

# Babcock & Wilcox

Power Generation Group

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November 20, 1979

Mr. Darrell G. Eisenhut  
Acting Director  
Division of Operating Reactors  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Subject: Cladding Swelling and Rupture Models for  
LOCA Analysis

Dear Mr. Eisenhut:

On November 14, 1979, Mr. R. P. Denise of the Division of Systems Safety contacted B&W with regard to the Burst Temperature Curve approved for use by B&W in LOCA analyses. Mr. Denise requested B&W to consider the effect of employing the Staff's ramp rate correlation as contained in Draft NUREG 0630 to determine the Burst Temperature Curve for use in LOCA analyses.

B&W has examined the ramp heat up rates calculated prior to rupture for B&W NSS systems which have either OLs or CPs granted under 10 CFR 50.46. (Documented in BAW-10102, Rev. 2, BAW-10103A, Rev. 3, and BAW-10105, Rev. 1.) Interpolating from the Staff's ramp heat up rate versus hoop stress and failure temperature referenced above, B&W has found that the Staff's correlation predicts the fuel cladding to rupture at the same or higher temperatures for all cases, except the 4-foot core elevation for the 177-Fuel Assembly raised-loop plant (BAW-10105, Rev. 1). The ramp rate prior to rupture for this case is approximately 12 C/s, while the extrapolation of the NRC curves to the B&W Burst Temperature Curve at the same stress indicates a 22 C/s heat up rate. B&W has estimated that the effect would be an earlier rupture, and, therefore, additional oxidation due to metal-water reaction, resulting in an increase of approximately 80°F in the peak cladding temperature (PCT). The original analysis showed a peak cladding temperature of 2073°F. The addition of 80°F would result in a peak of 2153°F and not violate the requirements of 10 CFR 50.46. Since the issuance of BAW-10105, Rev. 1, B&W has identified further conservatisms which amount to a reduction in peak cladding temperature of approximately 30°F. Therefore, if the evaluation were

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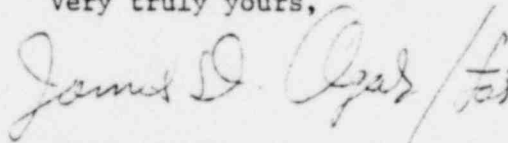
**Babcock & Wilcox**

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to include these further conservatisms, and the NRC ramp rate correlations employed, we would expect a peak cladding temperature increase of about 50°F (2123°F peak) with no difficulty in demonstrating compliance to 10 CFR 50.46.

In summary, B&W has examined the effect of the use of the Staff's ramp rate correlation as requested and found the calculated PCT to be either unchanged or lowered as a result except for the one case noted above. If there are any questions concerning this response, please call me or Henry Bailey (Ext. 2678) of my staff.

Very truly yours,

A handwritten signature in cursive script, appearing to read "James H. Taylor".

James H. Taylor  
Manager, Licensing

JHT/lc

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