

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) BROWNS FERRY UNIT 1	DOCKET NUMBER (2) 0 5 0 0 0 2 5 9	PAGE (3) 1 OF 0 4
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TITLE (4) **UNANALYZED ELECTRICAL LOADING ON SAFETY RELATED ELECTRICAL SYSTEM DUE TO AN INADEQUATE DESIGN AND REVIEW PROGRAM**

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		DOCKET NUMBER(S)
									BROWNS FERRY UNIT 2		0 5 0 0 0 2 6 0
1 0	1 8	8 8	8 8	0 3 6	0 1	0 3	1 5	8 9	BROWNS FERRY UNIT 3		0 5 0 0 0 2 9 6

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

OPERATING MODE (9) N	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 0 0 0	20.405(a)(1)(i)	50.36(e)(1)	50.73(a)(2)(v)	73.71(c)
	20.405(a)(1)(ii)	50.36(e)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
	20.405(a)(1)(iv)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME Stephen C. Willard, Engineer, Plant Reporting Section	TELEPHONE NUMBER 2 0 1 5 7 1 2 1 9 1 - 1 2 1 5 1 3 1 6
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single-space typewritten lines) (16)

As a result of evaluations performed following restart tests performed earlier this year, two possible unanalyzed conditions were identified concerning the loading and sequencing of loads on the safety related electrical distribution system. All three units were defueled when these conditions were discovered.

The first condition involves the possible overloading of the diesel generators supplying the 4160 volt shutdown boards during accident conditions with loss of offsite power if a spurious accident signal were concurrently generated from another unit. Accident signals from units 1 and 3 which could degrade unit 2 performance have been disabled.

The second condition involves the possible violation of 10 CFR 50, Appendix K analysis time sequence assumptions on availability of power to the Low Pressure Coolant Injection valves. TVA will examine or perform applicable calculations which involve the diesel generator and offsite power sequencing to determine the worst case power availability timing. Further actions which may be required to maintain the total response time within the analysis assumptions will be developed at that time.

The root cause of these conditions was an inadequate design control and review program at the time of the original design and during LPCI modifications made in 1977.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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NOTE: (If more space is required, use additional NRC Form 366A's) (17)

Description of Event

As a result of evaluations performed following restart tests performed earlier this year two possible unanalyzed conditions were identified concerning the loading and sequencing of loads on the safety related electrical distribution system. All three units were defueled when these conditions were discovered.

The first condition involves the possible overloading of the diesel generators (EIIS component code DG) supplying the 4160 volt shutdown boards (EIIS system code EB) during accident conditions with loss of offsite power if a spurious accident signal were concurrently generated from another unit. Units 1 and 2 share the 4160 volt shutdown boards. The common accident signal logic is designed to align loads such that all three units could be shutdown and cooled down following an accident with a loss of offsite power. Certain combinations of accident signals (real and spurious) can result in attempted starts of Residual Heat Removal (RHR) (EIIS system code BO) and Core Spray (EIIS system code BM) pumps on 4160 volt boards which are already loaded. Documentation is not available to prove the transient motor starting loads were considered in the system design. This condition could occur on multiple 4160 volt boards simultaneously and therefore could jeopardize the entire Standby Alternating Current (AC) power system.

The second condition involves the possible violation of 10 CFR 50, Appendix K analysis time sequence assumptions on availability of power to the D and E 480 volt reactor motor operated valve boards (EIIS system code ED) which supply power to the Low Pressure Coolant Injection (LPCI) valve motors. Measured transfer times of the boards to the alternate power supply following loss of the normal supply exceeded the assumed 13 seconds by 1.5 and .4 seconds respectively. A delay in energizing the boards would result in later completions of valve strokes and possible delays in reflood of the vessel (beyond analysis assumptions) which could therefore impact peak clad temperatures. Each affected board provides power to a RHR test return line valve (FCV-74-59 or -73). If these valves are open for torus cooling or test purposes when a RHR (LPCI mode) initiation signal is generated, the valves must close. The 10 CFR 50, Appendix K analysis takes no credit for RHR flow into the vessel until these valves are fully closed and other valves have been fully opened or closed. FCV-74-59 and -73 have long valve stroke times compared to the other valves involved and their closure time determines when RHR injection is assumed to start.

