



Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609

November 4, 1996

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

Gentlemen:

In the Matter of)	Docket Nos. 50-259
Tennessee Valley Authority)	50-260
		50-296

**BROWNS FERRY NUCLEAR PLANT (BFN) - NRC BULLETIN NO. 96-03,
POTENTIAL PLUGGING OF EMERGENCY CORE COOLING SUCTION
STRAINERS BY DEBRIS IN BOILING-WATER REACTORS
(TAC NOS. M96135, M96136, M96137)**

This letter provides TVA's response to the subject bulletin, issued May 6, 1996. The bulletin requests that TVA implement the appropriate procedural measures and plant modifications to minimize the potential for clogging of the Emergency Core Cooling Systems (ECCS) suppression pool strainers by debris generated during a loss of coolant accident (LOCA). The bulletin requests these actions be implemented by the end of the first refueling outage starting after January 1, 1997. This would correspond to the Unit 3 Cycle 7 Refueling Outage planned for February 1997 and the Unit 2 Cycle 9 Refueling Outage planned for fall 1997. Also, the bulletin requests that TVA report to the NRC whether and to what extent the requested actions will be taken and to notify the NRC when these actions are completed.

The subject bulletin concerns the potential for loss of ECCS following a LOCA due to inadequate net positive suction head (NPSH), resulting from accumulated debris on the ECCS strainers during the recirculation phase of a LOCA.

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TVA fully understands the importance of plant safety with regard to the ECCS suction strainer blockage issue. Accordingly, TVA is actively pursuing a resolution of this issue by participating in the Boiling Water Reactor Owners Group (BWROG) Suction Strainer Committee and supporting the formulation of the Utility Resolution Guidelines (URG). Implementation of a final resolution of NRC Bulletin 96-03 during the Unit 3 Cycle 7 Refueling Outage is not achievable due to schedule limitations; therefore, TVA requests a delay in the implementation on Unit 3 until the refueling outage in the fall of 1998. This delay will allow the completion of technical criteria development, which is critical in the successful resolution of this issue. Based on the current schedule for development and approval of URG, the earliest opportunity to evaluate the BFN plant specific conditions and implement any needed modifications, is the Unit 2 Cycle 9 Refueling Outage in the fall of 1997.

Our timetable for completion of the BWROG's recommendations for Unit 3, although not conforming to that suggested in the bulletin, is considered consistent with the technical criteria development and approval as discussed between the BWROG and the staff. The actions taken by TVA to comply with this bulletin will be formulated consistent with the URG being written by the BWROG ECCS Suction Strainer Committee and reviewed by the staff. Within 90 days following NRC approval of the URG, TVA will provide a follow-up submittal describing planned actions and schedules. Additionally, TVA will provide a report confirming completion of the actions taken to resolve this bulletin.

Until final issue resolution, TVA will continue with actions to reduce the possible ECCS blockage issue that are consistent with those described in response to NRC Bulletins 93-02, 93-02 Supplement 1, and 95-02. These actions are summarized below and in the enclosures.

BFN's ECCS design features include four ECCS suction strainers connected to a common ring header which provides suction needed for long term cooldown following a LOCA. Current plant design basis supports that adequate NPSH will exist with all four strainers clogged approximately 65 percent.

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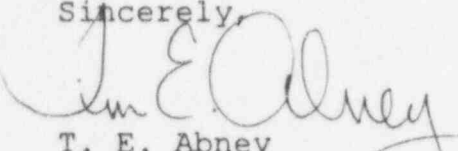
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The operator training program was augmented with required reading, and enhanced classroom and simulator training. The BFN Emergency Operating Instruction Appendices were revised. This provides the operator with the means to identify potential ECCS strainer clogging and implement mitigating actions. Moreover, the Foreign Material Exclusion Program provides the requirements to maintain cleanliness by preventing uncontrolled introduction of foreign material into open systems that lead to the torus.

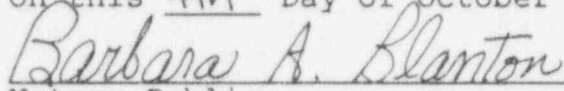
Enclosure 1 provides a detailed justification for an extension to delay the implementation of the final resolution to NRC Bulletin 96-03 on Unit 3 until the fall of 1998. Enclosure 2 is a summary of the commitments made in this letter. If you have any questions, please telephone me at (205) 729-2636.

Sincerely,


T. E. Abney
Manager of Licensing
and Industry Affairs

cc: See page 4

Subscribed and sworn before me
on this 4th Day of October 1996.


Notary Public

My Commission Expires 10/06/98

My Commission Expires _____ .

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Enclosures

cc (Enclosures):

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY BROWNS FERRY NUCLEAR PLANT (BFN) UNITS 1, 2, AND 3

NRC BULLETIN 96-03 POTENTIAL PLUGGING OF EMERGENCY CORE COOLING SUCTION STRAINERS BY DEBRIS IN BOILING-WATER REACTORS

This enclosure provides TVA's justification for delayed implementation of the final resolution to NRC Bulletin 96-03 on Unit 3 until the fall of 1998.

