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Docket Nos. 50-348
50-364

Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. S. A. Varga

Gentlemen:

Joseph M. Farley Nuclear Plant - Units 1 and 2
NUREG-0737, Item II.E.1.2 and Unit 2
License Condition 2.C(21)(e)

This letter is submitted to document conversations with Mr. Ed Reeves of June 3, 1982 clarifying Alabama Power Company's letter of April 16, 1982 as related to auxiliary feedwater system initiation and indication. It has been determined that Alabama Power Company meets the requirements of NUREG-0737, Item II.E.1.2. Attachment 1 provides an item by item response to each of the nine (9) specific NUREG-0737, Item II.E.1.2, requirements showing that the current design complies with these criteria. During the Unit 2 licensing review, auxiliary feedwater systems design enhancements were identified by the NRC. These enhancements were documented by NRC letter dated November 5, 1980. Alabama Power Company, in its December 4, 1980 letter to the NRC, committed to implement these modifications on both Units 1 and 2. This commitment was subsequently incorporated into the Unit 2 license as condition 2.C.(21)(e). In accordance with this license condition, Alabama Power Company submitted its design for these auxiliary feedwater system enhancements on July 1, 1981 and received NRC approval of this design by letter dated August 7, 1981.

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Attachment 2 is a brief summary of the NRC concerns identified in the NRC November 5, 1980 letter with an explanation of the modifications to be made by Alabama Power Company. Alabama Power Company does not consider these modifications to be necessary for the requirements of NUREG-0737 Item II.E.1.2 and therefore considers itself to have complied with all of the NUREG-0737, Item II.E.1.2 requirements. As indicated in the

April 16, 1982 letter, Alabama Power Company is nevertheless pursuing installation of these modifications on both units in accordance with the Unit 2 license condition and the Alabama Power Company letter of December 22, 1981.

If you have any questions, please advise.

Yours very truly,

F. L. Clayton, Jr.

FLCJr/CLB:lsh-D9
Attachments
cc: Mr. R. A. Thomas
Mr. G. F. Trowbridge
Mr. J. P. O'Reilly
Mr. E. A. Reeves
Mr. W. H. Bradford

Attachment 1

II.E.1.2 AUXILIARY FEEDWATER SYSTEM AUTOMATIC INITIATION AND FLOW INDICATION

PART 1: Auxiliary Feedwater System Automatic Initiation

Position

Consistent with satisfying the requirements of General Design Criterion 20 of Appendix A to 10 CFR Part 50 with respect to the timely initiation of the auxiliary feedwater system (AFWS), the following requirements shall be implemented in the short term:

(1) The design shall provide for the automatic initiation of the AFWS.

(2) The automatic initiation signals and circuits shall be designed so that a single failure will not result in the loss of AFWS function.

(3) Testability of the initiating signals and circuits shall be a feature of the design.

(4) The initiating signals and circuits shall be powered from the emergency buses.

(5) Manual capability to initiate the AFWS from the control room shall be retained and shall be implemented so that a single failure in the manual circuits will not result in the loss of system function.

(6) The ac motor-driven pumps and valves in the AFWS shall be included in the automatic actuation (simultaneous and/or sequential) of the loads onto the emergency buses.

(7) The automatic initiating signals and circuits shall be designed so that the failure will not result in the loss of manual capability to initiate the AFWS from the control room.

In the long term, the automatic initiation signals and circuits shall be upgraded in accordance with safety-grade requirements.

Response

(1) With the control switches in the auto position, the motor-driven auxiliary feedwater pumps will automatically start on any of the following signals:

A. Low-low water level signals from two-out-of-three level transmitters on any one steam generator.

B. Any of the conditions as defined in FSAR Section 7.3 that cause a safety injection signal.

C. Loss of offsite power.

D. Trip of both main feedwater pumps.

Operation of the turbine-driven auxiliary feedwater pump is initiated by the opening of the steam supply valves to the turbine drive. Steam from the main steam header is automatically admitted to the turbine drive on either of the following signals:

A. Loss of power signal (2/3 reactor coolant pump bus undervoltage), or

B. Low-low water level signals from two-out-of-three of the level transmitters of any two-out-of three steam generators.

Details of the emergency operation of the auxiliary feedwater systems are contained in FSAR Sections 6.5.2.2.5 and 6.5.2.3.3.

(2) The auxiliary feedwater system is designed to meet the single failure criteria so that no single failure will prevent the supply of sufficient feedwater to at least two of the three steam generators. A detailed design evaluation is contained in FSAR Section 6.5.3. A failure analysis of the auxiliary feedwater system is provided in Table 6.5-2 of the FSAR.

