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SUBJECT: Revises plant seismic qualification of control rod drive insert & withdrawal piping description.

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Gentlemen:

In the Matter of) Docket No. 50-260
Tennessee Valley Authority)

BROWNS FERRY NUCLEAR PLANT (BFN) - SEISMIC QUALIFICATION OF CONTROL ROD DRIVE INSERT AND WITHDRAWAL PIPING

This letter revises the description of the BFN program for the seismic qualification of the control rod drive (CRD) insert and withdrawal piping. This material was requested by letter from R. J. Clark to S. A. White dated July 31, 1986. This letter supersedes the information provided by letters from R. Gridley dated April 8, 1987, and section III.3.6 of revision 1 to the BFN Performance Plan which was transmitted by letter from S. A. White dated July 1, 1987.

Enclosure 1 to this letter describes the BFN program for resolving this issue. Enclosure 2 provides the BFN interim operability criteria for Class I seismic piping. TVA requests your review of this program and the issuance of a written statement documenting the acceptability of the program.

Please refer any questions regarding this submittal to M. J. May, Manager, BFN Site Licensing, (205) 729-3570.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R. Gridley, Director
Nuclear Licensing and
Regulatory Affairs

Enclosures
cc: See page 2

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U.S. Nuclear Regulatory Commission

MAR 17 1988

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
SEISMIC QUALIFICATION OF CONTROL ROD DRIVE
INSERT AND WITHDRAWAL PIPING

This report provides TVA's plan to qualify the control rod drive (CRD) insert and withdrawal piping to Seismic Class I.

Issue

Adequate documentation cannot be located to support the seismic qualification of the CRD insert and withdrawal piping. TVA has committed in volume 3 of the Nuclear Performance Plan to analyze and qualify this piping.

Background

In 1973, TVA recognized that the BFN CRD system designer, Reactor Controls, Inc., had not performed an explicit seismic analysis of the insert and withdrawal lines. In accordance with the requirement of 10 CFR 50.55(e), this design deficiency was reported to the AEC-DRO Region II in March of that year. TVA modified some of the insert and withdrawal line supports with the intention of complying with a design criteria for seismically supporting field routed piping two inches in diameter and smaller. (That criteria later became BFN-50-712.) BFN was licensed for operation on that basis.

In September 1985, TVA's engineering staff questioned the seismic adequacy of existing CRD insert and withdrawal piping supports while designing a modification to one of the CRD supports. A field investigation revealed that the typical structural frame supports for the CRD piping bundles were flexible in the horizontal direction perpendicular to the pipe axes which made their ability to resist seismic loads without overstress or excessive deflection questionable. Adequate seismic design documentation could not be retrieved. Therefore, TVA contracted with Impell to perform an as-built analysis of the CRD insert and withdrawal piping. This analysis was submitted for the NRC staff's review by TVA's April 8, 1987 transmittal which also requested a change in the design basis for the CRD system. This change was an increase in the level of damping assigned to the CRD piping from 0.5 percent (Operation Basis Earthquake) and one percent (Design Basis Earthquake) to five percent (Design Basis Earthquake). The modifications to the supports and support frames which resulted from this analysis are essentially complete.

Resolution

As discussed with your staff in the February 29, 1988 TVA/NRC meeting, TVA is withdrawing the April 8, 1987 request for a change to the CRD's design basis. TVA will reanalyze the CRD insert and withdrawal piping and evaluate the results to the design criteria. The design criteria used for the CRD piping and supports satisfies the BFN Final Safety Analysis Report (FSAR), Appendix C commitments for piping and pipe support design. Those piping and supports which do not meet the design criteria, but are within the interim operability criteria, will be modified to the design criteria before restart from the

next refueling outage (cycle 6). Those which do not meet the interim operability criteria will be modified to the design criteria before restart. A comparison of design and operability criteria is summarized in table 1.

Licensing Issue

Issue:

This program involves the use of interim operability criteria for CRD insert and withdrawal piping and supports.

Justification:

This criteria (CEB-CI 21.97) assures structural integrity of the piping and supports and has been proposed for use in the small bore piping program and the program to resolve IE Bulletins 79-02 and 79-14. This criteria is similar to that approved for the Sequoyah Nuclear Plant for large bore supports. Approval of the Sequoyah operability criteria is documented in NUREG 1232.

Conclusion

The CRD seismic qualification program is comprehensive and provides adequate assurance that the piping and supports will be in conformance with the systems' original design basis. Operation of BFN unit 2 for one fuel cycle based upon the interim operability criteria is acceptable. The CRD system is being extensively upgraded during this outage and the proposed operability criteria is similar to Sequoyah's large bore piping operability criteria which has been accepted by the NRC's staff as documented in NUREG 1232. All modifications required to meet the design criteria will be implemented before restart from the next refueling outage (cycle 6).

ENCLOSURE 1
TABLE 1

BROWNS FERRY UNIT 2
CONTROL ROD DRIVE INSERT AND WITHDRAWAL PIPING
CRITERIA COMPARISON CHART

COMPONENT	DESIGN CRITERIA	INTERIM OPERABILITY CRITERIA
Piping		
Primary	$1.2S_H$	$2S_Y$
Primary & Secondary	$S_A + S_H$	ASME EQ 11 or Augmented Fatigue Evaluation
Concrete Expansion Anchors Factor of Safety Wedge and Shell	Wedge Type 4 Shell Type 5 for Tension 4 for Shear	All Types 2
Pipe Support Tensile and Flexural Stress	1.5 X AISC Maximum Limit $0.9S_Y$	Lesser of $0.7S_U$ or $1.2S_Y$
Compressive Stress	1.5 X AISC Maximum Limit $0.9S_Y$	Maximum Limit $0.9P_{CR}$
Allowable Shear Stress	Maximum Limit $0.52S_Y$	Lesser of $0.42S_U$ $0.72S_Y$
Stress Bolt	$0.56S_U$	Greater of $0.7S_U$ or S_Y (Minimum)