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Docket No.: STN 50-470F

December 23, 1983
LD-83-108

Mr. Darrell G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Basis for Design of Plant Without Pipe Whip Restraints

Reference: Letter LD-83-053, A. E. Scherer to D. G. Eisenhut, dated June 14, 1983

Dear Mr. Eisenhut:

The above Reference submitted the report, "Basis for Design of Plant Without Pipe Whip Restraints for RCS Main Loop Piping", to demonstrate that guillotine type failure of Reactor Coolant System main loop piping need not be considered in the design basis for the System 80™ NSSS.

In a meeting with the NRC Staff on October 26, 1983, the Staff provided initial comments on the report. Attached is a response to each of those comments along with a revision to the report, which incorporates the necessary changes.

If you have any questions, please feel free to contact me or Mr. G. A. Davis of my staff at (203) 285-5207.

Very truly yours,

COMBUSTION ENGINEERING, INC.

A. E. Scherer
Director
Nuclear Licensing

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Attach.

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REVISIONS TO THE CE REPORT
"Leak Before Break Evaluation of the Main Loop Piping of a CE Reactor Coolant System"

On October 26, 1983, the NRC provided initial comments on the reference report. The report has been revised to accommodate the suggested new items and corrections. The manner in which each of the comments has been addressed is indicated below:

Comment: Information on effective load verses crack angle should be added.

Two new sections were added. Section 6d addresses the magnitude of the seismic moment computed by traditional seismic analysis and the effect of a crack in the pipe on the reduction of the moment. Section 6e illustrates the application of the tearing instability procedure of NUREG CR3464 to hypothetical cracks in the discharge pipe terminal end.

Comment 2: Additional justification should be provided concerning CE's considerations of weld materials in their analysis.

A subsection (5.a.2) has been added to discuss, in greater detail, the properties of the piping welds. The pipe fracture properties are presented and the weld properties are then compared to the pipe properties. The weld toughness is seen to be typically superior to the base metal.

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Comment 3: Page 37 of the report states "The maximum values calculated for the reaction forces and moments at the reactor vessel upper columns support are in excellent agreement with the coupled model." More specific data on this comparison should be provided.

This quotation was extracted for the report from a CE paper by T. Griesbach and D. Ayres which was presented at the SMiRT-5 Conference in 1979. More of the details from this paper are presented in Section 5.c.2.

Comment 4: Page 40 refers to a seismic loading of "100,000 in. - lb". This appears to be an error. CE should verify and correct.

The maximum seismic moment on a suction pipe elbow for the Palo Verde Plant is 1,000,000 in. - lb. This correction has been made in the report. Even the corrected value, however, is relatively small compared to the normal operating moment in the elbow (see Appendix A). The maximum seismic moment for any System 80 plant is 3,500,000 in. - lb. This moment has essentially no impact on the loading of an axial slot in an elbow.

Comment 5: Forces and moments around the loop for Palo Verde should be provided.

Appendix A has been added to present the forces and moments for the normal and upset design basis transients at key locations around the main loop.

Comment 6: CE should verify that the vertical and horizontal seismic motion has been considered in the analysis.

The seismic analyses described in the report employ system support motions which are considered to envelope the most severe seismic event. The support motion is computed in all directions by a coupled system/foundation model. The motion in the direction judged to be most severe was applied in all (3) directions for the analyses described in the report.

Comment 7: CE should provide the relationship between the older CE system design used in CENPD-168 and the System 80 design. CE should provide the justification for using loads from CENPD-168 for System 80 plants.

Appendix A presents the loads at key locations around the main loop for Palo Verde. CENPD-168 established the procedure for the selection of locations where pipe breaks must be considered. Each plant, or class of plants, has been analyzed according to the CENPD-168 procedure. The loadings for each plant are slightly different, but not sufficiently different to cause the conclusions of CENPD-168 to be found inapplicable for any plant evaluated to date.

In addition to the above considerations, in order to make the evaluations of tearing modulus more consistent with existing literature and NUREG CR3464, the scaling flow stress value, σ_o, has been changed to be equal to the yield stress at operating temperature, σ_o = 30 ksi. This alters the values of both T material and T applied by the same proportion and, therefore, does not impact the margins discussed originally.

** Page numbers refer to the original report.