(3) In order to ensure the operability of the auxiliary feedwater system, periodic testing of the system is performed in accordance with the Farley Nuclear Plant Standard Technical Specifications, Section 3.7.1.2 for both units. These technical specifications list the limiting conditions for operation and the surveillance requirements for the auxiliary feedwater system. These surveillance requirements ensure that both the motor-driven pumps and turbine-driven pumps are operable; that each valve in the flow path that is not locked, sealed, or otherwise secured in position is in its

correct position; and that the motor driven and turbine-driven pumps start automatically upon receipt of a test signal which simulates emergency operation of the system.

(4) The initiating signals and circuits for the auxiliary feedwater system are powered from the emergency buses.

(5) The auxiliary feedwater system can be operated locally from the hot shutdown panel or remotely from the control room. The operation of the system is described in FSAR Section 6.5.2.3. The system is designed to meet the single failure criteria and a failure analysis of the system is contained in FSAR Table 6.5-2.

(6) The AC motor-driven pumps and valves in the auxiliary feedwater system are included in the automatic actuation of the loads onto the emergency buses.

(7) The auxiliary feedwater system can be operated locally from the hot shutdown panel or remotely from the control room as detailed in FSAR Section 6.5.2.2.5.

The automatic initiation signals and circuits assoicated with the auxiliary feedwater system satisfy safety grade requirements (i.e., IEEE 279-1971 and seismic).

As part of the environmental qualification effort, Alabama Power Company has determined that six solenoid valves of the Unit 1 Auxiliary Feedwater System lack adequate qualification documentation. These six solenoids are to be replaced in conjunction with the design change for the Auxiliary Feedwater System to avoid duplication of effort upon the fourth refueling outage scheduled for the first quarter of 1983. Interim operation with these six solenoids has been justified based on a review of the post accident environmental conditions, the design features of the solenoids, and redundant equipment. This matter was addressed in letter dated March 8, 1982, " NRC Commitment Compliance Status."

The Auxiliary Feedwater System for Unit 2 is fully qualified as addressed by letter dated July 1, 1981, "NPF-8 License Condition 2.C.(18)(6).

Part 2: Auxiliary Feedwater System Flowrate Indication

Position

Consistent with satisfying the requirements set forth in General Design Criterion 13 to provide the capability in the control room to ascertain the actual performance of the AFWS when it is called to perform its intended function, the following requirements shall be implemented:

1. Safety-grade indication of auxiliary to each steam generator shall be provided in the control room.

2. The auxiliary feedwater flow instrument channels shall be powered from the emergency buses consistent with satisfying the emergency power diversity requirements of the auxiliary feedwater system set forth in Auxiliary Systems Branch Technical Position 10-1 of the Standard Review Plan, Section 10.4.9.

Response

(1) Auxiliary feedwater injection lines to each steam generator are provided with safety-grade flow indication. This flow indication is on the main control board and is powered from the plant emergency power. These flow instrument loops are testable. Redundancy requirements are met by qualified steam generator level instrumentation (safety-grade). A description of the presently installed equipment is provided below.

Local and control room indication of auxiliary feedwater flow to each of the steam generators is provided by flow orifices in the auxiliary feedwater supply line, located just upstream of the auxiliary feedwater stop check valves. The auxiliary feedwater flow indication is backed up by three redundant safety-grade narrow range steam generator level channels and one safety grade wide range steam generator level channel per steam generator which have control room readouts.

Testing of this equipment is conducted in accordance with the Farley Nuclear Plant Technical Specifications. The auxiliary feedwater flow indication channels and steam generator wide range level channels are calibrated every 18 months. The steam generator narrow range level channels are functionally tested every 31 days and calibrated every 18 months.

The displays and controls associated with auxiliary feedwater system flowrate indication were considered as part of the human factor analysis conducted in response to NUREG-0737, Item I.D.1.

(2) The auxiliary feedwater flow instrumentation channels and the steam generator narrow range channels receive their power from the Class 1E vital instrument buses. The steam generator wide range channels also receive their power from vital instrument buses.

Attachment 2

November 5, 1980 NRC Letter Concerns

1. The current protection system logic is such that the motor driven auxiliary feedwater pump discharge valves are not automatically fully opened following a low steam generator level signal, or signal indicating trip of the main feedwater pumps of a blackout sequence signal if the valve operating mode switches are in the modulate position. (These signals will, however, start the motor driven auxiliary feedwater pumps). The low steam generator level signal is the primary Auxiliary Feedwater System actuation signal for loss of feedwater accidents that do not involve initiation of safety injection. The logic should be modified such that all automatic protective signals shown in Figure 7.2-14 of the Final Safety Analysis Report will automatically open the motor driven pump discharge valves regardless of the position of the valve operating mode switches.

APCo Modification

The control-protection system logic will be modified to allow the motor driven auxiliary feedwater pump discharge valves to automatically open fully in reponse to all of the auxiliary feedwater system automatic initiation signals in Figure 7.2-14 of the FSAR, regardless of the position of the valve control swtiches.

