





Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

**FEB 04 1991**

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

Gentlemen:

In the Matter of the Application of ) Docket No. 50-438  
Tennessee Valley Authority ) 50-439

BELLEFONTE NUCLEAR PLANT (BLN) - TRANSMITTAL OF TVA POSITION REGARDING  
BLN FINAL SAFETY ANALYSES REPORT (FSAR) ACCIDENT ANALYSES (TAC #79274)

In accordance with TVA's letter to the NRC staff dated December 4, 1990, enclosed for staff review is the TVA position regarding the approach, scope and schedule for performing accident analyses for BLN.

A written staff response to TVA's position is requested by April 8, 1991. As discussed with NRC staff management, timely resolution of key issues such as those noted in the enclosure is important to TVA's consideration of the nuclear option at BLN.

The enclosed position relates only to FSAR accident analyses and is a stand alone document. Accordingly, TVA requests that written staff response to this paper not be delayed pending staff questions on other documents. Should TVA continue construction of BLN after staff resolution of this and other positions, the agreements reached will be used to govern design, construction, and operation of BLN and will be incorporated into the BLN FSAR, as appropriate.

Bruce S. Schofield will contact the BLN Project Manager to schedule working level meetings to assist in the staff's review of this position. As proposed in our January 17, 1991 meeting with the staff, the first working level meeting will be scheduled to occur approximately 10 days from the date of this letter.

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If you have any questions please contact Mr. Schofield at (205) 574-8058.

Very truly yours,

TENNESSEE VALLEY AUTHORITY



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Enclosure

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## ENCLOSURE

### BELLEFONTE POSITION PAPER REGARDING FSAR ACCIDENT ANALYSIS

#### PURPOSE

This position paper describes TVA's plans regarding analysis of accidents to be presented in future revisions of the FSAR, Chapters 6 and 15. TVA requests NRC staff agreement (1) to commit adequate staff resources to meet the review and approval schedule for LOCA event analyses noted in this document; (2) that the large break LOCA, small break LOCA and non-LOCA events described in this document are the appropriate set of events necessary to be analyzed in Chapters 6 and 15 of the FSAR; and (3) with TVA's position that the events listed in Table 2 need not be reanalyzed.

#### TECHNICAL POSITION

##### Overall Plan and Schedule

The existing FSAR event analyses contained in Chapters 6 and 15 were performed using NRC-approved computer codes and methods. Several Commission regulations regarding LOCA analyses (i.e., 10CFR50.46 and 10CFR50 Appendix K) were revised in 1988. As a result, TVA plans to revise the analyses of Bellefonte LOCA events using the RELAP5/MOD2-B&W computer code. Topical reports describing computer code methodology, evaluation model, and evaluation results will be submitted for NRC staff review and approval on the schedule provided in Table 1. With regard to analyses of non-LOCA events, some analyses described in the FSAR will be revised and some new events will be analyzed. The schedule for staff review of non-LOCA event analyses is not considered critical and, accordingly, is not addressed in this document.

##### Large Break LOCA Events

The RELAP5/MOD2 B&W computer code will be modified and submitted to the NRC staff for approval (see schedule in Table 1). Following NRC staff approval, a series of sensitivity studies will be performed to show calculational convergence for appropriate system nodding and time steps of the model. The results of this work will be presented in the large break LOCA evaluation model and methods topical report submittal to the staff in January 1994. Plant specific sensitivity studies and calculations will also be performed. These calculations will provide, for example, the LOCA linear heat rate limits and time-in-life studies. The results of this work will be presented in the large break LOCA evaluation model and application topical report submitted to the staff in January 1995.

The large break LOCA analysis discussed in Chapter 6 of the FSAR will be revised using updated methodology. In this regard, a reduced break spectrum analysis will be performed. This includes discharge coefficient variations, split versus double-ended breaks, and pump discharge and suction breaks. Hot leg breaks will not be considered because the conclusion from previous evaluation model studies that cold leg breaks are more limiting than hot leg breaks will remain valid for a RELAP5/MOD2-B&W evaluation. The methodology and results will be provided to the NRC staff in topical reports and summarized in the FSAR.

### Small Break LOCA (SBLOCA) Events

Following completion of the small break LOCA analyses reported in Chapter 6 of the FSAR, the evaluation models have been improved to address concerns raised in staff documents such as NUREG-0565, NUREG-0623, and NUREG-0737. Accordingly, small break LOCA events currently addressed in Chapter 6 of the FSAR will be revised. Additional small break LOCA events will also be analyzed. The methodology and results will be provided to the NRC staff in topical reports and summarized in revisions to the FSAR.

