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FEB 13 1991

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Gentlemen:

In the Matter of)	Docket Nos. 50-259
Tennessee Valley Authority)	50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - ACTION PLAN TO DISPOSITION CONCERNS
RELATED TO INSTRUMENT SENSING LINES FOR UNITS 1 and 3

Reference: TVA letter, dated January 9, 1991, Plans for the Return to
Service of BFN Units 1 and 3

As part of the referenced letter, TVA committed to provide the NRC Staff with the action plan for dispositioning instrument sensing line issues at BFN Units 1 and 3. Enclosure 1 to this letter provides a summary of this issue, a review of the Unit 2 resolution, a discussion of lessons learned, and a description of how this issue will be resolved on Units 1 and 3. This submittal is provided for informational purposes only. No NRC action is specifically requested.

A summary list of commitments contained in this letter is provided in Enclosure 2. If you have any questions, please contact J. E. McCarthy, Manager of Unit 3 Licensing, at (205) 729-3604.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

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Enclosures
cc: See page 2

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ENCLOSURE 1
BROWNS FERRY NUCLEAR PLANT - UNITS 1 AND 3
INSTRUMENT SENSING LINES CORRECTIVE ACTION PLAN

Three Condition Adverse to Quality Reports (CAQRs) were issued for Browns Ferry Nuclear Plant (BFN) pertaining to safety related sensing line installations. The CAQRs expressed concerns related to instrument line slope, physical separation, and quality classifications relating to material control⁽¹⁾.

TVA's plan for resolving this issue on BFN Unit 2 was submitted by TVA letter dated October 19, 1988 and supplemented by letter dated August 14, 1989. Implementation of the program was reviewed as documented in Inspection Reports 89-36, dated September 21, 1989, Report 89-59, dated February 23, 1990, and Report 90-13, dated August 10, 1990. TVA responded to the open items identified in Inspection Report 89-59 by letter dated April 9, 1990. TVA responded to the open items identified in Inspection Report 90-13 by letter dated October 4, 1990. TVA's program was accepted by the NRC Staff as documented in NUREG-1232, Volume 3, Supplement 2, dated January 23, 1991.

The following is a summary of the resolution for Unit 2 of the concerns related to sensing line installation and the program for resolving these concerns on Units 1 and 3:

Slope -

The scope of instruments and associated sensing lines requiring evaluation on Unit 2 was developed based on the System Requirement Calculations, Chapter 14 of the Final Safety Analysis Report (FSAR), The Master Component Equipment List, and those instruments identified in the Emergency Operating Instructions. Additionally, a review of maintenance records was performed to identify slope related problems (i.e., problems due to entrapped air). This review identified two specific problem areas, the H₂O₂ analyzers and the reactor vessel level instruments. Both of these instrument loops were extensively modified on Unit 2 during the current outage to correct these problems.

⁽¹⁾ Seismic qualification of instrument tubing was addressed as a separate program for Unit 2 and will be the subject of a separate informational submittal for Units 1 and 3.

ENCLOSURE 1 (CONTINUED)
BROWNS FERRY NUCLEAR PLANT - UNITS 1 AND 3
INSTRUMENT SENSING LINES CORRECTIVE ACTION PLAN

In order to ensure the satisfactory performance of the instruments and their associated sensing lines during normal and accident conditions, the following steps were taken for Unit 2:

- 1) Instruments and their associated sensing lines that were designed, installed, and certified by the vendor were eliminated from further consideration.
- 2) A calculation was performed to document that instruments with a process pressure greater than 100 psig would not experience outgassing. In addition, a backfilling procedure was implemented to remove any entrapped air from the sensing lines prior to returning a system or instrument loop to operation. Thus, these instruments were eliminated from further consideration.
- 3) Instruments with sealed capillary tubing, which are not connected to the process system via an unsealed sensing line, were eliminated from further consideration. Slope is not critical for sealed capillary lines.
- 4) The remaining population was walked down to document the as-installed configuration of the sensing lines. This information was analyzed to determine if the instruments would operate under design basis accident conditions. Where satisfactory operation could not be justified, the sensing lines were reworked.

The following program will be implemented to resolve these concerns on Units 1 and 3:

In order to resolve the slope problems identified during the review of maintenance records, the H₂O₂ analyzers and the reactor vessel level instruments will be modified in accordance with the Unit 2 precedent prior to the restart of Units 1 and 3, respectively. The reactor vessel instruments modifications are associated with previous NUREG-0737 commitments and are not being listed in Enclosure 2 as a new commitment.

ENCLOSURE 1 (CONTINUED)
BROWNS FERRY NUCLEAR PLANT - UNITS 1 AND 3
INSTRUMENT SENSING LINES CORRECTIVE ACTION PLAN

TVA will select the population of instrument sensing lines to be evaluated in accordance with the Unit 2 precedent. This population will be walked down to document the as-installed configuration of the sensing lines. This information will be analyzed to determine if the instruments would operate under design basis accident conditions. Where satisfactory operation can not be justified, the sensing lines will be reworked prior to the restart of Units 1 and 3, respectively.

