September 29, 2000

Mr. John H. Mueller
Chief Nuclear Officer
Niagara Mohawk Power Corporation
Nine Mile Point Nuclear Station
Operations Building, Second Floor
P. O. Box 63
Lycoming, NY 13093

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNIT NO. 1 - ALTERNATIVE REACTOR COOLANT RECIRCULATION PUMP SEALS (TAC NO. MA9965)

Dear Mr. Mueller:

By letter dated September 13, 2000, Niagara Mohawk Power Corporation (NMPC) submitted a proposed alternative testing request concerning the reactor coolant recirculation system pump seals. The proposed alternative would allow NMPC to replace the seals during the September 2000 non-refueling outage without having to perform the system pressure test for pump seal package replacements that include pressure retaining parts. The subject test is required by the 1989 Edition of the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI, Subsection IWA-5214(e), at not less than the nominal pressure associated with 100 percent rated reactor power, as required by IWB-5221(a). By letter dated September 20, 2000, NMPC submitted a revised alternative to the test requirements of ASME Code, Section XI, 1989 Edition, Subarticles IWA-5214(e), IWB-5221(a) and IWA-7530(a).

The proposed alternative is authorized for the current 10-year inspection interval pursuant to 10 CFR 50.55a(a)(3)(ii) on the basis that compliance with specified ASME Code requirements results in hardship without a compensating increase in the level of quality and safety. Details of the staff's findings are set forth in the enclosed safety evaluation. Please contact the project manager, Mr. Peter Tam, by telephone at (301) 415-1451 or by electronic mail (pst@nrc.gov) if you have any questions.

Sincerely,

/RA by Helen N. Pastis for/

Marsha Gamberoni, Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-220

Enclosure: Safety Evaluation

Nine Mile Point Nuclear Station
Unit No. 1

cc w/encl: See next page
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ALTERNATIVE TO THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

SECTION XI TESTING REQUIREMENTS

NINE MILE POINT, UNIT NO. 1

NIAGARA MOHAWK POWER CORPORATION

DOCKET NO. 50-220

1.0 INTRODUCTION

Preservice inspection of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (ASME Code) and applicable addenda, as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(a)(3) states that alternatives to the requirements of Paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) must meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that a preservice inspection of components be conducted after pressurization to nominal operating pressure. The Code of Record for Nine Mile Point Nuclear Station, Unit 1 (NMP1), is the 1989 Edition of the ASME Boiler and Pressure Vessel Code.

By letter dated September 13, 2000, Niagara Mohawk Power Corporation (the licensee, NMPC) submitted a proposed alternative testing request concerning the reactor coolant recirculation system pump seals. The proposed alternative would allow NMPC to replace the seals during the September 2000, non-refueling outage without having to perform the system pressure test for pump seal package replacements that include pressure retaining parts. The subject test is required by the 1989 Edition of the ASME Code, Section XI, Subsection IWA-5214(e), at not less than the nominal pressure associated with 100 percent rated reactor power, as required by IWB-5221(a). The staff held telephone conferences with the licensee on September 18 and 19, 2000. As a result of these discussions, on September 20, 2000, NMPC submitted a revised alternative to the test requirements of ASME Code, Section XI, 1989 Edition, Subarticles IWA-5214(e), IWB-5221(a) and IWA-7530(a).

ENCLOSURE

The staff's review of the licensee's proposed alternative follows:

2.0 DISCUSSION

2.1 Components

The components that will be affected by the proposed alternative are reactor recirculation pumps 32-187, 32-188, 32-189, 32-190, 32-191, all of which are Class 1 components.

2.2 Code Requirements

The ASME Code requirements for the applicable items are given in Subarticles IWA-5214(e), IWB-5221(a), and IWA-7530(a), of the 1989 Edition:

> IWA-5214(e) allows a system pressure test of IWA-5211(a), (b), or (c) in lieu of the system hydrostatic test after disassembly and reassembly of mechanical joints.
>
> IWA-7400(b)(2) exempts a pump seal package replacement from the requirements of IWA-7000, except that the requirements of IWA-7530 shall be met. IWA-7530(a) requires a preservice inspection in accordance with IWB-2200, including the joints that connect the pump to the system. IWB-2200, "Preservice Examination," refers to the pressure test of IWA-5214.
>
> IWB-5221(a) states that "the system leakage test shall be conducted at a test pressure not less than the nominal operating pressure associated with 100% rated operating power." At NMP1, the nominal operating pressure associated with 100% rated operating power is 1030 psi.

2.3 Licensee's Code Relief Request

The licensee has requested approval to use an alternative to IWB-5221(a).

2.4 Licensee's Basis for Requesting an Alternative (as stated)

The seal cartridge assembly for the reactor recirculation pump contains, among other components, a seal flange and seal flange cap screws. These components are identified as pressure retaining parts. Replacing the seal cartridge assembly is performed under an ASME Section XI Replacement Plan since pressure-retaining parts are involved.

