Enclosure 1

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM RELIEF REQUESTS

ROCHESTER GAS AND ELECTRIC CORPORATION

R.E. GINNA NUCLEAR POWER PLANT

DOCKET NO. 50-244

1.0 INTRODUCTION

The Code of Federal Regulations, 10 CFR 50.55a(g), requires that inservice testing (IST) of certain ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable addenda, except where relief has been requested by the licensee and granted by the Commission pursuant to 50.55a(g)(6)(i), or where the alternative has been authorized pursuant to 50.55a(a)(3)(i) or (a)(3)(ii). In requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance with certain requirements of the applicable Code edition and addenda is impractical for its facility. Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to Code requirements which have been determined by the staff to be acceptable, provided the alternatives are implemented in accordance with the guidance delineated in the applicable positions.

These regulations authorize the Commission to grant relief from, or approve alternatives for ASME Code requirements upon making the necessary findings. The NRC staff's findings with respect to granting or not granting the relief requested or authorizing the proposed alternative as part of the licensee's IST Program are contained in this Safety Evaluation (SE).

In Rochester Gas and Electric Corporation's April 23, 1992 submittal, nineteen anomalies identified in NRC's April 15, 1991 SE were addressed. Table 1 (Enclosure 2) describes each anomaly and indicates the action taken by the licensee to resolve the concerns. Additional actions required of the licensee are also described in Table 1. In a letter dated September 23, 1992, relief requests PR-7 and VR-17 were withdrawn and a new relief request, PR-12, was submitted for the service water pump flow measurement instrumentation. Evaluations of the new and revised relief requests are provided below. The Ginna IST Program was developed in accordance with the 1986 Edition of ASME Section XI.

2.0 EVALUATION

The April 23, 1992 submittal contained two new relief requests to facilitate pump inservice testing. These were identified during upgrades to the inservice testing program based on test experience, plant modifications, and changes in program administration. Relief Request VR-13 has been revised to address the stroke time testing of certain valves in response to Anomaly 7. New relief request PR-12 was submitted in the September 23, 1992 letter and evaluated below.

2.1 RELIEF REQUEST (PR-10)

The licensee has requested relief from the test quantities for measuring inlet and differential pressure listed in Section XI, Table IWP-3100-1 for the diesel fuel oil transfer pumps and has proposed to measure pump discharge pressure in lieu of inlet pressure per OM-1987, Part 6, Table 2.

2.1.1 Licensee's Basis for Relief Request

The licensee states: "The D/G fuel oil transfer pumps are positive displacement type pumps. The measurement of pump inlet (suction) pressure provides no useful data for evaluation of pump performance or for detecting pump degradation."

2.1.2 Alternative Testing

The licensee proposes: "Pump discharge pressure shall be measured in lieu of inlet pressure per OM-1987, Part 6, Table 2."

2.1.3 Evaluation

The Code, Section XI, requires that the test quantities shown in Table IWP-3100-1 be measured, or observed, and recorded. With the implementation of Operations and Maintenance Standard (OM) Part 6, it was recognized that measuring the pump discharge pressure in lieu of differential pressure provides useful data for evaluation of pump performance and for detecting pump degradation for positive displacement pumps. Additionally, OM-6 no longer requires measurement of pump inlet pressure for inservice testing. The fuel oil transfer pumps are positive displacement pumps.

(NOTE: Though the relief request is written as if the licensee intends to continue to measure differential pressure, the cover letter for the relief request indicated that they did intend to measure discharge pressure in lieu of differential pressure. The relief request should be revised to accurately reflect the licensee's intention.).

The use of OM-6 as alternative for pump inservice testing has been approved by NRC in rulemaking effective September 8, 1992. Therefore, measurement of

discharge pressure rather than inlet and differential pressure in accordance with OM-6 is an acceptable alternative for the positive displacement diesel fuel oil transfer pumps.

