



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 74 TO FACILITY OPERATING LICENSE NO. DPR-23

CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

DOCKET NO. 50-261

1.0 Introduction

By letter dated December 2, 1980, the NRC provided the licensee an interim Safety Evaluation (SE) for the Auxiliary Feedwater System Evaluation in accordance with NUREG-0737, Item II.E.1.1. This SE concluded that all but the following issues, involved in the resolution of Item II.E.1.1, had been acceptably addressed:

1. Short Term Recommendation GS-1 - Technical Specifications for plant operation with inoperable AFW pumps in accordance with current Technical Specifications.
2. Additional Short Term Recommendation 1 - Condensate storage tank level indicators and alarms.
3. Additional Short Term Recommendation 3 - The safety grade design for auxiliary feedwater flow indication.
4. Long Term Recommendation GL-3 - Safety grade automatic initiation of AFW system flow and providing system control capability independent of any AC power source for at least two hours.
5. Long Term Recommendation GL-5 - Safety grade design for auxiliary feedwater automatic initiation signals and circuits.
6. Additional Long Term Recommendation 4 - Provide positive tornado missile protection for and of the AFW water sources.

The licensee provided responses to these open items by letters dated January 9, June 8, and August 7, 1981 and October 1, 1982. A meeting was also held with the licensee on March 18, 1981 to discuss the open items. Open items 3 and 5, above, concerning AFW flow indication and automatic initiation, are under review and will be provided as a separate evaluation as Item II.E.1.2 of NUREG-0737. The evaluations for open items 1, 2, 4 and 6 are provided in this SE.

## 2.0 Evaluation

### A. Short Term Recommendations

Recommendation GS-1 - "The licensee should propose modifications to the Technical Specifications to limit the time that one AFW system pump and its associated flow train and essential instrumentation can be inoperable. The outage time limit and subsequent action time should be as required in current Technical Specifications; i.e., 72 hours and 12 hours, respectively."

In our original SE, we indicated that the licensee was not in compliance with this recommendation as the licensee proposed to revise plant Technical Specifications to allow plant operation for up to seven days with one AFW pump inoperable and up to 24 hours with two AFW pumps inoperable rather than the current Standard Technical Specification limiting conditions for operation of 72 hours with one pump inoperable and immediate shutdown with two pumps inoperable. In letters dated January 9, 1981 and June 8, 1981, the licensee provided further information to support the proposed Technical Specification revision. The licensee maintains that substantial improvement in AFW unavailability (a factor of approximately 11) is gained by the proposed Technical Specification change. The licensee points out that system redundancy is still maintained with one AFW pump inoperable. In addition, in order to perform thorough maintenance on the turbine driven pump, seven days is required as a manufacturer's field service representative is necessary to assist in the maintenance effort and thus additional time is necessary in order for this person to get to the site. The licensee further points out that since the AFW is required for normal plant shutdown, an immediate shutdown when two AFW pumps are inoperable is not prudent as system redundancy is not available and some investigation should be undertaken before challenging the degraded system. The licensee has proposed 24 hours as a reasonable time to assess the cause of the failures and attempt to restore system redundancy particularly if the cause of the failures is a common mode which may also affect the one operable pump.

We have performed independent evaluations on the subject of AFW pump inoperability due to maintenance outages and its effect on system unavailability with respect to the risk of core melt. These studies do not show significant improvement in system unavailability or effect on core melt risk between a 72 hour and 7 day limiting condition for operation for assumed infrequent outages when applied to the motor driven AFW pumps. However, they do indicate that a major accident sequence contributor to the total plant risk of core melt, namely station blackout (loss of all AC power) is affected by the availability of the turbine driven AFW pump. The availability of the motor driven AFW pumps is not as critical in the sequence as no credit can be given them in a total loss of AC power condition. Further, discussions with the licensee during the March 18, 1981 meeting indicate that the turbine driven pump is down for repair at fairly frequent intervals. This was shown to be significant in a recent event (reported in LER 81-17 dated July 1, 1981) where a motor driven pump tripped at the time the turbine driven pump was down for maintenance during a plant shutdown leaving only one operable AFW pump. Consequently, we

believe turbine driven pump availability should be more closely followed and kept at the maximum possible level. Thus, we concur with the licensee that the Technical Specifications may be revised to allow a motor driven pump to be inoperable for seven days prior to beginning hot shutdown. However, we continue to require the licensee to modify the Technical Specification concerning the turbine driven pump to indicate that every measure possible be taken to restore that pump to operable status within 72 hours. During subsequent discussions with the licensee it was agreed to include this requirement in their Technical Specification (TS). By letter dated October 1, 1982 the TS revision was submitted for approval.

