

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Browns Ferry Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 2 5 1 9	PAGE (3) 1 OF 0 5
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TITLE (4)  
Cable Tray Loading

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)
0 7	0 1	8 5	8 5	0 2 6	0 3	0 1	2 6	8 8	Browns Ferry Unit 2		0 5 0 0 0 2 6 0
									Browns Ferry Unit 3		0 5 0 0 0 2 9 6

OPERATING MODE (9)  N

POWER LEVEL (10) 0 0 0

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

75.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(ii)	50.36(e)(1)	50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(iii)	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)	X 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 Alan W. Gordon, Engineer, Plant Operations Review Staff	TELEPHONE NUMBER AREA CODE: 2 0 5 7 2 9 - 2 5 3 7
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)  NO

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On July 1, 1985, field inspections and subsequent structural evaluations determined various cable tray sections and their supports not seismically qualified in accordance with the plant's original design criteria. In addition, a number of cable tray sections were determined to have excessive fire retardant coating applied, raising a concern on cable ampacity. The essential cable trays and their supports in unit 2 and in other areas essential to operation of unit 2, were subjected to an evaluation by United Engineers and Constructors (UE&C). This evaluation specified modifications to ensure structural integrity of the cable tray supports. These modifications will be completed prior to unit 2 startup.

A design standard has been written to derate cable based upon excessive depth. Cables determined to be unsatisfactory will be replaced.

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

Units 1 and 2 were in a refueling outage, and unit 3 was in an extended maintenance outage when the cable tray condition was identified.

On July 1, 1985, field inspection and structural evaluations determined that various cable tray sections and their support frames are not seismically qualified in accordance with the plant's original design criteria. The affected cable trays are located in the units 1, 2, and 3 reactor buildings (EIIS code NG), control building (NA), intake pumping station (MK), common electrical tunnel, the units 1, 2, and 3 diesel generator (DG) buildings (NB), off-gas treatment building, and unit 2 drywell portion of containment (NH). In addition, a number of cable tray sections were determined to have excessive fire retardant coating applied, raising a concern with respect to cable (CBL2) (CBL5) ampacity.

A tray overflow condition was identified through the internal corrective action program in March 1981. It was not, however, recognized that the overflow condition had adverse effects on the seismic qualification of the tray system. A multidisciplinary inspection and evaluation performed in June 1985 revealed the nature of the seismic problems. As a result, certain cable tray supports may not perform their intended function during a seismic event; and the cable ampacity ratings may have been reduced due to excessive application of fire retardant.

The cable tray seismic problem was originally reported to NRC on July 1, 1985, following a review of the June 28, 1985 summary of the inspection and evaluation results. This summary recommended that additional inspections be performed, that an acceptance criteria for interim operation and corrective action be developed, and that a long-range plan and schedule be established to bring the cable tray system into full compliance with the design requirements. United Engineers and Constructors (UE&C) was contracted on August 9, 1985, to perform an evaluation of the cable tray seismic problem to support interim operation of unit 2. This evaluation included all the supports identified in units 1, 2, and 3 essential for operation of unit 2 and was based on acceptance criteria developed to provide a reasonable assurance that cables essential to unit 2 would be available during and after a design basis earthquake (DBE). The acceptance criteria consists of a combination of allowable forces, stresses, and displacements such that the structural integrity of the cable tray/support systems will be maintained in the event of a DBE.

An initial evaluation was completed in August 1985 with issue of the subsequent report on September 13, 1985. This report identified six recommended modifications to be performed as described below.

1. Intake Pumping Station - Included a vertical knee brace cantilevered from the ceiling to restrain motion in the longitudinal direction for essential trays.

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TEXT (If more space is required, use additional NRC Form 306A's) (17)

2. Intake Pumping Station - Included trussing nonessential tray adjacent to the essential tray to prevent longitudinal deformation or failure which could compromise the integrity of the tray.
3. Unit 2 Reactor Building - Involves decoupling a unit 2 control rod drive system (AA) support from a cable tray support.
4. Unit 2 Cable Spreading Room - Requires replacement of a missing rod hanger which was deleted when the fire protection piping was routed at the location of the support.
5. Intake Pumping Station - Involves removing one U-bolt from all double U-bolt conduit restraints above the electrical cabinets.
6. Common Electrical Tunnel (Rectangular Section) - Involves restraining cable trays which are overhanging their support brackets.

