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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. TO FACILITY OPERATING LICENSE NO. DPR-55

DUKE POWER COMPANY

OCONEE NUCLEAR GENERATING UNIT NO. 3

DOCKET NO. 50-287

Introduction

On April 6, 1985, a high outer motor bearing temperature "Stat-Alarm" for the "3A" reactor building cooling (RBC) fan was received by Control Room personnel at Oconee Unit 3. Upon investigation, it was discovered that the motor for the "3A" RBC fan had open windings. The "3A" RBC train was declared inoperable at 0933 hours on April 6, 1985. At that time, Unit 3 entered the degraded mode specified by Technical Specification 3.3.5.C.(2)(b). This specification permits continued power operation for up to seven days with one RBC fan inoperable as long as both reactor building spray trains are operable. The licensee has since determined that it may not be possible to restore the inoperable fan to an operable status within the seven day period and has requested an amendment to Technical Specification 3.3.5 which would extend the time period from seven days to 14 days. This amendment request was submitted April 11, 1985 and supplemented on April 12, 1985. Specifically, the amendment request would grant a one-time extension of inoperability for the "3A" RBC train of no longer than 14 days, which includes the seven days allowed by Specification 3.3.5.C.(2)(b), plus seven additional days. At this time, the licensee does not anticipate requiring the full seven additional days to repair and return to service the inoperable "3A" RBC train. Currently, the licensee projects installation of the replacement fan motor by April 12, 1985 and after completing the functional test, returning the "3A" RBC train to service by April 13, 1985. This is considered an optimistic schedule and assumes that no problems are encountered.

Background

The Reactor Building Cooling System provides the design heat removal capacity following a loss-of-coolant accident with all three coolers operating by continuously circulating the steam-air mixture past the cooling tubes to transfer heat from the containment atmosphere to the low pressure service water which is passed through the cooler tubes.

The Reactor Building Cooling System consists of three separate, independent units. Each cooling unit consists of a fan, a tube cooler, and the required distribution ductwork. The Reactor Building atmosphere is circulated past the cooling tubes by the fan and returned to the building. Cooling water for the cooling units is supplied by the Low Pressure Service Water System. During normal operation these units, with two fans operating, serve to cool the reactor building atmosphere. Upon receipt of the signal from the Engineered Safeguards Actuation System, the two operating fans switch to half speed and the third fan starts at half speed.

Following a loss-of-coolant-accident, reactor building pressure is limited to below the design pressure. The design heat load at these conditions is 240 x 10^6 Btu/hr. The design inlet cooling water is 75°F, although the expected cooling water range is 45 - 75°F. The heat removal capacity for each cooling unit is 80 x 10^6 Btu/hr.

In addition to the Reactor Building Cooling System, the Reactor Building Spray System will function independently to satisfy design heat removal requirements following a loss-of-coolant accident. This system consists of two half capacity trains, each comprised of a spray pump, spray header, isolation valves, and the necessary piping. Each spray train has a 120 x 10^6 Btu/hr heat removal capacity.

Technical Specifications 3.3.5 and 3.3.6 require the Reactor Building Cooling and Spray Systems, respectively, to be operable during power operation. However, in order to meet the design Reactor Building cooling capacity of 240 x 10^6 Btu/hr, any of the following may suffice: (1) two spray trains, (2) one spray train and two fan coolers, or (3) three fan coolers. With the A fan cooler inoperable, the worst case single failure is the inoperability of the TD 4160 V switchgear which would render Reactor Building spray train A and the B fan cooler inoperable. This would leave the unit with the C fan cooler and Reactor Building spray train B operable (200 x 10^6 Btu/hr heat removal capability). However, since this heat removal is needed only for long-term building cooling, not to mitigate the short-term pressure peak, an alternate supply of electrical power can be provided to the B fan cooler manually, either from the Unit 3 TC switchgear or from a Unit 2 transformer. Therefore, the long-term heat removal capability is assured.

