

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



SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ROCHESTER GAS AND ELECTRIC CORPORATION

R. E. GINNA NUCLEAR POWER PLANT

DOCKET NO. 50-244

1.0 INTRODUCTION

The Safety Evaluation Report (NUREG-0916) related to the restart of Ginna after the steam generator tube rupture (SGTR) incident on January 25, 1982 and specifically license conditions 2.C(9)1 through 20 required that Rochester Gas and Electric Corporation (RG&E) address 20 long-term items. Two of the license conditions concerned reactor coolant pump trip [2.C(9)8] and reactor coolant pump restart [2.C(9)9].

By letters dated November 22, 1982 (Reference 1) and April 22, 1983 (Reference 4) RG&E provided sufficient information to the staff to evaluate the licensee's response to the staff's concerns.

2.0 BACKGROUND

2.1 Reactor Coolant Pump Trip

During the January 25, 1982 steam generator tube rupture (SGTR) incident, reactor coolant pump (RCP) trip was performed in accordance with procedure E-1.4. However, it is known that continued operation of the reactor coolant pumps during a SGTR event is desirable for several reasons. First, continued forced circulation of primary coolant allows better and more uniform control of the primary system cooldown. Second pump operation keeps pressurizer spray available for pressure control. Third, forced circulation helps prevent the formation of sizable bubbles in the reactor coolant systems. Balanced against this, however, is the problem that for certain small break loss-of-coolant accidents (LOCAs), continued pump operation will result in a larger mass flow rate out of the breaks, and the possible formation of a significant void fraction in the coolant system. This is a problem because SGTR and small break LOCA events exhibit many similar symptoms and operators may experience difficulty in quickly determining the precise event. Consequently, the licensee has committed to perform a formal study of possible solutions to the RCP trip issue, with the purpose of finding a method for keeping the RCPs operational during SGTR events such as occurred at Ginna.

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2.2 Reactor Coolant Pump Restart

During the SGTR the A RCP was restarted after the E-1.4 emergency procedure criteria were met. The decision was made to start the RCP, even though the pressurizer was suspected to be water solid (pressurizer level indication of 100%). The reactor-coolant pump was restarted very deliberately, after checking all relevant parameters necessary for RCP operation. However, the decision regarding restart of the RCP has been the subject of considerable discussion. Depressurization of the reactor coolant system during a tube rupture accident may generate a steam bubble in the upper head region of the reactor vessel if no reactor coolant pump is operating. This bubble could rapidly condense during pump startup, drawing liquid from the pressurizer and reducing reactor coolant subcooling. If pressurizer inventory is not sufficient, level may decrease offscale. No direct indication of coolant inventory would exist if this occurred and pressurizer heaters would be unavailable for pressure control. In addition, local flashing of reactor coolant could result in erratic system response. These conditions would make plant control more difficult and may confuse the operator during an accident if such behavior was unexpected.

The licensee committed to formally study the question of RCP restart criteria in conjunction with the RCP trip study. The objective of this effort was to establish criteria for RCP restart that will not jeopardize plant safety or result in operator confusion.

3.0 EVALUATION

3.1 Reactor Coolant Pump Trip

The licensee's alternate RCP trip criteria reviewed included: (1) the current criterion of reactor coolant system (RCS) pressure below 1285 psia (including instrumentation uncertainty), (2) reactor coolant subcooling, (3) a secondary pressure dependent RCS pressure value, (4) reactor vessel level, and (5) reactor coolant pump electrical current.

The reactor vessel level and reactor coolant pump current methods were not considered further because of the need for substantial equipment modification and the need for extensive analytical and experimental efforts.

Several LOFTRAN analyses were performed for a spectrum of SGTR events to assess the margin to RCP trip following a SGTR. It was concluded that the secondary pressure dependent RCS pressure method provided the most potential for preventing RCP trip for a SGTR. It was also concluded that this method was beneficial only if instrument uncertainties were evaluated for normal containment conditions. If abnormal containment conditions occur (increased pressure and temperature),

then RCP trip could be expected, based on increased instrument uncertainties. Normal containment conditions are expected during a SGTR. It was therefore concluded that "whenever the need from pump trip is addressed in the procedure, the operator would be required to evaluate the containment condition and to select the appropriate criteria depending upon containment conditions. (e.g., for normal containment condition use secondary pressure RCS pressure; for abnormal condition use 1285 psia RCS pressure). This approach would prevent RCP trip for a design basis SGTR, while still providing for a required pump trip in the event of a LOCA."

In response to Generic Letter 83-10d (Reference 3), the licensee (Reference 4) has indicated that the resolution for RCP trip will be addressed in a Westinghouse Owners Group (WOG) submittal, scheduled for December 1983. The RCP trip setpoints will be incorporated in Revision 1 of WOG Emergency Response Guidelines, scheduled for July 31, 1983. The licensee has committed to implement the revised criteria into the existing emergency procedures and provide operator training within 2 months of receipt of the revision (provided the necessary instrumentation is currently available). Based on the information provided in Reference 4, the staff believes the necessary instrumentation is currently available in the plant.

3.2 Reactor Coolant Pump Restart

The licensee reviewed the current emergency operating procedures in place at Ginna to determine if indicated pressurizer level and reactor coolant subcooling would be maintained following RCP restart after a STGR event. It was concluded that the reactor restart criteria are sufficient to ensure both indications are maintained. In some cases, for large enough steam bubbles, the level may decrease below the minimum level required for operations of the heaters. In these cases guidance is provided to restore level using normal charging and safety injection pumps. It was also concluded that the current RCP restart criteria may not be appropriate for other accidents or multiple failure events where safety concerns exist.

4.0 CONCLUSIONS

Based on the information provided, by the licensee in Attachment C of Reference 1 and on the licensee's commitment to the WOG resolution of the pump trip issue, the staff concludes that the licensee is cognizant of the RCP trip issue and has acceptably fulfilled the commitment in item 2.C(9)8. The licensee has also evaluated the RCP restart criteria to assess the potential for coolant flashing and loss of pressurizer control during pump restart following a SGTR.

The staff will review the WOG submittal concerning RCP trip and its applicability to Ginna following its receipt.

Further, the staff concludes, based on Attachment D of Reference 1, that the Ginna RCP restart criteria are sufficient within the context of the steam generator tube rupture emergency operating procedures to ensure that indicated pressurizer level and reactor coolant subcooling would be maintained. The commitment of item 2.C(9)9 has been acceptably fulfilled.

5.0 ACKNOWLEDGEMENT

E. Throm prepared this evaluation.

Dated: October 14, 1983

REFERENCES

1. Docket No. 50-244, "Response to Safety Evaluation Report - NUREG-0916 Steam Generator Tube Rupture Incident R.E. Ginna Nuclear Power Plant Docket No. 50-244," letter from J.E. Maier to D.M. Crutchfield, November 22, 1982 (DCS 8211290410).
2. NUREG-0916, "NRC Report on the January 25, 1982 Steam Generator Tube Rupture at R.E. Ginna Nuclear Power Plant, USNRC, April 1982.
3. Generic Letter 83-10d, "Resolution of TMI Action Item II.K.3.5, Automatic Trip of Reactor Coolant Pumps," letter from D.G. Eisenhut to Licensee, February 8, 1983.
4. Docket No. 50-244, "Response to Generic Letter 83-10d, Automatic Trip of Reactor Coolant Pumps R.E. Ginna Nuclear Power Plant Docket No. 50-244," letter from J.E. Maier to D.M. Crutchfield, April 22, 1983.