

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

5N 105B Lookout Place

January 22, 1986

Director of Nuclear Reactor Regulation
Attention: Mr. B. J. Youngblood, Project Director
PWR Project Directorate No. 4
Division of Pressurized Water Reactor (PWR)
Licensing A
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Youngblood:

In the Matter of the Application of) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

Please refer to T. M. Novak's letter to H. G. Parris dated October 7, 1985 which provided a request for additional information and/or commitments before approval of certain technical specification modifications for the Watts Bar unit 1.

The referenced letter cited two separate technical specification issues. The first issue concerns NRC's request to commit TVA to administrative controls during mode 4 rod withdrawal. This issue is still under deliberation and a separate response will be provided. We have requested discussions with your staff regarding this issue so that we may come to a mutually agreeable solution before responding to your request.

The second issue requests us to reanalyze the small-break loss of coolant accident (SBLOCA) using approved emergency core cooling system (ECCS) codes which conforms to Appendix K of 10 CFR Part 50. In lieu of providing the new analysis as requested, we are providing justification for the analysis previously submitted to the NRC. The justification is enclosed.

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Boo!

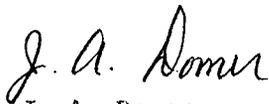
Director of Nuclear Reactor Regulation

January 22, 1986

If there are any questions, please get in touch with K. P. Parr at
FTS 858-2681.

Very truly yours,

TENNESSEE VALLEY AUTHORITY



J. A. Domer
Manager of Licensing

Sworn to and subscribed before me
this 22nd day of Jan. 1986



Notary Public

My Commission Expires 8-24-88

Enclosure

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

ENCLOSURE

NRC Request

The applicant requested that the test requirement for the centrifugal charging pumps (CCPs) during shutdown be reduced from 346 gpm to 315 gpm because the applicant intends to operate the CCPs with the recirculation bypass lines open at all times rather than only at high pressures. To justify the modifications, the applicant evaluated the effect of reduced charging flow on LOCA and main steamline break analyses.

The consequences from a large-break LOCA were determined to be unchanged from the reduction in charging flow because abundant coolant water is available from the low and intermediate pressure injection systems so that the reduction in total injected ECCS flow would be less than 0.05 percent. In addition, during most of the accident sequence, an excess of ECCS water is available so that most of the flow is assumed to spill out of the break.

In the case of a main steamline break, the applicant determined that a slightly greater return to power would occur at a slightly reduced pressure. Some reduction in the minimum departure from nucleate boiling ratio (DNBR) would occur; however, no fuel failure is predicted to occur and the consequences remain acceptable. The TVA committed to make the appropriate modifications in the FSAR.

The consequences of reduced charging flow on a SBLOCA analysis were determined to be more significant. The applicant estimated that the peak-cladding temperature could be as high as 1717°F instead of 1435°F as previously calculated. This was determined using a relationship of 20°F increase in peak-cladding temperature for each percent decrease in ECCS flow. Because of the significant increase in peak-cladding temperature, the staff requires that the applicant reanalyze the most severe SBLOCA using an approved ECCS evaluation model which conforms to Appendix K to 10 CFR 50 and update the appropriate sections in the FSAR (including Figures 15.3.1 through 15.3.12b) prior to approval of the technical specification change.

In addition, the change in charging system injection performance may alter the results from the small-break size sensitivity study in the FSAR. The applicant is required to demonstrate that the most severe small-break size has been identified and appropriately analyzed as required by 10 CFR 50.46 prior to approval of this technical specification modification.