Discussion

The Reactor Building Cooling System is required both to minimize the reactor building peak pressure after a large-break loss-of-coolant-accident and to provide long-term containment cooling following a design basis accident. Analysis of the worst case pipe break indicates that containment pressure would increase to 53.8 psig, with both reactor building spray systems operable but only two of the three fan cooler units operable (FSAR 15.14.5). Containment pressure in this case does not exceed the reactor building design pressure of 59.0 psig. With one fan cooler unit out of service, the long-term design cooling capacity of 240 x 10^6 Btu/hr can be provided by either both reactor

building spray systems or a combination of one reactor building spray system and two reactor building cooling system fan coolers. Since both reactor building spray systems and two reactor building fan cooler trains are operable, the reactor building design cooling capacity will be available even with the "3A" fan cooler unit out of service, if no additional failures occur during the event.

With the "3A" fan cooler unit inoperable, the worst case single failure is the postulated loss of the TD 4160 V switchgear which would render one reactor building spray system and one additional fan cooler unit inoperable. Analysis by the licensee indicates that in the event of a design basis LOCA, coupled with this worst case single failure, containment pressure still would not exceed the reactor building design pressure, but long-term heat removal capacity would be reduced below the design basis. The long-term heat removal capacity with only one reactor building spray unit and one reactor building fan cooler unit would be 200 x 10^6 Btu/hr, compared to the 240 x 10^6 Btu/hr specified in the design basis. The licensee has stated in its submittal that an alternate supply of electric power can be rapidly provided to the fan cooler disabled by the worst case single failure. Alternate power would be supplied by manually switching the 4160 V bus power source to either Unit 3 TC switchgear or to the Unit 2 transformer. Restoration of electric power to this fan cooler would provide heat removal capacity in excess of that required by the design basis. Moreover, the licensee states that the 240 x 10^6 Btu/hr design basis heat removal capability is a conservatively high figure and the licensee asserts that realistically, one reactor building fan cooler unit and one reactor building spray system should provide adequate cooling.

The Oconee FSAR (Section 15.16.3.3.1) addresses mixing of the reactor building atmosphere as related to hydrogen purging. The fan cooler units are mentioned as only one of several sources of mixing for the containment atmosphere and no credit is explicitly taken for any particular number of fan coolers operating. In addition, in the event of a LOCA and the worst case single failure, the licensee assures us that an additional fan cooler can be rapidly restored to operation by manual transfer to another power supply. Also Oconee now has a hydrogen recombiner which would be used to control hydrogen concentration. Therefore, the operability of the "3A" fan cooler unit should have no deleterious effect on post-accident hydrogen control measures.

The licensee's request for a one-time seven day extension to the Technical Specification regarding the inoperability of the "3A" reactor building fan cooler unit does not appear to be unreasonable. The existing Technical Specification 3.3.5.C.(2)(b) allows operation with the loss of one reactor building fan cooler unit for seven days. The licensee has demonstrated that during the time of this extension, results of a large-break LOCA, combined with a worst case single failure:

1. would yield a reactor building pressure not in excess of the design,
2. would not deleteriously affect hydrogen mixing, but
3. would slightly reduce containment long-term heat removal capacity.

The reduction in heat removal capacity is mitigated by the conservative assumptions used in the design analysis. One fan cooler unit and one spray train should provide adequate reactor building cooling. In addition, the 4160 V switchgear is a highly reliable piece of equipment and the possibility of a failure of it coincident with a large-break LOCA is extremely low. In addition, the fact that electrical power can be rapidly restored to the fan cooler unit lost in the worst case single failure scenario, for most failure mechanisms, is a significant mitigating factor in this analysis. Since heat removal capability would be below design basis until power is restored, compensatory measures should include increased operator awareness of the procedures required to restore electric power to the fan cooler unit in the event of a worst case single failure. The licensee has agreed to this compensatory measure. Based on the foregoing, we find the licensee's request to be acceptable.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) 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.

