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MEMORANDUM FOR: Frank J. Miraglia, Assistant Director for Safety Assessment
Division of Licensing

FROM: R. Wayne Houston, Assistant Director for Reactor Safety
Division of Systems Integration

SUBJECT: SAFETY EVALUATION FOR R. E. GINNA NUCLEAR POWER PLANT - LONG TERM RESTART REQUIREMENTS 6 AND 10

Plant Name:	R. E. Ginna Nuclear Power Plant
Docket Number:	50-244
TAC Number:	49346
Responsible Branch:	ORB #5
Project Manager:	G. Dick
Review Status:	Complete

The Reactor Systems Branch has completed its evaluation of long term items 6 and 10, as provided in the licensee's response of November 22, 1982, to the requirements of NUREG-0916 "SER Related to the Restart of R. E. Ginna Nuclear Power Plant". The safety evaluation is provided in the enclosure.

An SER for the other items of TAC 49346 (items 11, 12 & 20) was prepared by PSRB.

Original Signed By
R. Wayne Houston

R. Wayne Houston, Assistant Director
for Reactor Safety
Division of Systems Integration

Enclosure:
As stated

cc: R. Mattson
D. Eisenhut
F. Rosa
D. Crutchfield
D. Zieman
G. Dick

8402270070 840214
PDR ADOCK 05000244
P PDR

CONTACT: B. Mann, RSB
X20441

OFFICE	DSI:RSB	DSI:RSB	DSI:ICSB	DSI:RSB	DSI:AD:RS
SURNAME	BMann:gd	LMarsh	FRosa	BSheron	RHouston
DATE	01/10/84	01/17/84	01/18/84	02/8/84	02/14/84

SAFETY EVALUATION REPORT

R. E. GINNA NUCLEAR POWER PLANT

GINNA STEAM GENERATOR TUBE RUPTURE (SGTR) PROCEDURES

TAC NO. 49346

INTRODUCTION

As a result of the SGTR accident on January 25, 1982, at the Ginna Plant, an NRC task force was formed to report the circumstances surrounding the tube failure. The task force documented its findings in Reference (1). Subsequently, a safety evaluation report was prepared to determine if the Ginna Plant could be returned to full power operation (Reference 2). This report included relevant information from Reference (1), licensee submittals and significant task force findings. The report recommended restart of the Ginna plant. The bases for this recommendation included the staff's review of the mechanism that led to the Ginna SGTR, the staff's findings including the adequacy of the Ginna repair and inspection program and the operators' compliance with applicable Ginna procedures. Additionally, indications are that the reactor vessel was not subject to pressurized thermal shock during this event and that the offsite radiological consequences of this event were well within 10 CFR Part 100 dose guideline levels. The licensee was committed to a series of short term and long term requirements. The licensee responded to its long term commitments in Reference (7). The purpose of this SER is to present the staff evaluation of the licensee's compliance with long range items 6 and 10. The evaluation of other procedural items is contained in Reference (4).

ITEM 6

Within six months, review the requirement for a safety injection signal to be present for automatic transfer of safety injection pump suction from the boric acid storage tank to the refueling water storage tank.

LICENSEE'S RESPONSE

The requirement for a safety injection signal to be present for the automatic transfer to take place has been reviewed. The results of the review indicate that it is acceptable to remove this dependency. A modification will be made to the automatic switchover logic that will cause the switchover to occur on boric acid storage tank level only. The presence of an SI signal will not be required for the automatic switchover to occur. The modification will be implemented prior to startup from the 1983 refueling outage.

STAFF EVALUATION

In the event of a large steam line break (SLB) rapid addition of concentrated boric acid solution is required to maintain the reactivity and consequent power level, within acceptable limits. Therefore the Ginna safety injection (SI) pumps take suction from the boric acid tanks (BATs), which contain concentrated boric acid (21,000 ppm boron). However the BATs only contain 7200 gallons and are thus quickly depleted in the event of rapid depressurization of the RCS. The SI pump suction is therefore automatically switched to the refueling water storage tank (RWST) on low BAT level. The plant design previously required that the SI signals be present f this switchover to occur. The licensee therefore revised the emergency procedures to specify that the SI signal be reset only after MOV 825A or B (the SI suction valves from the RWST) were open.

