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AUTH.NAME AUTHOR AFFILIATION
CURTIS,N.W. Pennsylvania Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
YOUNGBLOOD,B.J. Licensing Branch 1

SUBJECT: Forwards info which completes action on SER Outstanding Issue 9 re fatigue evaluation of safety relief valve discharge lines for facility safety evaluation suppl.

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May 15, 1981

Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Docket Nos. 50-387
50-388

SUSQUEHANNA STEAM ELECTRIC STATION
SER OUTSTANDING ISSUE 9
ER 100450 File 841-2
PLA- 789

Dear Mr. Youngblood:

Attached is a discussion of fatique evaluation of SRV discharge lines for Susquehanna SES.

This discussion completes our action on SER Outstanding Issue 9.

Very truly yours,

N. W. Curtis/s

N. W. Curtis
Vice President - Engineering and Construction-Nuclear

cc: R. M. Stark-NRC

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The following write-up will be included in Section 7.0 of Revision 6 to the Design Assessment Report

7.1.4 Fatigue Evaluation of SRV Discharge Lines in Wetwell Air Volume

In an effort to evaluate the steam bypass potential arising from a failure of the SRV discharge line in the wetwell air space, a complete fatigue analysis of the same has been performed. Specifically, structural analyses of all the SRV discharge lines from the diaphragm slab penetration to the quencher was performed. Fatigue evaluation of fluedhead penetration, elbows and 3-way restraint attachment to pipe was done. This analysis considered all the cyclic loading acting on the SRV discharge lines and is in accordance with the applicable portions of ASME Code. This evaluation is considered supplemental and does not displace the original design basis for these lines as set forth in the appropriate FSAR/DAR sections.

7.1.4.1 Loads and Load Combinations Used for Assessment

The SRV discharge lines are subject to numerous dynamic and hydrodynamic loads from normal, upset, and LOCA-related plant operating conditions. For purposes of fatigue evaluation, the following loads are included: (1) All significant thermal and pressure transients. (2) All cyclic efforts due to the hydrodynamic loads including SRV actuations, CO and chugging and (3) Seismic effects. A description of each of these loads is provided in the appropriate DAR sections. The determination of load combinations as well as number and duration of each event is obtained from the applicable sections of DFFR and FSAR.

7.1.4.2 Acceptance Criteria

The design rules, as set forth in the ASME Boiler and Pressure Vessel Code, Section III, Subsection NB were utilized for the fatigue assessment. When required, allowables for fatigue stress evaluation were based on Mill certification reports for SRV discharge lines.

7.1.4.3 Methods of Analysis

The SRV discharge lines, in the wetwell air volume, were analyzed for the appropriate load combinations and their associated number of cycles. The combined stresses and corresponding equivalent stress cycles were computed to obtain the fatigue usage factors in accordance with the equations of Subsection NB-3600 of the ASME Code.

7.1.4.4 Results and Design Margins

The cumulative usage factors for fluedhead, 3-way restraint attachment to pipe and elbow are summarized in Table 7-4.

TABLE 7-4 MAXIMUM CUMULATIVE USAGE FACTORS
FOR SRV DISCHARGE LINE

COMPONENT	CALCULATED CUMULATIVE USAGE. FACTORS	CODE ALLOWABLE CUMULATIVE USAGE FACTORS
Flued Head	0.91	1.0
3-Way Restraint	0.52	1.0
Elbow (Line P)	1.52(1)	1.0
(Next Worst Elbow)	0.89	1.0

NOTES: 1) Refined analysis of this worst case elbow is expected to show the usage factor is less than 1.0. With the present calculation based on conservative analysis the worst case elbow has an expected fatigue life of 140 first valve actuations and 2324 subsequent valve openings. Assuming an evenly distributed valve actuations over the 40 year period an equivalent expected life for worst case elbow would be 22 years.