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 FACIL: 50-438 Bellefonte Nuclear Plant, Unit 1, Tennessee Valley Au 05000438  
 50-439 Bellefonte Nuclear Plant, Unit 2, Tennessee Valley Au 05000439  
 AUTH. NAME AUTHDR AFFILIATION  
 GRIDLEY, R. L. Tennessee Valley Authority  
 RECIP. NAME RECIPIENT AFFILIATION  
 STOLZ, J. F. PWR Project Directorate 6

SUBJECT: Forwards work package re new methods for calculating temp transients resulting from main steam line breaks inside containment, per 10CFR50.49 & 860117 commitment. Review requested by 860825 to support procurement efforts.

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 TITLE: Licensing Submittal: PSAR/FSAR Amdts & Related Correspondence

NOTES: OIA 1cy. Application for permit renewal filed. 05000438  
 OIA 1cy. Application for permit renewal filed. 05000439

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TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401  
5N 157B Lookout Place

May 28, 1986

Director of Nuclear Reactor Regulation  
Attention: Mr. J. F. Stolz  
PWR Project Directorate No. 6  
Division of Pressurized Water Reactor (PWR)  
Licensing B  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Stolz:

In the Matter of the Application of ) Docket Nos. 50-438  
Tennessee Valley Authority ) 50-439

TVA proposed, in a January 17, 1986 meeting with members of your staff, to provide "work packages" for specific outstanding Bellefonte Nuclear Plant licensing issues TVA considers to have a high priority. Enclosed is the work package for the, "Main Steam Line Break Temperature Inside Containment," issue. This issue deals with new methods for calculating the temperature transient resulting from main steam line breaks inside containment. This new methodology utilizes heat transfer conditions not previously assumed and provides a more realistic yet conservative prediction of the maximum temperature. Reports describing the methodology and FSAR changes providing revised temperature curves for Bellefonte were generated and previously submitted. TVA requests NRC review and resolution of this outstanding issue by August 25, 1986 in order to support TVA's equipment procurement and qualification efforts.

If you have any questions concerning this matter, please get in touch with D. L. Terrill at FTS 858-2682.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

*R. L. Gridley* by *RLG*

R. L. Gridley, Director  
Nuclear Safety and Licensing

Enclosure  
cc: See page 2

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Director of Nuclear Reactor Regulation

May 28, 1986

cc: U.S. Nuclear Regulatory Commission (Enclosure)  
Region II  
Attention: Dr. J. Nelson Grace, Regional Administrator  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

Mr. H. Brock Barkley, Manager (Enclosure)  
205 Plant Project Services  
Babcock & Wilcox Company  
P.O. Box 10935  
Lynchburg, Virginia 24506-0935

## ENCLOSURE

### BELLEFONTE NUCLEAR PLANT WORK PACKAGE FOR THE MAIN STEAM LINE BREAK INSIDE CONTAINMENT ISSUE

#### I. STATEMENT OF ISSUE

TVA has developed new methods for calculating the temperature transient resulting from main steam line breaks (MSLB) inside containment. This new methodology utilizes heat transfer conditions not previously assumed and provides a more realistic yet conservative prediction of the maximum temperature. Reports describing the methodology and FSAR changes providing revised temperature curves for Bellefonte were generated and submitted. A prompt review of these submittals is needed to support TVA's equipment procurement and qualification efforts.

#### II. REGULATORY REQUIREMENT

MSLBs are a design-basis accident for Bellefonte and, as such, the plant design must be able to mitigate the consequences of the event. This includes being able to show that certain equipment located inside containment is qualified to function as needed to mitigate the event in the temperatures that result from these MSLBs. This is required by 10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants."

#### III. HISTORY OF ISSUE

The original analyses of MSLBs were provided by Babcock and Wilcox (B&W). These analyses showed that a number of breaks resulted in temperatures in excess of 420°F inside containment, with a worst case temperature of 431°F. Temperatures at Bellefonte are higher than at most PWRs because of the once-through steam generators with their small liquid inventory and normal operation superheat. Other B&W plants have similar calculated peak temperatures. The methods used by B&W to calculate MSLB temperatures were consistent with those later recommended by the NRC in NUREG-0588.

The temperatures calculated to occur inside containment during a MSLB made it extremely difficult, and in some cases, impossible to obtain qualified electrical equipment. To improve TVA's ability to obtain qualified equipment, revised methods for calculating the temperature based on experimental data were developed and applied to Bellefonte. This resulted in the maximum temperature being reduced to 372°F. This temperature is typical of temperatures calculated during MSLBs for most PWR containments. Qualified equipment for these temperatures is available.

A preliminary and final version of the technical report describing TVA's methods and their basis have been submitted. The spectrum of MSLBs originally done by B&W has been redone, using the new methods; and FSAR sections describing the MSLB events have been revised to incorporate the new results. These FSAR changes also have been submitted.

#### IV. CHRONOLOGY

- 3/25/85 Letter from R. H. Shell (TVA) to E. Adensam (NRR) submitting proposed FSAR pages describing the new MSLB analysis and resultant containment temperatures, and the preliminary version of TVA report, "Methodology for Predicting Containment Temperatures Following A Main Steam Line Break."
- 8/6/85 Letter from J. A. Domer (TVA) to E. Adensam (NRR) submitting the final version of TVA report, "Methodology for Predicting Containment Temperatures Following A Main Steam Line Break."
- 11/15/85 Letter from J. A. Domer (TVA) to H. Denton (NRR) submitting FSAR Amendment 25 which included the new MSLB analysis.

#### V. IMPACT

Should the new methods not be approved for use, several options are available to obtain qualified equipment:

1. Much of the qualification testing is done in a very conservative manner. Test labs with the capability, or willingness to develop the capability, to realistically test to the calculated conditions could be used.
2. Use individual MSLB curves for testing, instead of using a single composite curve that bounds all of the analyses.
3. Thermal analyses of individual components to individual MSLB curves could be used.

Each of these options is a viable alternative; however, the cost of using these approaches would be greater than that accrued if TVA's new methods are approved.

#### VI. REQUESTED DECISION AND SCHEDULE

TVA requests that the NRC review the submittals provided on this issue to date and render a judgment on the acceptability of the revised containment temperature curves. Please take the necessary actions to resolve this issue by August 25, 1986.

A preliminary and final version of the technical report describing TVA's methods and their basis have been submitted. The spectrum of MSLBs originally done by B&W has been redone, using the new methods; and FSAR sections describing the MSLB events have been revised to incorporate the new results. These FSAR changes also have been submitted.

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