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Director of Nuclear Reactor Regulation
ATTN: Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing
U. S. Nuclera Regualtory Comm.
Washington, D.C. 20555

SUBJECT: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Emergency Feedwater System
(File: 2-1510.1)

Gentlemen:

Our letter of March 16, 1981 on the Emergency Feedwater System partially answered the staff's questions transmitted to AP&L on November 24, 1980, and gave a schedule for replying to the remaining items. We are hereby submitting our response to the "new questions" of the November 24 letter.

Very truly yours,

David C. Trimble

David C. Trimble
Manager, Licensing

DCT:PMH:lp

Attachment

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New Questions

1. Based on recent licensee event reports (LERs), the ANO-2 turbine driven AFW pump has been subject to a considerable number of trips, mainly due to overspeed, during both testing and plant shutdown. Discuss the effects of these trips on the overall reliability of the AFWS, and what measures are being taken to prevent recurrence of this problem. State what equipment modifications and tests have been performed to date and are planned for the future, and provide the pump test results and conclusions.

   Response:

   During the period between December 1978 and November 1980, there have been 14 licensee event reports as a result of turbine overspeed trips. All of these overspeed trips occurred almost immediately after receiving the actuation signal. The governor valve position was observed to have never moved or to have begun to move only at about the same time as the turbine speed reached the overspeed trip setpoint. It was further observed that a longer time span between successive starts increased the likelihood of an overspeed trip. Although there are a variety of turbine models with a variety of governor models in service, the problem of overspeed trips was seldom found to occur during steady state operation.

   In October of 1980, AP&L initiated a Design Change which accomplished the following:

   a) Removed and replaced the EG-R sump.
   b) Replaced existing .065" wall thickness tubing from EG-R to Remote Servo with .035" wall tubing.
   c) Install pressure transducers in the three lines from the EG-R to the Remote Servo and in the supply line to the EG-R sump, to allow monitoring of pressure during a startup.
   d) Install a sight glass on the EG-R sump to allow monitoring of oil level in the sump during and between startups.

   The four transducers were coupled to a six-channel recorder to make permanent records of pressure during a startup. A testing program was begun which provided an initial elapsed time of one day between successive starts. Two tests were run at each elapsed time. The test program called for increasing the elapsed time between starts until two tests with a one month interval had been completed. At this time, one test has been successfully completed with an elapsed time of 28 days. The overshoot on this start was 2400 rpm which is considered to be indicative of a very responsive governor. Twenty-two tests have been performed to date without an overspeed trip.

   The second 28-day test will be performed as soon as it is possible to conduct the test following the current refueling outage. A full report will be available at that time.

2. The ANO-2 AFWS is designed to utilize effluent from the startup and blowdown (SU/BD) demineralizer in parallel with the condensate storage tank (CST). During an incident on April 7, 1980, following loss of offsite power, the effluent temperature rose sufficiently to cause flashing at

the AFW pump inlet, with consequent cavitation and flowrate oscillation. As a result, the system operating and plant startup procedures were revised to require isolating the SU/BD demineralizer effluent during plant startup when 5% power is reached. Discuss what additional long-term solutions to this problem, such as automatic closure of the motor-operated isolation valve in the demineralizer effluent line upon receipt of an EFAS signal, routing the demineralizer effluent to the CST, or blanking off the line from the demineralizer to the AFW pump suction, are contemplated to increase system reliability.

Response:

No additional measures are necessary to prevent the same event as the one experienced on April 7, 1980. The administrative controls which were implemented as a result of the incident are adequate and sufficient to obviate a long-term system modification. The startup and operating procedures have been revised so that the valve 2CV-0706 is now closed upon reaching five percent of full power. This valve is verified as being closed once every eight hours.

3. The ANO-2 AFW turbine steam admission valves are AC operated. They are locked open with power removed during operation. It would appear that for true power diversity as well as flexibility of operation they should be DC operated. Discuss how blowdown of both steam generators would be prevented in the event of a pipe break downstream of the check valves below these motor operated valves. Consider operator response time and accessibility to these valves after the postulated event.

Response:

The scenario which would best suit this incident would be a loss of all AC, both offsite and onsite AC power, and the postulated line break. As the postulated line break is not a consequence of the loss of all AC, or vice versa, this scenario exceeds the criterion of single failure analysis. However, should it occur, the operator could fully close the EFW steam admission valves manually in approximately 2 to 3 minutes after the break.

4. In accordance with the ANO-2 FSAR, Section 9.2.1, the service water system (SWS) provides cooling for the AFW pump rooms. Since the SWS would not be available on loss of all AC power, state whether the turbine operated AFW pump could function for two hours without room cooling.

Response:

This question was asked on June 24, 1977, during a public meeting of the ACRS Subcommittee on Arkansas Nuclear One Unit 2 by Mr. Jesse Ebersole. An analysis was then performed to determine the rise of the ambient temperature as a function of time. From this analysis, the ambient room temperature would rise to 114F at the end of a two hour period from an initial ambient room temperature of 90F. The turbine vendor has stated that the components located on the turbine control panel should not be rendered inoperable under the environmental conditions of 115F, 50 percent relative humidity, and no air movement for the 2-hour period.