U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Inspection Report 50-244/94-06 | **License: DPR-18**

Facility: R. E. Ginna Nuclear Power Plant
Rochester Gas and Electric Corporation (RG&E)

Inspection: March 1 - 28, 1994

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Approved by: W. J. Lazarus 4/25/94
W. J. Lazarus, Chief, Reactor Projects Section 3B — Date

INSPECTION SCOPE

This inspection report documents a safety inspection of refueling outage shutdown safety planning and refueling operations.

EXECUTIVE SUMMARY

Outage planning was based on a defense-in-depth safety philosophy which enhanced the safety posture of the unit throughout the outage. Planning ensured that key safety functions and contingencies were available throughout the outage.

The plant shutdown was well controlled and completed without incident; however, appropriate precautions were not planned for the main turbine overspeed trip testing. This concern was resolved. Some weaknesses were identified in the spent fuel pool cooling operability verifications and monitoring capabilities.

All fuel handling evolutions were conducted safely, without incident, by experienced professional personnel. Strong supervision and leadership were evident both on and off shift. Two minor areas for improvement were noted with respect to foreign material controls and the content of radiological controls briefings.

The licensee's procedures associated with refueling were very good. One error was found with the core reload pattern, which was corrected prior to the actual fuel reload. The licensee is taking steps to eliminate future errors in fuel unload and reload patterns.

Licensee personnel were familiar with recent industry fuel handling events, and had adequately reviewed the information for applicability to their own program. Based on performance during refueling operations, the licensee's training program was determined to be acceptable.

The licensee does not use a load cell for fuel movements in the spent fuel pit, a practice which is discouraged by the fuel vendor. This method of operation is being reevaluated.

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DETAILS

1.0 PURPOSE AND SCOPE

The purpose of this inspection was to assess the licensee's preparations for and conduct of refueling activities to determine if these activities were performed safely and in accordance with regulatory requirements. Areas reviewed and observed included: pre-outage shutdown safety planning; the plant shutdown; spent fuel pool cooling; preparations for refueling; and fuel off-load and reload activities. Inspections were conducted during daylight, backshifts, and deep backshifts.

2.0 PRE-OUTAGE SHUTDOWN SAFETY ASSESSMENT (71715)

The inspectors reviewed the Rochester Gas and Electric (RG&E) refueling outage schedule and assessed their shutdown safety posture. Overall, the inspectors found that the outage plan applied defense-in-depth principles to ensure that key safety functions and contingencies were available throughout the outage.

The outage plan implemented this defense-in-depth philosophy by providing a minimum of "N+2" levels of redundancy for the key safety functions of decay heat removal, reactor coolant system inventory control, power availability, reactivity control and containment closure. The inspectors found the outage plan to be developed with the intent of optimizing the availability of key safety function equipment. For example, the outage plan delays removing the first emergency diesel generator from service while the plant is in cold shutdown until cavity flood up is completed. Cavity flood provides an additional source of heat removal capability, and thus a greater margin to "time to boil" should a loss of power event occur. A complete core offload was also planned, and thus avoids early midloop operation while decay heat load is high. Midloop operations at the end of the outage may also be avoided, but are dependent on the magnitude of the steam generator tube repairs. The outage schedule already planned for this contingency and ensures that the appropriate key safety function redundancy is satisfied. Midloop operation at the end of the outage was subsequently required.

The plan to minimize shutdown risk is based upon following the outage plan as developed. Any schedule change which will reduce the key safety function availability to the minimum level of redundancy ("N+1") requires Plant Operation Review Committee (PORC) approval. A PORC subcommittee is also utilized by providing a continuous assessment of plant safety during the outage. The outage coordinators also perform a quantitative outage safety assessment by grading each of the key safety functions on a daily basis or following a major schedule change. The inspectors found this quantitative assessment to be improved with the use of a graphical description of the multiple borated water makeup paths for inventory control and boration flow paths for reactivity control. Overall, the defense-in-depth safety philosophy used by the licensee in the outage plan development enhanced the safety posture of the unit throughout the outage.

3.0 SPENT FUEL POOL COOLING (71715)

The inspectors reviewed the spent fuel pool (SFP) cooling system design bases, procedures, and operation to ensure that adequate decay heat removal redundancy exists during the full core offload. Overall, the inspectors found that outage scheduling ensured proper equipment redundancy; however, some weaknesses were identified in SFP cooling operability verifications and monitoring capabilities.

Three separate SFP cooling trains are installed for decay heat removal. The 'B' train is the primary SFP cooling loop and is designed to maintain pool water below the technical specification limit (150°F). The two backup cooling loops ('A' train and "standby" train) were each designed to remove about half of the decay heat load of the 'B' train. Due to the planned maintenance on the service water system, service water was isolated to the 'A' train SFP heat exchanger early in the outage. The inspectors reviewed the 1994 SFP heatload analysis and Engineering Work Request 5411 to verify the performance analysis of the "standby" fuel pool cooling system. The outage schedule was developed so that the 'A' train SFP cooling system would not be removed from service until day 14, when the total SFP heat load is within the capacity of the "standby" SFP cooling system. Thus, two 100 percent capacity trains remain available for decay heat removal. The inspectors considered this a good example of the licensee's application of defense-in-depth principles to the outage schedule development.

