of local operator actions (manual actions),
- Use of fire-rated materials for cable protection,
- The design basis relative to the number of simultaneous spurious operation which must be designed against.

b. Observations and Findings

(1) Local Operator Actions

During review of Calculation ED-Q0999-2003-0048, "Unit 1, 2, and 3 Appendix R Manual Action Requirements," Rev. 2, the inspectors noted that the licensee credited the use of numerous local operator actions to achieve safe shutdown during a fire event in any given fire area/fire zone. These included local operator actions related to fire areas falling under the requirements of Appendix R, Section III.G.2, which does not allow local operator actions, but requires a combination of automatic control and main control room operator actions to effect shutdown.

The inspectors observed that the calculations were recommending a relatively large number of local operator actions as resolutions to safe shutdown cable separation problems. The inspectors learned during interviews with plant personnel and review of Post Issuance Change (PIC) 61965, that plant operations personnel questioned whether racking out some of the circuit breakers to reduce diesel generator loading, as specified by the analysis, could be accomplished within the time frame specified in the analysis due to the extra time required for personnel safety considerations. The licensee will have to carefully validate the feasibility of the shutdown procedure.

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When the inspectors reviewed the SERs to determine what, if any, local operator actions may have been approved as an exemption for Unit 1 III.G.2 fire areas/fire zones, they identified that the SERs were not clear on this point. The inspectors found that the SERs dated March 6, 1991; March 31, 1993; and November 5, 1995, were based on Unit 1 being shut down and defueled. Other SERs contained inconsistencies regarding the NRC's approval of the licensee's use of local manual operator actions to achieve safe shutdown for fires in Unit 1 III.G.2 fire areas/fire zones. For example, the SER issued December 8, 1988, approved a number of manual actions that could be used for a fire in almost all plant areas. This SER discussed manual actions that would be used for a fire in the reactor building in terms of alternative shutdown, but elsewhere stated that III.G.2 type separation would be needed. A November 3, 1989, SER, which was a supplement to the December 8, 1988 SER, clarified that the NRC only had approved the manual actions for a fire in the control complex (Fire Area 16), which was a III.G.3 fire area. The SER issued on November 2, 1995, just before startup of Unit 3, indicated that the NRC staff reviewed licensee Calculation ND-Q0999-920116, Units 2 and 3 Appendix R Manual Action Requirements. The inspectors reviewed the version of the calculation that was submitted to the NRC and noted that it identified many manual actions for Units 2 and 3 fire areas. The inspectors noted that the SER dated November 2, 1995, documented only the NRC staff's review and evaluation of the revised combined Unit 2 and Unit 3 Browns Ferry FPR, with Unit 1 being shut down and defueled. The inspectors could not determine what had been approved regarding the use of local operator actions. This issue is unresolved pending further NRC review to clarify the licensing basis for use of local operator actions, and will be identified as Unresolved Item (URI) 05000259/2005016-01, Use of Local Operator Actions to Achieve Safe Shutdown.

In a letter dated March 19, 1993, the licensee had committed to submit, for NRC review and approval, their Appendix R Safe Shutdown Program covering combined operation of all three units. The licensee also committed in this letter to update the applicable license conditions to reflect a multi-unit Appendix R Safe Shutdown Program as Units 1 and 3 Appendix R Safe Shutdown Programs were approved by the NRC staff. As previously discussed in this inspection report, the Appendix R Safe Shutdown Program was approved for Browns Ferry Units 2 and 3 operation only, with Unit 1 being shut down and defueled. The NRC acknowledged these commitments in a letter to Tennessee Valley Authority (TVA) dated April 1, 1993. However, the inspectors were informed that the licensee was not intending to submit the revised FRP to the NRC. The inspectors were told that the licensee's position was that the commitment had been superseded by later correspondence. The licensee did not present any documentation to NRC which clearly showed that the NRC agreed to forego review and approval of the final Unit 1 Appendix R Safe Shutdown Program. The inspectors discussed this issue with appropriate NRC Headquarters staff, who stated that NRC will review TVA commitments regarding this matter.

