UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO PROPOSED CHANGES TO THE TECHNICAL SPECIFICATIONS AND RELATED TO PROPOSED EXEMPTIONS TO 10 CFR 50, APPENDIX J

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR POWER STATION, UNIT NO. 1

DOCKET NO. 50-220

INTRODUCTION

By letter dated August 7, 1975 (Ref. 1) the NRC staff requested Niagara Mohawk Power Corporation (the licensee) to review the containment leakage testing program for Nine Mile Point Nuclear Station, Unit 1 (NMP-1), and the associated Technical Specifications, for compliance with the requirements of Appendix J to 10 CFR Part 50. Appendix J was published on February 14, 1973, subsequent to licensing of NMP-1. The licensee responded to the staff's request by providing submittals (Refs. 2, 3, 4, 5) describing the extent to which the NMP-1 containment leak test program complies with Appendix J requirements.

By letters dated November 1, 1983 (Ref. 6) and August 27, 1984 (Ref. 7), the licensee submitted an application for an amendment to the NMP-1 Operating License which included proposed changes to the Technical Specifications and Appendix J exemption requests. These proposed changes are the result of the licensee's review for compliance with Appendix J test requirements. By letter dated November 13, 1985 (Ref. 8), the licensee provided input requested by the staff, and updated the Technical Specifications that had been provided in References 6 and 7. Following is the staff's evaluation of the licensee's proposed Technical Specification changes and exemption requests.

Although our evaluation has found some of the proposed Technical Specification changes acceptable, they are not being implemented at this time because they must be revised. Revisions are necessary to reflect changes to the pages which may have occurred since the proposed changes were submitted and to reflect the fact that not all of the proposed changes have been approved.

EVALUATION/CONCLUSIONS

Attachment C of Reference 7 identified several Technical Specification changes and exemption requests to the testing requirements of 10 CFR 50 Appendix J. The licensee's proposed Technical Specification changes and exemption requests are itemized below, followed by the staff's evaluation of the requests.

1. The licensee requested to exempt the following containment isolation valves from the leak testing requirements of Appendix J. These valves are included in Technical Specification 3.2.7, "Reactor Coolant System Isolation Valves", and Table 3.3.4, "Primary Containment Isolation Valves, Lines Entering Free Space of the Containment".

ISOLATION VALVES	TEST EXEMPTION REQUESTED
Main Steam	Type A Testing
Main Steam Warm-up	Type A Testing
Emergency Cooling Steam Line Drain to Main Steam	Type A Testing
Emergency Cooling High Point Vent to Main Steam	Type A Testing
Feedwater	Type A Testing
Emergency Cooling	
Steam Leaving Reactor	Type A Testing
Condenser Return to Reactor	Type A & C Testing
High Point Vent Common Line	Type A Testing
Reactor Cleanup	Type A Testing
Shutdown Cooling	Type A & C Testing
Liquid Poison	Type A & C Testing
Control Rod Drive Hydraulic	Type A & C Testing
Core Spray High Point Vent	Type A Testing
Core Spray Keep Fill	Type A Testing
Scram Discharge Volume System Vent	Type A Testing
Scram Discharge Volume System Drain	Type A Testing
Post-Accident Reactor Sampling Supply Line	Type A Testing
Reactor Recirculation System Sampling	Type A Testing
Drywell Equipment Drain Line	Type A Testing
Drywell Floor Drain Line	Type A Testing
Reactor Cleanup System Relief Valve Discharge	Type A & C Testing
Line Vacuum Relief	Type A Testing
Core Spray	
Pump Discharge	Type A & C Testing
Raw Water Inter-tie to Core Spray	Type A Testing
H_2-O_2 #12 Sampling	Type A Testing
N_2 Purge-TIP Indexes	Type A Testing
Containment Spray	
Radwaste Discharge	Type A Testing
Raw Water Inter-tie to Containment Spray	Type A Testing

The staff concludes that no exemption is necessary for those isolation valves identified above for which only a Type A test exemption is requested, since the licensee has committed to perform Type C tests on these valves with air and to add the as-found leakage so determined into the Type A results. This will result in a test equivalent to having these valves vented to the containment atmosphere. The staff agrees that these valves need not be vented for the Type A test.

a. Emergency Cooling System-Condenser Return to Reactor

The Emergency Cooling System consists of two redundant subsystems. Each subsystem consists of a steam line from the reactor through two normally open containment isolation valves to two emergency condensers (in parallel operation). The condensate from the condenser is returned to the suction line of the reactor recirculation pumps through two containment isolation valves. One of the return line valves in each subsystem is a DC-powered, air-operated, fail open valve. The two valves are numbered 39-05 and 39-06, and are located outside of containment. These outboard valves are normally closed and are opened automatically on high reactor pressure (after a time delay) or on low-low reactor water level. The inboard containment isolation valves are check valves and are numbered 39-03 and 39-04.

