July 27, 1981

Docket No. 50-244
LS05-81-07-079

Mr. John E. Maier, Vice President
Electric and Steam Production
Rochester Gas & Electric Corp.
89 East Avenue
Rochester, New York 14649

RECEIVED
JUL 29 1981
U.S. NUCLEAR REGULATORY COMMISSION

Dear Mr. Maier:

SUBJECT: SEP TOPIC IX-4, BORON ADDITION SYSTEM
(R. E. GINNA)

Enclosed is a copy of our draft evaluation of Topic IX-4, "Boron Addition System" for the Ginna plant. This assessment compares your facility as described in Amendment No. 7 to Provisional Operating License No. DPR-18 for the Ginna plant with the criteria currently used by the regulatory staff for licensing new facilities.

You are requested to examine the facts upon which the staff has based its evaluations and respond either by confirming that the facts are correct, or by identifying any errors. If in error, please supply corrected information for the docket. We encourage you to supply for the docket any other material related to this topic that might affect the staff's evaluation. This assessment may be revised in the future if your facility design is changed or if the NRC criteria relating to this subject is modified before the integrated assessment is completed.

Your response within 30 days of the date you receive this letter is requested. If no response is received within that time, we will assume that you have no comments or corrections.

Sincerely,

AUG 5 1981

8107300125 810727
PDR ADOCK 05000244
P PDR

Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing

SE04
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Enclosure: As stated

cc w/enclosure:
See next page

DSU USE ET(07)

OFFICE	SEPB:DL	SEPB:DL	SEPB:DL	ORB#5:DL:PM	ORB#5:DL:C	AD:SA:DL	
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DATE	7/23/81	7/23/81	7/23/81	7/24/81	7/24/81	7/29/81	

Mr. John E. Maier

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SYSTEMATIC EVALUATION PROGRAM BRANCH
TOPIC IX-4, BORON ADDITION SYSTEM
GINNA PLANT

I. INTRODUCTION

Following a LOCA, boric acid solution is introduced into the reactor vessel by two modes of injection. In the initial injection mode, borated water is provided from the accumulators, from the refueling water storage tank and from the boron injection tank (Westinghouse plants only). After this initial period, which may last somewhere between 20-60 minutes, the Emergency Core Cooling System (ECCS) is realigned for the recirculation mode. In this mode borated water is recirculated from the containment sump to the reactor vessel and back to the sump through the break. A portion of the water introduced into the reactor vessel is converted into steam by the decay heat generated in the core. Since the steam contains virtually no impurities, the boric acid content in the water that was vaporized remains in the vessel. The concentration of boric acid in the core region will therefore continuously increase, unless a dilution flow is provided through the core. Without the dilution flow the concentration of boric acid will eventually reach the saturation limit and any further increase in boric acid inventory will cause its precipitation. Boric acid deposited in the core may clog flow passages and seriously compromise the performance of the ECCS. Topic IX-4 is intended to review the boron addition system, in particular with respect to boron precipitation during the long term cooling mode of operation following a loss of coolant accident, to assure that the ECCS is designed and operated in such a manner that a sufficient throughflow is provided before the concentration of boric acid will reach its saturation limit.

II. REVIEW CRITERIA

The plant design was reviewed with regard to Appendix A, 10CFR Part 50, General Design Criteria - 35, "Emergency Core Cooling", which requires that a system to supply abundant emergency core cooling shall be provided. In addition, the plant design was reviewed with regard to 10CFR 50.46, "Acceptance Criteria for Light Water Nuclear Power Reactors", and Appendix K to 10CFR Part 50 "ECCS Evaluation Models", which set forth the requirements to maintain coolable core geometry and to provide long-term core cooling; the basis for the boron precipitation reviews.

III. RELATED SAFETY TOPICS

Topic VI-7.A.3 reviews the ECCS actuation system with respect to the testing for operation and design performance of each component of the system. Topic VI-7.B reviews the procedures for ESF switchover from injection to recirculation mode.

IV. REVIEW GUIDELINES

There are no unique SRP sections that deal with this issue. The primary criterion used for review of this system was discussed in a memo dated January 21, 1976 entitled, "Concentration of Boric Acid in Reactor Vessel During Long Term Cooling - Method for Reviewing Appendix K Submittals."

V. EVALUATION

The guidelines for this review are contained in Reference 1, which is a memo describing the methods used to review boric acid buildup during post-LOCA long-term cooling. There is no SRP section covering this topic.

The Ginna reactor is different than current Westinghouse designs in two areas that affect boron precipitation. One is that the residual heat removal (RHR) injection feeds directly into the upper plenum rather than into the cold or hot legs. This means that a switchover from cold leg to hot leg injection cannot be used to dilute boron in the RHR system. The second area of difference is that several valves may be flooded following a LOCA. Once flooded, the valves may not work and no credit is given for operation of flooded valves. The valve lineup on the Ginna high head injection system is set for cold leg injection with power removed to prevent spurious operation of the flooded valves. This means that switchover from cold to hot leg injection cannot be used to prevent boron precipitation in the high head injection system.

To prevent boron precipitation, the Ginna plant utilizes simultaneous injection from the RHR and high head systems. The simultaneous injection takes place within 20 hours following the LOCA, and requires the primary system to be cooled to RHR conditions. However, even if the system is not cooled to RHR conditions, it is unlikely that boron precipitation would occur since the solubility is greater at higher temperatures. Furthermore, cooldown to RHR operating conditions will not be a problem with a large break LOCA.

VI. CONCLUSION

The Ginna method of preventing boron precipitation is to simultaneously inject into the cold legs (high head system) and upper plenum (RHR system). This will provide sufficient dilution flow for both hot and cold leg breaks. Based on our review and using staff criteria referenced earlier, we conclude that the Ginna method for prevention of boron precipitation is acceptable.

REFERENCES

1. Memorandum for Thomas M. Novak, Chief, Reactor Systems Branch from K. I. Parczewski, Reactor Safety Branch dated January 21, 1976.

2. Letter to L. D. White, Jr., Rochester Gas and Electric from A. Giambusso, dated May 14, 1975.

3. Letter to R. A. Purple, NRC from L. D. White, Jr., RG&E dated May 20, 1975.

4. Letter to R. A. Purple, NRC from L. D. White, Jr., RG&E dated May 30, 1975.

5. Letter to L. D. White, Jr., RG&E from R. A. Purple, NRC dated July 3, 1975.