(2) Fire-Rated Material

By letter dated October 21, 1988, the NRC granted an exemption to 10 CFR 50, Appendix R, Section III.G.2. b, which applied to the reactor building of all three units. The exemption allows combustibles in the form of cable trays containing cables coated with fire retardant material in the 20-foot separation space between redundant trains of safe shutdown equipment. The presence of cables would be compensated by supplemental sprinkler coverage, manual extinguishers and hose stations. No other combustibles would be permitted in the 20-foot separation space. The licensee prepared Design Change Notice (DCN) 61563 which would not comply with the terms of this exemption in that a combustible one-hour fire rated material (Thermo-lag) would be installed on two conduits in the 20-foot separation space in the Unit 1 reactor building. The licensee's analysis concluded that Thermo-lag does not propagate a fire, and therefore should not be treated as a combustible.

The NRC has evaluated the burning characteristics of Thermo-lag and concluded that it should be treated as combustible material when evaluating its use as proposed above by Browns Ferry. This conclusion and its basis are explained in NRC Information Notice (IN) 95-27, "NRC Review of Nuclear Energy Institute Thermo-lag 330-1 Combustibility Evaluation Methodology Plant Screening Guide" and IN 95-32, "Thermo-lag 330-1 Flame Spread Test Results." The inspectors concluded that the limited use of Thermo-lag proposed in DCN 61563 (i.e., two conduits) would add an insignificant amount of combustible material to the cable trays which were already allowed to be in the 20-foot separation space. Therefore, the modification could proceed without prior approval of the NRC. However, the inspectors communicated to the licensee that their analysis on Thermo-lag material combustibility was not consistent with a published NRC position. The licensee initiated Problem Evaluation Report (PER) 93306 to address this issue.

(3) Spurious Operations

As a result of questions asked by the NRC during the last triennial fire protection inspection, the licensee generated PER 53705 related to multiple spurious operations. The action stemming from this PER was: TVA nuclear [i.e. all three sites] will re-evaluate its position with respect to multiple spurious actuations in accordance with the guidance provided in Nuclear Energy Institute (NEI) document 00-01, "Guidance for Post-Fire Safe-Shutdown Analysis." When the inspectors inquired as to the status and nature of this re-evaluation, the licensee responded that they were planning a study aimed at identifying cases where more stringent criteria than contained in their current design criteria document would be applied. The criteria statement for this new study was not available for review by the inspectors. The cognizant engineer stated that the new criteria would follow the guidance in NRC Regulatory Issue Summary (RIS) 2004-03, Rev. 1, "Risk-Informed Approach for Post-Fire Safe-Shutdown Circuit Analysis." The inspectors' understanding of this concept was that the study would apply the following statement taken from RIS 2004-03: "To focus on the most risk-significant aspects of scenarios, including multiple concurrent spurious actuations, inspectors will assume fire damage to no more than two separate cables for each

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scenario evaluated.” The important word in this statement is “concurrent.” The licensee’s present design criteria document states that, for non-high/low pressure interface considerations, “multiple spurious actuations are considered one at a time.” (The NRC has not approved this criteria in a SER or other correspondence). For example, if two valves in series would have to spuriously open to adversely affect safe shutdown, the licensee’s current analysis assumes that these two events would not occur simultaneously. This time delay between the two events provides a nominal time period for operator intervention to prevent the adverse effect. Assumption of the time delay was made without regard to proximity of the two circuits involved. The objective of the new study would be to identify safety significant cases where a time delay was assumed between two events and analyze these further. Where deemed necessary, a new resolution would be specified.

The licensee was aware that a draft Generic Letter has been published in the Federal Register for public comment on the subject of spurious actuations. The licensee stated that the study described above may not envelop the following statements contained in the draft Generic Letter: “... it follows that all possible spurious actuations, as well as the cumulative effect of the actuations, should be considered.” The draft Generic Letter also states that the spurious actuations must be assumed to occur simultaneously. Depending on the wording of the final generic letter the licensee may need a different type of evaluation than currently in progress.

c. Conclusions

Review of updates to the Fire Protection Report made as a result of Unit 1 restart work indicated that Unit 1 is maintaining the same fire protection program and analysis methodology as Units 2 & 3.

