TU ELECTRIC

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Executive Vice President

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
ON FEEDWATER CHECK VALVE QUALIFICATION FOR SEVERE LOADINGS

Gentlemen:

In Amendment 76 to the CPSES Final Safety Analysis Report (FSAR), a brief description of the stress analyses which demonstrate Feedwater check valve operability during the severe loading condition present following a postulated Feedwater line rupture was added to section 3.9B.3.2 entitled "Pump and Valve Operability Assurance." In response to a verbal request for additional information from the NRC staff, the attachment provides clarifying details of the Feedwater check valve stress analyses. A complete discussion of details associated with the analyses performed to qualify the Feedwater check valves for the most severe loading condition is included.

If there are any questions, please contact H. A. Marvray at (214) 812-8296.

Sincerely,

William J. Cahill, Jr.

HAM/bjh

Attachment

c - Mr. R. D. Martin, Region IV
Resident Inspectors, CPSES (3)

A029

Request for Additional Information
FSAR Amendment 76
3.9B.3.2

NRC Request for Additional Information:

Provide a more detailed description of the dynamic analysis which was performed on the applicable portions of the piping system, including the check valves.

TU Electric Response to Request for Additional Information:

The Feedwater piping and support system, and the six and eighteen inch Feedwater check valves were evaluated for the most severe loading condition resulting from a rapid closure of the check valves following a Feedwater pipe break.

Feedwater Piping Analyses

The fluid forcing functions developed for this event were applied at the appropriate locations in the computer models of the ASME Section III Class 2 piping systems. Elastic dynamic analyses were performed for each of the twelve piping systems. The piping system stresses due to this event were appropriately combined with the stresses from the other loading conditions in accordance with the provisions of FSAR section 3.9B.3.1. The calculated Feedwater piping system stresses were verified to be within the allowable stresses per ASME Section III, Subsection NC for normal, upset, emergency and faulted conditions.

Feedwater Check Valve Analysis

The Feedwater check valves and their internal components were evaluated separately. An elastic-plastic dynamic analysis of the disk and the valve seat (including the arm and the pin) using the ANSYS finite element computer code was performed. The applied loading consisted of disk velocity just prior to impact and differential pressure across the valve disk resulting from the pipe break. The acceptance criteria is in the form of stress allowable values for the various components in the Feedwater check valves. In addition, confirmation was required and obtained that the disk to seat interface forces remain compressive along the perimeter, and forces in the interface elements between the disk and seat decrease simultaneously. Compliance with this last acceptance criterion demonstrates that the disk to seat interface structural integrity is not compromised, thus assuring the ability to achieve leak tightness following the postulated Feedwater pipe break.

Feedwater Check Valve Analyses (continued)

The two (2) types of Feedwater check valves analyzed were an eighteen inch Rockwell tilting disk check valve and a six inch Borg Warner Company swing check valve. There are four (4) identical eighteen inch check valves and twelve (12) identical six inch check valves in the Feedwater system at CPSES.

The maximum disk angular velocity and differential pressure was calculated for each of the Feedwater check valves (i.e. four (4) eighteen inch and twelve (12) six inch check valves). An ANSYS finite element model was performed for each of the two (2) types of Feedwater check valves (i.e. eighteen inch Rockwell tilting disk check valve and six inch Borg Warner Company swing check valve) utilizing the enveloping calculated maximum disk angular velocity and differential pressure for the respective Feedwater check valve type. The dynamic analyses of the disk assemblies were performed for a time sufficient to determine the highest stresses in the assemblies and the peak forces in the gap elements between the disk and the seats. The seats were statically analyzed with the loads that were calculated from the dynamic analyses of the disks. Non-linear material properties of the disk and the seat were considered by the analyses. The extent of the plastic analysis used is inherent in the computer code by inclusion of the Non-linear stress-strain curves.

The seat, disk and disk assembly of the CPSES Feedwater check valves have been determined to maintain their structural integrity, per ASME III criteria, thus assuring the ability to achieve leak tightness following a postulated Feedwater pipe break.

Feedwater Piping Support System Analyses

Piping analyses that were performed for the Feedwater check valve slam forcing functions required that the Feedwater piping support configuration be designed to mitigate the effect of these forces and maintain the stresses within the ASME Code required allowable values. The results from the as-built reconciled stress analyses for the Feedwater piping support system satisfy the CPSES licensing and design bases.