



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE JUSTIFICATION FOR CONTINUING OPERATION

BY THE TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

1.0 BACKGROUND

By Licensee Event Report No. 50-327/92013, the Tennessee Valley Authority (TVA) reported a deficiency in the calculation by Westinghouse (W) of the mass and energy releases used to calculate the pressure which would be experienced in the main steam vaults at the Sequoyah Nuclear Plant, Units 1 and 2, as a result of a postulated main steam line break. These calculated releases were determined based on a non-conservative methodology, and TVA concluded that the pressure used in the safety design of these vaults was underestimated. W recommended that TVA use a methodology outlined in ANSI/ANS Standard 58.2, 1980 (Reference 2) to generate bounding mass and energy releases for vault pressurization calculation. The use of this methodology increased significantly the mass and energy releases, and thus also increased the pressures which the reinforced concrete walls and slabs of the valve vaults would experience, should a postulated main steam line break (MSLB) occur. TVA concluded that there would be inadequate design margin and that the structural integrity of the vaults could not be assured in such an event.

To prevent an immediate shutdown of the plant, TVA submitted to Region II a Justification for Continued Operation (JCO), which was submitted by letter dated November 30, 1992.

2.0 EVALUATION

TVA has stated that an MSLB is the only applicable pipe-break design condition for verifying the structural integrity of the vaults. Based on the criteria specified in Standard Review Plan (SRP) Section 3.6.2, Branch Technical Position (BTP) MEB 3-1, "Postulated Rupture Locations In Fluid System Piping Inside And Outside Containment", for postulating pipe breaks in Class 2 piping, the only break which needs to be postulated is a double-ended guillotine break at the terminal end of the flued head anchor where the main steam piping exits the vaults. No intermediate breaks were required to be postulated at other locations, since the stress criteria of BTP MEB 3-1 were stated to be satisfied.

Based on the geometry of the flued head anchor and the existing pipe restraint system, TVA determined that the resulting break size would be significantly smaller than a full guillotine break. For this break size it was found that the peak pressure in the vaults would be less than the current design values. However, the static pressure existing after the initial pressure peak was calculated to be higher than the current design values, which would affect the structural integrity of the vaults. TVA evaluated the consequences of the failure of the structural slabs and walls, and concluded that the intact main steam line could be damaged, resulting in the blow-down of a second steam generator, and/or that essential equipment or piping associated with the feedwater or auxiliary feedwater systems could also be damaged.

To justify continued operation, TVA invoked a provision of SRP Section 3.6.1, BTP ASB 3-1, "Protection Against Postulated Piping Failures In Fluid Systems Outside Containment", whereby certain pipe breaks may be excluded from design basis consideration, provided certain criteria are met. These criteria for pipe break exclusion are contained in BTP MEB 3-1, and are actually applicable to piping in containment penetration areas only. However, TVA stated that they could also be applicable to the main steam lines passing through the vaults since the design requirements are the same in both locations.

TVA reviewed the pipe break exclusion criteria for Class 2 piping in containment penetrations, and demonstrated that all but one of these criteria are satisfied for the main steam lines passing through the vaults. This criterion consists of the requirement for 100% volumetric inservice examination of all pipe welds in the break exclusion area to be conducted during each inspection interval as defined in IWA-2400, ASME Section XI. TVA has stated that these inspections have not been performed for the pipe welds within the vaults; however, these welds were inspected during the original installation. In addition, selected welds have been inspected under the TVA inservice inspection program; welds inspected to-date have been found to be acceptable. However, these welds represent a small number of the total welds. TVA has also estimated the erosion/corrosion rate of the main steam piping and components from the steam generator nozzle to the flued head, using the EPRI program CHECMATE, and determined that it is acceptably low. On this basis, TVA has concluded that it meets the intent of BTP MEB 3-1 for the exclusion of breaks in the main steam valve vaults.

3.0 CONCLUSION

Based on the data submitted by TVA, the staff concludes that there is a very small likelihood that a double-ended guillotine break will occur at the flued heads in the main steam pipe vaults before the upcoming refueling outages at Units 1 and 2 (presently scheduled to start in April and August 1993, respectively). We, therefore, find the justification for break exclusion of the main steam lines in the valve vaults provisionally acceptable until the

end of these refueling outages. To continue to implement the JCO provisions beyond these refueling outages, the staff requires that TVA commit to satisfy all relevant break exclusion requirements of BTP MEB 3-1, including the requirement of 100% volumetric inservice inspection of all pipe welds, beginning with the upcoming refueling outages (unless the original design analysis criteria is re-established).

Principal Contributor: M. Hartzman

Dated: February 11, 1993