This system is normally pressurized to the reactor pressure, via the open steam admission lines, and normally operates only during an accident or upset conditions.

The licensee has requested that the isolation valves in the condensate return lines to the reactor be exempted from the 10 CFR Part 50, Appendix J, Type A and Type C tests on the basis that the Emergency Cooling System is a closed-loop system that constitutes an extension of the primary containment boundary. As an extension of the primary containment boundary, the four isolation valves in the condensate return lines are not containment isolation valves and, therefore, they should not be required to be tested.

Steam from the reactor flows through the tubes of the emergency condenser where it is condensed by cooling water on the shell side. The shell side of the condenser is vented to the atmosphere via a radiation monitor. The radiation monitor is to detect leakage of the reactor coolant from any tube bundle leakage and is alarmed in the control room. In the event of a Loss of Coolant Accident with a tube leak in the emergency condenser, it may be necessary to manually isolate the Emergency Condenser by closing the containment isolation valves on the steam line and the DC-powered, air-operated valve on the water return line. Under these conditions, the steam admission valves and the condenser return line valves (39-03, -04, -05, and -06) perform a containment isolation function by providing a barrier between the containment environment and the outside environment.

It is the staff's position, and past practice, to require leak testing of all valves that are relied upon to prevent the contents inside of containment from entering the environment outside of containment. This philosophy is consistent with the ANSI/ANS Standard 56.8-1981, "Containment System Leakage Testing Requirements." Since the return water line valves, when closed, provide a barrier between the containment environment and the outside environment, the staff concludes that

these valves (39-03, 39-04, 39-05, and 39-06) are containment isolation valves, consistent with the ANSI/ANS 56.8-1981 Standard, and, therefore, are subject to Type A and Type C testing requirements as defined in 10 CFR Part 50, Appendix J.

Based on the above, the staff concludes that the exemption requested is not acceptable. However, these valves need not be exposed to the containment atmosphere during the Type A test, with no Type A test exemption required, provided the as-found leakage determined by the Type C test is added back into the Type A test results.

b. Shutdown Cooling

The licensee has requested Type A and Type C exemptions for the Shutdown Cooling System isolation valves. The Shutdown Cooling System provides for the removal of reactor fission product decay heat during shutdown operations by circulating cooling water to and from the reactor through heat exchangers. The system is not an engineered safety feature and is not relied on to mitigate a postulated design basis accident. The Shutdown Cooling System contains two penetrations; penetration X-8 from the reactor (isolation valves 38-01 and 38-02) and penetration X-7 to the reactor (isolation valves 38-12 and 38-13). The staff concludes that the isolation valves for this system should be Type C tested, since this system is required to be isolated following a postulated accident. In the event that Type C testing cannot be performed in the accident direction of flow without installation of a blocking valve between the inboard isolation valve in each penetration and the reactor, the staff will accept a test procedure which requires tests between the two isolation valves in each pentration and allocates all the leakage to the two isolation valves together without breaking it down by valve. Furthermore, these valves need not be vented during the Type A test. However, the staff requires that a leakage rate for each penetration, equal to one-half the total as-found leakage measured for the penetration, be added to the Type A test results for comparison to the leakage limit, 1.0 La.

c. Control Rod Drive Hydraulic

The licensee has requested an exemption from the Type A and Type C test requirements for check valves 301-112 and 301-113 in penetration X-174. This penetration provides high pressure makeup to the reactor vessel and also provides core cooling in case of a small line break. Two redundant pumps supply makeup water to the reactor at 50 gpm each. Each pump is served by a separate emergency diesel generator which provides electricity in the event of loss of off-site power. The control rod drive (CDR) system at penetration X-174 is a safety grade design with post-accident function, and was designed to withstand

seismic loads. The staff finds that the design of the system provides a continuous water seal by virtue of the redundant pumps and back-up power sources (diesel generators). Consequently, penetration X-174 need not be Type C tested, since 10 CFR 50 Appendix J, Section III.C.3(b), allows exclusion from Type C testing for valves sealed with fluid from a seal system. Therefore, no exemption from Appendix J is required, no venting for Type A testing, and no Type C testing is required.

