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December 12, 1991

O. J. "Ike" Zeringue
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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) - SMALL BORE PIPING PROGRAM, TUBING, AND CONDUIT SUPPORT PLANS FOR UNITS 1 AND 3 - ADDITIONAL INFORMATION

References:
1. TVA letter to NRC dated February 27, 1991 - Action Plan to Disposition Concerns Related to Units 1 and 3 Small Bore Piping
2. TVA letter to NRC dated February 27, 1991 - Action Plan to Disposition Concerns Related to Units 1 and 3 Tubing
3. TVA letter to NRC dated May 6, 1991 - Action Plan to Disposition Concerns Related to Units 1 and 3 Conduit and Conduit Supports.

The purpose of this letter is to provide additional information which clarifies TVA's plans for dispositioning concerns related to Units 1 and 3 Small Bore Piping, Tubing, and Conduit Support Programs. This additional information was requested by NRC during teleconferences held on October 21 and November 19 and 21, 1991. This letter augments the referenced TVA letters.

Enclosure 1 to this letter provides the requested information for the Small Bore and Tubing Programs. Enclosure 2 provides the requested information for the Conduit Support Program. Expeditious NRC review of this additional information and issuance of a supplemental Safety Evaluation Report by December 31, 1991, are requested in order to support the design and modifications required to be completed prior to restart of Unit 3.

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U.S. Nuclear Regulatory Commission

December 12, 1991

Enclosvre 3 summarizes the new commitments contained in this letter. If you have any questions, please telephone J. E. McCarthy, Restart Licensing Manager, at (205) 729-2703.

Sincerely,

Paul Barron for

O. J. Zeringue

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ENCLOSURE 1

BFN Unit 3 Small Bore/Tubing Programs

Background - Unit 2 and Common Restart Program

The Small Bore program resulted from the resolution of Significant Condition Report (SCR) SCRBFNCEB8509 and employee concerns which were identified for the entire plant. The Unit 2 and common small bore restart program consisted of approximately 715 analysis problems covering 27,000 feet of piping and 4,500 supports. The Unit 2 and common small bore program developed the attributes for field walkdown originally by rigorously analyzing 31 problems which consisted of approximately 1,500 feet of piping and 137 supports. The original 31 problems were selected based on worst case loading conditions, representative problems associated with employee concerns (EC), conditions adverse to quality (CAQ), and industry concerns. The selected problems contained two or more of the following items: 1) >200°F and/or >200 psi, 2) relief valve, 3) high elevation or heavy eccentric mass, 4) source movements, 5) schedule 160 pipe, 6) seismic non-seismic overlap, 7) diesel generator building, and 8) standby gas treatment building. The 31 problems were distributed between the units with 20 being in Unit 2, 0 in Unit 3, eight in Unit 1, and three in Common.

After the small bore program attributes were established, a walkdown procedure was written. The walkdown procedure established a set of minimum requirements. Implementation of the procedure was accomplished by training experienced pipe stress and support design engineers or engineering associates. The walkdown team evaluated the small bore piping and supports for functionality and adherence to the design criteria. The field judgements and evaluations were based on conservative assumptions, which assured qualification to the design criteria for the accepted, repaired, or modified plant configuration. During the course of the walkdowns, configurations in the field, that could not be accepted by engineering judgement were further evaluated. In order to perform these further evaluations, generally as-built data was obtained and rigorous analysis performed. Conditions, which did not meet the design criteria but met the operability criteria, were acceptable for one cycle. Modifications or repairs were made in accordance with the design criteria for items found to be deficient when compared to the operability criteria.

During the small bore program, the NRC requested that TVA increase the rigorously analyzed population so that ten percent of the supports were specifically evaluated. In response to their request and due to the program's need for further evaluations, 45 additional problems, which contained approximately 2,200 feet of piping and 200 supports were as-built and analyzed in the Unit 2 and common restart effort. The 45 problems were distributed between the units as three in Unit 1, 29 in Unit 2, one in Unit 3, and 12 in common. The additional 45 problems analyzed did not result in any additional attributes which required revision to the Unit 2 and common program procedure.