Actuation of the SI signal also automatically isolates the containment resulting in isolation of letdown and interruption of the reactor coolant pump (RCP) seal water return flow and instrument air supply. Reset of the SI signal would permit reestablishment of normal RCP seal flow, normal letdown and charging and allow operation of the pressurizer spray. The limitations imposed by the transfer logic circuitry and the emergency procedures could cause delay in the utilization of equipment which can mitigate the consequences of a SGTR event. The staff determined that the licensee should perform a review of the need for a coincident SI signal for automatic transfer of SI pump suction from the BATs to the RWST on BAT low level (Reference 2).

As indicated in the licensee's response the requirement for an SI signal to be present for the automatic transfer has been reviewed, and the results of this review indicate that it is acceptable and desirable to remove this dependency. This is because SI reset and reestablishment of necessary systems could be accomplished quicker without defeating the SI switchover requirement. We conclude that the licensee has adequately responded to this requirement.

ITEM 10

Within six months, review plant procedures to provide any additional guidance required for operator actions to be taken in response to real or suspected reactor vessel upper head voiding.

LICENSEE'S RESPONSE

Additional guidance beyond that present in the Ginna procedures on January 25 regarding real or suspected reactor vessel upper head voiding has been found necessary in two areas, safety injection termination and reactor coolant pump restart. Additional guidance has been added to the S/G Tube Rupture and Loss of Secondary Coolant procedures to permit SI termination with a upper RV head void as long as natural circulation and other SI termination criteria are met.

Guidance has also been added to the "E" series procedures (major accident procedural) concerning upper RV head void collapse during RCP start. The procedures permit RCP start with an upper head void as long as adequate pressurizer level and RCS subcooling are present.

STAFF EVALUATION

During the Ginna SGTR event, void formation apparently occurred first during the initial depressurization following reactor trip, and again after the PORV stuck open. The latter was the more severe case. However there never was any indication that the water in the core did not stay subcooled. The licensee agreed to perform detailed thermal-hydraulic analyses for the SGTR event. These analyses included Westinghouse LOFTRAN calculations and auxiliary calculations employing standard mass and energy balance techniques to address the limitations of the LOFTRAN results. The analyses are evaluated in Enclosure 1 of Reference (3). The staff concluded that, in spite of some limitations in the LOFTRAN program, the analyses supported the verification of the system phenomena including void formation, as required in Reference (2), and that the information provided by the licensee was therefore acceptable.

The licensee's evaluation of RCP restart requirements following an SGTR event is presented in Attachment D of reference (7). This evaluation assesses the potential for coolant flashing and loss of pressurizer pressure control during pump startup. Depressurization of the RCS following an SGTR may generate a steam bubble in the reactor vessel upper head region if the RCP's are not operating. This bubble could rapidly condense on RCP restart, drawing liquid from the pressurizer and reducing RCS subcooling. This could result in loss of level indication and pressurizer heater unavailability.

thus losing the ability for pressure control and direct indication of coolant inventory. In addition, local flashing in the RCS could result in erratic system response. These conditions would make plant control more difficult and may confuse the operator.

The licensee has performed calculations to determine RCS pressure response to the collapse of an upper head void. Based on these, minimum indicated levels were calculated that would assure: (1) no heater uncovery; (2) no loss of level indication. Emergency operating procedures for Ginna establish a minimum level of 80 percent before restarting a RCP. This criterion assures that an indicated level will be maintained for initial RCS pressure greater than 620 psia. For large voids, pressurizer heaters may not remain available, but guidance is provided to restore level using the charging pumps, and if necessary, reinitiate safety injection.

