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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 133 TO FACILITY OPERATING LICENSE NO. DPR-63

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION UNIT NO. 1

DOCKET NO. 50-220

1.0 INTRODUCTION

By letter dated September 20, 1991, as supplemented March 12, 1992, and September 17, 1992, Niagara Mohawk Power Corporation (the licensee) submitted a request for changes to the Nine Mile Point Nuclear Station Unit No. 1, Technical Specifications (TS). The requested changes would revise TS 3.1.4/4.1.4 (Core Spray System), TS 3.3.2/4.3.2 (Pressure Suppression System Pressure and Suppression Chamber Water Temperature and Level), TS 3.3.7/4.3.7 (Containment Spray System), and associated Bases to authorize an increase in the maximum allowable water temperature limit of Lake Ontario (ultimate heat sink) from 77 °F to 81 °F. The licensee indicated that the original Final Safety Analysis Report (FSAR) assumed a peak lake temperature of 77 °F for the ultimate heat sink. A 5 year trend showed an increase in the Lake Ontario peak water temperature during the mid-summer months. As a result, the licensee has performed evaluations for affected safety systems to justify plant operability for lake water temperatures up to 81 °F and proposed changes to the subject TS.

The licensee proposed to: (1) revise the minimum downcomer submergence from 3.0 feet to 3.5 feet, (2) increase the maximum allowable torus water operating temperature from 77 °F to 85°F, and (3) decrease initiation of containment spray raw water from 30 minutes to 15 minutes into the event as a result of a new suppression pool heat-up analysis. A new lake water temperature limit is proposed to clarify operability requirements of the containment spray system. TS 3.3.2/4.3.2 is also proposed to be revised to change the maximum submergence level of the downcomers from 4.5 feet to 4.25 feet to conform to that used in the NMP-1 Mark I containment plant unique analysis.

The licensee also proposed a change to the Bases for TS 3.3.7/4.3.7. This revision is required by the change in operation of the containment spray system to provide a water seal for the containment spray system isolation valves. This change is administrative in nature.

The March 12, 1992, and September 17, 1992, letters provided revised TS pages that corrected typographical errors on the TS pages submitted in the

September 20, 1991, letter. These revised pages did not change the initial proposed no significant hazards consideration determination.

2.0 EVALUATION

The licensee indicated that it has performed an analysis supporting containment spray system operation at a design basis temperature of 82 °F which allows for a 1 °F margin to the proposed lake water limit of 81 °F. The design basis requirement for the containment spray system is to assure that the primary containment design pressure and temperature limits are not exceeded. In addition, the containment spray heat removal system must maintain the torus water temperature such that adequate Net Positive Suction Head (NPSH) is provided to the core spray and containment spray pumps. The NPSH is calculated assuming no increase in containment pressure from that present prior to the postulated loss-of-coolant accident (LOCA).

The licensee stated that the analysis was conducted under its Design Basis Reconstitution (DBR) program which analyzed the effects of higher lake temperature using the SHEX-04 computer code with input assumptions consistent with those used by General Electric (GE) to perform this type of licensing analysis. Benchmark cases to compare to the original FSAR methods and input assumptions were developed. These benchmark cases included a case which analyzed the original FSAR input assumptions coupled with new decay heat and metal water reaction assumptions. This case was used to evaluate the relative effects of changing containment spray system parameters (i.e., lake temperature) and torus initial conditions. The LOCA analysis was based on assuming the loss of offsite power, the single failure of one of the emergency diesel generators, and the dynamic effects of the postulated pipe break, which result in one core spray pump set available to provide core cooling. The DBR analysis evaluated the containment suppression chamber heatup assuming the containment spray system was operated in the drywell and wetwell spray mode or with Emergency Operating Procedures (EOP) in the spray and torus cooling modes. The results of the analysis show that the peak torus water temperature was between 158.9 °F and 163 °F, respectively. The DBR analysis profile shows that the temperature increases to 140 °F within 10 minutes because of the design basis accident reactor blowdown. From 10 minutes until the peak temperature is reached, torus heatup is governed by the heat removal capacity of the containment spray system versus that added from decay heat. For the torus bulk pool temperature of less than 165 °F, all the original FSAR design criteria were satisfied. These criteria included core spray NPSH requirements, primary containment temperature limits, torus attached piping stress, and piping supports. The operability requirements imposed upon the suppression chamber to compensate for the increased lake water temperature limit from 77 °F to 81 °F are: (1) maintain 3.5 feet minimum downcomer submergence and 85 °F maximum torus water operating temperature from original operability requirements of 3 feet minimum submergence and 77 °F maximum torus water temperature, and (2) initiate containment spray raw cooling water within 15 minutes of the initiation of the event. The licensee indicated that the

raw cooling water pumps which provide cooling to the torus can be started from the control room and that the 15 minutes is adequate time for operator action.

