



Tennessee Valley Authority, P.O. Box 7700, Decatur, Alabama 35601

MAR 27 1992

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 REQUEST FOR ADDITIONAL INFORMATION REGARDING TVA'S RESPONSE TO NRC'S SAFETY EVALUATION (SE) ON THE CONFORMANCE OF BFN PLANT WITH THE STATION BLACKOUT RULE (SBO) (10 CFR 50.63) (TAC NOs. 68517, 68518, AND 68519)

- Reference:
- 1) NRC Letter to TVA dated July 11, 1991, "Safety Evaluation on the Conformance of BFN with the Station Blackout Rule (TAC NOs. 68517, 68518, and 68519)"
 - 2) NRC Letter to TVA dated March 5, 1992, "Request for Additional Information on Station Blackout for Browns Ferry (TAC Nos. 68517, 68518, and 68519)"

This letter provides TVA's response to NRC requests for additional information on Station Blackout for BFN made during a January 8, 1992 TVA/NRC teleconference and by Reference 2. As discussed during a March 19, 1992 TVA/NRC teleconference, TVA plans to implement a more realistic coping strategy for SBO during multi-unit operation. Heating, ventilating, and air-conditioning (HVAC) equipment will be powered from the non-blackout unit's emergency diesel generators (EDG) to provide cooling in some areas. Also, as discussed in the March 19, 1992 teleconference, TVA plans to request a change to BFN's Emergency AG (EAG) group classification. TVA will provide additional information on these proposed changes by May 29, 1992. These changes will require a supplemental safety evaluation report (SER) to address SBO compliance for multi-unit operation. They do not affect SBO compliance for single unit operation. Therefore, no changes to the SER provided by Reference 1, as it relates to Unit 2, are required. As previously committed, BFN will be in compliance with the SBO rule for single unit operation by May 30, 1992.

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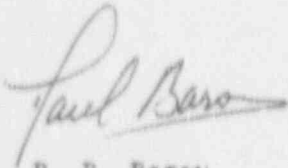
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Enclosures 1 and 2 restate the January 8, 1992 teleconference questions and the March 5, 1992 Request for Additional Information questions, respectively, and provide TVA's response to each. TVA requests that a supplemental SER that addresses multi-unit operation be provided by December 31, 1992.

A summary list of commitments contained in this letter is provided in Enclosure 3. If you have any questions, please contact me at (205) 729-7570.

Sincerely,



R. R. Barou

Enclosures

cc. (Enclosures):

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BROWNS FERRY NUCLEAR PLANT

TVA RESPONSE TO NRC QUESTIONS

The NRC's Safety Evaluation (SE) for BFN's compliance to the Station Blackout (SBO) rule was provided to TVA by letter dated July 11, 1991. TVA provided a response for BFN Unit 2 by letter dated August 13, 1991 and for BFN Units 1 and 3 by letter dated December 2, 1991. Additional information was requested by the NRC during a January 8, 1992 teleconference held between TVA BFN representatives and Thierry Ross (NRR) regarding BFN's Unit 2 response. TVA originally agreed to provide a response to this request by March 6, 1992; however, the NRR Project Manager for BFN requested that TVA withhold this response and provide it concurrent with the March 5, 1992 RAI response.

The following documents the verbal responses provided by TVA on January 8, 1992. TVA's responses to NRC Questions 1 through 3b below apply to Unit 2 only. The responses to Questions 3c and 3d apply to all three BFN units. With the exception of TVA's responses to NRC Question 3a, Concern #1 and Question 3b, Concerns #1 and #2, these are the same responses provided verbally on January 8, 1992. For these three questions, TVA considered the additional clarification provided in the January 8 teleconference and has provided a revised response and/or additional clarification.

*** NRC QUESTION 1**

In TVA's August 13, 1991 response to SE Section 2.2.4, TVA stated a re-evaluation of the Effects of Loss of Ventilation was expected to be completed by December 6, 1991. NRR needs a copy of the calculation.

BFN RESPONSE

TVA extended the completion date for the Unit 2 calculation to March 6, 1992 per telecon with NRR on December 3, 1991. The Unit 2 calculation package is available for NRR review at TVA's Rockville, Maryland office.

*** NRC QUESTION 2**

In TVA's August 13, 1991 response to SE Section 2.2.5, TVA stated a re-evaluation of containment isolation valves was expected to be completed by December 6, 1991. NRR needs a copy of the evaluation.

BFN RESPONSE

TVA extended the completion date for the Unit 2 calculation to March 6, 1992 per telecon with NRR on December 3, 1991. The Unit 2 calculation package is available for NRR review at TVA's Rockville, Maryland office.

• NRC QUESTION 3A

NRR needs a response to concerns #1 and 2 on page 4 of SE Section 7.2.2, Class 1E Battery Capacity, the Safety Evaluation.

- Concern #1 - The licensee has taken an exception to the IEEE Standard 485 cell sizing method in its calculations by breaking the time step size into smaller than one-minute intervals. This results in a smaller net average current and, therefore, is non-conservative.

BFN Response - The Unit 2 calculations have been revised to use the 1 minute rate as recommended by IEEE Standard 485. This calculation is available for NRR review at TVA's Rockville, Maryland office.

