ARKANSAS POWER & LIGHT COMPANY
POST OFFICE BOX 551 LITTLE ROCK, ARKANSAS 72203 (501) 371-4000

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Director of Nuclear Reactor Regulation
ATTN: Mr. Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing
U.S. Nuclear Regulatory 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 Arkansas Nuclear One, Unit 2 (ANO-2) Emergency Feedwater (EFW) 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 hereby submit our response to the Long Term Recommendations of the November 24 letter.

Very truly yours,

David C. Trimble

David C. Trimble,
Manager, Licensing

DCT:PMH:kb

Attachment

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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 B.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.

Response

Emergency feedwater (EFW) is normally supplied from the condensate storage tank as the quality of this water is higher than that provided by the primary source which is the safety-grade service water system. The primary EFW system water supply does not pass through valves in a single flow path and redundant parallel valves are provided by the design of the EFW system.

In our letter of January 31, 1980, we responded to Additional Short Term Recommendation 1 that an alarm annunciates, locally and in the

control room, a pressure decrease in the suction piping to the EFW pumps at 7 psig. This alarm is sensed off of two safety grade pressure sensing devices which are located upstream of the EFW pumps. In the normal system lineup both of these devices would sense decreased suction pressure and thereby provide redundancy. The operator may manually open the service water lines from the control room. If no action is taken by the operator, the water supply is automatically switched from the alternate source (condensate storage tank) to the primary source (service water system) at 5 psig. The valves in the piping from the condensate storage tank are then simultaneously closed.

Therefore, we conclude that the ANO-2 emergency feedwater system satisfies this recommendation.

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 January 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.

Response

The ANO-2 emergency feedwater system is designed to supply the necessary feedwater to the steam generators for decay heat removal whenever the main feedwater system is inoperable. The availability of sufficient feedwater from the EFW system is assured by two redundant EFW trains which assures its operation in the event of a single failure of a mechanical or electrical component within the system.

One EFW train consists of a motor driven pump with AC powered motor operated valves. The other train consists of a turbine driven pump and the motor operated valves and control systems within this train

are DC powered. This aspect of the design of the EFW system is intended to meet the requirements set forth in Branch Technical Position APCSB 10-1. As AC power can be supplied by two independent sources, the offsite power system or the emergency diesel generators, a loss of either source will not cause the loss of an EFW train.

The ANO-2 EFW system has been analyzed for postulated high energy line breaks inside and outside of containment. A discussion of these analyses is presented in Sections 3A.1.4 and 3A.2.5 of the ANO-2 Final Safety Analysis Report. It concludes that the consequences of any one high energy line break cannot result in loss of function to required safety systems but loss of redundancy is permitted.

As defined in 10 CFR 50, Appendix A, General Design Criteria for Nuclear Power Plants: "A single failure means an occurrence which results in the loss of capability of a component to perform its intended safety functions. Multiple failures resulting from a single occurrence are considered to be a single failure. Fluid and electric systems are considered to be designed against an assumed single failure if neither (1) a single failure of any active component (assuming passive components function properly) nor (2) a single failure of a passive component (assuming active components function properly), results in a loss of the capability of the system to perform its safety functions".

It is interpreted that a high energy line break is a single failure of a passive component. However, Branch Technical Position ACSB 10-1 exceeds the definition of single failure as a concurrent single active failure is assumed in addition to the high energy line break.

We conclude that the ANO-2 EFW system is designed in accordance with applicable federal regulations for single failure criteria and is capable of delivering sufficient emergency feedwater to the steam generators whenever emergency feedwater is required.