The reactor recirculation pumps are Class 1 components and, as such, ASME Section XI Subarticle IWB-5221(a) requires that the system leakage test be conducted at a pressure not less than the nominal operating pressure associated with 100% rated reactor power.

The seal cartridge assembly is bench tested before installation on the pump. The seal flange and the seal flange cap screws are exposed to 1050 psig during the bench test. The seal cartridge, including the mechanical joint (seal flange to test assembly), is examined for leakage

during this test. The pump side of the mechanical joint is the only component lacking for this to be considered an equivalent VT-2 visual examination.

There are two methods that can be used to perform a system leakage test in accordance with Code requirements, each of these have negative implications:

(1) An isolated system leakage test can be performed. Performing an isolated system leakage test at 1030 psig after seal cartridge installation on the pump requires closing the recirculation loop blocking valves, installation of test equipment and use of an external pressure source. The radiation dose to test personnel during this activity is approximately 200 mRem. This test represents an unnecessary burden to just verify the integrity of the O-ring seal.

(2) Perform a normal system leakage test of the reactor coolant pressure boundary at 1030 psig. Performing this test is considered a special evolution, involving additional prerequisites, valve lineups and system configurations to be performed. During this test, the reactor vessel is taken to a water solid condition, a temporary relief valve is installed, the reactor head safety valves are gagged, mechanical and electrical jumpers are installed and a 50-minute “soak time” is required to ensure thermal equilibrium. The radiation dose will be in excess of 200 mRem to test personnel.

The licensee stated that performing a Code-required system leakage test following seal cartridge installation on the pump, in a non-refueling outage condition, to just test the integrity of the O-ring seal is impractical and burdensome without a commensurate increase in the level of quality and safety.

The licensee stated that establishing test conditions consistent with IWB-5221(a), when not performing a normal system leakage test, would require a drywell entry to perform a VT-2 examination with reactor power greater than 80 percent. This power level would result in radiological concerns as stated above. Additionally, the unit’s Technical Specifications require the drywell oxygen concentration to be less than 4 percent within 24 hours of placing the mode switch in RUN. Drywell inerting commences at approximately 20 percent reactor power. Therefore, drywell entry at 80 percent power would also be prohibited by environmental concerns.

2.5 Licensee’s Proposed Alternative

The licensee stated in its September 20, 2000, submittal:

> Applicable during a non-refueling outage condition or when the refueling outage Class 1 System Leakage Test is not required to be performed (i.e., in the case of seal replacement during a refueling outage but following system leakage test completion).
>
> In lieu of performing the system pressure test, for pump seal package replacements that include pressure retaining parts, required by ASME Section XI, IWA-5214 at the nominal pressure associated with 100% rated reactor power required by IWB-5221(a), a combination of visual examinations, VT-2, shall be performed.

Specifically, the bench test performed at 1050 psig shall be used to expose the seal flange and seal flange cap screws to the nominal pressure associated with 100% rated reactor power required by IWB-5221(a). At this time a visual examination, VT-2, shall be performed to verify pressure integrity for the seal flange portion of the mechanical joint.

Following seal cartridge installation on the pump, during the normal drywell closeout inspection, an additional VT-2 examination of the mechanical joint shall be performed at approximately 940 psi system pressure.

3.0 EVALUATION

The Code requires that, after the replacement of the Class 1 components, the system leakage test be conducted at a pressure not less than the nominal operating pressure (1030 psi) associated with 100 percent rated reactor power. However, as explained above, performing the inspection as required by the Code using either method during a non-refueling outage would be a considerable hardship.

The licensee's proposed alternative includes a bench test in which the seal cartridge and the flange connections would be pressurized to 1050 psi (20 psi higher than the Code requires). The bench test would demonstrate the structural integrity of the reassembled seal package and its flange connections. The licensee would also perform a VT-2 visual examination when the system pressure reaches approximately 940 psi, which is reasonably close to the nominal operating pressure required by the Code. This pressure corresponds to a low reactor power condition. A VT-2 examination test at 940 psi would be expected to achieve the purpose of the Code requirements, which is to detect leakage after the reassembly of the pump. If the reassembled pump were going to leak at nominal operating pressure, it would most likely leak at 940 psi, although at a lower rate.

Based on the above evaluation, the staff finds that performance of the alternative examination provides reasonable assurance of the leakage integrity of the pump seal.

4.0 CONCLUSION

The staff concludes that compliance with the Code-required system leakage test in a non-refueling outage would result in undue hardship without a compensating increase in the level of quality and safety. The proposed alternative would provide reasonable assurance of the leakage integrity of the pump seal. The staff has determined that granting this request is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Accordingly, the licensee's request to use the alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the current 10-year interval.

Principal Contributor: Z. B. Fu

Date: September 29, 2000