2.1.4 Conclusion

The measurement of discharge pressure for the diesel fuel oil transfer pumps in lieu of inlet pressure and differential pressure provides an acceptable alternative for maintaining the level of quality and safety of the inservice testing program and is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

2.2 RELIEF REQUEST (PR-11)

The licensee requested relief from the test quantities shown in Section XI, Table IWP-3100-1 for vibration amplitude for all safety-related pumps.

2.2.1 Licensee's Basis for Relief

The licensee states: "The monitoring of pump vibration by measuring displacement amplitude has been the convention in the past. However, advances made in vibration monitoring technology indicate peak velocity to be a more encompassing indication of pump degradation. Through use of state-of-the-art equipment, peak velocity has shown to be more predictive of pump failure and subsequently, more cost effective regarding preventive maintenance and spare parts inventory."

2.2.2 Alternative Testing

The licensee proposes: "Test measurement of vibration using peak velocity (in accordance with OMa-1988, Part 6, Table 2) vice displacement amplitude shall be phased into this program coinciding with the maintenance schedule of pump overhauls. In the interim, prior to the next pump overhaul, pump vibration shall be measured as displacement amplitude."

2.2.3 Evaluation

The use of vibration velocity measurement is recognized in the industry as a more effective indicator of mechanical degradation than displacement measurements for pumps with speeds greater than 600 rpm. Displacement measurements are useful primarily for detecting relatively high-amplitude vibration, which is characteristic of major mechanical problems, such as bearing failure or shaft warpage. Velocity measurements detect not only high-amplitude vibration, but also detect misalignment, imbalance, or minor bearing wear which makes velocity measurement a more versatile parameter for monitoring pump degradation.

ASME/ANSI OMa-1988, Part 6, requires vibration measurements to be taken in either displacement or velocity units and provides the corresponding limits for both test parameters. For centrifugal pumps, it also requires the

measurements to be taken in a plane approximately perpendicular to the rotating shaft in two orthogonal directions on each accessible pump bearing housing and in the axial direction on each accessible pump thrust bearing housing. The vibration measurement requirements of ASME/ANSI OM-6 provide an acceptable alternative to the Section XI Code requirements for assuring pump operational requirements and assessing pump degradation. Rulemaking effective September 8, 1992, approved the 1989 Edition of Section XI which references OMa-1988, Part 6, as the alternative rules for inservice pump testing. Therefore, if the licensee were to adopt the use of OM, Part 6, for pump vibration measurement it would provide an acceptable level of quality and safety. In the implementation of the vibration monitoring per OM-6, all the vibration-related requirements of OM-6 must be followed.

2.2.4 Conclusion

The proposed alternative testing provides an acceptable level of quality and safety and is based on requirements which have been endorsed for use by the NRC. Therefore, the alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

2.3 RELIEF REQUEST VR-13

Relief from the requirements to stroke-time power operated valves 4291, 4304, 4310, 9701A, and 9701B per IWV-3413 and evaluate the stroke-times per IWV-3417 is requested. These valves function in the auxiliary feedwater and standby auxiliary feedwater system to prevent pump cavitation, overheating, or deadheading upon low flow to the steam generators.

2.3.1 Licensee's Basis for Relief

The licensee states: "These valves operate based upon a pressure/flow signal only. Manual activation of these valves is not practical in the present configuration. Lifting of leads or jumpers, or installation of new instrumentation or controls would be necessary. Stroke timing during normal valve operation is affected by variations in parameters, therefore, measurement of stroke times for these valves could only be performed by simulating these parameters in a controlled manner."

2.3.2 Alternative Testing

The licensee proposes: "Measurement and evaluation of stroke times shall be performed yearly during scheduled I&C [instrumentation and controls] calibration testing. These valves will be exercised and fail-safe tested quarterly."