Prior to the completion of the Unit 2 and common program, a confirmatory analysis was performed. This analysis included 12 additional problems which consisted of approximately 1,100 feet of piping and 169 supports. The purpose of the confirmatory analysis was to demonstrate the adequacy of the judgements made in the field. As-built data was obtained and the analysis included the fixes made by the program (i.e., including modifications to supports, support additions, or support deletions as applicable for that problem). The results of this analysis demonstrated that all 12 problems met the long term pipe stress and pipe support criteria. The confirmatory analysis did not result in any additional attributes or programmatic concerns; thus confirming that walkdown instructions were consistent with the requirements of the design criteria for both pipe stress and pipe supports. The 12 problems were distributed between the units as one in Unit 1, seven in Unit 2, two in Unit 3, and two in common.

In retrospect, all of the evidence from the Unit 2 and common small bore restart program concluded that the attributes were properly identified in the original 31 problems and that the program has been properly implemented to assure that the small bore piping and associated supports were qualified to the pipe and support design criteria. Increasing the rigorous analysis sample size did not produce any additional generic attributes; therefore, increasing the population had no effect on changing the implementation of the program from the original developed attributes.

The tubing program resulted from the resolution of SCRBFNEEB8535, SCRBFNEEB8543, employee concerns and nonconforming conditions which were identified for the entire plant. The Unit 2 and common restart tubing program began as an as-constructed program consisting of 66 tubing installations and approximately 250 tubing supports. Later the scope of the tubing program increased and then changed to an engineering attribute evaluation program similar to the small bore program. The generic tubing attributes were developed from the as-built analysis of the original 66 tubing installations. A walkdown procedure established inspection attributes to be used in the field and was implemented by using engineering judgement. Qualified engineers were trained and performed the walkdown and evaluations similar to those of the small bore program. No confirmatory analysis was performed. The Unit 2 and common restart program included the as-built analysis of 20 tubing problems in Unit 3 and 23 tubing problems in Unit 1. The scope of the tubing program was approximately 200 problems consisting of 9,000 feet of tubing and 714 supports. Therefore, Units 1 and 3 installations were more than adequately considered in the development of the tubing attributes.

Similarity Between Unit 2 and Units 1 and 3

The primary systems, for all three units, used similar drawings for installation (Unit 2 is opposite hand of Unit 1 and Unit 3 is a slide along of Unit 2). The small bore piping and tubing for all three units were field routed utilizing the same design criteria and construction methods. The seismic response spectra is the same for all units and the operating modes are the same. The Unit 3 walkdowns to date have shown that the small bore and tubing supports are similar in that the supports consist of Unistrut framing members and light weight structural shapes (angles). The Unit 3 walkdowns to date are finding breakage similar to Unit 2 breakage.

Unit 3 Plan Summary

For the Unit 3 restart effort, the small bore and tubing programs have been combined into one program for efficiency. The Unit 3 scope is approximately as follows:

	Total	Small Bore	Tubing
Problems	375	275	100
Footage (ft.)	19000	16000	3000
Supports	2500	2000	500

The Unit 3 small bore/tubing program is utilizing Unit 2 developed attributes and the same technical walkdown procedure. Walkdown personnel are experienced in piping and tubing stress analysis and support design. The as-built analysis data generated for Unit 2 and common restart effort is available for use by Unit 3 personnel and has been used in training the Unit 3 personnel. The Unit 3 teams walk the plant down and make conservative judgements of the acceptability of the piping, tubing and their associated supports in the field. Items, which are judged as possibly not being acceptable, are further evaluated which generally includes collection, and evaluation of as-built data. The acceptability is based on the piping and support design criteria. No operability criteria is being used in the Unit 3 and Unit 1 small bore/tubing programs. Modifications and/or repairs are made to any item which is determined to be unacceptable.

As was done for the Unit 2 and common program, the Unit 1 and 3 small bore/tubing program will perform rigorous analysis which will consist of ten percent of the piping/tubing and ten percent of the supports. The confirmatory analysis is contained in the ten percent.

The Unit 2 and common restart tubing program performed analysis on approximately 20 problems physically located in Unit 3. These problems encompassed tubing throughout the Unit 3 reactor building (including inside containment) and the diesel generator building. No additional analysis will be performed on the Unit 3 tubing or supports unless the need to do so is identified during the program implementation.