Minimum reactor subcooling requirements, consistent with an initial pressurizer level of 80 percent, were calculated for different RCS pressures. For RCS pressures less than 1100 psia, the required subcooling is less than 49°F. These results include instrument uncertainties. SGTR emergency procedures require a minimum of 50°F subcooling. RCP restart is only permitted after the primary and secondary pressure are equalized. The maximum secondary pressure would be 1100 psia (approximate safety valve set point). Therefore the RCS would remain subcooled following RCP restart with the Ginna subcooling criteria.

The licensee has stated that the sequence of recovery actions follow the Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERG's) and should ensure early termination of the break flow (Reference 5). In Reference (6) the staff concluded that actions prescribed in the WOG ERG's for the SGTR accident are generally acceptable. Areas requiring improvement include SI termination criteria, guidelines for combination SGTR/LOCA, and clarification of the use of non-safety related equipment for accident mitigation. The SI termination criteria require that once the primary system and ruptured steam generator pressures are equalized, primary system pressure must again be increased by 200 psi by SI flow. This action would reestablish leak flow from the RCS. The NRC position is that the criteria of pressurizer level and RCS subcooling also prescribed in the ERG are adequate to protect the core without the additional requirement of RCS repressurization. These issues will be addressed in future ERG revisions.

We conclude that the licensee has adequately responded to this requirement, subject to adequate resolution by the WOG of the ERG areas requiring improvement and additional information, particularly with regard to SI termination criteria.

REFERENCES

1. NUREG-0909 "NRC Report on the January 25, 1982 SGTR at R. E. Ginna Nuclear Power Plant", April 1982.

2. NUREG-0916 "SER Related to the Restart of the R. E. Ginna Nuclear Power Plant", May 1982.

3. Memo from R. W. Houston to G. C. Lainas, "SER for R. E. Ginna Nuclear Power Plant", July 27, 1983.

4. Memo from D. L. Ziemann to F. J Miraglia "Evaluation of Rochester Gas & Electric Corporation Response to Long Term Items Contained in the Ginna Restart SER, SGTR Incident", August 23, 1983.

5. Telephone conversation with RG&E, July 15, 1983.

6. Memo from R. J. Mattson and H. L. Thompson to D. G. Eisenhut "SER for W Emergency Response Guidelines", May 19, 1983.

7. Letter from John E. Maier, Rochester Gas & Electric Co., to Dennis M. Crutchfield, NRC, "Response to Safety Evaluation Report NUREG-0916, SGTR Incident - R. E. Ginna Nuclear Power Plant" November 22, 1982.

SALP Input for TAC 49346

The purpose of this attachment is to document our evaluation of the licensee's performance during DSI's review of the subject operating reactor action. The following criteria from NRC Appendix 0516 are the only ones relevant to this evaluation:

1. Management Involvement in Assuring Quality

This action was handled by personnel at the appropriate level of management. The utility involved the necessary in-house technical staff, to help bring about a solution to the salient issues. The analytical effort was performed by Westinghouse.

Rating: Category 2

2. Approach to Resolution of Technical Issues

The licensee approached the resolution of the technical issues involved in responding to the long term requirements of reference (2) in a competent manner. Their resources were used properly, and the work was submitted on time. There was no need to obtain additional clarification from the staff after completion of reference (2).

Rating: Category 1

3. Response to NRC Initiatives

The licensee's was generally responsive to NRC Initiatives.

Rating: Category 2

4. Overall Rating: Category 2

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   This action was handled by personnel at the appropriate level of management. The utility involved the necessary in-house technical staff, to help bring about a solution to the salient issues. The analytical effort was performed by Westinghouse.

   Rating: Category 2

2. Approach to Resolution of Technical Issues

   The licensee approached the resolution of the technical issues involved in responding to the long term requirements of reference (2) in a competent manner. Their resources were used properly, and the work was submitted on time. There was no need to obtain additional clarification from the staff after completion of reference (2).

   Rating: Category 1

3. Response to NRC Initiatives

The licensee's was generally responsive to NRC Initiatives.

Rating: Category 2

4. Overall Rating: Category 2