2.3.3 Evaluation

Interim relief was granted in the April 15, 1991, SE. The licensee was requested to determine a means of monitoring these valves for degradation, as it is impractical to measure stroke times in accordance with the Code. There is no means to manually signal these valves to open and measure the stroke time "from the initiation of the actuation signal to the end of the actuation cycle" as required by IWV-3413. However, during an annual calibration and testing of the control circuits, the stroke time of these valves can be measured under repeatable conditions, allowing a means to monitor for degradation. The extension of stroke time testing to annually is not inconsistent with OM-10 which allows that for valves which cannot be exercised during power operation or cold shutdown, exercising during refueling outages is acceptable. The NRC has approved the use of OM-10 as alternative rules for inservice testing of valves through the approval of the 1989 Edition of Section XI, rulemaking effective September 8, 1992. Therefore, the proposed alternative testing provides an acceptable level of quality and safety for monitoring these valves for degradation.

2.3.4 Conclusion

The alternative testing is authorized pursuant to 50.55a(a)(3)(i) for measuring stroke times of the applicable valves on an annual schedule during calibration of the control circuits which provide the signals to operate these valves.

2.4 RELIEF REQUEST PR-12

Previously, the service water pump testing for pumps PSWO-1A, -1B, -1C, and -1D, was conducted at a flow rate approximately one-half accident flow rate in order to utilize flow instrumentation installed to measure service water flow through containment recirculation fan coolers. In response to a recommendation made by NRC during the team inspection of the Ginna service water system, November/December 1991, a new test methodology is proposed in PR-12. This effectively eliminates the need for Relief Request PR-7, and it is withdrawn upon NRC approval of PR-12. The new test method is expected to be implemented in the tests scheduled for November 1992.

The new test method will also provide full flow exercising of the service water pump discharge check valves 4601, 4602, 4603, and 4604. This will eliminate the need for employing a disassembly and inspection program for these four valves discussed in Relief Request VR-17, and it is withdrawn upon NRC approval of PR-12. The change also permits reclassification of twelve manual butterfly valves which function as the inlet and outlet valves for the four containment recirculation fan coolers and the two reactor compartment coolers from "Category A - Active" to "Category A - Passive." The appropriate changes to the IST Program for these valves should be made. These changes do not effect existing or new relief requests.

2.4.1 Licensee's Basis for Relief

The licensee states: "The present system configuration and instrumentation does not provide permanently installed flow indication at the SW [service water] pump discharge piping to provide a positive means of determining full flow during pump tests. Employing a clamp-on ultrasonic flowmeter to measure full SW pump discharge flow is not currently addressed in ASME Section XI, Subsection IWP (Code).

The Code requires an instrument accuracy of 2% of full scale. The clamp-on ultrasonic flowmeter possesses an instrument accuracy of 3% of actual flow. Although the percentage error (3% of the actual flow as compared with 2% of full scale) is stated as a larger numerical value, the actual absolute value of instrument inaccuracy at the reference flow rate of 5,600 gpm (approximate SW pump design [flow rate]) is actually less for the clamp-on ultrasonic flowmeter. The accuracy of the reading from a 1 - 10,000 gpm analog gauge is 5,600 $\pm$ 200 gpm (2% of full scale). The accuracy of the reading from the clamp-on ultrasonic flowmeter is 5,600 $\pm$ 168 gpm (3% of actual flow). Thus, the actual maximum instrument error of the flow reading, as read on the clamp-on ultrasonic flowmeter, is less than the error as read on the analog gauge at the specified flow rate of 5,600 gpm.

The full-scale range (calibrated) of the clamp-on ultrasonic flowmeter is 40 ft./sec. This corresponds to a flow rate of approximately 17,000 gpm (for 14 inch pipe), which exceeds three times the reference value of 5,600 gpm.

Relief is requested since the clamp-on ultrasonic flowmeter yields a more accurate flow reading at the specified SW pump test flow rate of 5,600 gpm and since the range of the clamp-on ultrasonic flowmeter meets the requirement of ASME/ANSI OMa-1988, Part 6, Paragraph 4.6.1.2(b), i.e. reference flow rate < 70% of calibrated range.

