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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 34 TO FACILITY OPERATING LICENSE NO. DPR-68

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNIT NO. 3

DOCKET NO. 50-296

1.0 Introduction

By letter dated August 26, 1980, (Tennessee Valley Authority Browns Ferry Nuclear Plant Technical Specifications 147), and supplemented by letter dated August 28, 1980, the Tennessee Valley Authority (the licensee or TVA) requested changes to the Technical Specifications (Appendix A) appended to Facility Operating License No. DPR-68 for the Browns Ferry Nuclear Plant, Unit No. 3. The proposed amendment and revised Technical Specifications would permit isolation of the residual heat removal service water (RHRSW) to the Unit No. 2 2B RHR heat exchanger for a period up to 10 days, which also isolates the standby coolant supply (RHRSW supply) from Unit No. 2 to Unit No. 3.

2.0 Discussion

Each of the three Browns Ferry units has four residual heat removal (RHR) heat exchangers and four associated main system pumps. One of the RHR loops, consisting of two heat exchangers, two main system pumps in parallel, and associated piping, is located in one area of the reactor building. The other heat exchangers, pumps, and piping, forming a second loop, are located in another area of the reactor building to minimize the possibility of a single physical event causing the loss of the entire system. In addition, the pump suction and heat exchanger discharge lines of one loop in Unit 1 are cross-connected to the pump suction and heat exchanger discharge lines of one loop in Unit 2. Unit 2 and Unit 3 systems are cross-connected in a similar manner. Two normally closed isolation valves are provided in each heat exchanger discharge cross-connection and four normally closed isolation valves are provided in each suction cross-connection (one at each pump suction). This arrangement between Units 2 and 3 is shown in the attached figure; the cross-connection valves are those in the cross-hatched circles.

The RHR system is designed for three modes of operation: (1) shutdown cooling and reactor vessel head spray, (2) containment cooling, and (3) low pressure coolant injection. Except for the initial period of decay heat removal during a normal shutdown and for reflooding the core following a postulated maximum line break, one of the four RHR heat exchangers in each unit is adequate for all required functions. The cross-connections between the units in the RHR systems thus provide a third, redundant backup cooling system in case the pumps and heat exchangers in an RHR loop of an adjoining unit are both inoperable. As can be noted in the attached figure, the RHR heat exchangers and their associated pumps are in parallel with each other, so that a heat exchanger can be used even if the other heat exchanger in the loop is out of operation.

The four RHR heat exchangers in each unit are cooled by service water taken directly from Wheeler Reservoir. There are 12 service water pumps for the plant. Four pairs of pumps are for the RHR systems in each unit, with each pair connected to one of four RHR service water (RHRSW) system headers. The other four RHRSW pumps are connected to the two Emergency Equipment Cooling Water (EECW) system headers (two pumps per header). Under this arrangement, a pair of service water pumps (for example, the B1 and B2 service water pumps) supply cooling water to just one RHR heat exchanger in each unit. (In the above example, the B pumps service the 1B RHR heat exchanger in Unit 1, the 2B heat exchanger in Unit 2 and the 3B heat exchanger in Unit 3). The maximum requirements on the RHRSW system (one hour following a postulated design basis accident) would require six (out of nine) pumps to supply cooling water to the RHR heat exchangers and three (out of four) to supply EECW requirements.

Because of the redundancy in the RHR systems, the present Technical Specifications permit the units to continue to operate for up to 30 days if one RHR heat exchanger or pump is out of service and for up to seven days if both heat exchangers or pumps in a loop are inoperable, provided certain other conditions are met. Likewise, normal operation only requires nine of the twelve service water pumps to be operable.

There is one other backup crosstie connection pertinent to this evaluation. On the service water outlet from the 1D RHR heat exchanger in Unit 1 and on the service water outlet from the 2B RHR heat exchanger in Unit 2, there is a connection to the primary system crosstie between the units. The connection from the 2B heat exchanger is shown in the attached figure. If all primary coolant and suppression pool water and condensate were lost, this cross-connection would permit the pair of B service water pumps to supply raw river water to the reactor core of Unit 2 or 3 (after the pressure approaches 50 psig) or to supply river water to the respective suppression chambers. Thus, the RHR service water in the B loop in Unit 2 is an emergency back-up supply of cooling water to Unit 3. Because of this function, the present Technical Specifications for Unit No. 3 only permit the unit to be operated for 30 days if one of the B1 or B2 RHRSW pumps is inoperable and require shutdown of the unit if the service water to the Unit No. 2 2B RHR heat exchanger is lost. TVA has requested that the present Technical Specifications for Unit No. 3 be amended to permit Unit No. 3 to be operated for a period up to 10 days without the RHR and RHRSW back-up coolant supply from Unit No. 2. The Unit No. 2 2B has developed a leak. The proposed Technical Specification change would allow maintenance of the Unit No. 2 2B heat exchangers without necessitating the shutdown of Unit No. 3.

To perform the required heat exchanger maintenance, both the RHR and RHRSW lines must be isolated. Isolation of the RHRSW line to the 2B heat exchanger isolates the standby coolant supply (RHRSW supply) from Unit 2 to Unit 3. Technical Specification 3.5.C.3 (Unit 3) presently states that "During power operation, both RHRSW pumps B1 and B2 normally or alternately assigned to the RHR heat exchanger header supplying the standby coolant supply connection must be operable." Although the proposed maintenance activity will not affect the operability of the 1B and 2B RHRSW pumps, it will isolate the RHR heat exchanger header supplying the standby coolant supply connection.