However, an unresolved item was initiated because NRC Safety Evaluation Reports covering fire protection were not clear as to whether local operator actions as utilized by Browns Ferry for post-fire safe shutdown were permitted in an NRC-approved exemption to 10 CFR 50, Appendix R, Section III.G.2.

The licensee’s current design approach to the analysis of multiple spurious operations is not consistent with published NRC interpretations on this subject in that, at present, the licensee has assumed substantial time delay between two potential spurious operations which together could adversely affect safe shutdown. However, the licensee stated they are planning a study to apply more stringent criteria to the consideration of multiple spurious operations.

E1.2 Review of Calculations and Modifications (37550)

a. Inspection Scope

The inspectors reviewed a number of calculations which were performed to support the safe shutdown analysis. Examples of these calculations are lighting study, communication system study, electric power system alignments, diesel generator load

study, battery load study, validation of cable routing, common enclosure of power supply cables, and coordination of electrical protective devices. The review consisted of evaluation of the assumptions and methodology given in the calculation as compared with the requirements for fire protection. In addition, the inspectors performed a detailed review of a calculation of the fire endurance and qualification of fire-rated material used for cable protection known as Thermo-lag. The calculations reviewed are listed in the attachment. DCN 61563 for the Thermo-lag was also reviewed. For a selected sample, when the calculation recommended a modification, the inspectors followed up to determine whether that modification was actually designed and implemented.

b. Observations and Findings

The calculations utilized format and methodology according to good industry design control techniques. Assumptions, methodology and qualification test performance parameters were clearly stated and the inspectors did not identify any questions or deficiencies. Sources of key information were documented and included in the calculation package. Each revision of the calculations received several levels of review with proper signatures. Inspectors verified the following modifications had been implemented:

- Re-routing of cable 1B95-IA per Design Change Notice (DCN) 51217, Stage 5, as recommended by Calculation ED-N0999-880700, Summary Item 8.5. In addition, summary Item 8.6 recommends replacement of cable 1B96-IB, which was cancelled by DCN 51217. The inspectors verified the validity of the cancellation through a plant walkdown of the as-built configuration.
- Style THEF molded-case circuit breakers were replaced with style THED circuit breakers at 250 V DC reactor MOV board 1B, Compartments 8C2 and 8E2 per DCN-51110 as recommended by Calculation EDQ1-999-2002-0061, Table 8-2.2, Resolution for Breakages. In addition, Table 8-2.2 recommended a set point change for an EC1 trip device at 250 V DC reactor MOV board 1A, compartment 2D. Upon followup on this recommended change, the inspector was presented with documentation showing that the set point change will be superseded by replacement of the EC1 trip device with a different type device. The inspector concluded that the design controls were adequate.

c. Conclusions

Control of design changes being implemented to bring Unit 1 into compliance with 10CFR50, Appendix R, was effective. This conclusion was based on verification of correct implementation of four modifications recommended by calculations.

E1.3 (Closed) LER 88-40, Inadequate Design Controls Result in the Backup Control System Not Meeting Design Requirements (37550)

The backup control system is the system that Browns Ferry would rely on for safe shutdown for fires that prevent plant shutdown from the control room. An important part of this system is the backup control panel. Licensee Event Report (LER) 88-40 describes a number of design problems with the backup control panel involving the potential for cable or circuit damage which could adversely affect safe shutdown. The identified problems involve fire scenarios in the area of the control panel itself. To review this issue, the inspectors selected two of the problems mentioned in the LER and evaluated the licensee's corrective action.

One problem involved circuitry for all thirteen main steam safety relief valves. This circuitry was routed to the backup panel and fire damage could cause control of all thirteen safety relief valves to be lost. This would be a problem because the safe shutdown procedures rely on the operator having control of at least three safety relief valves. The inspectors found that a modification was developed which will move circuitry and controls for four safety relief valves to a new panel located in another fire area. The inspectors reviewed the design of the new control circuit for the four valves and concluded that the new design would resolve the issue. The modification was in the process of being implemented at the time of the inspection and it had only been partially completed. The inspectors were able to see that the control switches and circuitry for the four valves had been removed from the backup control panel. In addition, the inspectors confirmed that an operator action was specified in the calculations to de-energize the circuitry for the safety relief valves remaining at the backup control panel to preclude spurious operation of those safety relief valves during fires in that area.