d. Reactor Cleanup System Relief Valve Discharge

The licensee has requested Type A and Type C exemptions for the reactor cleanup system relief valve discharge to torus. During normal plant operation the discharge point of this line is approximately 1.5 feet below torus water level. In its letter dated November 13, 1985 (Ref. 8), the licensee stated that the discharge line would remain underwater following a postulated accident. This determination considered the amount of water that would remain at the bottom of the drywell and the drawdown associated with core spray and containment spray operations. All equipment in the clean-up system is safety grade and designed to withstand seismic and dynamic loads. Consequently, the staff concludes that the relief valve discharge line will not be an atmosphere leak path and can therefore be excluded from Type A and Type C testing. No exemption is required.

e. Core Spray Pump Discharge

The licensee has requested Type A and Type C test exemptions for isolation valves on penetrations XS-334 and XS-335, the core spray pump discharge test lines. Two separate and independent core spray systems are provided to prevent overheating of the fuel following a postulated loss-of-coolant accident. Each system is designed with two trains for redundancy. Each train is equipped with two sets of pumps, consisting of a pump and a topping pump for higher discharge pressure. The power supply for each set of pumps is from diverse diesel generators to ensure their functioning in the event of loss of offsite power. For this reason the core spray system is capable of providing a continuous water seal in the containment isolation valves, considering a LOCA and a single active failure with the loss of offsite power. Since the core spray pump discharge line meets the requirements of Appendix J Section III.C.3(b), regarding a seal water system, leakage from these valves may be excluded when determining the Type C air leakages. Section III.C.3.(a) of Appendix J does require these valves to demonstrate a liquid leakage in accordance with acceptance criteria as specified in the Technical Specifications. Therefore, Type C testing with air is not required, but these valves should be tested with water with a test interval equal to the Type C

test and the leakage acceptance criteria should be specified in the Technical Specifications. The water testing results need not be added to Type B and Type C test totals. No exemption is required.

2. The licensee requested an exemption (Ref. 8) from certain requirements of Appendix J, Section III.D.2(b), for the containment airlock Type B tests. The licensee has proposed using a reduced pressure, 10 psig, in lieu of full pressure (Pa), 35 psig, for the six-month test of the airlocks required by Appendix J. The licensee's basis for this request is that, to conduct the full pressure test of the entire airlock, a holding device (strongbacks) must be installed in the inner door to prevent it from being unseated. The test pressure exerted on the inner door during the test is in a direction opposite to that of the accident pressure direction and the seal locking mechanism is not designed to withstand such pressure.

   Sections III.B.2 and III.D.2 of Appendix J require that containment airlocks be tested at Pa at six-month intervals and after each opening in the interim between six-month tests. This is because airlocks represent potentially large leakage paths and are more subject to human error than other containment penetrations. Improper seating of the airlock doors seals has been found to be the most frequent cause of airlock failure. Testing at Pa at six-month intervals or after each opening will identify seal leakage. Furthermore, experience indicates that full pressure testing of the entire airlock is preferable. However, testing at Pa after each opening becomes impractical when conditions require frequent opening over a short period of time. For this reason, the licensee may perform the three-day airlock door seal tests at reduced pressure, but the results of the tests must be conservatively extrapolated to equivalent Pa test results. Since the six-month test at Pa is essential to ensure the integrity of the entire airlock assembly, the licensee should test the airlock at six-month intervals at full pressure in accordance with 10 CFR 50, Appendix J. Consequently, the staff concludes that the requested exemption should not be granted.

3. Technical Specification Section 1.18

   The licensee has proposed to include definitions in the Technical Specifications pertaining to the Appendix J requirements. The staff has reviewed these definitions and finds them in agreement with Appendix J, with one exception: the upper confidence limit (UCL) included in the Technical Specifications is not described in 10 CFR 50, Appendix J. However, the staff agrees with the definition and finds proposed Section 1.18 acceptable.

4. Technical Specification Section 4.3.3.a(3)

The licensee proposes to complete Type A leak testing by isolating the leakage path if excessive leakage is identified. The identified leakage path will be subsequently repaired, locally tested, and the results added to the Type A test results. The proposed Technical Specifications deviate from the requirements of Section III.A.1(a) of Appendix J which states, in part, that "If during a Type A test, including the supplemental test specified in III.A.3(b), potentially excessive leakage paths are identified which will interfere with satisfactory completion of the test, or which result in the Type A test not meeting the acceptance criteria III.A.4(b) or III.A.5(b), the Type A test shall be terminated and the leakage through such paths shall be measured using local leakage testing methods."

Excessive leakage is leakage which would not only cause the Type A test to fail, but would also prohibit the actual completion of the test in the failed state. The licensee has stated that it plans to terminate the Type A test if the test pressure drops to less than 1 psi below the test pressure, P_t, or 22 psig (as per Section 3.2.2 of ANSI/ANS-56.8-1981 "Containment System Leakage Testing Requirements").