- Concern #2 - The licensee assumed that only two circuit breakers would be closed at the end of the SBO event and that 5 ampere would be required to close each breaker. A review of the plant electrical distribution drawings indicates that more than two circuit breakers are required to connect the emergency buses to the offsite power source.

BFN Response - The Unit 2 calculation includes over 300 amp for one minute to close switchyard breakers; this is more than adequate to close any number of switchyard breakers.

• NRC QUESTION 3B

Respond to the following additional concerns:

- Concern #1 - For the battery room temperature, the licensee assumed an initial temperature of 76°F. The licensee needs to ensure that the room ambient air temperature will not drop below this temperature under any circumstances or if it does, there is an alarm in the control room to alert the operators to take appropriate action (See TER page 13 & 25) (Refer to NUMARC 87-00 Section 7.2.2 page 7-7 & 7-9 for electrolyte temperature)

BFN Response - The 76 degrees F temperature used is a bulk average temperature for control bay elevation 593. Based on the control systems for the cooling/heating systems and the air flow patterns this is the temperature that would be expected during normal conditions. TVA has revised the battery capacity calculation for BFN Unit 2 using an initial temperature of 69°F based on an evaluation of measured temperatures. This is the lowest electrolyte temperature anticipated under normal operating conditions. Since TVA's calculation uses the lowest anticipated electrolyte temperature, there is no need to provide an alarm in the control room. These calculations are available for review at TVA's Rockville, Maryland office.

- Concern #2 - The licensee used a design margin of 1.00 in its battery calculation. This is not consistent with the guidance provided in IEEE Standard 485, which recommends a design margin of 1.10-1.15 be used. (See TER page 14, 25, & 26) This margin is required for less-than-optimum operating conditions of the battery due to improper maintenance, recent discharge or ambient temperature lower than expected.

BFN Response - The design margin for the Unit 2 battery calculation was in terms of voltage in excess of the minimum required to support loads. The battery calculation has been revised to show design margin as a percent of battery capacity.

BFN was licensed prior to the issuance of IEEE Standard 485. The design margin for which the plant was licensed is defined as any capacity in excess of that required to support design basis load conditions at BFN. TVA considers this design margin (currently 1.02-1.03) adequate for use in the SBO battery calculation. This design margin may also be used for future load additions. NUMARC 87-00 (refer to Section 7.2.2, page 7-10) states that DC power requirements for a required SBO may be estimated using the same methodology for which the plant was licensed.

• **NRC QUESTION 3C**

NRR needs the duration of emergency bearing oil pump and generator seal oil pump loads for all 3-units on non-1E battery.

BFN RESPONSE

These pumps are not used for recovery from an SBO at BFN. Therefore, no calculation for SBO is required. (See TVA's response to NRC Question 3D below.)

• **NRC QUESTION 3D**

NRR needs a copy of the EDG battery calculation.

BFN RESPONSE

The diesel generator batteries are not adequate to last 4 hours. The SBO analysis assumes the batteries were depleted early in the event trying to start the diesels. No credit is taken for diesel batteries in analysis therefore no calculation for SBO is required.

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT

TVA Response to NRC Request for Additional
Information Dated March 5, 1992

This enclosure restates the Request for Additional Information items in NRC's letter dated March 5, 1992 and provides TVA's response to each. In those cases where the RAI items below are similar to the January 8, 1992 teleconference questions, TVA refers to the response made for the teleconference question in Enclosure 1.

• NRC Item A.1

Provide completion schedule for DC-power system modifications.

BFN Response

DC-power system modifications required for SBO compliance during multi-unit operation will be completed prior to Unit 3 restart. Some of these modifications are also being performed to support Unit 2 operations and will be completed prior to restart from the Unit 2 Cycle 6 outage.

• NRC Item A.2

Provide results from the modified battery capacity calculations for multi-unit operation using the new safety-related batteries (actual calculations should be made available at the TVA Rockville office). Justify all assumptions, and address any applicable non-conservatism or concerns identified in the staff's safety evaluation (SE) (e.g., Section 2.2.2).

BFN Response

As stated in TVA's December 2, 1991 response, the multi-unit calculation for battery capacity will be revised using field verified walkdown data for Units 2 and 3 by March 31, 1992. This calculation will be made available to NRR for review at TVA's Rockville, Maryland office by April 7, 1992.

• NRC Item A.3

In Enclosure 1 (on page 1 of 3) of TVA's response dated December 2, 1991, "the 120V AC Reactor Core Isolation Cooling (RCIC) system controls... will be transferred to an appropriate source." Identify this source and verify that it will be available during the four-hour duration of SBO.

BFN Response

The 120V AC Reactor Core Isolation Cooling (RCIC) system controls will be powered by a Class 1 DC power supply system and will be available during the four-hour duration of SBO.

- NRC Item A.4

Following the four-hour SBO event, power will be restored from either offsite or onsite (i.e., emergency diesel generators (EDG)) sources. Since EDG restart and switchyard circuit breaker closure are powered from different sources, TVA should consider both scenarios in order to properly bound the end of the postulated SBO event. TVA is requested to verify that Browns Ferry can accommodate the most limiting power restoration scenario (e.g., calculations that confirm adequate DC power supplies to restart EDGs).

