

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

STEAM GENERATOR WATER HAMMER

MAINE YANKEE ATOMIC POWER STATION

DOCKET NO. 50-309

1.0 INTRODUCTION

Steam generator water hammer has occurred in certain nuclear power plants as a result of the rapid condensation of steam in a steam generator feedwater line and the consequent acceleration of a slug of water which upon impact within the piping system causes undue stresses in the piping and its support system. The significance of these events varies from plant to plant. Since a total loss of feedwater could affect the ability of the plant to cool down after a reactor shutdown, the NRC is concerned about these events occurring, even though an event with potentially serious consequences is unlikely to happen.

Because of the continuing occurrence of water hammer events, the NRC, in September 1977, informed all PWR licensees that water hammer events due to the rapid condensation of steam in the feedwater lines of steam generators represented a safety concern and that further actions by licensees for Westinghouse and Combustion Engineering designed nuclear steam supply systems are warranted to assure that an acceptably low risk to public safety due to such events is maintained. Accordingly, these licensees were requested to submit proposed hardware and/or procedural modifications, if any, which would be necessary to assure that the feedwater lines and feedrings remain filled with water during normal as well as transient operating conditions. At the same time, the NRC provided each PWR licensee with a copy of its consultant's report, "An Evaluation of PWR Steam Generator Water Hammer," NUREG-0291.

The evaluation of the potential for steam generator water hammer at the Maine Yankee plant shows that the feedwater piping adjacent to the steam generator consists of a favorably short run of horizontal piping and that during seven years of successful operation it has experienced those conditions that might induce steam generator water hammer, but no water hammer has occurred.

2.0 EVALUATION

Our consultant, EG&G Idaho Inc., prepared the attached evaluation of steam generator water hammer at the Maine Yankee Plant as part of our technical assistance program. (Letter from J.A. Dearien, EG&G, to R.E. Tiller, DOE, dated December 13, 1979.) We have reviewed this report together with the licensees submittals listed under item 4.0.

3.0 CONCLUSION

Based on our knowledge of water hammer phenomena, and our review of the licensees responses and the enclosed evaluation report, we concur with our consultants' conclusion that the potential for steam generator water hammer is sufficiently low to permit continued operation of this facility. However, even though steam generator water hammer is not likely to occur, the licensee should be vigilant and monitor for water hammers that might impose significant stresses on the piping systems or their supports. We will continue to monitor reports from this licensee for indications of possible water hammer. If such indications appear in the future, this matter will be reexamined and may result in additional requirements to reduce the probability of steam generator water hammer at these facilities.

We have concluded that steam generator water hammer is not likely to occur at this facility and, therefore, we find no undue risk to the health and safety of the public as a result of the continued operation of the Maine Yankee Atomic Power Station.

4.0 REFERENCES

- 4.1 J.L. French, Maine Yankee Atomic Power Company (MYAPC), letter to R.A. Purple, NRC, Subject: "Response to May 13, 1975 letter on Steam Generator Water Hammer," July 14, 1975.
- 4.2 R.H. Groce, MYAPC, letter to R.W. Reid, NRC, Subject: "Feedline Water Hammer," November 25, 1977.
- 4.3 C.D. Frizzle, MYAPC, letter to R. Colmar, NRC, Subject: "Maine Yankee Steam Generator Feedwater Piping," June 6, 1979.
- 4.4 D.E. Moody, MYAPC, letter to R. Reid, NRC, dated November 15, 1979, in response to NRC request for information regarding the potential for steam generator water hammer.
- 4.5 J.A. Block, et al, An Evaluation of PWR Steam Generator Water Hammer, Creare, Inc., NUREG-0291 (December 1976).
- 4.6 W.E. Bennett, Waterhammer in Steam Generator Feedwater Lines, Westinghouse Technical Bulletin, NSD-TB-75-7, June 10, 1975.

December 13, 1979

Mr. R. E. Tiller, Director
Reactor Operations and Programs Division
Idaho Operations Office - DOE
Idaho Falls, ID 83401

MAINE YANKEE POWER STATION STEAM GENERATOR WATER HAMMER TECHNICAL
EVALUATION (A6257) - JAD-250-79

Ref: J. A. Dearien Ltr to R. E. Tiller, PWR Steam Generator Water
Hammer Reviews (A6257) - JAD-225-79, November 8, 1979

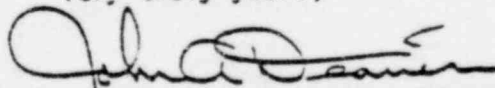
Dear Mr. Tiller:

The attachment completes the assessment of the effectiveness of the existing means to reduce the potential for steam generator water hammer at the Maine Yankee Power Station (MYPs).

We have reviewed the operating history of the MYPs pertinent to steam generator water hammer and the related operational and procedural characteristics of the feedwater system. The review has shown that conditions conducive to steam generator water hammer have occurred at the MYPs but no water hammer events have been observed. The conditions have been encountered during normal operating transients and startup and shutdown operations. Such conditions would also be expected in the future during the normal and accident operating situations addressed in the review. Based on this review we have concluded that the potential for steam generator water hammer is sufficiently low to permit continued operation of this facility.

This transmittal constitutes completion of the MYPs SER, Task A6257 of the referenced Milestone Chart.

Very truly yours,



J. A. Dearien, Manager
Code Assessment and
Applications Program

DDC:tn

Attachment:
As stated

cc: S. D. MacKay, NRC-DOR
R. W. Kiehn, EG&G Idaho w/o at

DUPLICATE DOCUMENT

Entire document previously
entered into system under:

ANO 8003100155

No. of pages: 9