2. The redundant solenoid valves in the control air lines to the auxiliary feedwater pump discharge valves are presently arranged to be "energized to close or modulate" the discharge valves and "de-energize to open" the discharge valves. When the auxiliary feedwater system is in use, the loss of a single power supply would, thus, open all of the auxiliary feedwater pump discharge valves resulting in full auxiliary feedwater flow to the steam generators. Manual control of the discharge valves from the control room would be precluded by the loss of either of the power supplies for the redundant solenoid valves. While these failure modes cause undesirable transients resulting in inadvertent plant cooldown transients during normal operations, we find that such failures are unacceptable with respect to the safety function of controlling auxiliary feedwater flow following its initiation by the protection system. The logic and failure modes of the solenoid valves should be modified such that the loss of single power supply will not cause the pump discharge valves to open. Dependence on manual corrective actions which could be taken to limit auxiliary feedwater flow, e.g., closure of block valves, control of turbine driven pump speed, tripping

pumps, etc., are not an acceptable alternative to resolve this concern in the long term.

APCo Modification

The existing redundant solenoid valves in the control air lines of the motor driven pump discharge valves will be replaced with solenoid valves required to be "energized" to open and "de-energeized" to close or modulate.

The existing redundant solenoid valves in the control air line of each turbine driven pump discharge valve will be replaced with only one (1) solenoid valve required to "energized" to open and "de-energized" to close or modulate.

The new solenoid valve, as well as the remaining existing solenoid valve in the air line of each discharge valve associated with the turbine driven pump, will be powered from an uninterruptible power supply (UPS), which also is the source of power for the turbine driven pump steam admission valves.

3. All manual control stations for both the motor and turbine driven pump discharge valves are presently powered from a single train power source. Loss of this power causes these valves to fail open and results in loss of the capability to modulate auxiliary feedwater flow using any of the pump discharge valves. The power distribution should be modified such that the turbine driven pump discharge valve manual control stations are powered from the power source used to derive power for the turbine driven pump steam admission valves and related controls.

APCo Modificaton

The present power source for the manual control stations of the turbine driven pump discharge valves will be replaced with the UPS.

As a result of the above modifications, which make the entire operation of the turbine driven pump and its associated steam admission and discharge valves dependent on the UPS for power, the control selector switches for the turbine driven pump discharge valves will be relocated from the existing hot shutdown panel into a new hot shutdown panel dedicated to the turbine driven pump, and the manual control stations are to be relocated to the existing TDAFP hot shutdown Panel "D".

The existing control selector switches for the turbine driven pump steam admission valves will also be relocated to the new

hot shutdown panel dedicated to the turbine driven pump.

The electronics associated with the remote manual control of the turbine driven pump discharge valves and speed control loops will be procured from Westinghouse and will be installed in the new hot shutdown panel dedicated to the turbine driven pump.

4. Air accumulators are provided for the turbine driven auxiliary feedwater pump steam admission valves since air is required for their operation and the normal air supply is from the non-safety grade instrument air system. The Unit 1 design utilizes a check valve and a solenoid operated valve, which closes by action of a pressure switch on low pressure, to isolate the accumulator from the instrument air system and assure accumulator air availability. The Unit 2 design uses two series check valves to assure the availability of the accumulator air. There is presently no way to independently verify by testing the operability of each check valve. The advantage of the Unit 1 design, i.e., diversity and the fact that it is easier to verify its operability by testing, appears to make it a more reliable system to perform this safety function. The system design for this function should be the same for both units. Alabama Power Company should provide the design basis for this system. The design basis should address a rapid and a slow depressurization of the normal air system as well as the method of independently testing the redundant means for isolating the accumulators from the normal air supply. If a check valve is used as part of the isolation function, the concerns contained in IE Bulletin No. 80-01 related to the check valve seat material should be addressed.

APCo Modification

The design uses a check valve and solenoid valve to provide diversity of isolation. The solenoid valve and check valve have been relocated outside the main steam room to improve accessibility for periodic testing. Test connections have been added to allow individual operability checks of check valve and solenoid valve. The check valve is soft seated as required by Bulletin 80-01. The check valve, pressure switches and solenoid valve are seismic Class I.

The design basis for the air accumulators is to provide sufficient capacity to open the valves and allow turbine operation for two hours. The design basis for the accumulator air supply is to provide redundant backflow

prevention between the safety related air accumulator and non safety instrument air system. The spring loaded check valve provides isolation whenever instrument air pressure falls below accumulator pressure and is the primary protection for the rapid depressurization event. The solenoid valve provides isolation whenever instrument air pressure falls below the pressure switch setpoint. The pressure switch is to be set at 80 psig to provide isolation for the slow depressurization event. An alarm is provided to alert the operator to low pressure in the accumulators. The air isolation solenoid valve will be powered from a UPS.