The second problem selected for review was a statement in the LER that certain unspecified high pressure coolant injection system components could spuriously operate or fail to operate due to a fire at the backup control panel. The inspector discussed this topic with the cognizant engineer who presented the system piping flow diagram and explained that only the turbine steam admission valve would be a concern. The control circuit drawing for this valve showed the necessary remote isolation switches. This was confirmed by the inspector through a walkdown in the plant.

In consideration of the results of the above reviews and verifications, the inspectors concluded that the problems discussed in LER 88-40 were being corrected by the licensee. LER 88-40 is closed for Unit 1.

E1.4 Review of Previously Identified Issues and Self-Assessments (37550)

a. Inspection Scope

The inspectors followed up on PERs initiated to document and disposition deficiencies generated as a result of a previous inspection (05000259/2004009) of Unit 1 restart in the area of fire protection.

Inspectors reviewed two self-assessments by the Unit 1 restart project in the area of fire protection.

b. Observations and Findings

The inspectors verified that corrective actions for the following PERs had been implemented:

PER 73587 - Calculation NDN0026920065 was revised to Rev. 010 to document criteria for detector placement in relation to ventilation duct registers.

PER 73907 - CO2 system procedures 0-OI-39 and 0-GOI-300-2 were revised to require that valve 0-39-604 was to be in the locked open position to reduce the possibility of a single point system failure

PER 73330 - Shift briefings now include a reminder to Unit 1 craft personnel to maintain isolation zones for fire protection and safety equipment clear of obstructions

The inspectors reviewed one self-assessment that was completed on September 4, 2003. It was conducted by a team of five engineers, who reviewed three calculations: safe shutdown analysis, manual action requirements and combustible loading. The calculations were reviewed for compliance with TVA design criteria and procedures. The self-assessment concluded that tracking to completion of resolutions recommended by calculations should be enhanced. It appeared that four resolutions in the manual actions calculation and ten components in the safe shutdown analysis were reviewed by the self-assessment. One minor issue was identified by the inspectors related to the reason given for concluding that one component was available for use which was not clearly stated in the calculation. Further investigation found that it was in fact available.

The inspectors reviewed a second self-assessment that was completed August 19, 2004. It was conducted by a team of nine engineers. The self-assessment audited cases where calculations recommended modifications. The self-assessment found that DCN packages had been prepared for the resolutions. The self-assessment reviewed the qualification of barriers; design of fire suppression, detection and alarm systems; industry operating experience and past assessments. A major finding of the self-assessment was that the main steam relief valves were vulnerable to spurious opening for the case of a fire at the area of the backup control panel. The inspectors verified that the procedure had been revised to specify de-energizing these valves during a fire at the backup control panel. The inspectors noted that samples were taken only from the safe shutdown analysis, and none from the other supporting calculations.

c. Conclusions

Follow-up on corrective action program problem reports generated as a result of a previous inspection of Unit 1 restart in the area of fire protection indicated that the previously identified issues had been resolved by the licensee.

In September 2003 and October 2004, the licensee performed self-assessments of the Unit 1 Recovery Special Program for Fire Protection. The scope and results of these self-assessments indicate they helped verify compliance with and effectiveness of the quality assurance program for design control.

V. Management Meetings

X1 Exit Meeting Summary

On November 4, 2005, the lead inspector presented the inspection results to Mr. R. Jones and other members of the Unit 1 restart staff, who acknowledged the findings. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

R. Baron, Nuclear Assurance Manager, Unit 1
C. Brush, Engineering Planning and Management, Inc.
D. Burrell, Supervisor, Electrical Engineer, Unit 1
P. Byron, Licensing Engineer
G. Christopher, Operations, Unit 1
G. Cowles, Nuclear Assurance
W. Crouch, Manager, Site Licensing and Industry Affairs
M. Heatherly, TVA Corporate Engineering
B. Heinmiller, Bechtel Engineering
K. Hess, Stone & Webster Construction Engineering
R. Jones, Plant Recovery Manager, Unit 1
S. Kammer, Mechanical Engineer, Unit 1
D. Kehoe, Nuclear Assurance, Unit 1
J. McCarthy, Licensing Supervisor, Unit 1
J. McCrary, Operations, Unit 1
B. Reilly, Bechtel Corporation
J. Schlessel, Maintenance Manager, Unit 1
J. Tarpinian, Fire Protection/Appendix R Engineer, Unit 1
J. Valente, Engineering Manager, Unit 1

