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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF FROM ASME CODE HYDROSTATIC PRESSURE TESTING

ROCHESTER GAS AND ELECTRIC CORPORATION

R. E. GINNA NUCLEAR POWER PLANT

DOCKET NO. 50-244

## 1.0 INTRODUCTION

In letters of April 5, 1993 for Relief Request No. 23 and April 19, 1993 for Relief Request No. 24, which were modified by two letters of April 20, 1993, and May 7, 1993, Rochester Gas and Electric Corporation (the licensee) submitted the requests for relief from the provisions of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code of Section XI, 1986 Edition (Code), requirements for hydrostatic testing of replaced valves at R. E. Ginna Nuclear Power Plant (Ginna). During the current outage, seven valves were scheduled for replacement in the Class 3 service water system (SWS), and one valve was scheduled for replacement in the Class 3 turbine-driven auxiliary feedwater system (AFWS). After installation, the Code requires that the welds connecting the valves be subjected to a hydrostatic pressure test (HSPT). An examination of the pressure boundaries that would be used to isolate these welds revealed unusual difficulties in providing leak-tight isolation, resulting in Relief Request No. 23.

While performing a scheduled refurbishment program, four more SWS valves were replaced. The replacement of these valves was an unscheduled activity. An examination of the pressure boundaries that would be used to isolate these welds also revealed unusual difficulties in providing leak-tight isolation, resulting in Relief Request No. 24.

Because of the unusual difficulties that the licensee would encounter trying to perform the required HSPT, the licensee has proposed alternatives to the requirement. The licensee proposed that the welds receive additional non-destructive examinations (NDEs) and that a visual examination be performed in conjunction with an inservice or functional leakage test.

## 2.0 BACKGROUND

The replaced valves were repair welded to the SWS or AFWS piping. The ASME requirements imposed on the repair welds are:

> Hydrostatic Testing of Repairs, Replacements of Modifications or Class 3 systems is required by IWA-4400 which specifies that hydrostatic testing shall be performed to IWD-5223(a). The system hydrostatic test pressure shall be at least 1.10 times the system pressure ($P_{sv}$) for systems with design temperature of 200 °F or less, and at least 1.25 times the $P_{sv}$ for systems with design temperature above 200 °F. The $P_{sv}$ shall be the lowest pressure setting among the number of safety or relief valves provided for

overpressure protection within the boundary of the system to be tested. For systems (or portions of systems) not provided with safety or relief valves, the system design pressure $P_d$ shall be substituted for $P_{sv}$.

The licensee proposed the following alternative requirements:

(1) NDE shall be performed in accordance with the methods and acceptance criteria of Subsection ND of the 1986 Edition of Section III. Additional NDE also is performed by dye penetrant testing of the root pass weld.

(2) Prior to, or immediately upon return to service, a VT-2 visual examination shall be performed in conjunction with an inservice or functional leakage test, using the 1986 Edition of Section XI, in accordance with IWA-5000, at nominal operating pressure and temperature.

(3) Use of the relief request will be documented on Form NIS-2 for the replacement.

## 3.0 DESCRIPTION

The replaced valves in the SWS are butt welded to the piping system using Section III of the 1986 Edition of the ASME Code for the repair. The valves have a Code required test pressure of 165 psig, an operating pressure of 75 psig (nominal), and an operating temperature of 100 °F (nominal).

| VALVE | RELIEF REQUEST | NDE TECHNIQUE | NOMINAL PIPE SIZE (INCHES) |
|---|---|---|---|
| V-4663 | 24 | Dye Penetrant Test | 6 |
| V-4013 | 24 | Dye Penetrant Test | 4 |
| V-4027 | 24 | Dye Penetrant Test | 4 |
| V-4028 | 24 | Dye Penetrant Test | 4 |
| V-4626 | 23 | Dye Penetrant Test | 2-1/2 |
| V-4613 | 23 | Radiography Test | 10 |
| V-4611 | 23 | Dye Penetrant Test | 4 |
| V-4669 | 23 | Dye Penetrant Test | 4 |
| V-4738 | 23 | Dye Penetrant Test | 3 |
| V-4739 | 23 | Dye Penetrant Test | 3 |
| V-4760 | 23 | Dye Penetrant Test | 4 |

In addition to these NDE tests, the licensee performed dye penetrant tests on the root pass of the repair welds.

The replaced valve (V-4023, Relief Request 23) in the turbine-driven AFWS is socket welded to a 1-1/2 inch nominal pipe size (NPS), using the 1989 Edition of the American National Standard Institute (ANSI) Code B31.1 for the repair. The valve has a Code-required test pressure of 2304 psig, an operating pressure of 1100 psig (nominal), and an operating temperature of 150 °F (nominal). The repair welds on the valve were examined, using the dye penetrant testing technique.