The Unit 1 tubing scope is currently undefined. However, the Unit 2 and common restart program analyzed 11 problems in the Unit 1 reactor building and diesel generator building and 12 problems in the Unit 1 control bay areas. Depending on the total Unit 1 tubing scope, if the Unit 2 and common analysis provide an adequate sample, no further tubing analysis will be performed unless required for the program implementation.

Unit 1 and 3 Program Details

In the development of attributes for the Unit 2 and common small bore and tubing program, a list of 27 attributes was made. The Unit 2 and common small bore and tubing rigorous analysis sample identified that 12 of the attributes were applicable as deficiencies at BFN. The small bore and tubing programs evaluated the other 15 attributes by having experienced and trained engineers performing the walkdown. The Unit 3 checklist of walkdown procedure BC-012- "Engineering Attribute Walkdown Instructions for Seismic Class I Small Bore Piping, Tubing, and Associated Supports" contains an attribute which requires an evaluation to identify any other condition which is judged to be detrimental to the qualification of the piping/tubing or support. Training is provided to walkdown personnel to assure that the system is functional and will meet the design criteria.

Relationship to Welding Program

The BFN weld program report identified a Unit 3 small bore support with a deficient weld. The deficiency was weld burn through of the Unistrut attached to the base plate. This type of condition would have been identified during the Unit 3 small bore/tubing walkdown and evaluated as part of the evaluation of any condition deemed to be detrimental to the qualification of the system. Additionally, the weld program report identified a Unit 1 small bore support with a deficient weld. The deficiency was a one sided weld used to attach Unistrut to structural steel. This type of condition would have been identified during the small bore/tubing walkdown and evaluated as part of the evaluation of any condition deemed to be detrimental to the qualification of the system. Welds are evaluated by the walkdown team from a craftsmanship aspect and from a functional perspective. During the walkdown, the team decides if the weld is acceptable, or requires further evaluation, or if repair is needed. Those requiring further evaluation will have as-built data collected prior to performing the structural analysis. This procedure satisfies the intent of the welding project report. The Unit 3 small bore/tubing program walkdown procedure BC-012 states that as-build data will be obtained by using Unit 3 walkdown procedure BC-005 - "Walkdown Instruction for Piping and Pipe Supports."

Unit 3 Small Bore/Tubing Program Status

As of November 8, 1991, approximately 20 percent of the program is complete. Ninety problems have been field evaluated consisting of approximately 4,000 feet of piping and 505 supports. Fifty-six of the problems require some further evaluation for pipe stress concerns. Of the 505 supports evaluated:

(a) 24 supports have been evaluated as acceptable without any repair or modification being required.
(b) 52 supports require modifications (i.e., adding brace, changing the support direction, adding a U-bolt, deleting a support).
(c) 303 supports required generic repairs (i.e., torquing of U-bolts nuts, torquing of clamp bolts, replacing of existing clamp with Unistrut or B-line brand clamp). Some of these supports had other non-generic repairs also.
(d) 75 supports require repairs consisting of adding of washers for oversized holes, replacing missing hardware, pipe to support attachment, and replacing defective hardware.

(e) During the review of these 90 problems, an addition of 24 new supports were identified as being required to qualify the piping installations.

To date the Unit 3 evaluation has found that the percentage of repairs, modifications and new support additions is comparable to Unit 2.

Conclusion

The use of the Unit 2 and common small bore and tubing programs' attributes for the evaluation of Units 1 and 3 is justifiable based on the following conclusions:

1. The primary systems, for all three units, used similar drawings for installation. The small bore piping and tubing were field routed utilizing the same design criteria and construction methods. The seismic response spectra is the same for all units and the operating modes are the same.

2. The increased size of the Unit 2 and common rigorously analyzed population for small bore did not result in any additional attributes or changes to the Unit 2 and common restart program from what was developed in the original 31 problem sample.

3. Implementation of the Unit 2 and common attributes on Unit 3 have resulted in a conservative program. The percentage of repairs, modifications and new support additions to date is comparable to Unit 2. The Unit 3 walkdowns have shown that the small bore and tubing supports are similar between the units consisting of Unistrut framing members and light weight structural shapes (angles).