TVA Response

In the Watts Bar SBLOCA FSAR analysis, the six-inch break case exhibited the limiting calculated peak-clad temperature (PCT) at 1435°F. The calculated PCT occurs during a core uncover transient which extends from 160 seconds to 280 seconds; during this time interval, the reactor coolant system pressure falls from 1150 psi to 650 psi. The period of interest in assessing the effect reduced safety injection (SI) flow has on the six-inch break ECCS performance calculation is the period when system pressure is falling from 1150 PSI to 650 psi. At 900 psig, the shortfall in CCP flow is such that the total pumped SI flowrate is reduced by 14.1 percent. Therefore, a reduction in pumped SI flow of 14.1 percent needs to be evaluated for its impact upon calculated PCT. A conservative sensitivity relationship between PCT and SI flow in SBLOCA analyses has been established as a 20°F increase in calculated PCT for each percent reduction in pumped SI flowrate.

WCAP-9600, "Report on Small-Break Accidents for Westinghouse NSSS System," contains detailed SBLOCA analyses for various accident scenarios using the WFLASH ECCS evaluation model. It was submitted as a generic response to NRC requests for information concerning SBLOCA system behavior. WCAP-9600, Volume II, provides the relationship between calculated PCT and the SI flow for Westinghouse plant small cold-leg break LOCAs. Case I of that reference was performed assuming a higher SI delivery due to no spilling of the pumped safety injection. Relative to base Case B, the limiting break with a calculated PCT of 1708°F, Case I produced a PCT reduction of 764°F for a 50 percent increase in SI flow. Thus, for a PCT in the range of interest for Watts Bar WCAP-9600 demonstrates a $d(\text{PCT})/d(\text{SI flow})$ value of $764^\circ\text{F}/50 \text{ percent} = 15.3^\circ\text{F}$ per percent SI flow change. This generic relationship applicable to Westinghouse plants is altered to 20°F/percent SI flow to add more conservatism in the Watts Bar evaluation.

WCAP-9600 further notes that "with respect to the effect of safety injection flow on limiting break size considerations, higher SI flows tend to make larger break sizes limiting." It follows directly from this that a reduction in SI flow will affect smaller break sizes more severely. The Watts Bar FSAR SBLOCA spectrum provides calculated PCT values for eight-, six-, and four-inch equivalent diameter breaks of 1263°F, 1435°F, and 980°F, respectively. The PCT difference between four- and six-inch break sizes is considerably larger than the computed PCT increase due to the reduced total pumped SI flow, so that four-inch case cannot become more limiting than the six-inch case. Moreover, because the six-inch break not only exhibits a 172°F higher PCT in the FSAR analysis but also is more adversely affected by reduced SI flow than the eight-inch case, the six-inch break case remains limiting for Watts Bar with a 14.1 percent reduction in the total pumped SI flow delivery.

The impact of the shortfall is therefore estimated as 282°F increase in PCT. Since the current calculated PCT is only 1435°F for the limiting small-break, adequate margin remains between the resultant 1717°F PCT value and the regulatory limit of 2200°F.

It should be noted that TVA had this reanalysis performed to account for the CCP (high head safety injection pumps) injection flow lost due to recirculation lines remaining open following a SI signal. The recirculation lines remaining open negates the potential for dead-heading the CCPs under certain secondary side high energy line break scenarios. This potential problem is discussed in IE Bulletin 80-18. Watts Bar had initially decided to rely on a procedure solution involving main control room operator actions. However, TVA has decided that the revised ECCS analysis will resolve this issue without having to rely on operator action. TVA believes the additional effort involved with the ECCS reanalysis is more than offset by the removal of these procedure steps from our Emergency Instruction. It also removes the potential for operator error.

TVA believes the sensitivity study performed by W on the SBLOCA is the most conservative and cost effective way to resolve this issue. TVA would like to point out that we have notified you of our intent to license unit 2 without upperhead injection (UHI) (reference Domer to Adensam letter dated September 8, 1985). This effort will require that the ECCS analyses be updated to the latest codes. TVA also intends to remove UHI on unit 1 during a subsequent refueling outage. This, of course, will also require an ECCS reanalysis utilizing the latest codes. TVA believes that a complete reanalysis at this time would provide no added safety benefit but it would significantly increase the cost.

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