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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 33 TO FACILITY OPERATING LICENSE NO. DPR-18
ROCHESTER GAS AND ELECTRIC CORPORATION
R. E. GINNA NUCLEAR POWER PLANT
DOCKET NO. 50-244

1.0 INTRODUCTION

On November 21, and 29, 1988, Rochester Gas and Electric Corp. (RGE) requested amendments to the Technical Specifications to modify the requirements for residual heat removal pump (RHR) and safety injection pump surveillance tests following the proposed modifications to the pump recirculation flow lines. Also, the Technical Specifications on the Boric Acid Storage Tanks level and subsequent amounts of boric acid must be modified as a result of the expected change in recirculation lines for the pumps. These proposed amendments are required in response to NRC Bulletin 88-04, Potential Safety-Related Pump Loss, dated July 7, 1988.

2.0 EVALUATION

NRC Bulletin 88-04 requested an evaluation of two conditions that might exist at Ginna. Such conditions if found to exist, might result in damage or failure of residual heat removal pumps and/or safety injection pumps. One condition involves two pumps operating in parallel, where the weaker pump may be deadheaded by the stronger pump when the pumps are operating at minimum flow. A second condition concerns the inadequacy of flow to preclude damage even if a single pump is operating.

RGE carried out a detailed analysis of the modes of operation for these pumps to determine whether or not the conditions, noted above, could exist at Ginna with the current system configuration. A review and analysis of several months of test data revealed that pump deadheading under certain conditions could occur. Special testing of the RHR pumps, operating in parallel, were carried out. The tests confirmed that the pumps could deadhead. Safety injection pumps have independent recirculation lines; consequently, those pumps are not susceptible to deadheading.

Other aspects of pump operation were reviewed and tested to determine the type of modifications that would be needed to satisfy NRC Bulletin 88-04. For both systems, larger recirculation lines are considered desirable. Continued operation utilizing the present recirculation systems were justified on the basis that it did not create a condition which is outside the original design basis for the system nor does it represent an unacceptable condition in terms of pump protection for the maximum duration that the pumps would be expected to operate in the recirculation modes. In the interim, procedures for pump operation were developed and adopted to assure the aforementioned adverse conditions delineated in the NRC Bulletin 88-04 would not occur. The corrective action that is necessary for a permanent solution to the NRC concerns are plant modifications to the recirculation system.

The necessary hardware modifications will be carried out during the current plant outage which began in mid-March 1989. The proposed Technical Specifications are to be effective upon completion of the modification and subsequent plant startup.

For the RHR system, a redesign is underway which will provide each RHR pump with a minimum flow recirculation line which is independent of the opposite train. The line is being sized to provide sufficient recirculation flow when the pump discharge path is isolated. For the SI system, the planned modification will require additional larger diameter recirculation piping with a pressure breakdown orifice in each separate line, sized to allow 100 gpm or about 25% of best efficiency point (BEP) of flow. Each of these designs had the objective of providing sufficient recirculation flow consistent with pump manufacturer recommendations without reduction in the injected flow delivery during accident conditions used in the safety analysis report.

The auxiliary feedwater pumps have also been evaluated relative to the NRC Bulletin 88-04 concerns. The Ginna Station main auxiliary feedwater system consists of two 100% capacity motor driven pumps and one 100% capacity turbine driven pump. Two additional standby auxiliary feedwater pumps, each 100% capacity, are also installed in a separate building as a backup to the main auxiliary feedwater pumps. Each of these pumps is provided with an automatically controlled minimum flow recirculation system sized and periodically tested to ensure that sufficient minimum flow will be provided under all accident and normal operating conditions. It has been determined that the minimum flow concerns raised in NRC Bulletin 88-04 have been adequately addressed in the design and testing of these systems at Ginna. There are no other safety-related pumps which are susceptible to the NRC Bulletin 88-04 concerns.

As a result of the expected modifications to the safety injection (SI) pump recirculation flow, the level of boric acid in the Boric Acid Storage Tanks (BAST) must be increased to be consistent with the analysis that requires 2000 gallons of 20,000 ppm boric acid solution to be delivered to the Reactor Coolant System (RCS). This is based on a transient event analyzed in Chapter 15 of the UFSAR that requires high concentration boric acid to be delivered. The results of the loss-of-coolant accident analysis and the steam break accident analysis for core response satisfy the UFSAR acceptance criteria with 2000 ppm boric acid, which is provided from the refueling water storage tank. Since the SI recirculation flow returns to the refueling water storage tank instead of the BAST, the inventory in the BAST must be increased to ensure 2000 gallons of 20,000 ppm solution is delivered to the RCS after the SI recirculation line is modified. Calculations using the RCS pressure vs. time for the most limiting containment integrity steam break and SI flow assumptions that maximize the recirculation loss were performed to determine a bounding initial BAST

volume. These calculations show that a BAST inventory of 3110 gallons above the switchover to the RWST setpoint will ensure 2000 gallons of 20,000 ppm solution is delivered during the most limiting containment integrity steam break. Also the tanks were determined to be large enough to hold the necessary usable inventory. The ability of the Safety Injection system to meet or exceed the UFSAR SI flow requirements was evaluated using a hydraulic analysis computer software entitled KYPIPE (Kentucky Pipe Network Analysis Program). The hydraulic analysis model consisted of the primary injection flow paths, miniflow recirculation paths, and suction paths of the Safety Injection System. KYPIPE software was used to perform steady-state simulation of flows throughout the Safety Injection System at varying reactor pressures and tank levels. During the March 1989 outage, SI and RHR systems will be tested to validate the results of the analysis to assure adequate flows and discharge pressures are met or exceeded on the modified systems.

Since the requirements for 3110 gallons are associated with Safety Injection (SI) they have been added to the section of Specifications associated with SI. The requirements are applicable only when SI is required to be operable (above 1600 psig and 350°). Below 1600 psig or 350° the existing requirements in Section 3.2 are still applicable.

3.0 ENVIRONMENTAL CONSIDERATION

The proposed amendment was noticed for hearing on February 3, 1989 (54 FR 5565), and no comments or requests for hearing were received. An Environmental Assessment and Finding of No Significant Impact was published in the Federal Register on March 28, 1989 (54FR12685).

4.0 CONCLUSION

Based on the review of the analysis and the results provided, the staff finds RGE has shown that the proposed modifications to the RHR and SI recirculation systems will satisfy the concerns of NRC Bulletin 88-04. The staff 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 the proposed plant modifications, (2) 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 to the health and safety of the public.

Principal Contributor: C. Stahle

Dated: MAR 3 0 1989