ORAB: DL
G HOLAHAN
4/12/85

Helen N Nicolaras
4/12/85

John F Stolz 4/12/85

The reduction in heat removal capacity is mitigated by the conservative assumptions used in the design analysis. One fan cooler unit and one spray train should provide adequate reactor building cooling. In addition, the 4160 V switchgear is a highly reliable piece of equipment and the possibility of a failure of it coincident with a large-break LOCA is extremely low. In addition, the fact that electrical power can be rapidly restored to the fan cooler unit lost in the worst case single failure scenario, for most failure mechanisms, is a significant mitigating factor in this analysis. Nevertheless, since heat removal capability would be below design basis until power is restored, compensatory measures should include increased operator awareness of the procedures required to restore electric power to the fan cooler unit in the event of a worst case single failure. Based on the foregoing, we find the licensee's request to be acceptable.

FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92 state that the Commission may make a final determination that a license amendment involves no significant hazards considerations if operation of the facility, in accordance with the amendment, would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

(3) Involve a significant reduction in a margin of safety.

The information in this Safety Evaluation provides the basis for evaluating the license amendment against these criteria. The request for amendment changes the Technical Specifications (TSs) to allow Oconee Unit 3 to continue operating for an additional seven days beyond the seven days allowed by TS 3.3.5.c(2)(b), with the '3A' Reactor Building Cooling (RBC) unit inoperable, provided that the two Reactor Building Spray (RBS) trains are operable, and that the '3A' RBC unit is returned to service by April 20, 1985. The additional seven days is required so that the '3A' RBC fan motor can be replaced.

The probability of worst case single failure coinciding with a design basis LOCA which would result in the availability of only one reactor building spray and one reactor building cooling unit is low.

Notwithstanding the low probability of the single failure noted above, the remaining operable equipment available following the worst case single failure coupled with a design basis LOCA is still sufficient to keep the containment pressure below the peak calculated pressure of 54.6 psig. Accordingly, the margin to the design pressure (59 psig) of the containment is not resolved.

Based on the above discussion, we conclude that:

(1) Operation of the facilities in accordance with the amendments would not significantly increase the probability or consequences of an accident previously evaluated.

(2) Operation of the facilities in accordance with the amendments would not create the possibility of a new or different kind of accident from any accident previously evaluated.

(3) Operation of the facilities in accordance with the amendments would not involve a significant reduction in a margin of safety.

Accordingly, we conclude that the amendment to Facility Operating License DPR-55 involves no significant hazards considerations.

STATE CONSULTATION

In accordance with the Commission's regulations, consultations was held with the State of South Carolina by telephone. The State expressed no concern either from the standpoint of safety or of our no significant hazards consideration determination.

The State wanted the staff to verify that the licensee was exerting its best efforts to return the reactor building cooler to service as soon as possible. We have verified that the licensee is providing its best efforts on this matter.

ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. We have determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has made a final no significant hazards consideration finding with respect to this amendment. Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need by prepared in connection with the issuance of the amendment.

Dated:

Principal Contributors:

TAC 07434 4/12/85

OCONEE UNIT 3 - '3A' RBCU out of service inoperable per 4/6/85 9:33 AM.

EMERGENCY LICENSE AUTHORIZATION

CHECK LIST

1. Complete submittal (Section III, Item 1) ☑

2. Prepare and sign handwritten SER, EIA, final NSHC and Technical Specifications (Section III, Item 3) ☑

   a. ORAB or technical branch input ☑
   b. Resident or regional personnel input ☑

3. "Best effort" to obtain state comments (Section III, Item 6) ☑

4. Assistant Director concurrence (Section III, Item 7) ☑

5. Assistant Director oral authorization to licensee (Section III, Item 8) ☑

6. Telecopy Technical Specifications (Section III, Item 8) ☑

7. Forward final two day license amendment with post notice and FNSHC (Section III, Item 9) (Prepare DLOP 223, Attachment 4) 4/15 in concurrence

Project Manager HELEN NICOLARAS

Branch Chief JOHN F. STOLZ

ORAB Branch Chief / Tech. Review Branch Chief* GARY M. HOLAHAN

ORAB AD / Tech. Review Branch AD* DENNIS M. CRUTCHFIELD

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* To the extent practicable.

4-22-85

Please place this in the docket file and LPDR.

Thanks,

Helen Nicolaras
X28561