`

March 13, 2001

Mr. J. H. Swailes
Vice President of Nuclear Energy
Nebraska Public Power District
P. O. Box 98
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION - ISSUANCE OF AMENDMENT ON CREDITING SERVICE WATER FOR REACTOR EQUIPMENT COOLING DURING A LOSS-OF-COOLANT ACCIDENT EVENT (TAC NO. MA5751)

Dear Mr. Swailes:

The Commission has issued the enclosed Amendment No.185 to Facility Operating License No. DPR-46 for the Cooper Nuclear Station. The amendment authorizes changes to the Updated Safety Analysis Report (USAR) in response to your application dated June 15, 1999, as supplemented by letter dated November 14, 2000.

The amendment authorizes revision of the USAR to allow the use of the service water system to directly supply cooling water to the reactor equipment cooling system during a loss-of-coolant accident event.

A copy of our related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

Thomas W. Alexion, Project Manager, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosures: 1. Amendment No.185 to DPR-46
2. Safety Evaluation

cc w/encls: See next page

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NEBRASKA PUBLIC POWER DISTRICT

DOCKET NO. 50-298

COOPER NUCLEAR STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No.185
License No. DPR-46

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Nebraska Public Power District (the licensee) dated June 15, 1999, as supplemented by letter dated November 14, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, by Amendment No. 185, the Facility Operating License No. DPR-46 is amended to authorize revision of the Updated Safety Analysis Report (USAR) to allow the use of the service water system to directly supply cooling water to the reactor equipment cooling system during a loss-of-coolant accident event as set forth in the application for amendment by Nebraska Public Power District dated June 15, 1999, as supplemented by letter dated November 14, 2000, and evaluated in the staff's safety evaluation enclosed with this amendment. Nebraska Public Power District shall incorporate the revision into the next USAR update in accordance with the schedule in 10 CFR 50.71(e).

3. The license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Robert A. Gramm, Chief, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Date of Issuance: March 13, 2001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 185 TO FACILITY OPERATING LICENSE NO. DPR-46

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

By application dated June 15, 1999, as supplemented by letter dated November 14, 2000, Nebraska Public Power District (the licensee) submitted a request for changes to the Cooper Nuclear Station (CNS) licensing basis. The proposed changes would allow the use of the service water (SW) system to directly supply cooling water to the reactor equipment cooling (REC) system during a loss-of-coolant accident (LOCA) event.

The November 14, 2000, supplemental letter provided clarifying information that did not change the scope of the original *Federal Register* notice or the initial no significant hazards consideration determination.

2.0 BACKGROUND

The proposed license amendment would credit the use of the SW system as a back-up cooling source for the REC system, seven days after the occurrence of a LOCA. This change would allow CNS to increase the maximum allowable REC system leakage rate during normal power operation, to provide greater operational flexibility while assuring that the REC system would fulfill its safety function for at least the first 7 days (instead of for the first 30 days) following a large break LOCA. For the duration of the event beyond the initial 7-day period, the SW system would be credited for performing the REC cooling function if the REC system should become unavailable.

The REC system provides cooling water to the safety-related Emergency Core Cooling System (ECCS) pumps and the ventilation system which cools the ECCS pump rooms during accident conditions. Heat is transferred from these safety-related components to the SW system through the REC heat exchangers. The SW is then discharged to the Missouri River. The REC surge tank leakage criterion for normal operation was originally established to assure that the REC system would remain functional for 30 days in a post-LOCA condition. Due to radiation levels that would exist following a LOCA, no credit can be taken for operator action in the reactor building to restore the water level in the REC surge tank following a LOCA.

2.1 Original REC System Design

The REC system at CNS [as originally described and approved by the Nuclear Regulatory Commission (NRC) staff] consisted of two subsystems with independent closed loops for cooling those components that were relied upon during postulated accident and transient conditions. Each of the two critical loops contained two pumps and a heat exchanger that is cooled by SW. REC cooling for non-essential equipment was provided by a single non-critical cooling loop that could be aligned to either of the critical cooling loops. The two critical REC system loops were not entirely independent in that the system had only one surge tank, which effectively required the two independent loops to be cross-connected at the pump suctions.

