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RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. OFFICE OF NUCLEAR REACTOR REGULATION

SUBJECT: FORWARDS DOCUMENTATION, DESIGN INFO & PROJECTED IMPLEMENTATION SCHEDULES RE EMERGENCY FEEDWATER SYS AS COMMITTED IN 790425 MEETING.

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NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MEMORANDUM FOR: TERA Corp.

FROM: US NRC/TIDC/Distribution Services Branch

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April 25, 1979

Mr. Harold R. Denton
Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Oconee Nuclear Station
Docket Nos. 50-269, 50-270, and 50-287

Dear Mr. Denton:

In the Nuclear Regulatory Commissioners' meeting of April 25, 1979, Duke Power Company committed to provide a three part improvement of the emergency feedwater system at Oconee Nuclear Station. The purpose of this letter is to provide documentation, design information and projected implementation schedules on each of those three parts.

PART I. - Immediate

On April 25, 1979, Duke Power Company initiated at Oconee Nuclear Station the following procedural changes to enhance the reliability of emergency feedwater system.

1. The emergency feedwater system in the existing design for each Oconee Unit has a turbine driven emergency feedwater pump which supplies 150% of the required water to the steam generators on loss of main feedwater. The discharges of these pumps have been tied together by alignment of manual valves such that each and all of the pumps can supply emergency feedwater to any Oconee Unit requiring it.

2. Operating personnel have been stationed at each emergency feedwater pump with a direct communication link to that unit's control room.

3. Administrative controls have been established so that in the event of loss of both main feedwater pumps on an affected unit, that unit's emergency feedwater pump will start automatically, backed up by remote manual start from the control room. If the pump fails to start automatically the operator stationed at that pump will start the pump locally, and has been trained to do so.

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In addition, the other two available emergency feedwater pumps will be started remotely from their unit's control room or locally if required to provide two more redundant sources of feedwater to the affected unit.

4. Emergency feedwater flow to the steam generators will be assured by the control room operator who has been trained to maintain the necessary levels.

PART II. - One Week

Within a time period not to exceed seven days from April 25, 1979, the emergency feedwater system at Oconee will be revised as follows:

1. Emergency feedwater pump control systems will be revised such that emergency feedwater pumps on all three units will start automatically whenever loss of main feedwater occurs on any unit.

2. The emergency feedwater pump discharge flow will be connected to the interconnection headers such that each or all emergency feedwater pumps can supply water to any unit.

PART III. - 3 to 4 Months

Within about three to four months, two motor driven emergency feedwater pumps will be added to each unit at Oconee with the following design criteria.

1. The two electrically operated pumps will provide a minimum of 100% design capacity for each unit.

2. The design of the pumps and the associated equipment will be seismic.

3. The controls for the electric pumps will be independent of the integrated control system.

4. The power supply for the pumps and controls will be from the 4160 volt safety related busses.

5. Piping and valves added will be Duke Class F (B31.1-SSE seismic design) which is of like quality to the existing turbine driven emergency feedwater pump system.

6. The existing feedwater control valves will be utilized thereby providing four functional flow paths to the steam generators on each unit.

A preliminary flow diagram of the revised motor driven emergency feedwater pump system is attached. Last week we proceeded with design and procurement of these systems.

For reliability of the Oconee emergency feedwater system, cross connecting the discharge headers of all three emergency feedwater pump versus single pump operation for each unit has been evaluated by the Babcock & Wilcox Company. The approach used a WASH-1400 failure data for components, component mode contribution and test and maintenance contribution. Values utilized in the probability model are appropriate to the Oconee emergency feedwater system. The estimates obtained were 2.3×10^{-2} per demand for the single pump system and 2.0×10^{-4} per demand as a conservative estimate with a cross connection considered. The incremental improvement factor would then be approximately 100.

Based on a review of periodic test procedure records at Oconee Nuclear Station from June 1975 on Unit 1, from August 1977 on Unit 2 and from January 1977 on Unit 3 following results on emergency feedwater pump operability were derived. In 67 tests for starting automatically the pumps successfully performed 61 times, which is 6 failures to automatically start in 67 attempts, or 1 in 11. With three pumps thus aligned, the probability of failure of at least one pump to automatically start becomes $(1/11)^3$ or 1 failure in over 1300 attempts. As further assurance of safety, over the operating history of Oconee the emergency feedwater pumps have never failed to start manually locally. Therefore we conclude that for the operating modes described in Parts I or II the probability of failure of emergency feedwater pumps to start is very remote. Part III will provide even greater assurance.

Very truly yours,

William O. Parker, Jr.

OCONEE EMERGENCY FEEDWATER SYSTEM
MOTOR DRIVEN EMERGENCY FEEDWATER PUMP ADDITION