NRC personnel

W. Bearden, Senior Resident Inspector, Unit 1
E. Christnot, Resident Inspector, Unit 1
S. Schaeffer, Senior Project Engineer, Division of Reactor Projects, Region II

INSPECTION PROCEDURES USED

IP 37550 Engineering
IP 37551 On-site Engineering

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000259/2005016-01	URI	Use of Local Manual Operator Actions to Achieve Safe Shutdown (Section E1.1.b (1))
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Enclosure

Closed

88-40	LER	Inadequate Design Controls Result in the Backup Control System not Meeting Design Requirements (Section E1.3)
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LIST OF DOCUMENTS REVIEWEDDrawings

1-47E605-181, Front View of Backup Control Panel for Unit 1 (as revised for Design Change Notice 51106), dated 4/27/05
 1-730E929-4, Control Circuit for Manual Relief Valve PCV-1-179 and PCV-1-31(as revised for Design Change Notice 51211), dated 10/01/03
 1-730E929-3, Control Circuit for Manual Relief Valve PSV-1-19 and PSV-1-18(as revised for Design Change Notice 51211), dated 10/01/03
 1-45E714-2, Wiring Diagrams Unit 1 HPCI Steam Supply Valve to Turbine FCV-73-16, Rev. 0
 1-47E610-73-1, Mechanical Control Diagram HPCI System, Rev. 5
 0-47W216-51 through -62, Fire Protection - 10CFR50 Appendix R Fire Area Compartmentation and Zone Drawings, Rev. 5
 1-47E243-6 through -22, Thermo-Lag Installation Details, Rev. 0

Design Change Notices

51211, Unit 1 Restart, Electrical Discipline, Main Steam System, Reactor Building, Rev. A
 51106, Unit 1, Implement Modifications to Backup Control Panel 1-25-32 to Resolve HEDs, Rev. A
 61563, Fire Wrapped Identified Raceways to Meet Appendix R Requirements, Rev. A
 51092, Appendix R Modifications, Rev. A, dated December 2003

Calculations

NDQ0999920115, Appendix R - Location of Emergency Lighting, Rev. 15
 EDN0244890050, Appendix R Analysis for Intra-plant Communications System, Rev. 6
 EDQ099920030055, Unit 1, 2, 3 Appendix R - Auxiliary Power System Alignments and Diesel Generator Loading, Rev. 2
 EDQ199920030089, Unit 1 Appendix R - Validation of Cable Fire Zone Locations, Rev. 0
 EDQ024820020042, 250 V DC Unit Battery Load Study, etc., Rev. 9
 EDN0999880700, 4 kV and 480 V Switchgear - Normal DC Control Power Associated Circuit Analysis, Rev. 15
 EDQ0999870077, Analysis of the Auxiliary & Control Power System to Identify Associated Circuits - 10CFR50 Appendix R, Rev. 23
 EDQ199920040031, Unit 1 Multiple High Impedance Fault Analysis Calculation for ADS/LPCI Fire Areas, Rev. 0

EDQ2000870548, Cable and Bus Protection/Breaker Coordination for 4 kV Switchgear and 480 V Load Centers, rev. 26

EDQ0254880085, Cable and Bus Protection/Fuse Coordination for 125 V DC System

EDQ199920020061, 250 V DC Bus and Cable Protection and Breaker/Fuse Coordination, Rev. 12

MDQ110020050013, TVA Browns Ferry Nuclear Plant Reactor Building Thermo-Lag 330-1 Fire Endurance Qualification Calculation, Rev. 0

ED-Q0999-2003-0037, Appendix R Computerized Separation Analysis (Units 1, 2, and 3), Rev. 2