While the REC system was considered to be acceptable for LOCA mitigation, the NRC concluded that REC cooling could not be assured for either a seismic event with a concurrent single failure, or for a passive failure in the essential cooling loops. In order to address these vulnerabilities, the licensee added a SW connection to the REC system to provide a source of back-up cooling water in the event of a passive REC system failure. The NRC staff considered this to be acceptable.

2.2 REC System Design Discrepancies

The licensee identified a number of design discrepancies associated with the REC and SW systems as a result of design-basis reconstitution efforts for these systems, and these discrepancies were reported to the NRC in Licensee Event Report (LER) 50-298/93-001 dated February 25, 1993. The discrepancies included (for example) a construction error that connected Division I SW cooling to the Division II REC heat exchanger, and vice versa; automatic isolation of the non-critical REC loop was accomplished by valves powered by Division I only, making the REC system susceptible to single-failure scenarios; and because the REC critical header return lines were connected to the opposite division's pump suction (instead of to the same division's pump suction), the REC critical loops could not be split, and mechanical separation and redundancy were not possible. The licensee resolved these discrepancies by implementing Design Change Package (DCP) 93-057, which was reviewed by the NRC as documented in Inspection Report 50-298/94-04 dated June 6, 1994.

2.3 Modified REC System Design

In order to resolve the discrepancies that had been identified, valves were relocated or added and electrical power was realigned to establish divisional electrical separation within and between the A and B loops of the SW and REC systems, and to provide for complete electrical Division I and Division II automatic isolation capability of the REC non-critical loads. The existing automatic opening of the REC critical loop isolation valves was divisionalized so that the starting of any ECCS equipment in the North Quads would cause the North REC critical loop supply isolation valve to automatically open, and the starting of any ECCS equipment in the South Quads or in the high pressure core injection (HPCI) room would cause the South REC critical loop supply isolation valve to automatically open. The classification of the SW-to-REC intertie valves was changed from non-essential to essential, and the valves were split divisionally and additional valves were added so that both a Division I and Division II supply and return valve pair would be available to provide a source of backup cooling for the REC system in order to resolve the lack of redundancy and mechanical separation. The REC system modifications did not establish physical separation between the two trains in that the pump

discharge of a given train was returned to the pump suction of the opposite train, and the two trains continued to share a common surge tank. Consequently, the REC system is more susceptible to passive failure scenarios than originally recognized, and the system is considered to be inoperable when the two REC loops are not cross-connected.

3.0 EVALUATION

The maximum allowable leakage from the REC system is based on the criterion that there be enough water in the REC system surge tank to enable the REC system to fulfill its safety function for a 30-day period following a LOCA. The licensee has found that this REC leakage criterion is too limiting and does not afford much operational flexibility. The June 15, 1999, amendment request proposes a change to the criterion whereby REC cooling would be credited for at least the first 7 days post-LOCA, and the existing essential SW back-up cooling connections would be credited for cooling REC system components beyond the 7-day period in the event that the REC system should become unavailable. The criterion for closed loop component cooling water systems (e.g., the REC system at CNS) in NUREG-0800, Standard Review Plan (SRP) Section 9.2.2, states that the surge tank shall have sufficient capacity to accommodate expected leakage from the system for 7 days. The licensee's request is consistent with the SRP criteria in this respect, and is directed at establishing an assured safety-related source of REC cooling for the longer term consistent with the CNS design basis.