I. JUSTIFICATION

On May 11, 1993, NRC issued Bulletin 93-02 (Reference 1), which notified licensees of a previously unrecognized contributor to the potential loss of net positive suction head (NPSH) for the Emergency Core Cooling Systems (ECCS) during the recirculation phase of a loss of coolant accident (LOCA). The filtering of corrosion products, dust, fibrous thermal insulation, debris, and other temporary material may cause an unexpected rapid loss of net positive suction head for the ECCS pumps when they are needed to perform their intended function. Licensees were requested to identify fibrous air filters or other temporary sources of fibrous material, not designed to withstand a LOCA, which are installed or stored within the primary containment and take prompt action to remove any such material.

TVA responded to the bulletin on May 23, 1993, (Reference 2). As a result of the bulletin, TVA performed a walkdown of the Unit 2 drywell (primary containment) and found no temporary or permanently installed fibrous air filters or other sources of fibrous material not designed to withstand a LOCA. The piping inside the drywell is insulated with reflective metal insulation which is not a potential source of fibrous material. Subsequently, TVA identified fibrous material in the drywell. TVA discussed these findings in a letter dated December 1, 1994, (Reference 5). Specifics of the findings are described later in this enclosure.

On February 18, 1994, NRC issued Supplement 1 to Bulletin 93-02 (Reference 3). The staff's ongoing review of this issue suggests that the previous method of estimating the fragmentation of insulation materials may not be representative of the large break LOCA scenario. As such, the extent of debris generation due to a jet impingement from a postulated pipe break may have been underestimated. Small particles of fibers, in combination with debris, have been found to significantly increase the pressure drop across strainers.

On April 18, 1994, TVA responded to Supplement 1 to NRC Bulletin 93-02 (Reference 4). In the letter, TVA committed to implement changes that would minimize the risk of clogging of the suppression pool strainers and provide the Operator with the means to identify possible strainer clogging and the mitigating actions.

As detailed below, TVA augmented the Operator's required reading program, conducted classroom and simulator training, revised appendices in the BFN Emergency Operating Instructions (EOI), and changed the applicable design procedures to control the amount of fibrous material introduced into the drywell area through changes in the facility design.

Information Notices 88-28, 90-07, 92-71, 93-34, Supplement 1 to 93-34 and TVA's response, to Bulletin 93-02 Supplement 1 were included in the Operator's required reading program.

TVA conducted classroom training on the symptoms of ECCS strainer blockage and the mitigating actions allowed by the BFN EOIs. In addition, simulator demonstration training was observed by the Operators in order to illustrate the indications of ECCS strainer blockage.

Applicable EOI appendices were revised to include a precautionary statement warning the Operator that continuous operation of the low pressure injection system pumps with inadequate NPSH may result in pump damage or pump inoperability. The Operator is instructed to monitor NPSH using an attachment to the EOI appendices that contains a NPSH limit curve, showing pump flow versus suppression pool temperature for various suppression pool pressures. The attachment also lists additional indications of inadequate NPSH. Operators are trained on these procedures as part of

their periodic requalification program.

Site Standard Practice (SSP)-9.3, "Plant Modifications and Design Change Control," was revised to require that any proposed addition of fibrous material in the drywell be coordinated with the Lead Mechanical Nuclear Engineer in accordance with Browns Ferry Engineering Procedure (BFEP) Project Instruction (PI)89-06, "Design Change Control." BFEP PI 89-06 requires an evaluation of fibrous material being introduced into the drywell that could become dislodged during a LOCA or other event and contribute to ECCS strainer blockage.

Also, in the April 18, 1994, letter, TVA detailed an administrative program utilized as part of our defense in depth. The program ensures maintenance activities will not introduce debris that could induce clogging of the ECCS strainers and affect ECCS pump performance. Site Standard Practice-12.8, "Foreign Material Exclusion," provides the requirements for maintaining cleanliness by preventing uncontrolled introduction of foreign material into open systems that lead to the torus.

In the original response to Supplement 1 dated April 18, 1994, (Reference 4), TVA stated that a walkdown had been performed on Unit 2 which confirmed there were no permanently or temporarily installed fibrous material not designed to withstand a LOCA. Subsequently, TVA identified approximately 190 ft³ of asbestos, 35 ft³ of fiberglass, and 8 ft³ of calcium silicate (which is 95 percent non-fibrous) in the drywell penetrations. The Unit 2 drywell contains an additional approximate two square foot piece of encapsulated fibrous insulation for thermal protection of a cable. TVA detailed these findings on Unit 2 in a letter dated December 1, 1994, (Reference 5). NRC was informed of completion of the Unit 3 walkdown in a letter dated February 8, 1996, (Reference 6). This walkdown identified similar amounts of fibrous material inside the Unit 3 drywell penetrations.

