



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 27 TO FACILITY OPERATING LICENSE DPR-79

TENNESSEE VALLEY AUTHORITY

INTRODUCTION

By letter dated July 11, 1984, the licensee requested an emergency one-time change to the facility Technical Specifications (T.S.) regarding how long plant power operation may continue with one of the two ECCS charging pumps out of service. The present T.S. 3.1.2.4 requires that the charging pump be restored to operable status within 72 hours or the plant must be in Hot Standby and heavily borated within the next 6 hours. The licensee requested that the 72-hour allowance be extended by an additional 72 hours to avoid having to start a plant shutdown at 8:48 PM on July 11, 1984.

EVALUATION:

On July 8, 1984, the smoke alarm sounded in the room containing the 2A-A ECCS centrifugal charging pump. Investigation revealed that the inboard and outboard bearings on the pump motor had failed. The motor oil level was low and the oil was discolored. At 8:48 PM July 8, the pump was declared to be inoperable; and the 72-hour T.S. Action Statement was entered. This plant condition was clearly unexpected, and the need for this emergency T.S. change could not have been foreseen.

Since then, the licensee has vigorously pursued replacement actions for the pump motor. A new motor has been received at the Sequoyah station from the Watts Bar station. However, special machining has been necessary to couple the motor to the charging pump. Time will also be necessary to align the pumps and motor and to conduct tests to verify operability. As of 5:30 PM, July 11, 1984, the licensee estimated that operability could be achieved as early as 6:00 AM July 12, 1984, --- some 9-10 hours after the 72-hour period would expire. Further, experience has shown that additional time should be allocated for contingency in the precision alignment process.

The licensee has stated that there is a regional need for electric power that supports the request to avoid shutting down Unit 2. July 11 is expected to be the hottest day of the summer to date. The expected electric demand can be just matched if both Sequoyah Units remain on line.

The licensee has provided technical justification for the proposed T.S. change. The remaining operable centrifugal charging pump with other ECCS equipment is sufficient to mitigate the consequences of all postulated accidents or for any unexpected need to shutdown the plant.

The question is whether or not a postulated single failure would reduce the remaining core cooling capability to an unacceptable level.

The licensee has performed a probabilistic risk assessment that indicates that the probability of losing the remaining charging pump coincident with a small-break LOCA during the additional 72 hours is 2.5×10^{-7} .

The licensee had Westinghouse perform special analysis of clad temperatures for this case. The absence of any charging flow would degrade the safety injection flow by 44% and would cause an increase in peak clad temperatures (PCT) of 440°F. This increase causes the worst case calculated PCT to be 1925°F. When compared to 2200°F, there is still a significant margin. Based upon our previous experience with similar cases, where the loss of intermediate head ECCS flow would have caused a PCT increase of 550°F, the result of the analysis for this case appears to be reasonable. Further, the licensee states that conservative assumptions regarding decay heat levels and availability of the steam dumps provide an additional PCT margin of 300°F. We note that the Sequoyah design includes an Upper Head Injection System which is a rather unique plant feature that provides core cooling capability beyond that of many contemporary plant designs.

We asked the licensee about the need for the high concentration Boron Injection Tank (BIT) and for charging flow to mitigate a postulated steamline break accident. The licensee stated that they had recently received a new analysis from the NSSS vendor that demonstrates that neither the BIT nor charging flow from the lower concentration RWST are necessary. Based on recent NRC approved changes at similar plants, the results of this analysis appear to be reasonable.

We asked the licensee about the need for charging pumps flow for plant shutdowns for more likely situations than postulated accidents. We were interested in situations such as: shutdown following inadvertent plant trip with the remaining charging pump inoperable, shutdown following loss of offsite power and failure of the emergency diesel generator to the remaining charging pump, and shutdown with no high-head charging flow available. The licensee has provided, as a compensatory measure, special guidance to the plant's operators regarding use of the non-safety related positive displacement (P-D) pump as an alternate method of charging flow. The P-D pump was aligned to provide charging flow and functionally tested on July 10, 1984.

The P-D pump however receives electric power from the same electrical division as the remaining centrifugal charging pump. As a further compensatory measure, the licensee has provided special guidance regarding providing an alternate source of power from the corresponding electric division of Unit 1. This bus tie is a hardwired feature and involves only racking-in breakers.

The licensee stated that plant operators have received special simulator training on safe shutdown with the loss of all charging flow capabilities, based on generic Westinghouse guidelines. Therefore, it is not unreasonable to assume that the operators could handle this contingency. We asked about the need for charging flow to provide seal injection cooling to the reactor coolant pumps. The licensee stated that seal failure is precluded by a thermal barrier in the pump which is cooled separately via the component cooling water system.

We verified that the licensee has taken steps to avoid the loss of the remaining charging pump flow. The pump motor lube oil has been checked out and the bearings do not appear to be running at above normal temperatures. The onsite diesel generator associated with the remaining charging pump is on a monthly testing cycle (which indicates a low failure rate history) and has been tested satisfactorily within the last two weeks. As further compensation, the licensee will be providing dedicated additional operations personnel to perform manual actions should they become necessary, such as manual opening of a valve in the charging flow system. In view of the expected return to operability of the charging pump at 6:00 a.m. on July 12, 1984, we believe that a 72-hour extension of the Action Statement is not necessary. We believe that a 36-hour extension is ample in that it provides 24 hours for contingency. The licensee has stated that a 36-hour extension is agreeable.

SUMMARY AND CONCLUSIONS

The plant condition which could lead to a plant shutdown resulted from an unexpected equipment failure and maintenance efforts have been pursued vigorously. There is a need for electric power to be generated. The probability of an accident occurring and the loss of the remaining charging pump is small. The licensee has provided a technical basis upon which all postulated accidents can be accommodated without a significant reduction in the safety margins.

The licensee has provided compensatory measures that provide reasonable assurance that the plant can be safely shutdown for situations more likely than postulated accidents, even if an additional failure were to occur. The licensee has taken special measures to avoid the loss of the remaining charging pump.

In view of these considerations, a brief one-time extension of the T.S. 3.1.2.4 Action Statement is acceptable. We find that a 72-hour extension is not necessary. The licensee has agreed to a 36-hour extension.

FINAL NO SIGNIFICANT HAZARDS CONSIDERATION (SHC) DETERMINATION

For the reasons discussed above we conclude that the proposed Technical Specification changes do not (1) involve a significant increase in the probability or consequences of an accident previously evaluated since the loss of the operable pump with a LOCA is low and the consequences from such an occurrence do not change from previously analyzed accidents, (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, in that the probability of losing the remaining operable centrifugal charging pump coincident with a small break loss of coolant accident, is extremely small for the additional 36-hour period of time.

The Commission consulted with the State of Tennessee. The State of Tennessee did not have any comments. Based on the Commission's final review and the absence of State comments, the Commission has made a final determination that the amendment involves no significant hazards consideration.

ENVIRONMENTAL CONSIDERATION

The amendment involves a change in use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has 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 the amendment. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Sec 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

CONCLUSION

Based on the consideration discussed above, we have concluded that: (1) the amendment (a) does not significantly increase the probability or consequences of accidents previously considered, (b) does not create the possibility of a new or different kind of accident from any accident previously evaluated, and (c) does not significantly reduce a margin of safety and therefore does not involve significant hazards considerations; (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 the amendment will not be inimical to the common defense and security or the health and safety of the public.

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Dated: August 23, 1984

August 23, 1984

AMENDMENT NO. 27 TO FACILITY OPERATING LICENSE DPR-79 - SEQUOYAH UNIT 2

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