BFN Response

TVA stated in the August 13 and December 2, 1991 responses that TVA's SBO analysis (Unit battery capacity calculation) does not consider that ac power will be restored by the diesel generators, therefore, dc power is not needed for the control and field flashing of the EDGs. TVA explained during the January 8, 1992 teleconference that the SBO analysis assumes the EDG batteries are depleted early in the event trying to start the diesels and that no credit was taken for diesel batteries in the SBO analysis, therefore, an EDG battery capacity calculation with respect to SBO was not required. The NRC agreed with this conclusion during the teleconference. After issuing this RAI, the TVA BFN NRR Project Manager determined, and advised TVA on March 10, 1992, that Item A.4 above was not an explicit requirement and that TVA's current coping strategy was acceptable. TVA's ac power restoration strategy is clarified below.

BFN procedure O-AOI-57-2, Station Blackout, directs the operator to restore ac power via the EDGs or offsite power. In relation to the EDGs, the procedure directs specific individuals to assist in restoring diesel generators to operable status. This includes determining and correcting the cause of EDG start and/or loading failures.

If troubleshooting fails to correct EDG problems or the EDG batteries are depleted during this effort, the only method available for restoring ac power is by offsite power. It is not possible to determine when this will occur since it would be dependent upon the type of problem and how long it takes to address. Each EDG has a dedicated 125V dc battery that provides control and field flashing. The batteries are sized to carry the control load and provide three starts within a thirty minute period. After the three attempts, the battery is considered depleted and, as a result, the EDGs are no longer available for restoring AC power.

BFN's SBO battery capacity calculation was performed for the Unit battery that provides dc power for required SBO loads for the four hour coping period. The EDG is not powered from the Unit battery, therefore power requirements for starting the EDG are not considered in this calculation.

- NRC Item A.5

TVA used a design margin of 1.00 in its battery calculations. This is inconsistent with the guidance of IEEE Standard 485, which recommends 1.10 - 1.35. Provide justification for using an apparently non-conservative design margin.

BFN Response

See response to NRC Question 3B, Concern #2 in Enclosure 1.

• NRC Item A.6

TVA assumed an initial battery room temperature of 75°F. This is inconsistent with the guidance in NUMARC 87-00 (Section 7.2.2). Provide rationale for deviating from accepted NUMARC guidance.

BFN Response

See response to NRC Question 3B, Concern #1 in Enclosure 1.

• NRC Item B.1

In letters dated August 13 and December 2, 1991, TVA committed to re-evaluate the containment isolation valves (CIV) in accordance with the exclusion criteria of Regulatory Guide (RG) 1.155. List all CIVs, indicating those that can be excluded (specifying applicable RG 1.155 exclusion criteria) and those that can not.

BFN Response

See response to NRC Question 2 in Enclosure 1. Also, the Units 1 and 3 CIV re-evaluation will be completed by March 31, 1992 and made available to NRR for review at TVA's Rockville, Maryland office by April 7, 1992.

• NRC Item C.1

In letters dated August 13 and December 2, 1991, TVA committed to revise its heat-up calculations based upon staff recommended input data (Section 2.2.4 of staff SE). TVA is requested to provide the results of its modified heat-up calculations (actual calculations to be made available at the TVA Rockville office) for areas containing SBO equipment (e.g., HPCI/RCIC rooms, the control room, drywell, etc.). Initial inputs, assumptions, and computer codes used in these calculations are to be identified. Equipment qualification temperatures for each area also need to be provided.

BFN Response

As committed in TVA letters dated August 13 and December 2, 1991, TVA has evaluated the recommended input data and utilized it in associated calculations as applicable. For single unit operation, refer to the response to NRC Question 1 in Enclosure 1. For multi-unit operation, heat-up calculations for the HPCI, RCIC, Steam Tunnel and Drywell areas will be completed by March 31, 1992.

For multi-unit operation, TVA plans to make ac power available to HVAC for cooling the other dominant areas of concern from the non-blackout units' EDGs. Therefore, heat-up calculations will not be performed for these areas.

• NRC Item D.1

Confirm that all of the equipment and components needed during an SBO event are specifically identified and covered by a quality assurance program consistent with the guidance of RG 1.155.

BFN Response

SBO equipment is covered by a quality assurance program consistent with the guidance of RG 1.155.

ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT

SUMMARY OF COMMITMENTS

1. TVA will make a copy of the BFN Units 1 and 3 evaluation package for Containment Isolation Valves available for NRR review at TVA's Rockville, Maryland office by April 7, 1992.
2. TVA will make copies of the calculation packages for Unit Battery Capacity, Heatup and EDGs that support multi-unit operation available for NRR review at TVA's Rockville, Maryland office by April 7, 1992.
3. DC power system modifications required for SBO compliance during multi-unit operation will be completed prior to Unit 3 restart.
4. TVA will provide additional information on proposed changes in SBO coping strategy and EAC group classification by May 29, 1992.