4. The Unit 1 and 3 small bore/tubing program will perform rigorous analysis which will consist of ten percent of the piping/tubing and ten percent of the supports. This will confirm that the application of the attributes used on the Unit 2 and common provides a conservative program for Units 1 and 3. Through this program it will be demonstrated that the Unit 1 and 3 small bore and tubing meet the design criteria.

ENCLOSURE 3

Summary of Commitments

1. The Unit 1 and 3 Small Bore and Tubing Program will perform analysis which will consist of ten percent of the piping/tubing and ten percent of the supports.

ENCLOSURE 2

BFN Unit 3 Conduit Programs

Background

The Unit 2 and common restart effort for the conduit system qualification utilized Design Criteria DC-50-C-723 as a basis for acceptance. (This criteria was later consolidated into DC-50-C-7104 as the current criteria). For the Unit 2 and common restart effort, the rod hung conduit installation comprised approximately 70 percent of the total population. When the walkdown teams evaluated the rod hung conduit systems, each system was identified as an outlier. In order to qualify the rod hung systems, Unit 2 and common initially performed rigorous computer analysis of these systems. This approach was considered inefficient and extremely costly considering the large number of problems that would require analysis.

In order to assure seismic qualification of the rod hung conduit systems, Unit 2 and common utilized the seismic experience data base information by having EQE Inc. perform the review of these systems in all three units. The EQE review was able to show that the BFN rod hung conduit systems were bounded by the seismic experience data base.

During the NRC review of the Unit 2 and common conduit program, the NRC did not accept the use of the seismic experience data base information as a method for resolving the qualification of the rod hung systems. In order to resolve the NRC reviewers concerns, TVA agreed to rigorously analyze five rod hung systems as bounding cases for the seismic experience data base information. Bounding case problems were selected. These problems included the maximum parameters that were accepted by the use of the seismic experience data base (i.e., long spans, large axial spans, mixed rod length, heavily loaded trapeze hangers, mix support conditions such as braced and unbraced trapezes). This analysis validated the use of seismic experience data base information for BFN. The NRC overviewed the five problems and concentrated their review on two of these problems (DN 40-10 and DN 40-212). The review of these problems are discussed in NRC inspection reports 50-260/88-38, 50-260/89-29 and 50-260/89-42.

Unit 1 and 3 Program Summary

The Unit 3/Unit 1 programs will utilize the Unit 2 and common results for the evaluation of the rod hung conduit systems. The Unit 2 systems were bounded by the seismic experience data. During the Unit 2 restart program, EQE reviewed conduit installations in Unit 1 and Unit 3. No conditions were identified for the rod hung conduit systems in any unit that would not be bounded by the seismic experience date base information. TVA's interim program for the seismic qualification of the remaining Units 1 and 3 conduit and conduit supports will consist of engineering evaluations of these commodities with a focus on the attributes which resulted in modifications in the Unit 2 and common program. These walkdowns will include the Units 1 and 3 areas of the Reactor Building which were not included in the Unit 2 and common restart effort. Discrepancies will be evaluated against the criteria and the enveloping (worst) cases used in the Unit 2 and common restart program. The resolution of identified discrepancies will be implemented prior to the restart of Units 1 and 3 respectively. Based on the Unit 2 and common experience, BFN expects no hardware deficiencies to be identified on the rod hung systems.

TVA's final program for the seismic qualification of the remaining Units 1 and 3 conduit and conduit supports will be in accordance with the Unit 2 post-restart commitments. TVA will evaluate and upgrade, as needed, the Units 1 and 3 aluminum and steel conduit and supports against the USI A-46 program guidelines.

Conclusions

The use of the Unit 2 and common rod hung conduit information for Unit 1 or Unit 3 is justifiable based on the following conclusions:

1. The conduit systems and supports for all units were field routed and supported to the same specification.

2. The conduit material type is the same for all units. Conduit was and is procured for all three units to the same procurement specification.

3. The rod hung conduit systems are supported approximately to the same spans (4 feet to 7 feet). Conduits have the same maximum fill ratio and have similar support types (trapeze, braced trapeze) in all units.

4. The response spectra is identical for all reactor buildings.