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

TIC

November 24, 1980

Docket No. 50-368

Mr. William Cavanaugh III
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Arkansas Power and Light Company
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Dear Mr. Cavanaugh:

Enclosure one contains our requests for additional information and positions resulting from our review of your response of January 31, 1980 to our letter of November 6, 1979 on the auxiliary feedwater system and also resulting from our review of your proposed Technical Specification change regarding the verification of the emergency feedwater flow paths. The numbering of the Enclosure 1 items is consistent with that of our November 6, 1979 letter.

Enclosure two contains questions based on our review of recent operating experience at ANO.

Please note that these matters must be resolved on a schedule consistent with the associated TMI Action Plan Items. Please provide a schedule for submittal of your responses to these concerns.

Sincerely,

Robert A. Clark, Chief
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Division of Licensing

Enclosures:
1. Request for Additional Information and Positions
2. Questions

cc w/enclosures: See next page

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ATTACHMENT

Request for Additional Information and Positions
Auxiliary Feedwater System (AFWS)*
Arkansas Nuclear One, Unit 2 (ANO-2)

A. Short Term Recommendation

1. Recommendation GS-6 - "The licensee should confirm flow path availability of an AFW system flow train that has been out of service to perform periodic testing or maintenance as follows:

   - Procedures should be implemented to require an operator to determine that the AFWS valves are properly aligned and a second operator to independently verify that the valves are properly aligned.

   - The licensee should propose Technical Specifications to assure that prior to plant startup following an extended cold shutdown, a flow test would be performed to verify the normal flow path from the primary AFW system water source to the steam generators. The flow test should be conducted with AFWS valves in their normal alignment."

In response to the first part of this recommendation, the licensee, in its January 31, 1980 letter, provided summaries of its procedures for realigning the AFWS to its normal operating mode after testing or maintenance of the system. However, no mention is made of independent verification of proper valve alignment by a second operator. Our position remains that this is a

*The term AFWS as used in this letter applies to the ANO-2 Emergency Feedwater System (EFWS).

requirement. The licensee should commit to revise its procedures accordingly, and the adequacy of the revised procedures will be verified by the Office of Inspection and Enforcement.

In response to the second part of this recommendation, the licensee, in its letter of September 17, 1980, submitted a proposed addition to AFW Surveillance Requirement 4.7.1.2.b, which would require verification of the normal flow path of the turbine driven AFW train from the primary AFW water source to the steam generators at least once per 18 months. The second sentence of this proposed surveillance requirement states, "The provisions of Specification 4.0.4 are not applicable." In its response letter of January 31, 1980, the licensee stated that the flow path of the motor driven pump train would be verified during startup since this pump normally supplies condensate to the steam generators during plant startup. We conclude that the licensee's recommendation satisfies Recommendation GS-6 with regard to verification of an EFW flow path after a cold shutdown, subject to provision of the basis for non-applicability of Specification 4.0.4.

2. Recommendation 3 - "The Surveillance Requirements section of the Technical Specifications should add pressure and flow acceptance criteria for the periodic (31-day) testing of the motor driven pumps."

In its response letter of January 31, 1980, the licensee indicated that the pump would be tested in accordance with Section XI of the ASME Boiler and Pressure Vessel Code. It is not clear whether the licensee intends to test the motor driven pump every 31 days (Section XI specifies inservice testing of pumps nominally every 3 months). ANO-2 Surveillance Requirement 4.7.1.2 presently requires a 31 day test for the turbine driven pump

to demonstrate its operability by verification of proper discharge pressure and flow. There is not presently an equivalent specification for the motor driven pump. It is our position that a Surveillance Requirement should be included for testing the motor driven pump every 31 days by verifying the developed discharge pressure and flow rate.

B. Additional Short Term Recommendations

1. Recommendation 1 - "The licensee should provide redundant level indications and low level alarms in the control room for the AFW system primary water supply to allow the operator to anticipate the need to make up water or transfer to an alternate water supply and prevent a low pump suction pressure condition from occurring. The low level alarm setpoint should allow at least 20 minutes for operator action, assuming that the largest capacity AFW pump is operating."