On October 17, 1995, NRC issued Bulletin 95-02 (Reference 7). TVA responded to the bulletin detailing steps to ensure the operability of the ECCS pumps in a letter dated November 15, 1995, (Reference 8). In doing so, TVA committed to clean the Unit 3 suppression pool, and perform a confirmatory inspection and test prior to Cycle 7 operation. TVA also committed to visually

inspect the Unit 2 suppression pool including the ECCS ring header during the Cycle 8 Refueling Outage and develop a program for suppression pool cleaning.

When Bulletin 95-02 was issued, Unit 3 was in the final stages of recovery from an extended outage. As part of the recovery effort, the Unit 3 torus was cleaned, the coatings were confirmed acceptable or repaired as needed. The torus was then filled with condensate water. The Unit 3 suppression pool was verified clean and a confirmatory test was completed prior to restart from the outage. TVA notified NRC that this action was completed in a letter submitted February 8, 1996 (Reference 6).

The Unit 2 suppression pool and ECCS strainers were cleaned during the Unit 2 Cycle 7 Refueling Outage in October 1994. During the Cycle 8 Refueling Outage, divers performed an underwater visual inspection of the Unit 2 torus and ECCS strainers. They removed any debris that could contribute to strainer blockage. TVA detailed the results of this inspection in a letter submitted April 19, 1996, (Reference 9). TVA found that the overall clarity of the water was good, and a minimal amount of sediment was identified in the torus. The divers retrieved small items from the pool floor which included small pieces of masking tape, small pieces of paper, plastic tie wraps, and small pieces of wire.

As requested by the staff in Bulletin 95-02, a program for suppression pool cleaning is currently under development. Plant specific and industry information will be used to generate the criteria needed to establish suppression pool cleaning frequency and procedures needed for pool cleaning¹. TVA currently performs a visual inspection of the ECCS Strainers during refueling outages. The inspection will also include an examination of the suppression pool for sludge and debris that could potentially lead to ECCS strainer clogging. If the inspection results indicate desludging is necessary, TVA will desludge the suppression pool. Prior to the inspection, the ECCS pumps will have been operated to allow available

¹A commitment to establish a program for suppression pool cleaning resulted from the reply to NRC Bulletin 95-02; therefore, this action does not constitute a new regulatory commitment.

material to be drawn to the strainers.

The augmenting of the Operator's training program with required reading, enhanced classroom and simulator training, revised BFN Emergency Operating procedures provide the Operator with the means to identify potential ECCS strainer clogging and implement the mitigating actions. Moreover, TVA's design features and the Foreign Material Exclusion Program minimizes the potential for introduction of fibrous material into the suppression pool. Therefore, TVA contends that safe operation of Unit 3 can continue until implementation of the final resolution of NRC Bulletin 96-03.

II. REFERENCES

1. NRC letter to all holders of Operating Licenses or Construction Permits for Nuclear Power Reactors, dated May 11, 1993, NRC Bulletin No. 93-02: Debris Plugging on Emergency Core Cooling Suction Strainers
2. TVA letter to NRC, dated May 23, 1993, NRC Bulletin No. 93-02, "Debris Plugging of Emergency Core Cooling Suction Strainers"
3. NRC letter to all holders of Operating Licenses or Construction Permits for Boiling-Water and Pressurized-Water Reactors, dated February 18, 1994, NRC Bulletin No. 93-02 Supplement 1: Debris Plugging on Emergency Core Cooling Suction Strainers
4. TVA letter to NRC, dated April 18, 1994, NRC Bulletin No. 93-02 Supplement 1, "Debris Plugging of Emergency Core Cooling Suction Strainers"
5. TVA letter to NRC, dated December 1, 1994, "Debris Plugging of Emergency Core Cooling Suction System (ECCS) Strainers"
6. TVA letter to NRC, dated February 8, 1996, "Completion Status of Unit 3 Restart Issues - Revision 3"
7. NRC letter to all holders of Operating Licenses or Construction Permits for Nuclear Power Reactors, dated October 17, 1995, NRC Bulletin No. 95-02: "Unexpected Clogging of a Residual Heat Removal (RHR) Pump Strainer While Operating in The suppression Cooling Mode"
8. TVA letter to NRC, dated November 15, 1995, NRC Bulletin No. 95-02: "Unexpected Clogging of a Residual Heat Removal (RHR) Pump Strainer While Operating in The suppression Cooling Mode"
9. TVA letter to NRC, dated April 19, 1995, NRC Bulletin No. 95-02: "Unexpected Clogging of a Residual Heat Removal (RHR) Pump Strainer While Operating in The suppression Cooling Mode"

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3

NRC BULLETIN 96-03
POTENTIAL PLUGGING OF EMERGENCY CORE COOLING SUCTION
STRAINERS BY DEBRIS IN BOILING-WATER REACTORS
LIST OF COMMITMENTS

1. TVA will continue to perform a visual inspection of the torus and ECCS Strainers during each refueling outage until resolution of NRC Bulletin 96-03.
2. TVA will provide a submittal describing planned actions and schedules to be utilized to resolve NRC Bulletin 96-03. This submittal will be issued within 90 days following the approval of the Utility Resolution Guidelines.
3. TVA will provide a report confirming completion of actions taken to resolve NRC Bulletin 96-03 within 30 days of completion of the last action.