The inspectors observed that procedures used to couple and align the "standby" SFP cooling system pump and motor did not specify alignment acceptance criterion. Although the responsible mechanic, using "skill of the trade," achieved appropriate alignment, there were no formal assurances (*i.e.,* procedural specification) that the pump and motor would be properly aligned in the future. Additionally, the post installation operability test was limited in scope since it only verified system alignment, pump rotation, and lack of system leakage. The inspector discussed this with the responsible engineer, and subsequent bearing vibration analysis was determined to be acceptable.

Capabilities for monitoring SFP cooling were limited, particularly if the 'B' train is removed from service. All three SFP cooling pumps are controlled locally, and no flow indication exists for operators in the control room. Annunciator K-29 would alert operators to high spent fuel pool temperature (greater than 115°F), and annunciator K-21 would alert operators to a low flow condition for the 'B' train. No control room indication or annunciator exists to promptly alert operators of a low flow condition, low system pressure, or pump trip for the 'A' and "standby" trains. Auxiliary operator logs are taken on these trains only twice per shift. Thus, if the 'B' train is removed from service, the potential exists for not being able to detect a loss of fuel pool cooling for up to 4 hours, or until the SFP high temperature annunciator is received. The inspector discussed this with the licensee management, who will evaluate the need for increased system monitoring.

4.0 PLANT SHUTDOWN (71715)

The inspectors observed the plant shutdown to cold shutdown conditions per Operations Procedures 0-2.1 and 0-2.2. The inspectors noted frequent briefings to the control room staff by the shift supervisor on current plant status and the next planned activity. Shutdown precautions and limitations were properly communicated to and understood by the control board operators. Active involvement by the shift foreman was evident in controlling the evolution. Overall, the plant shutdown was well controlled and completed without incident; however, appropriate precautions were not initially planned for the main turbine overspeed trip testing.

During testing of the low-temperature overpressure protection (LTOP) system, power operated relief valve (PORV) PCV-430 failed to stroke open within the ASME stroke time limit of 3 seconds. PCV-431 stroked satisfactorily within about 0.5 seconds. Technical specifications require both PORVs to be operable for low-temperature overpressure protection when the reactor coolant system temperature is less than 330°F. Licensee Administrate Procedure A-52.4, "Control of Limiting Conditions for Operating Equipment," states that "entry into a mode or other specified condition shall not be made unless the appropriate limiting conditions for operation are satisfied." This requirement is part of standardized Technical Specification 3.0.4, but is not part of the Ginna Station technical specifications. The PORC reviewed this issue and decided to maintain the plant above 330°F while conducting troubleshooting vice continuing the cooldown and entering the LTOP technical specification action statement. The inspectors considered the application of the more conservative standardized technical specification to be a good practice. Troubleshooting identified that the nitrogen regulator as found pressure was 85 psig, while 105 psig is the desired pressure. The regulator was subsequently adjusted, and proper post-maintenance testing verified PORV operability. The cooldown was then continued and LTOP was placed in service.

The inspectors observed the main turbine overspeed trip testing per procedure T-18C. The mechanical overspeed device is designed to trip the turbine at 110 percent of rated speed (about 1980 rpm). Although the turbine tripped successfully at 1950 rpm, the test procedure and pre-evolution briefing did not, however, consider any contingencies if the overspeed trip device failed to actuate. The only backup to the mechanical overspeed would be a manual trip by the operator. No precaution existed which would direct operators to manually trip the turbine if a maximum rpm limit was exceeded. The inspector discussed this issue with the plant superintendent and it was decided to manually trip the turbine at 2000 rpm if the overspeed device failed to actuate. The inspectors were informed that the test procedure would also be updated with this precaution for future testing.

5.0 PRE-REFUELING ACTIVITIES (60710)

The inspectors reviewed: procedures for the conduct of refueling activities; operations procedures for establishing and maintaining plant conditions for refueling activities; and the "Cycle 24 Core Loading Plan" provided to the licensee by Westinghouse. Additionally, key refueling supervisors and the Outage Manager were interviewed to determine: their expectations concerning refueling personnel performance and oversight; their knowledge of and actions in response to recent industry events; if recent industry events had been conveyed to refueling personnel; their expectations concerning unanticipated occurrences during refueling; and the extent of training given to shift refueling personnel.

The inspectors found that the refueling and operations procedures were easy to follow, contained sufficient detail, were technically adequate, and had appropriate signature steps. One problem was found with the core reload sequence. A single core location was specified to receive two fuel assemblies. The licensee had previously identified this problem, but the core reload sequence was not revised. The licensee has determined why the error was not corrected, and will revise their review process to prevent future problems of this nature. Additionally, the licensee completely reevaluated the core off-load and re-load patterns. No other significant errors were found.