   In its response letter of January 31, 1980, the licensee stated that redundancy was provided by safety grade pressure switches located in the suction piping to the AFW pumps which alarm upon a decrease in pressure to 7 psig from its normal 10 psig, and switch the AFW supply to the service water system upon a further decrease in pressure to 5 psig.

   This subject is treated in detail in Long Term Recommendation GL-2 (Item C.1).

2. Recommendation 2 - "The licensee should perform a 72-hour endurance test on all AFW system pumps, if such a test or continuous period of operation has not been accomplished to date. Following the 72-hour pump run, the pumps should be shut down and cooled down and then restarted and run for one hour. Test acceptance criteria should include demonstrating that the

pumps remain within the design limits with respect to bearing/bearing oil temperatures and vibration and that pump room ambient conditions (temperature, humidity) do not exceed environmental qualification limits for safety-related equipment in the room."

Note: The licensee was subsequently informed by an NRC letter dated December 13, 1979 that this test should be conducted for 48 hours rather than 72 hours. This letter also included test acceptance criteria and the information we require from the licensee regarding test results.

The licensee responded that the motor driven pump functioned continuously for over 72 hours during Unit 2 hot functional testing without exceeding design limits for bearing/bearing oil temperature and vibration. The steam driven pump would be tested subsequent to the outage current at the time this response was prepared (January 1980). We require that the licensee submit reports on the pump performance tests to NRC for evaluation. For the steam driven pump the report should include the information required in our December 13, 1979 letter.

C. Long Term Recommendations

1. Recommendation GL-2 - "Licensees with plant designs in which all (primary and alternate) water supplies to the AFW systems pass through valves in a single flow path should install redundant parallel flow paths (piping and valves).

Licensees with plant designs in which the primary AFW system water supply passes through valves in a single flow path, but the alternate AFW system

water supplies connect to the AFW system pump suction piping downstream of the above valve(s), should install redundant valves parallel to the above valve(s) or provide automatic opening of the valve(s) from the alternate water supply upon low pump suction pressure.

The licensee should propose Technical Specifications to incorporate appropriate periodic inspections to verify the valve positions into the surveillance requirements."

(Note: Recommendation GL-2 was not included in our requirements letter of November 6, 1979 but is set forth in NUREG-0635, page x-51.)

The normal AFW pump water supply is from a condensate storage tank via a single line containing both motor operated and manual valves. The ANO-2 AFW system also includes automatic switchover of the AFW pump water supply from the condensate tank to the service water system as described in Additional Short Term Recommendation 1 (item 3.1). The licensee must demonstrate that the response time of the control systems and valves utilized in switching the water supplies is adequate to protect the pumps from the effects of suction flow termination, and that the control system is redundant in all respects. Our primary concern is automatic switchover resulting from inadvertent closure of a valve in the common suction line from the condensate storage tank. As an alternative, the licensee must provide redundant parallel valves in the common suction line, as well as meeting the requirements of Additional Short Term Recommendation 1 regarding redundant condensate tank level indication and

low level alarms in the control room. Disabling the common valves by removing the valve internals would be an acceptable substitute for installing redundant parallel valves.

2. Recommendation 2 - "The Arkansas Unit 2 AFW system design does not meet the high energy line break criteria in SRP 10.4.9 and Branch Technical Position 10-1; namely, that the AFW system should maintain the capability to supply the required AFW flow to the steam generator(s) assuming a pipe break anywhere in the AFW pump discharge lines or other high energy line concurrent with a single active failure.

The licensee should evaluate the postulated pipe breaks stated above and (1) determine any AFW system design changes or procedures necessary to detect and isolate the break and direct the required feedwater flow to the steam generator(s) before they boil dry or (2) describe how the plant can be brought to a safe shutdown condition by use of other systems which would be available following such postulated events."

The licensee responded in its letter of Janury 31, 1980, that if both AFW trains were rendered inoperable, the operator would follow an emergency procedure which involves opening the pressurizer ECCS vent valves to lower reactor pressure and provide greater HPSI flow. It is our position that this is not an acceptable alternative to meeting the high energy line break criteria stated above. The licensee should demonstrate that either the present AFWS design or proposed design revisions meet applicable parts of Branch Technical Position ASB 10-1, ASB 3-1 and MEB 3-1.

D. 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.

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. (See also our SER of September 18, 1980, on this subject.)

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.

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.