Additional walkdowns were completed and several additional modifications were identified as follows:

7. Reactor Building, Unit 2 - Provide lateral and longitudinal restraint to three nonessential trays, which are presently unrestrained.
8. Reactor Building, Unit 2 - Provide lateral and longitudinal restraint at a different location but to work with fix number 7 on three nonessential trays, which are presently unrestrained.
9. Reactor Building, Unit 2 - Replace two field fabricated clips on rigid supports with standard cable tray connection clips.
10. Drywell, Unit 2 - Replace bent tray connection clip.
11. Drywell, Unit 2 - Replace missing cable tray section and two support brackets.
12. Drywell, Unit 2 - TVA to evaluate loads exerted by cable tray support on an HVAC blower bank frame.
13. Control Bay, Units 1, 2, and 3 - Perform minor fixes to 15 hardware related discrepancies (tighten or replace nuts, bolts, tray clips, etc.).
14. Drywell, Unit 2 - Weld two support angles for a vertical run of cable tray.

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Review of the UE&C report was completed by TVA design personnel and concurrence was given to the 14 recommended fixes. The report discussing the inspections and modifications, was forwarded to NRC under a separate cover letter.

The condition of the cable trays in the control building, reactor buildings, drywell, intake pumping station, and common electrical tunnel are the result of not properly including seismic considerations during the initial design and construction of the facility. The condition in the DG rooms is a result of not using the seismic response spectrum developed for the building structure. The loading problems caused by the excessive fire retardant resulted from overapplication of retardant during the initial application and following later cable additions. The excessive application of fire retardant material was a result of personnel not being made aware of the vendor recommended maximum application thickness. Also, field application practices lead to excessive coating in order to ensure adequate coverage of cable. Disciplines involved were civil and electrical design branches along with modifications personnel at the site.

The UE&C report concludes that after the installation of the identified fixes the unit 2 cable tray structural integrity will not be jeopardized during a single DPE. Additionally, the structural integrity of the supports will be maintained during a DBE for those cables in all three units which are essential for safe operation of unit 2 pending long-term qualification of the support system. However, it was later discovered by plant field inspectors in April 1987 that contrary to the design drawings, substandard bolting material had been used in some support frames. UE&C concluded that adequate design margin would not exist in some of the structures until high strength bolts, upon which their analyses were based, are installed. All of the recommended fixes are nearly field complete and will be completed prior to unit 2 restart.

The long-term plan of action for the cable trays is to confirm through analysis, testing, and documentation evaluation that the safety related cable trays and their supports are adequate during and after the time the plant is subjected to the forces resulting from one DBE preceded by a number of operating basis earthquakes. Consideration is being given to potential application of alternate seismic approaches related to Unresolved Safety Issue A-46.

In regard to the cable ampacity issue, Ebasco is presently onsite inspecting cable trays to establish the depth of flamastic covering 75 particular cable segments. A TVA design standard has been written to derate cable based upon excessive depth. Laboratory testing by TVA and calculations by Ebasco will determine which safety-related cables will be satisfactory for unit 2 cycle 5 operation. The length of service life remaining will also be calculated, and cables which are determined to be unsatisfactory will be replaced. To date, 28 of the 75 cable segments have been identified as presenting a problem due to excessive flamastic depth.

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APPROVED GMP NO. 3150-0104  
EXPIRES: 8/31/88

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

Responsible Plant Section - EN

Previous Events - None

TENNESSEE VALLEY AUTHORITY

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

FEB 12 1988

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

Dear Sir:

TENNESSEE VALLEY AUTHORITY - BROWNS FERRY NUCLEAR PLANT UNIT 1 - DOCKET  
NO. 50-259 - FACILITY OPERATING LICENSE DPR-33 - REPORTABLE OCCURRENCE REPORT  
BFRO-50-259/85026 R3

The enclosed report provides additional details concerning the cable tray loading  
and cable ampacity issues. This report is submitted in accordance with  
10 CFR 50.73 (a)(2)(ii).

Very truly yours,

TENNESSEE VALLEY AUTHORITY

*J. G. Walker*

J. G. Walker  
Plant Manager  
Browns Ferry Nuclear Plant

Enclosures

cc (Enclosures):

Regional Administration  
U.S. Nuclear Regulatory Commission  
Office of Inspection and Enforcement  
Region II  
101 Marietta Street, Suite 2900  
Atlanta, Georgia 30303

INPO Records Center  
Suite 1500  
1100 Circle 75 Parkway  
Atlanta, Georgia 30339

NRC Resident Inspector, Browns Ferry Nuclear Plant

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