This substantial improvement in test method provides for the measurement of a sufficiently accurate and repeatable value for SW pump flow rate. By employing this test method and obtaining the pump's corresponding differential pressure, the hydraulic performance of the SW pump can be more accurately assessed. Repeatability of flow rate measurement will be ensured through the permanent installation of clamp-on ultrasonic flowmeter instrumentation via the Ginna Station minor modification process."

2.4.2 Alternative Testing

The licensee proposes: "SW pump flow testing will utilize a permanently installed clamp-on ultrasonic flowmeter to allow rate measurement at a reference flow equivalent to the design point of the SW pumps."

2.4.3 Evaluation

ASME Section XI requires that flow instrument accuracy be within ± 2% of full scale and that the full-scale range of the instrument be three times the reference value or less (*see* IWP-4110 and IWP-4120). The instrumentation to be utilized for service water pump flow measurement at Ginna does not meet these requirements.

The capability to perform pump testing at a flow rate equivalent to design accident flow requirements is considered a better test than one performed at reduced flow conditions. The mechanical and hydraulic conditions during testing would be representative of those conditions that would exist in an accident situation. The proposed application of the permanently installed clamp-on ultrasonic flow measurement devices will provide accuracy of the test data which meets the allowed accuracy of the reading which would be provided by instrumentation meeting the accuracy and range requirements of the Code. The ultrasonic measurement device accuracy is based on a reading and is not dependent on the range. By installing the devices in a permanent configuration, the orientation and test point will be repeatable during each test, eliminating any errors due to placement of the devices from test to test.

Additionally, the proposed change in test methodology will provide for testing of the discharge check valves in accordance with the Code requirements and the guidance in GL 89-04, Position 1. Therefore, the proposed alternative testing method provides an acceptable level of quality and safety for the inservice testing of the service water pumps.

2.4.4 Conclusion

The alternative testing method is authorized for implementation pursuant to 10 CFR 50.55a(a)(3)(i) based on the alternative providing an acceptable level of quality and safety for flow measurement of SW pump flow during inservice testing.

3.0 CONCLUSION

The staff has determined that the alternatives proposed are authorized based on the licensee's demonstration that the testing as proposed provides an acceptable level of quality and safety. The Commission may authorize such alternatives pursuant to 10 CFR 50.55a(a)(3)(i).

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Safety Evaluation Table 1
Rochester Gas And Electric Corporation (RG&E)
R.E. Ginna Nuclear Power Plant
Inservice Testing (IST) Program Anomalies
Identified by NRC Safety Evaluation Dated April 15, 1991
Docket No. 50-244

Anomaly Number	Description from NRC SE Dated April 15, 1991	RG&E Actions as Described in April 23, 1992, IST Program Submittal	Remaining Actions
Anomaly 1 (PR-6)	The licensee requested relief from instrument full-scale range requirements of Section XI for the vibration instruments used for IST of safety-related pumps and proposed to use vibration detectors with multiple overlapping scales. Relief was granted provided the accuracy of the vibration instruments, on the scales used for vibration measurements, is equivalent to that provided by a single scale instrument that complies with the requirements of IWP-4110 and IWP-4120.	RG&E stated that the accuracy of the vibration instruments employing multiple overlapping scales used for IST of safety-related pumps is equivalent to that provided by a single scale instrument that complies with the requirements of IWP-4110 and IWP-4120.	The licensee has addressed the concerns of the anomaly. Further verification of the accuracy is subject to NRC inspection. No further action is required.
Anomaly 2 (PR-2)	The licensee requested relief from the flow rate measurement requirements of Section XI for the diesel generator fuel oil transfer pumps and proposed to determine pump flow rate by measuring the change in day tank level versus time. Relief was granted provided the licensee complies with the Allowable Ranges and Corrective Action requirements specified in IWP-3200.	RG&E stated that the IST of the diesel generator fuel oil transfer pumps involving the determination of pump flow rate by measuring the change in day tank level versus time complies with the Allowable Ranges and Corrective Action requirements specified in IWP-3200.	The licensee has addressed the concerns of the anomaly. Implementation is subject to NRC inspection. No further action is required.
Anomaly 3 (PR-7)	The licensee requested relief from the flow rate measurement requirements of Section XI for service water (SW) pumps and proposed to measure the flow rate in the containment fan cooler outlet lines. Relief was granted provided the licensee establishes repeatable test conditions which permit obtaining data that is meaningful for detecting pump degradation.	RG&E stated that measurements of the SW flow rate in the containment fan cooler lines have been established as repeatable test conditions providing valid data for detecting pump degradation. RG&E also stated that results are trended and evaluated for indication of degradation. NOTE: This relief request was withdrawn in RG&E's September 23, 1992, letter, with PR-12 approval.	The licensee has addressed the concerns of the anomaly; however, the relief request has been withdrawn. Reference PR-12. No further action is required.