In response to an NRC staff question about what other operator actions are required within 10 to 15 minutes, the licensee indicated that in the design basis mode of operation, the containment spray flow path is from the torus through the containment spray pumps to the heat exchangers with discharge to the drywell and wetwell spray headers. In this mode of operation, initiation of the raw water pumps from the control room is the only action that will be required. In the EOP mode of operation, the containment spray pumps are secured after the drywell pressure is reduced to less than 3.5 psig and the containment spray system is then aligned to provide torus cooling through the containment spray test return line by operation of three or five valves depending upon the spray loop from the control room. These actions are all directed by the EOPs, are incorporated into the simulator training, and are easily completed in less than 5 minutes. Torus cooling is then initiated by starting the raw water pumps from the control room. The licensee indicated that no other manual actions are required before providing cooling to the suppression pool after a LOCA.

The NRC staff also asked a question regarding the effects of delayed initiation of suppression pool cooling from 15 minutes to 30 minutes. The licensee indicated that it expects the maximum suppression pool temperature to increase by 3.5 °F. The estimate is based on adding the energy removed in the 15 minute period to the total energy in the pool after 30 minutes in one step and solving for enthalpy and the corresponding temperature. For the design basis spray mode of operation, the maximum pool temperature is expected to increase from 159.5 °F to 162.4 °F at 0 psig containment pressure and remain bounded by the maximum analyzed temperature of 165 °F associated with the core spray NPSH requirement. In the EOP mode of operation, the maximum pool temperature is expected to increase from 163 °F to 166.5 °F. This slight increase in pool temperature will not affect the core spray NPSH requirements due to positive pressure of about 4 psig in the containment expected at the time of maximum pool temperature. It will also not affect any other containment temperature limits or torus attached piping.

Based on the above, the NRC staff considers that the licensee has demonstrated that 15 minutes is adequate time for operator action to initiate the suppression pool cooling from the control room and that even if initiation of cooling is delayed to 30 minutes, this delay will have no significant affect on the core spray NPSH requirements and other temperature limits and is therefore acceptable.

The licensee also stated that all safety-related components cooled by lake water system have been evaluated and were found to be able to perform their intended function under normal operating, shutdown, abnormal and accident

conditions with a lake water temperature of up to 81 °F and that the proposed change does not adversely affect the environmental qualification of any plant equipment.

The NRC staff has reviewed the licensee's submittal as discussed above and considers the proposed changes acceptable as the DBR analysis of suppression chamber heat-up post LOCA indicates that the maximum torus water temperature associated with the revised torus level and temperature limits is less than the current maximum torus water temperature using existing torus level limits and a maximum lake water temperature of 77 °F when calculated on an equivalent basis and as all other safety-related systems and components remain operable within their applicable design limits with 81 °F lake water temperature.

The licensee's proposed change to the Bases for TS 3.3.7/4.3.7 is required by the change in the operation of the containment spray system to provide a water seal for the containment spray system isolation valves to meet Appendix J requirements. Operation of the containment spray system with the primary and secondary loops interconnected through the test line requires that the two containment spray pumps function to provide flow to all of containment spray headers located in the primary and secondary loops. Previously, with the two loops separated, one pump in either loop provided flow to the spray headers in that loop to satisfy system design criteria. The staff considers that the above change to the Bases for TS 3.3.7/4.3.7 is administrative in nature. It is based on a safety evaluation report dated March 13, 1990; therefore, the NRC staff offers no objections.

The licensee also indicated that proposed TS changes to TS 3.3.2/4.3.2 and associated Bases to change maximum downcomer submergence to 4.25 feet from 4.50 feet submergence results from the Nine Mile Point Unit 1, Mark I containment plant unique analysis. This discrepancy was discovered as a result of performing the suppression pool heatup analysis. A review of operating data indicated that 4.25 feet submergence has not been exceeded during normal operation and additionally sufficient margins existed in the torus to allow for operation at 4.50 feet submergence. Based on the above discussion, the NRC staff finds the proposed change to correct the maximum downcomer submergence to 4.25 feet acceptable as it is more conservative and consistent with the Mark I plant unique analysis for Nine Mile Point Unit 1.

Based on the above evaluation, the NRC staff concludes that the proposed changes to TS 3.1.4/4.1.4, TS 3.3.2/4.3.2, TS 3.3.7/4.3.7, and associated Bases for minimum and maximum submergence levels, maximum torus and lake water temperatures, and initiation time for raw water system are acceptable.

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 55948). 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.

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Date: October 14, 1992