This does not constitute excessive leakage as described in Appendix J. Therefore, the staff finds this provision acceptable, provided the licensee commits to provide the values for both "as found" and "as left" (i.e., repaired) leakage data obtained from those areas of containment which resulted in the leakage exceeding the test acceptance criteria. Once the leak path is isolated, the test is considered as a failed test in accordance with the intent of Section III.A.1 of Appendix J.

5. Technical Specification Section 4.3.3.a(5)

The licensee has proposed to conduct Type A test in accordance with Bechtel Topical Report, BN-TOP-1, "Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power Plants." The staff has approved the use of BN-TOP-1. In addition, at the staff's request the licensee will calculate leakage rates based on both the "Total-Time" (BN-TOP-1) and the "Mass Point" (ANSI/ANS-56.8-1981) analysis methods. The staff finds these provisions acceptable.

6. Technical Specification Section 4.3.3b(3)

The licensee has proposed to permit the recalculated leakage rate to increase to 1.0 times L_t during the time period between Type A tests. Following the next Type A test, the measured leakage would have to be less than or equal to 0.75 times L_t. Section III.A.4.(b)(1) of Appendix J requires that the measured Type A leakage rate at the reduced pressure, L_{tm}, to be less than 0.75 times the maximum allowable rate, L_t. This requirement, that the measured leakage rate be less than $0.75 L_t$, is intended to be applied only to the Type A test acceptance criteria prior to a power run. Subsequent to the test, during normal operation, the

overall integrated leak rate is limited to 1.0 L_t. Consequently, the staff finds this proposed Technical Specification Section to be acceptable.

7. Attachment B of Reference 7 identifies Technical Specification changes proposed by the licensee. The evaluations above address all sections of Attachment B related to Appendix J, except for the containment spray system. Attachment B identifies a proposed change to Technical Specification page 148a. The change would delete the containment spray discharge and pump suction isolation valves from Table 3.3.4, which lists containment isolation valves from lines entering the free space of the containment. The licensee states that these valves are not considered primary containment isolation valves since the containment spray system was designed as an extension of the containment boundary. The staff disagrees with licensee's justification and concludes that the following lines should remain in Table 3.3.4:

   Drywell and Suppression Chamber Common Supply

   Drywell Branch Line

   Suppression Chamber Branch Line

   Pump Suction from Suppression Chamber

   The Pump Suction line need not be Type C leak tested because it is below the minimum drawdown water level of the suppression pool. However, water leakage criteria must be established in the Technical Specifications. The other three lines, which provide discharge to the spray headers on the drywell and torus, would usually require Type C leak testing. However, the design of the containment spray system at Nine Mile Point 1 incorporates a cross-over tie, between the two containment spray trains, for test purposes. In the worst case DBA condition, involving a LOCA concurrent with a pump failure in the operational train that is not powered by the failed diesel generator, the cross-over tie could be employed to maintain a water seal on all discharge isolation valves. The licensee has indicated that it is developing an accident procedure to accomplish the goal of maintaining the water seal on the valves in the event of loss of diesel generator. With those procedures in effect, the valves would not require Type C air leak testing. If not in effect, the valves require Type C testing unless an exemption is granted. The licensee should submit the procedure for staff review.

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REFERENCES

(1) NRC Generic Letter from Mr. Karl Goller, Acting Director for Operating Reactors, to Niagara Mohawk Power Corporation (NMPC), dated August 7, 1975.

(2) LaBoeuf, Lamb, Leiby, and MacRae letter to Mr. Ben Rusche, Director, Office of Nuclear Reactor Regulation, dated October 28, 1975, which forwarded NMPC "Application for Amendment to Operating License" of October 24, 1975.

(3) LaBoeuf, Lamb, Leiby, and MacRae letter to Secretary USNRC, dated October 31, 1975, which forwarded NMPC "Request for Exemption" of October 30, 1975.

(4) LaBoeuf, Lamb, Leiby, and MacRae letter to Mr. Ben Rusche, Director, Office of Nuclear Reactor Regulation, dated March 4, 1977, which forwarded NMPC "Application for Amendment to Operating License" of March 3, 1977.

(5) NMPC letter from Mr. D. P. Dise, Vice President, Engineering, to Mr. G. Lear, Chief, Operating Reactors Branch No. 3, dated May 31, 1978.

(6) Letter, C. V. Mangan, Niagara Mohawk Co., to H. R. Denton, NRC, Re: Application for Amendment to NMP-1 Operating License DPR-63, November 1, 1983.

(7) Letter, C. V. Mangan, Niagara Mohawk Power Co., to D. B. Vassallo, NRC, August 27, 1984.

(8) Letter, C. V. Mangan, Niagara Mohawk Power Co., to D. B. Vassallo, NRC, November 13, 1985.