The licensee states that the hydrostatic pressure tests of the repair welds securing the replaced valves are impractical for the following reasons:

V-4626: Both upstream and downstream isolation would require the use of butterfly-type isolation valves (butterfly valves are not leak-tight).

V-4611, V-4669, V-4738, V4739, V-4760: These five valves serve as loop cross-connects. In order to establish test boundaries, complete service water loops would be required to be isolated, thus creating an operational hardship resulting in a reduction in plant safety due to rendering certain critical operational and safety related equipment unavailable.

V-4663, V-4013, V-4027, V-4028: The isolation boundaries for the valves would require the use of butterfly valves (butterfly valves are not leak-tight).

V-4613: This is a butterfly valve that discharges into an open-ended pipe (butterfly valves are not leak-tight). IWD-5223(d) states that, for open-ended portions of discharge lines beyond the last shutoff valve in nonclosed systems confirmation of adequate flow during system operation shall be acceptable in lieu of system hydrostatic test.

V-4023: The isolation boundaries require the use of throttle valves (throttle valves are not leak-tight) and require the partial disassembly of the turbine-driven AFWS pump in order to blank out the pump's discharge line.

## 4.0 EVALUATION

The SWS has butterfly valves that are not designed to provide a leak-tight boundary, and the throttle valves wear unevenly thus preventing leak-tight seals. Encompassing these valves in a leak-tight boundary for a Code-required hydrostatic test would be unusually difficult. Also, the hydrostatic testing of the gate valves that cross-connect SWS loops would temporarily remove the loops from operation, creating unusual difficulties during the outage as a result of balancing critical operational and safety equipment needs with cooling water from the redundant SWS loop.

In lieu of the Code-required hydrostatic test to the SWS, the licensee proposed a one time use of an alternative test consisting of a system leak test with VT-2 visual examination, and the examination of the replacement welds with dye penetrant testing of the root pass and last pass of multi-pass welds. The proposed NDE for the replacement welds on valve V-4613 is radiography testing.

The SWS is a moderate energy system that operates at a nominal 75 psig, which is only 90 psig below the Code-required hydrostatic test pressure. This Code-required hydrostatic test would not offer any significant increase in the

ability to determine the structural integrity and leak-tightness of the repairs over the system leakage test. The structural integrity is ensured by the controls instituted in the replacement procedure and verified with NDE. In the event of a leak, an ample margin in cooling capacity is provided by system design that would maintain sufficient heat removal for normal operations. Since the system is in constant operation, its integrity is continually monitored. In addition, the redundancy in SWS gives adequate safety margins for emergency shutdowns if required.

The AFWS work activity entailed the replacement of check valve V-4023 into the recirculation test line. The maximum pressure that this system will be exposed to is the 1400 psig shutoff head pressure of the turbine pump. The AFWS is tested every 3 months at this pressure. To test the system according to the Code, the turbine pump would have to be isolated from the piping. The isolation boundaries for V-4023 encompass the turbine pump discharge, flow control valve (throttle valve), and discharge check valve. The flow control and check valves are not designed for isolating applications, and the pump would have to be disassembled to insert a test blank at its discharge. For these reasons, isolating V-4023 would create unusual difficulties.

In lieu of the Code-required hydrostatic test to the AFWS, the licensee proposed a one-time use of an alternative test consisting of a system leak test with VT-2 visual examination, and the replacement welds being examined with dye penetrant testing of the root pass and the last pass of the multi-pass welds. The socket welds in a 1-1/2 inch NPS are considered incomplete penetration welds that are easily accessible for surface examinations. The alternative tests would satisfy the requirements for applying Code Case N-416, "Alternative Rules for Hydrostatic Testing of Repair or Replacement of Class 2 Piping," on Class 2 systems. The AFWS is a Class 3 system. Applying Code Case N-416 as an alternative for hydrostatic testing to the AFWS is acceptable.

A thorough inspection of the replaced valves and repair welds in the SWS and AFWS each period, until the next 10-year inspection interval, at the full operating pressure, is adequate to detect any gross failures without degrading system safety or availability.

## 5.0 CONCLUSION

The staff concludes that the requirements of the ASME Code Section XI hydrostatic pressure test may be replaced by the proposed alternative tests and still maintain an acceptable level of quality and safety. The staff has concluded that system operating pressures, controlled procedures, and NDE testing assures the structural integrity of the SWS. The staff also concludes that applying Code Case N-416 for the Class 3 AFWS with the additional NDE assures the structural integrity of the system. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative tests may be authorized.

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