The personnel interviewed were familiar with recent industry events, and had evaluated the issues for applicability at the Ginna Nuclear Power Station. The primary action taken by licensee management was to communicate the events to appropriate refueling personnel. This was accomplished through a memo to refueling personnel, delineating management expectations for refueling, which referenced NRC Information Notice 94-13 "Unanticipated and Unintended Movement of Fuel Assemblies and Other Components due to Improper Operation of Refueling Equipment." The inspectors concluded that the licensee's response to recent industry events and the communication of management expectations to refueling personnel were adequate.

Master Lee was contracted to perform the majority of the refueling activities, under the supervision of RG&E personnel. RG&E primarily relies on the Master Lee training program to ensure that personnel have a satisfactory level of knowledge to conduct refueling operations. Based on the observations discussed in Section 6.0 of this report, this level of training was determined to be acceptable. However, the inspectors did note two instances in which refueling personnel were not completely familiar with licensee requirements for operating the fuel manipulator crane. This lack of familiarity did not affect the safe handling of the fuel. The licensee stated that the personnel knew the licensee's requirements, but that the procedure needed to reflect the Westinghouse specification F-5 requirements. The licensee plans to make these changes in their procedure for the next refueling outage.

6.0 FUEL OFF-LOAD AND RELOAD ACTIVITIES (60710, 71715)

The inspectors observed the following fuel off-load and reload activities: reactor vessel head removal, control rod drive mechanism unlatching, fuel movement from the reactor vessel to the spent fuel pool and back, core monitoring during the refueling, and the return of the upper internals to the reactor vessel. All of the evolutions were conducted safely, without incident by experienced, professional personnel.

The following licensee strengths were identified: (1) Fuel handling senior reactor operators (SROs) were involved in all of the refueling activities, not just fuel movement. This provided for good continuity and on-shift supervision throughout all activities. (2) The fuel handling senior reactor operators maintained good command and control of fuel movement activities. (3) The performance of the experienced refueling personnel and excellent refueling equipment reliability contributed to safe fuel movement. (4) The on-shift and off-shift refueling supervisors provided clear, conservative and experienced leadership throughout all phases of the fuel off-load. (5) There were no indications of outage schedule pressures adversely influencing refueling activities.

The following areas for improvement were identified: (1) Foreign material controls in the area of the refueling cavity were informal. The refueling procedures contained precautions concerning foreign materials, but the licensee did not maintain accountability for materials in the refueling cavity area, or always ensure that materials were properly restrained (*i.e.*, through lanyards, tape, etc.) during the defueling. Controls were later improved and no improperly restrained materials were observed during the refueling. Foreign materials which enter the refueling cavity are a concern because of the possibility of fuel damage. The licensee stated that they would evaluate the use of more formal foreign material controls. (2) The licensee implemented good radiological controls and contingency plans for unexpected radiological conditions during the reactor vessel head lift, but the contingency plans and implementation points were not fully communicated to the workers. The licensee agreed with the inspectors observation and will try to improve the scope of future pre-evolution briefs involving significant radiological controls.

The inspectors also noted that fuel movements in the spent fuel pit area were conducted without a load cell on the hoist. This is discouraged by the fuel vendor (Westinghouse). The primary concern with fuel movements that do not involve a load monitoring device is the possibility of inadvertent excessive force (and subsequent fuel damage) during removal of fuel assemblies from storage locations. The licensee evaluated the use of a load cell some time ago. The idea was rejected because the height of the spent fuel pit bridge was not sufficient (without modification) to permit movement of fuel assemblies in all areas of the pit with the added length of a load cell on the hoist chain. Since the licensee's last evaluation, the state of load cell technology (and size) has changed. The licensee stated that they would reevaluate the practicality of installing a load cell on the spent fuel pit hoist, and were also investigating the ability to adjust the hoist stall point to provide similar protection.

7.0 EXIT MEETING

License management was informed of the scope and purpose of this inspection at the entrance meeting on March 1, 1994. The findings of the inspection were discussed with licensee representatives during the course of the inspection and were presented to licensee management at an exit meeting on March 28, 1994. A concern with inadequate turbine overspeed trip testing precautions was identified and resolved. Overall, the inspectors concluded that the refueling activities inspected were well planned from a safety perspective and were performed safely and in accordance with regulatory requirements.

ATTACHMENT

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EXIT MEETING ATTENDEES

MARCH 28, 1994

Name	Position
Larry Rossbach	NRC Senior Resident Inspector
Dan Klemz	Ginna Refueling
Gary Burgess	Ginna Refueling
Terry White	Operations Manager
Ken Masker	Ginna Refueling
Richard Marchionda	Superintendent, Ginna Production
Michael Micklow	Ginna Refueling
Peter Bamford	Reactor Engineer
John Cook	Manager, Planning and Scheduling
Steven Adams	Superintendent, Support Services
William Stroup	Master Lee, Refueling Coordinator
Tom Daniels	Nuclear Safety and Licensing
Tom Moslak	Senior Resident Inspector, NRC
Joseph A. Widay	Plant Manager