Cause of Event

The root cause of these conditions was an inadequate design control and review program at the time of the original design and during LPCI modifications made in 1977.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Cause of Event (continued)

The original design of the Standby AC Auxiliary Power System failed to document or failed to consider the transient load increase encountered when starting motors on a previously loaded board as would be the case of a common accident signal.

The 10 CFR 50, Appendix K analysis failed to properly include all time delays into the analysis assumptions of power availability.

Corrective Action

For the transient loading concern the common accident signal logic was reevaluated. Accident signals from units 1 and 3 which could degrade unit 2 performance have been disabled. The modifications will allow the operation of unit 2 exclusively. Further modifications to the common accident signal logic will be required prior to the restart of units 1 and 3. Integrated system response was demonstrated during the Loss of Offsite Power/Loss of Coolant Accident restart test series.

For the 480 volt board transfer time concern TVA will examine or perform applicable calculations which involve the diesel generator and offsite power sequencing to determine the worst case power availability timing. These results will be compared to the analysis. Any further actions which may be required to maintain the total response time within the analysis assumptions will be developed at that time. The Appendix K analysis is applicable in rated conditions, therefore these evaluations will be required prior to unit 2 power operation and are not needed prior to fuel load.

Significant programmatic improvements have occurred in the design program since 1977. Current design program requires detailed design reviews and interface reviews for all modifications. Design criteria have been upgraded. These improvements will minimize the chance of future design errors. The design baseline verification program and the restart test program, normal surveillance and startup testing will ensure the plant systems are capable of performing their design functions.

Analysis of Event

The standby AC power system is intended to provide a self contained, highly reliable source of power capable of supplying the Emergency Core Cooling System (ECCS) power requirements during accident conditions. A spurious accident signal (single failure) should not jeopardize the effectiveness of the ECCS. However, a spurious accident signal occurring with a real accident signal could cause transient motor starting loads on a board which is already loaded. These transient loads may not have been considered in the system design and could possibly overload the DG supplying the board. These conditions could occur on multiple boards simultaneously and would therefore affect the entire Standby AC Power System.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Analysis of Event (continued)

The LPCI mode of RHR is designed to flood the reactor vessel following loss-of-coolant accident (LOCA) in order to limit fuel clad temperature. A delay in LPCI actuations could allow an increase in the peak clad temperatures that are predicted following a LOCA.

- Previous Similar Events - BFR0-50-259/84013
 BFR0-50-259/84021
 BFR0-50-259/84022
 BFR0-50-259/84025
 BFR0-50-259/87026
 BFR0-50-259/88012
 BFR0-50-259/88023
 BFR0-50-259/88032

Commitments

For the 480 volt board transfer time concern TVA will examine or perform applicable calculations which involve the diesel generator and offsite power sequencing to determine the worst case power availability timing. These results will be compared to the analysis. Any further actions which may be required to maintain the total response time within the analysis assumptions will be developed at that time. These evaluations will be required prior to unit 2 power operation but should be completed as early as June 1, 1989.

TENNESSEE VALLEY AUTHORITY
Browns Ferry Nuclear Plant
Post Office Box 2000
Decatur, Alabama 35602

MAR 18 1989

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

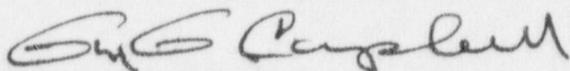
Dear Sir:

TVA - BROWNS FERRY NUCLEAR PLANT (BFN) UNIT 1 - DOCKET NO. 50-259 - FACILITY
OPERATING LICENSE DPR-33 - REPORTABLE OCCURRENCE REPORT BFRO-50-259/88036 R1

The enclosed report provides details concerning the unanalyzed electrical loading
on safety related electrical system due to an inadequate design and review
program. This report is submitted in accordance with 10 CFR 50.73 (a)(2)(ii).

Very truly yours,

TENNESSEE VALLEY AUTHORITY



Guy G. Campbell
Plant Manager

Enclosures

cc (Enclosures):

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NRC Resident Inspector, BFN

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