Anomaly Number	Description from NRC SE Dated April 15, 1991	RG&E Actions as Described in April 23, 1992, IST Program Submittal	Remaining Actions
Anomaly 8 (VRs 5 & 17)	The licensee requested relief from the exercising requirements of check valves in the service water line to the standby auxiliary feedwater pump suction and the service water pump discharge check valves and to partially exercise quarterly and proposed to disassemble and manually full stroke exercise on a sampling basis during refueling outages. Relief was granted provided the licensee performs a partial flow test of each affected valve after valve disassembly and inspection is completed but before returning the valve to service.	RG&E stated that after disassembly and inspection of the check valves on a sampling basis a partial flow test of each affected valve is performed per test procedures before returning the valve to service (re. Generic Letter 89-04, Position 2). NOTE: Relief Request VR-17 has been withdrawn by RG&E's letter dated September 23, 1992, as these valves will now be full flow tested.	The licensee has addressed the concerns of the anomaly. Implementation is subject to NRC inspection. No further action is required.
Anomaly 9 (VR-23)	The licensee requested relief from the exercising requirements of Section XI for the check valve in the recirculation flow path of the turbine driven auxiliary feedwater pump and proposed to verify the full-stroke capability of that valve by disassembly and inspection during each refueling outage. Interim relief was granted from Section XI requirements until system modification to install flow rate instrumentation have been completed.	Relief Request (VR-23) has been withdrawn. Full-stroke open exercising will be performed due to modifications to add flow instrumentation.	No further action is required.

Anomaly Number	Description from NRC SE Dated April 15, 1991	RG&E Actions as Described in April 23, 1992, IST Program Submittal	Remaining Actions
Anomaly 11 (VR-7)	The licensee requested relief from the remote position indication verification requirements of Section XI for the pressurizer relief valves, and to verify valve remote position indication during reactor refueling outages by simulating valve actuation by moving the valve's coil. Relief was granted provided the valve position indication is verified to accurately reflect obturator position during the valve setpoint testing.	RG&E stated that this test methodology is verified to accurately reflect obturator position since position indication actuation is accomplished using a properly sized mechanical extension rod which simulates actual valve stem position. RG&E also stated that this testing is not performed simultaneously with setpoint verification; however, displacement attributed to the test rod and the resulting indication directly correlates to valve stem movement during valve operation.	It does not appear that the licensee has addressed all of the concerns of the anomaly. The intent of the anomaly was to ensure that the interface between the position indication and the valve is verified; that is, verification that the position of the valve stem/disc is actually represented by the position indication at the valve, is necessary. The verification of the remote indication by the correlation is acceptable to ensure operation of the signal to the remote indication. However, the licensee should determine a means to monitor the physical position of the valve stem or to monitor a system parameter and compare to the position indicated. The licensee may continue to perform position indication in accordance with the relief request provided a comparative method is developed prior to startup from the 1993 refueling outage.
Anomaly 12 (VRs 8 & 9)	The licensee requested relief from the exercising requirements of Section XI for the accumulator discharge check valves and combined accumulator/safety injection pump check valves, and to part-stroke exercise these quarterly and to verify their full-stroke capability by disassembling and inspecting each valve once every ten year cycle. Relief was granted provided the valves are disassembled and inspected so that the interval between examining each valve is not longer than once every 6 years as specified in Generic Letter 89-04, or verify that these valves move to their fully open position by use of non-intrusive diagnostic techniques while performing a reduced flow at least once every refueling outage.	RG&E stated that disassembly shall occur so that the interval between examining each valve is not longer than once every 6 years as discussed in Generic Letter 89-04, and the disassembled valves shall be part-stroke exercise after valve disassembly and inspection is completed, but before returning the valve to service. RG&E also stated that once a non-intrusive diagnostic methodology is incorporated by RG&E, it will be employed while performing a partial flow test each refueling outage.	The licensee has addressed the concerns of the anomaly. Further verification will be subject to NRC inspection. No further action is required. If a nonintrusive technique is employed and full-stroke is achieved with partial flow, this relief should be revised or deleted, as appropriate.