Physical Separation -

The original CAQR questioned the adequacy of documentation to demonstrate physical separation of redundant instrument sensing lines. No specific cases of inadequate separation were identified. In order to resolve this concern on Unit 2, the plant layout, design bases, and various programs and analyses were reviewed.

The plant layout for the Emergency Core Cooling Systems (ECCS) and the Reactor Protection System (RPS) instrument lines is such that separation of the redundant instrument lines is inherently achieved. The main ECCS components are located in separate rooms which are adjacent to the primary containment structure. Redundant systems or subsystems are located on opposite sides of the primary containment. In general, instrument lines that interface with the containment or reactor vessel are approximately 180 degrees apart from their redundant counterpart.

FSAR Sections 7.2.2 and 7.3.3 commit to the separation of redundant instrument tubing for the RPS, ECCS actuation and primary containment isolation functions to prevent a single event from disabling the redundant function. GE Topical Report, T-70-10139, dated June 1970, concluded that the BFN design met the requirements of IEEE-279 for separation of redundant safety related instrument channels.

ENCLOSURE 1 (CONTINUED)
BROWNS FERRY NUCLEAR PLANT - UNITS 1 AND 3
INSTRUMENT SENSING LINES CORRECTIVE ACTION PLAN

Since instrument lines are required to be adequately separated to prevent the consequences of accidents from impairing the functionality of redundant safety systems, the programs developed at BFN to analyze the effects of specific accidents were reviewed. These programs include the following:

10 CFR 50, Appendix R	Evaluated the impact of an Appendix R fire on the safe shutdown of Unit 2.
NUREG-0612	Evaluated the impact of heavy loads dropped from cranes or hoists on the safe shutdown of the plant.
Bulletin 80-11	Seismically qualified any block wall whose failure could damage safety related equipment.
FSAR Appendix M Pipe Failure Report	Evaluated the affects of high energy line break (HELB) outside containment on all devices within the HELBs zone of influence for Unit 2.
Generic Evaluation of Internally Generated Missiles	Evaluated possible sources of internally generated missiles and their impact on redundant trains of safety related equipment which is used to mitigate the event which created the missile. Although the generic evaluation of internally generated missiles did not specifically address instrument sensing lines, a review of the Unit 2 configuration indicates that loss of redundant sense lines would not result from missiles.

TVA's review did not identify instances of inadequate separation on Unit 2 and common equipment. An Engineering Requirements Specification was issued to control future sensing line design.

ENCLOSURE 1 (CONTINUED)
BROWNS FERRY NUCLEAR PLANT - UNITS 1 AND 3
INSTRUMENT SENSING LINES CORRECTIVE ACTION PLAN

The following program will be implemented to resolve these concerns on Units 1 and 3:

Based on the similarity of design bases and layout for Units 1, 2, and 3, the same conclusions of the design basis and layout review for Unit 2 also apply to Units 1 and 3. No further evaluation is required for Bulletin 80-11 or the NUREG-0612 programs, since the reviews associated with these issues were completed for all three units. The Units 1 and 3 10 CFR 50, Appendix R, FSAR Appendix M, and Generic Evaluation of Internally Generated Missiles programs will require evaluations to maintain the integrity of instrument sense line separation prior to the restart of Units 1 and 3, respectively, in accordance with the Unit 2 precedent.

Quality Classification -

The original CAQR questioned the adequacy of quality classification in the original design of instrument sensing lines. No specific cases of inadequate quality classification were identified. In resolving this concern, various design specifications and criteria were reviewed for appropriate material quality classifications. TVA confirmed that the original TVA design specifications and purchase orders issued for instrument line materials and fabrication conform with, or are more stringent than, the requirements of ANSI/ASME Section B31.1. Fabrication drawings and bills of material for instrument sense lines provided with NSSS (General Electric) equipment were reviewed. This review confirmed that GE requirements were reflected. Design drawings were reviewed to determine the quality classification specified. Based on these reviews, it was concluded that appropriate quality classifications were specified. An Engineering Requirements Specification was issued to control future sensing line design. TVA determined that the concern regarding instrument sense lines quality classification did not reflect actual deficiencies.

Since the same basic TVA criteria documents and GE design specifications were used for Units 1, 2, and 3 and no deficiencies were identified, no further review of this issue will be performed on Units 1 and 3.

ENCLOSURE 2
BROWNS FERRY NUCLEAR PLANT - UNITS 1 AND 3
SUMMARY OF COMMITMENTS

- 1) In order to resolve the slope problems identified during the review of maintenance records, the H₂O₂ analyzers will be modified in accordance with the Unit 2 precedent prior to the restart of Units 1 and 3, respectively.
- 2) TVA will select the population of instrument sensing lines to be evaluated in accordance with the Unit 2 precedent. This population will be walked down to document the as-installed configuration of the sensing lines. This information will be analyzed to determine if the instruments would operate under design basis accident conditions. Where satisfactory operation can not be justified, the sensing lines will be rewired prior to the restart of Units 1 and 3, respectively.
- 3) The Units 1 and 3 10 CFP 50, Appendix R, FSAR Appendix M, and Generic Evaluation of Internally Generated Missiles programs will require evaluations to maintain the integrity of instrument sense line separation prior to the restart of Units 1 and 3, respectively.