3.0 Evaluation

The present Technical Specifications (Section 3.5.B.13) permit operation of Unit No. 3 without the RHR (primary coolant) cross flow connection for up to ten days. Specifically, 3.5.B.13 reads: "If RHR cross-connection flow or heat removal capability is lost, the unit may remain in operation for a period not to exceed ten days unless such capability is restored." This was judged to be acceptable because the cross connection would not be required unless both redundant RHR loops in Unit No. 3 were lost, no credit for this cross-connected RHR flow was taken in the ECCS Appendix K analysis in the FSAR and the very low probability of ever needing the cross flow standby cooling capability.

Although the present Technical Specifications as noted above permit operation for up to 10 days without the RHR primary coolant cross-flow capability, as described in the above "Discussion", Section 3.5.C.3 does not permit operation without the RHR service water cross-flow capability. The probability of needing-or using-the raw river water for backup cooling capability is far less than the possibility of using the RHR cross flow capability. If the raw service water were needed for backup coolant supply in Unit No. 3, the normal source would be the service water headers in Unit No. 3, rather than the cross-connection from Unit No. 2. If the RHR cross-flow connection can be out of service for 10 days - and our reevaluation concludes that this is reasonable and acceptable - it is logical and acceptable that the service water cross-connection can be out of service for 10 days also in view of the very low probability of ever needing this redundant backup source of raw river cooling water. We conclude that the proposed Technical Specification change to allow a 10 day outage time for the RHRSW cross-flow connection between units is acceptable and that the overall reduction in plant safety margin is insignificant.

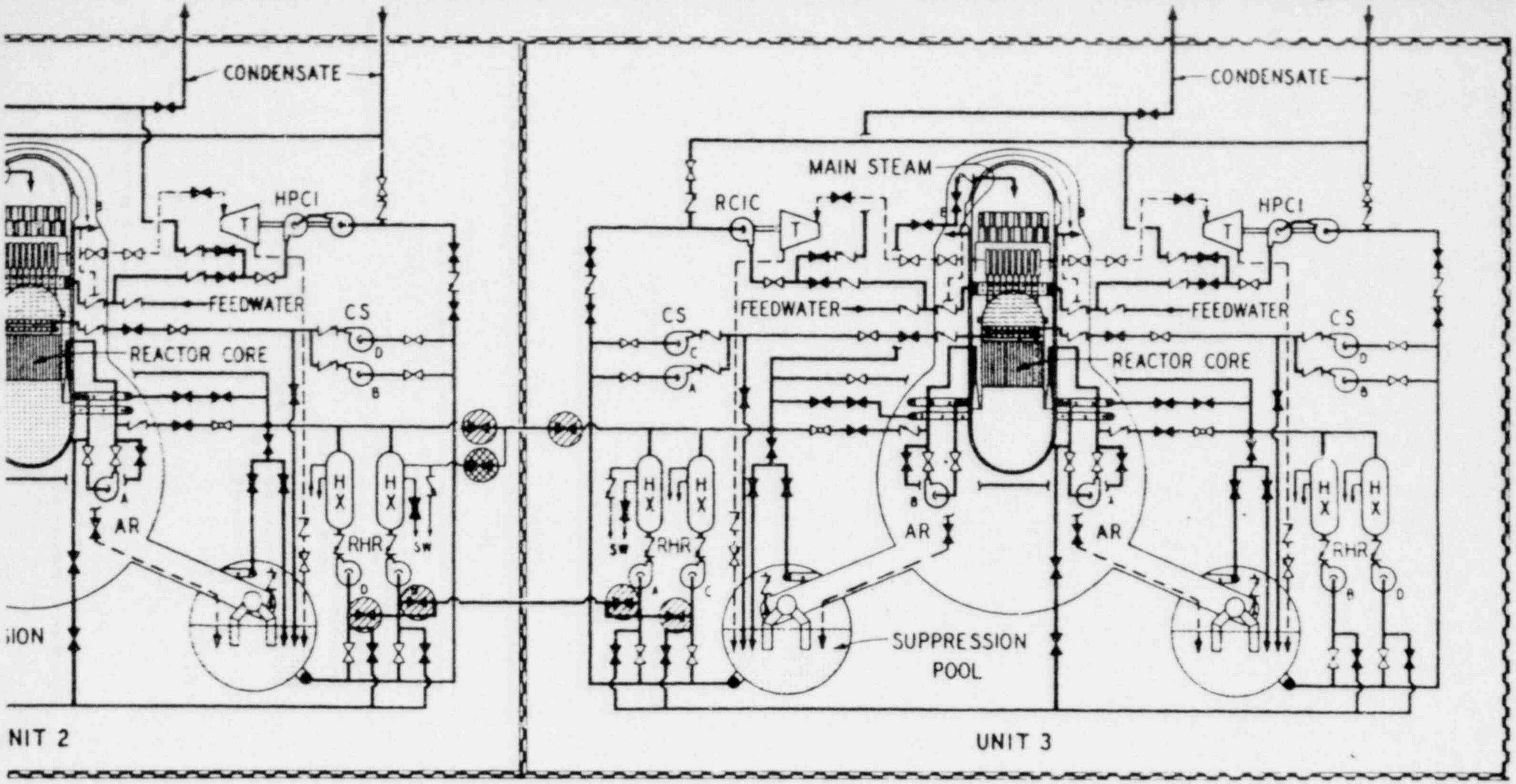
4.0 Environmental Considerations

We have determined that this 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 this 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.

5.0 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 accidents previously considered and does not involve a significant decrease in a safety margin, 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.

Dated: September 9, 1980



BROWNS FERRY NUCLEAR PLANT

Residual Heat Removal System, Unit Cross Connections and Standby Coolant Supply