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Norman W. Curtis
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MAR 06 1984

Dr. Thomas E. Murley
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

SUSQUEHANNA STEAM ELECTRIC STATION
FINAL REPORT ON A DEFICIENCY INVOLVING
CAVITATION OF JET PUMPS DUE TO IHSI COOLING
ER 100508 FILE 821-10
PLA-2103 Docket No. 50-388

Reference: (1) PLA-1749 dated 7/21/83
(2) PLA-1924 dated 11/14/83

Dear Dr. Murley:

This letter serves to provide the Commission with a final report on a deficiency involving cavitation of the Unit 2 Loop A jet pumps due to IHSI cooling. This deficiency was reported under 10CFR50.55(e) as potentially reportable by telephone to Mr. R. Architzel of NRC Region I by Mr. J. Saranga of PP&L on June 21, 1983.

The attachment to this letter contains a description of the problem, its cause, the safety implications, and the corrective action.

Since the details of this report provide information relevant to the reporting requirements of 10CFR21 for Unit 2, this correspondence is considered to also discharge any formal responsibility PP&L may have for reporting in compliance thereto.

We trust the Commission will find this report to be satisfactory.

Very truly yours,

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

Attachment

A027
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Copy to:
Mr. Richard C. DeYoung (15)
Director-Office of Inspection & Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. G. McDonald, Director
Office of Management Information & Program Control
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. R. H. Jacobs
U.S. Nuclear Regulatory Commission
P.O. Box 52
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Records Center
Institute of Nuclear Power Operations
1100 Circle 75 Parkway, Suite 1500
Atlanta, GA 30339

FINAL REPORT

SUBJECT

Cavitation experienced by the Unit 2 Loop A jet pumps during Induction Heating Stress Improvement (IHSI) of the Recirculation System, piping.

DESCRIPTION

Induction Heating Stress Improvement (IHSI) is a process which reduces the residual stresses in the heat affected zone of welded stainless steel piping. These residual stresses contribute to the occurrence of intergranular stress corrosion cracking (IGSCC). To perform IHSI, heating coils are placed around the pipe welds while cooling water is circulated through the pipe. The recirc pumps were used to supply this cooling water during IHSI of the recirc system pipe welds. On three occasions between May 13, 1983 and May 17, 1983, Loop A of the recirc system was operated in the cavitation region. GE was notified of the condition and was requested to assist PP&L in assessing the safety implications of the incident.

CAUSE

The underlying cause of the incident, based on items a thru d below, was that the anti-cavitation interlocks on Recirculation Pump A had been bypassed, and inadequate precautions were taken to prevent operation in the cavitation region.

a. The anti-cavitation interlock was jumpered out by the Integrated Startup Group (ISG) Recirculation System Startup Engineer.

b. The Temporary Modification Control Procedure AD 6.8, Rev. 6, was violated by the System Startup Engineer. No visible indication (i.e. orange tag) was placed on the Recirculation Pump Speed controller to alert the operators that the anti-cavitation interlocks had been disabled.

c. The Operating Instructions provided to the operating crew were not modified to reflect the fact that the anti-cavitation interlock had been disabled.

d. No precautions were specified in the IHSI procedure, or in the IHSI Summary, which was provided to the operating crew, to prevent cavitation.

SAFETY IMPLICATIONS

If the stresses incurred during operation in the cavitation region were of sufficient amplitude, the fatigue life of the incore housings, jet pump riser braces, and jet pump thermal sleeves may have been reduced. Of these components, the jet pump riser brace welds are the most sensitive to the incurred stresses. Assuming excessive usage, a possibility exists for the failure of these components during a design basis accident. In this case, the present licensing basis for fuel peak cladding temperature might be exceeded. Therefore, PP&L considered this deficiency as potentially reportable under the provisions of 10CFR50.55(e).

CORRECTIVE ACTIONS

The programmatic aspects of this deficiency were addressed in Reference (2).

PP&L and General Electric have performed extensive vibration tests to assess the amplitude and frequency of the loadings experienced by the incore housings, jet pump riser braces, and jet pump thermal sleeves. The tests simulated the actual conditions which occurred during the inadvertent cavitation episode. The results of the tests indicate that fatigue life of all above listed sensitive components was not significantly affected by either the cavitation or the testing episodes.

A visual inspection of jet pump #15 was also performed. Jet pump #15 (and its adjacent jet pump #16) will experience the highest flow rate in Loop A and as a result the greatest cavitation. The inspection of jet pump #15 revealed that no erosion or pitting had occurred as a result of the cavitation.

CONCLUSION

The Unit 2 Loop A jet pumps were subjected to cavitation during IHSI of the recirc system piping. An evaluation of this incident's impact on the Loop A jet pump fatigue life concluded that no significant fatigue life degradation had occurred. A visual inspection of jet pump 15 was performed and no erosion or pitting was found. Consequently, PP&L no longer considers this deficiency reportable under 10CFR50.55(e).