Anomaly Number	Description from NRC SE Dated April 15, 1991	RG&E Actions as Described in April 23, 1992, IST Program Submittal	Remaining Actions
Anomaly 14 (VR-18)	The licensee requested relief from the stroke time measurement requirements of Section XI for solenoid control valves that direct diesel fuel oil flow and to verify proper valve operability by observing their operation during quarterly diesel testing without measuring stroke time. Interim relief was granted for 12 months, to allow a period of time for the licensee to develop a means of monitoring for degradation.	RG&E stated that a reliable method of monitoring for degradation within solenoid-operated valves has not yet been proven. They further contend that the monthly emergency diesel generator testing verified the operability of these valves for day tank fill and recirculation, and that tank pressure and level is monitored to verify proper operation. Further, RG&E is actively pursuing non-intrusive diagnostic test methods.	The interim relief has expired and a revised relief was not included in the April 23, 1992, submittal. However, because the diesel generator testing is performed in a manner that demonstrates these valves operate and is performed monthly, the licensee may continue to use this method until the next refueling outage scheduled to begin in March 1993. While the monthly testing verifies that these valves operate, the testing provides no information relative to degrading conditions of the valves. If RG&E cannot determine an acceptable test to verify degradation, an enhanced preventive maintenance could be an acceptable alternative. Actions to develop a method to assess the condition of these valves must be developed and a revised relief request submitted prior to startup from the 1993 refueling outage. The licensee should reference NUREG/CP-0123, Proceedings of the Second NRC/ASME Symposium on Pumps and Valve Testing, "Use of Ultrasonic and Acoustics in Measurement of Solenoid Valve Stroke Time at Hope Creek Generating Station," for information on a test method for stroke-timing solenoid operated valves.

Anomaly Number	Description from NRC SE Dated April 15, 1991	RG&E Actions as Described in April 23, 1992, IST Program Submittal	Remaining Actions
Anomaly 18	The licensee stated in cold shutdown justification (CS-20) that valve 8419, an "Active" Category A/C, valve is normally closed during power operation and is not required to change position to perform its safety function. However, if this valve is ever opened during power operation, it would have to change position to perform its containment isolation safety function in the closed position and would be correctly classified as "Active". The licensee was instructed to exercise valve 8419 quarterly to demonstrate its operational readiness.	Cold shutdown justification CS-20 has been withdrawn and the associated components will be tested in accordance with the Code.	No further action required.
Anomaly 19	The licensee stated in cold shutdown justification (CS-29) that 9227, an "Active" Category A valve, and 9229, an "Active" Category A/C valve, are normally closed during power operation and are not required to change position to perform their safety functions. However, if these valves are ever opened during power operation, they would have to change position to perform their containment isolation safety functions in the closed position and would be correctly classified as "Active". The licensee was instructed to exercise valves 9227 and 9229 quarterly to demonstrate their operational readiness.	Cold shutdown justification CS-29 has been withdrawn and the associated components will be tested in accordance with the Code.	No further action is required.