Independent evaluations on the effect of core melt resulting from various allowable outage times for two AFW pumps have not been performed. However, in our judgment, it is prudent to allow some time period to assess the cause of a loss of redundancy in the AFWS rather than immediately challenging the one operable pump by initiating a reactor shutdown. Thus, we concur with the licensee's proposed Technical Specification change for allowing 24 hours before shutting down with two AFW pumps inoperable.

Based on the above and the licensee's Technical Specification revision to restore the turbine driven AFW pump to operable status within 72 hours, we conclude that the licensee is in compliance with this recommendation.

B. Additional Short Term Recommendations

Recommendation - "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 our original SE, we indicated that the licensee had not committed to meet the required implementation date of January 1, 1982 for installation of the fully upgraded redundant condensate level instrumentation. By letter dated January 9, 1981, the licensee indicated that the redundant condensate storage tank low level alarms will be installed by January 1, 1982. We have verified that the redundant instrumentation was installed by January 1, 1982. We conclude that the licensee's response is acceptable, and therefore, the licensee is in compliance with this recommendation.

C. Long Term Recommendations

Recommendation GL-3 - "At least one AFW system pump and its associated flow path and essential instrumentation should automatically initiate AFW system flow and be capable of being operated independently of any AC power source for at least two hours. Conversion of DC power to AC power is acceptable."

In our original SE, we indicated that the licensee was not in compliance with this recommendation as manual actions were required to initiate flow from the turbine driven AFW pump in the event of loss of all AC power. In letters dated January 9, 1981 and June 8, 1981, the licensee presented further information to support their position that the dedicated shutdown system and limited procedural manual actions provide adequate assurance that the turbine driven AFW pump can be started within the required time. Transfer of control for the steam supply valves for the AFW pump turbine to the dedicated shutdown control panel and manual realignment of cooling water flow to the turbine driven pump lube oil coolers can be accomplished before steam generator water inventory is appreciably depleted (dryout). This capability has been verified in control room evacuation procedure walk-throughs. We have reviewed the information submitted and conclude that the turbine driven AFW can be expeditiously started manually in a loss of all AC power condition. We conclude that the licensee meets the intent of this recommendation, in that he has proposed an acceptable alternative.

Additional Long Term Recommendation No. 4 - "None of the AFW water sources are protected against tornado missiles. The licensee should complete an evaluation considering a postulated tornado plus a single active failure to determine any AFW system modifications or procedures necessary to assure a sufficient AFW water supply or assure that the plant can be brought to a safe shutdown condition in such an event."

The licensee's position, contained in letters dated January 9 and August 7, 1981, is that sufficient redundancy and separation of the AFW water sources coupled with the low probability of a tornado and concurrent loss of offsite power, will assure the availability of an AFW supply even when considering a single active failure. As a result of our review we find that the licensee has not provided sufficient information to demonstrate that an AFW water source would be available in the event of tornado generated missiles at the site.

Our review of the information and diagram provided in the licensee's August 7, 1981 letter indicates that a tornado passing through the H. B. Robinson site in a straight line from a west to east direction would affect the condensate storage tank, switchyard, and service water pumps intake structure. Thus, loss of offsite power and failure of all AFW water sources is a probable occurrence.

We are concerned with the potential loss of service water system, not only as a backup source of AFW supply, but as an integral portion of the ultimate heat sink (UHS) required to assure a safe shutdown. All the service water pump motors and some system piping are located at a common intake structure with no separation provided and are fully exposed to the ambient environment. In addition, loss of offsite power would lose the availability of the deep-well AFW water source.

We have discussed these concerns with the licensee and an agreement has been reached that this subject will be handled as a separate issue. The licensee has agreed to provide supporting information within 120 days of this evaluation which demonstrates:

1. That sufficient redundancy and separation of the AFW sources coupled with the low probability of a tornado and concurrent loss of offsite power will assure the availability of an AFW supply even when considering a single active failure. This information should include a probabilistic analysis to demonstrate the low probability of tornado missile damage to all AFW sources.
2. Commit to provide positive missile protection for one of the AFW water supplies.

We find the above agreement to be an acceptable approach to this concern.

#### Environmental Consideration

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

#### Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated, does not create the possibility of an accident of a type different from any evaluated previously, and does not involve a significant reduction in a margin of safety, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: January 6, 1983