ED-Q0999-2003-0048, Units 1, 2, and 3 Appendix R Manual Action Requirements, Rev. 2

ND-Q0999-920116, Units 2 and 3 Appendix R Manual Action Requirements, Rev. 7

Miscellaneous

General Design Criteria Document, BFN-50-747, Fire Protection of Safe Shutdown, Rev. 5

Self Assessment Report BFR-REN-03-004, Unit 1 Appendix R Analysis, dated 9/4/03

Appendix F of TVA Engineering Design Standard DS-M17.2.2, Electrical Raceway Fire Barrier Systems, Rev. 5

Problem Evaluation Reports

73587 - Calculation NDN0026920065 has unclear acceptance criteria for application of NFPA Standard 72 engineering judgement in locating photoelectric products of combustion detectors near heating ventilation and air conditioning (HVAC) supply-air-diffuser outlets

73907 - Evaluate the need to lock valve 0-39-604 consistent with other TVA facilities to reduce possibility of a single point system failure

73330 - Accessibility to the standpipe systems hose racks in the Unit 1 reactor building by fire brigade personnel was degraded

Procedures

2/3-SSI-001, Safe Shutdown Instructions, Rev. 7

EPIP-17, Fire Emergency Procedure, Rev. 29

Licensing Bases Documents

UFSAR Section 10.11, Fire Protection Systems

SERs dated December 8, 1988; March 6, 1991; March 31, 1993; November 2, 1995; and SER Supplement dated November 3, 1989

Browns Ferry Nuclear Plant Units 2 and 3 Fire Protection Report, Volume 1, Rev. 31

Browns Ferry Nuclear Plant Units 1, 2, and 3 draft Fire Protection Report, draft Rev. 31

Correspondence

TVA Letter to NRC dated June 22, 1987; "Browns Ferry Nuclear Plant (BFN) - 10 CFR 50, Appendix R"

TVA Letter to NRC dated March 10, 1989; "Browns Ferry Nuclear Plant (BFN) - Appendix R

Audit Ready Date, Procedures, and Safety Evaluation (SE) Comments”
 TVA Letter to NRC dated March 19, 1993; “Browns Ferry Nuclear Plant (BFN) - TVA BFN
 Technical Specification (TS) No. 306 Removal of Fire Protection Requirements From TS
 Withdrawal of Request to Remove Definition “NN” From TS”

NRC Letter to TVA dated April 1, 1993; “Partial Withdrawal of Amendment Request and
 Issuance of Amendments (TAC Nos. M83198, M83199, and M83200)”

TVA Letter to NRC dated December 13, 2002; Browns Ferry Nuclear Plant (BFN) - Unit 1 -
 Regulatory Framework for the Restart of Unit 1”

NRC Letter to TVA dated August 14, 2003; “Regulatory Framework for the Restart of Browns
 Ferry Nuclear Plant, Unit 1 (TAC MB7679)”

NRC Letter to TVA dated August 3, 2005; “Meeting Summary - Category 1 Meeting With
 Tennessee Valley Authority (TVA) RE. Browns Ferry Unit 1 Recovery Status - Docket
 No. 50-259”

TVA letter to NRC, Browns Ferry Nuclear Plant - Appendix R Exemptions, dated
 September 14, 1987

NRC letter to TVA, Browns Ferry Nuclear Plant - Appendix R Exemptions for Units 1, 2, and 3,
 dated October 21, 1988

ACRONYMS

10 CFR 50	Title 10, Part 50 of the Code of Federal Regulations
DC	Direct Current
DCN	Design Change Notice
EC1	Manufacturer’s style number for a low-voltage circuit breaker trip device
FPR	Fire Protection Report
IN	Information Notice
LER	Licensee Event Report
MOV	Motor Operated Valve
NRC	United States Nuclear Regulatory Commission
PER	Problem Evaluation Report
RIS	Regulatory Issue Summary
SER	Safety Evaluation Report
THED	Manufacturer’s style number for a molded-case circuit breaker
THEF	Manufacturer’s style number for a molded-case circuit breaker
TVA	Tennessee Valley Authority
URI	Unresolved Item
V	Volts