As with large break LOCA events, the small break LOCA analyses will be contained in a methods topical report and an applications topical report, and submitted to the staff according to the schedule in Table 1. The methods topical report will include generic sensitivity studies applicable to all classes of B&W designed plants (177-FA lowered and raised loop as well as the BLN 205-FA raised loop). The applications topical report on small break LOCA events will address cold leg pump discharge small break LOCA events for a spectrum of break sizes. It will also address core flood tank line breaks, high pressure injection line breaks and pinch breaks, and the large break LOCA-to-small break LOCA transition breaks.

### Non-LOCA Events Being Reanalyzed

Several specific non-LOCA event analyses contained in Chapter 15 of the FSAR will be reanalyzed and/or expanded in scope, as summarized below:

- The steam generator tube rupture accident
- A full spectrum break study of the feedwater line break accident
- Partial pump initial condition cases (coolant flow upsets with less than four coolant pumps operating)
- Resolution of long term cooling and post-LOCA boron concentration and precipitation issues for the BLN design
- Evaluation of the core analysis for departure from nucleate boiling to ensure it remains applicable, and to update if necessary

The analyses listed above reflect TVA's intent to address new guidance that has been added to the Standard Review Plan (NUREG 0800). Although there is no regulatory requirement for this, TVA believes that performing these analyses will allow a better understanding of the operation of the BLN reactor during transient conditions.

### Non-LOCA Events Not Being Reanalyzed

Table 2 lists the accidents for which previous analyses remain valid. The analyses are unaffected by recent code modifications and revised regulatory requirements. They have been analyzed using NRC-approved codes and meet the acceptance criteria for each class of accidents using assumptions consistent with NUREG 0800.

Station Blackout

Evaluation of station blackout, as currently defined by the NRC, will be addressed during the Bellefonte FSAR review. The content and schedule of the station blackout discussions will be provided to the NRC if Bellefonte licensing proceeds.

Table 1

<u>Description</u>	<u>Date</u>
Begin RELAP5 Code Development	01/91
Resubmit RELAP5 Code Topical Report	07/92
RELAP5 Code Topical Report Approval	04/93
Submit LBLOCA Methods Topical Report	01/94
Submit SBLOCA Methods Topical Report	01/94
LBLOCA Methods Topical Report Approval	10/94
SBLOCA Methods Topical Report Approval	10/94
Submit LBLOCA Evaluation Model Application Topical	01/95
Submit SBLOCA Evaluation Model Application Topical	01/95
LBLOCA Evaluation Model Application Topical Approval	10/95
SBLOCA Evaluation Model Application Topical Approval	10/95
BLN-1 Power Operation	1997

## Table 2

### Non-LOCA Events Not Being Reanalyzed

- 15.1.1 Feedwater System Malfunctions that Result in a Decrease in Feedwater Temperatures
- 15.1.2 Feedwater System Malfunctions that Result in an Increase in Feedwater Flow
- 15.1.3 Steam System Malfunctions that Result in Increase in Steam Flow
- 15.1.4 Inadvertent Opening of a Steam Generator Relief or Safety Valve
- 15.1.5 Steam Line Break
- 15.2.2 Loss of External Electrical Load
- 15.2.3 Turbine Trip
- 15.2.4 Inadvertent Closure of Main Steam Isolation Valves
- 15.2.5 Loss of Condenser Vacuum
- 15.2.7 Loss of Normal Feedwater Flow
- 15.3.1 Single and Multiple Reactor Coolant Pump Trips (Loss of Coolant Flow)
- 15.3.3 Reactor Coolant Pump Shaft Seizure (Locked Rotor)
- 15.4.3 Reactor Coolant Pump Shaft Break
- 15.4.1 Uncontrolled Control Rod Group Withdrawal from a Subcritical Condition
- 15.4.2 Uncontrolled Control Rod Withdrawal at Power
- 15.4.3 Control Rod Assembly (CRA) Misoperation
- 15.4.4 Startup of Inactive Reactor Coolant Pumps (Pump Startup Accident)
- 15.4.6 Makeup and Purification System Malfunction (Boron Dilution)
- 15.4.7 Inadvertent Loading of Fuel Assembly into an Improper Position
- 15.4.8 Rod Ejection Accident
- 15.5.1 Inadvertent Operation of ECCS During Power Operation
- 15.5.2 Makeup and Purification System Malfunction (or Operator Error) Causing Increased Reactor Coolant Inventory
- 15.7.1 Waste Gas Decay Tank Failure
- 15.7.2 Liquid Waste Disposal System Failure (Release to Atmosphere)
- 15.7.3 Postulated Radioactive Release Due to Liquid Tank Failures
- 15.7.4 Fuel Loading Accident
- 15.8 Anticipated Transients Without Scram