As discussed in Sections 2.1 and 2.3 (above), the SW and REC systems were modified during initial licensing to enable the SW system to be used as a back-up cooling water source for the REC system during seismic event and passive failure scenarios, and this capability was further enhanced and upgraded by implementing DCP 93-057. While the SW system was not originally credited as a qualified back-up source of REC cooling water for post-LOCA cooling, it is a safety-related system and it was accepted by the NRC as an acceptable back-up source of cooling water for seismic event and passive failure scenarios. The more recent changes that were made to the REC and SW systems by DCP 93-057 to upgrade the classification of the SW-to-REC intertie valves from non-essential to essential, and to provide a fully qualified, safety-related, redundant and mechanically separate SW-to-REC backup cooling capability, are consistent with the staff's design criteria for safety-related applications. In response to questions that were raised by the NRC staff in connection with the June 15, 1999, amendment request, the licensee provided additional information concerning SW and REC system design and operational considerations, such as hot shorts, periodic testing of the SW-to-REC intertie valves and REC boundary valves, SW flow capacity, boundary valve leakage, control room annunciation and indication, human factors considerations, and silt buildup at the SW-to-REC intertie connections. Further, during a telephone conversation on December 14, 2000, the licensee provided the following additional clarification about the measures that will be taken to assure that the SW-to-REC intertie connections are not blocked by silt from the SW system during normal plant operation:

- Flow will be established periodically through the SW-to-REC intertie connections by flushing water through appropriate drain valves during the routine performance of in-service testing of the applicable motor-operated valves.

- Following maintenance evolutions when the silt may become dry and less fluid, post-maintenance testing will be completed to assure that any affected SW-to-REC intertie connection is not blocked prior to restoring the REC system to operable status.

Based on the information that was provided by the licensee, it is the staff's understanding that: (1) procedures have been established to aid plant operators in determining if a loss of all REC cooling has occurred and to specify actions to be taken, (2) the SW system is able to fulfill its safety function as well as the safety function of the REC system when the SW-to-REC intertie valves are open, (3) the SW-to-REC intertie capability satisfies the applicable CNS design-basis criteria for safety-related applications, (4) measures have been established to assure that silting will not prevent the SW system from performing the REC cooling function, and (5) even though the control room annunciation and indication for monitoring the status of the REC system are not safety-related or essential, they are highly reliable and diverse. The staff considers the use of control room annunciators as described in the November 14, 2000, supplemental letter (response to Question 9) to be adequate for this particular application because operator action is not immediately necessary and is not anticipated for at least 7 days following event initiation. All other aspects of the amendment request are consistent with the staff's criteria for systems that are relied upon for LOCA mitigation. Therefore, the staff considers the licensee's request to be acceptable.

In the licensee's supplemental letter dated November 14, 2000, the response to Question 2 (regarding the Division I and Division II suction and discharge flow paths) states the following in the second paragraph: "This is acceptable since CNS is not designed to withstand a passive failure concurrent with a Safe Shutdown Earthquake (SSE)..." The staff does not fully agree with this statement. In particular, the staff notes that typically non-seismic piping is assumed to fail during a seismic event (see position C.2 of NRC Regulatory Guide 1.29). This was discussed with the licensee during the December 14, 2000, telephone conversation (referred to above), and the licensee indicated that the statement was referring to the failure of seismic Category I piping. The staff agrees that a complete failure of seismic Category I piping is not assumed to occur during an SSE; however, a crack would be assumed to occur concurrent with an SSE in seismic Category I piping.

4.0 EVALUATION SUMMARY

The SW system is a safety-related system and satisfies the staff's criteria for performing the REC cooling function. The control room annunciation and indication that is relied upon for determining when to initiate flow through the SW-to-REC intertie connection is not safety-related, but it is considered to be highly reliable and diverse. The staff considers this particular use of non safety-related instrumentation to be adequate because alignment of the SW-to-REC intertie connection will not be needed until at least 7 days following a LOCA initiation, affording the reactor operators ample time to determine the status of the REC system. Based on the above evaluation, the staff finds that the proposed use of the SW system will not adversely affect public health and safety. Therefore, the licensee's request is acceptable.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Nebraska State official was notified of the proposed issuance of the amendment. The State official had no comment.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC 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 previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (64 FR 38030, dated July 14, 1999). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR Section 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.

7.0 CONCLUSION

The Commission has 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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: J. Tatum

Date: March 13, 2001

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