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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 33 TO FACILITY OPERATING LICENSE NO. NPF-69

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION, UNIT 2

DOCKET NO. 50-410

1.0 INTRODUCTION

By letter dated February 19, 1991, as supplemented on March 8, 1991 and May 20, 1991, Niagara Mohawk Power Corporation (the licensee) submitted a request for changes to the Nine Mile Point Nuclear Station, Unit 2, Technical Specifications (TS). The requested changes would permit the licensee to temporarily increase the Technical Specification setpoints of the Main Steam Line Radiation Monitors (MSLRM) during the performance of a special test during which hydrogen would be injected into the reactor coolant. The May 20, 1991, letter responded to the NRC staff's Request for Additional Information dated April 5, 1991, regarding the storage of hydrogen, oxygen, and chlorine at Nine Mile Point 2. This response provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

2.0 EVALUATION

During normal water chemistry conditions, the reactor coolant contains 100 to 300 ppb dissolved oxygen. This concentration of oxygen increases the susceptibility of austenitic stainless steel to Intergranular Stress Corrosion Cracking (IGSCC) when other requisite factors such as stress and sensitization are present. One method of reducing the dissolved oxygen concentration in the coolant, and thereby reducing or eliminating the potential for IGSCC, is to inject gaseous hydrogen in the reactor coolant.

The injection of hydrogen reduces the oxygen concentration in the reactor coolant but results in an increased carryover of N^{16} in the primary steam. The increased presence of N^{16}, which has a half-life of 7.1 seconds and emits a very energetic gamma (6.1 Mev), results in a marked increase in radiation levels of the main steam line between the reactor vessel and the main turbines. The background radiation levels at the MSLRM can increase by a factor of five for peak hydrogen concentration.

Because Hydrogen Water Chemistry (HWC) testing will result in increased radiation levels in various areas of the plant from elevated N^{16} levels in the main steam line, the licensee has committed to implement the following protective measures to meet plant ALARA requirements:

- Conduct HWC testing during shifts when there are fewer personnel on site.
- Identify and restrict access to or shield locations where increased radiation levels are expected during the test period.
- Conduct radiation level surveys at various hydrogen flow rates.
- Maintain a log of area radiation monitor readings at specific increments of hydrogen addition.
- Conduct site surveys to measure increases in dose rates due to increased N^{16} gamma levels.

The licensee will closely monitor the radiation levels during the hydrogen step increases and will reduce the hydrogen addition rates to the previous step if the radiation increases are ever significantly higher than projected. In addition, the licensee will post, rope off, and provide a flashing light in any area where radiation levels will temporarily exceed 1000 mrem/hr during hydrogen addition. This is in accordance with TS requirement Section 6.12.2 for high radiation areas where no enclosure exists.

The NRC staff has reviewed the licensee's submittal regarding the radiological implications of the dose rate increases associated with N^{16} activity increases during hydrogen injections into the reactor coolant system. The review addresses the radiation protection/ALARA measures for the course of the planned test, in accordance with 10 CFR 20.1(c) and Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Station will be As Low As is Reasonably Achievable."

The NRC staff has also reviewed the licensee's proposed dose control measures and surveillance efforts planned for the hydrogen addition test. Tests of this type have been conducted at other operating BWRs, following NRC staff review of similar Technical Specification changes. These test conditions, as identified by the licensee, as well as the measures proposed for radiation protection/ALARA at Nine Mile Point 2, are consistent with those utilized at the other BWRs during their hydrogen addition tests. None of these tests involved any significant, unanticipated, radiological exposures or releases.

The conduct of the test and radiological surveys during the test will ensure ALARA in accordance with Regulatory Guide 8.8 and is, therefore, acceptable.

The MSLRMs initiate a reactor scram as well as Main Steam Isolation Valve (MSIV) closure upon detection of high radioactivity levels in the main steam lines. The closure of the MSIVs limits the release of fission products in the event of fuel failures. The proposed Technical Specification changes (Section 2.2 (Limiting Safety System Settings) Table 2.2.1-1, Section 3/4.3.2 (Isolation Actuation Instrumentation) Table 3.3.2-2, and the notes to

these tables) would allow adjustments to the normal background radiation level and associated trip setpoints for the MSLRMs at reactor power levels greater than 20 percent of rated power. The adjustments will be based on either calculations or measurements of actual radiation levels resulting from hydrogen injection and are required to preclude inadvertent or spurious reactor scrams and MSIV closures.

The licensee states that increasing the MSLRM setpoints will not affect any of the transient analyses of the Updated Safety Analysis Report (USAR), and that USAR transient analyses do not take credit for a MSLRM initiated trip. Only the radiological consequences of a Control Rod Drop Accident (CRDA) can be affected by the availability of the MSLRM to provide a MSIV automatic closure signal. Generic analysis of the consequences of a CRDA has shown that fuel failures are not expected from a CRDA occurring at greater than 10 percent power. This is primarily a result of analyses which show that as power increases, the severity of the CRDA decreases due to the effects of increased void formation and increased Doppler reactivity feedback. Since hydrogen injection during the test will be limited to above 20 percent of rated power and the MSLRM setpoint adjustments will not be altered below this power level, the NRC staff concludes that the currently approved CRDA analysis for NMP2 is bounded appropriately and remains valid. Therefore, the proposed Technical Specification changes are acceptable.

The licensee responded to a Request for Additional Information from the NRC staff dated April 5, 1991, regarding storage of hydrogen, oxygen, and chlorine during the test period. The licensee stated in its response that gaseous chlorine is not stored on site and that hydrogen and oxygen used during the testing would meet the BWR Owners Group Guidelines for Permanent BWR Hydrogen Water Chemistry Installations, 1987 Revision, with two exceptions. The two exceptions are: (a) The storage vessels and foundation will not be designed for design basis tornado and site-specific flood conditions. Both hydrogen and oxygen will be stored in temporary trailers during the test period. Hydrogen will be stored in an area already used for hydrogen storage within the site boundary. The oxygen will be stored at least 150 feet away from the hydrogen storage area. (b) The BWR Owners Group Guidelines require 130 feet of separation from the nearest structure assuming a cylinder failure. This exception is met except for the service water tunnel which is located below grade and is not expected to be affected by a potential fire ball in the unlikely event of a fire ball from the stored hydrogen.

The staff finds these two exceptions acceptable for the short duration needed to perform the hydrogen addition test.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New York State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (56 FR 15644). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors:
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Date: July 15, 1991

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular biweekly Federal Register notice.

Sincerely,

ORIGINAL SIGNED BY:

Donald S. Brinkman, Senior Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
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Enclosures:
1. Amendment No. 33 to NPF-69
2. Safety Evaluation

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