



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 46

TO FACILITY OPERATING LICENSE NO. DPR-21

NORTHEAST NUCLEAR ENERGY COMPANY

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 1

DOCKET NO. 50-245

1.0 INTRODUCTION

Pursuant to 10 CFR 50.90 and 50.91, Northeast Nuclear Energy Company (NNECO or licensee) proposed to amend Operating License No. DPR-21 for Millstone Nuclear Power Station, Unit 1. By letter dated September 11, 1990, NNECO proposed to change the containment spray interlock trip level setting in Technical Specification (TS) Table 3.2.2 from between 4.5 and 5.5 psig to between 9.0 and 10.0 psig. In that letter, NNECO requested that the proposed change to the TS be processed on an emergency basis and that a Temporary Waiver of Compliance be granted to allow the restart and operation of Millstone Unit 1 during the period that the TS amendment was being processed by the NRC. By letter dated September 12, 1990, the NRC granted the Temporary Waiver of Compliance that allowed the restart of Millstone Unit 1 provided that the new containment spray interlock trip level setting and associated procedure changes were implemented.

2.0 DISCUSSION

At 6:45 pm on September 7, 1990, NNECO made the determination that the low pressure coolant injection (LPCI) heat exchangers could not perform their intended function post-accident with two LPCI pumps per train operating at maximum flow. At that time, both trains of containment cooling (a mode of LPCI operation) were declared inoperable and TS action statement 3.5.B.6 was entered which required that the plant be in cold shutdown within 24 hours. Shutdown was achieved at 5:05 pm on September 8, 1990.

NNECO in their September 11, 1990, letter stated that during its biennial review of plant procedures, an inconsistency between procedural and design parameters associated with LPCI heat exchanger flow rates was identified. In particular, the maximum LPCI flow through the heat exchanger could be greater than the design allowable flow. NNECO contacted General Electric Corporation and the heat exchanger manufacturer to obtain supporting analysis and

documentation. Preliminary indications showed that for LPCI flow through the heat exchanger during operation of two LPCI pumps per subsystem, design flow rates through the heat exchanger may result in erosion and flow-induced vibration failure of the heat exchanger.

3.0 EVALUATION

LPCI provides high volume makeup to the reactor vessel and reduces primary containment temperature and pressure following a loss of coolant accident (LOCA). Each LPCI train contains, among other equipment, two 5000 gpm pumps, a 5000 gpm heat exchanger, and a heat exchanger bypass valve.

When LPCI is initiated, the heat exchanger bypass valve receives a signal to remain open for five minutes and the LPCI pumps provide a total flow of 10000 gpm in parallel through the bypass piping and heat exchanger (most of the flow is through the heat exchanger bypass piping, which offers significantly less flow resistance than the heat exchanger). In this mode, the injection mode, the heat exchanger does not approach its design flow limit. When the reactor core is at least 2/3 covered with water and the water level is remaining stable or is increasing, and the containment pressure is 5.0 psig nominal, the operator can switch the LPCI mode from injection to containment cooling.

In the containment cooling mode, the operator closes the heat exchanger bypass valve and throttles the flow rate to 6400 gpm (3200 gpm through each LPCI pump in that train). This flow is in excess of the design flow of the heat exchanger.

The licensee determined that a 5000 gpm flow rate from a single LPCI pump in the containment cooling mode will provide sufficient cooling. This flow rate is within the design basis of the LPCI heat exchanger. In order to assure sufficient net positive suction head (NPSH) for the increased flow demands for the LPCI pumps in this mode, the licensee has proposed changing the TS setpoint for the containment spray interlock trip level from between 4.5 and 5.5 psig to between 9.0 and 10.0 psig.

The licensee has revised the Emergency Operating Procedures (EOPs) and the normal operating procedures to ensure that no more than one LPCI pump per loop will be running when the LPCI heat exchanger bypass valve is closed. A procedure was also revised to ensure that the measured flow through the heat exchanger is limited to 5000 gpm. The EOPs were also revised to instruct the operator to verify that the drywell or torus sprays are terminated when the drywell pressure drops to 9 psig. The EOP changes reflect the proposed change to the TS containment spray interlock trip level setting.

The change to the TS and the plant procedures were discussed with the NRC staff prior to the issuance of the Temporary Waiver of Compliance. As a condition of the Temporary Waiver of Compliance, NNECO was to implement the new containment spray interlock trip level setting and the associated procedures. Prior to the restart of Millstone Unit 1, NNECO implemented the new trip level setting, revised the appropriate procedures to reflect the new trip level setting and the new requirement to trip a single LPCI pump if the

LPCI heat exchanger bypass valve is closed, tested the new trip level setting and procedures on the plant-specific simulator, and trained the plant operators on the TS change and the new procedures. These actions were verified by the NRC Resident Inspector at the Millstone Nuclear Power Station.

The NRC staff has evaluated the TS change proposed by the licensee and finds: (1) that the use of a single LPCI pump in the containment cooling mode provides adequate flow to fulfill the system requirements and assures adequate protection to the LPCI heat exchangers from erosion or flow induced vibration failure; (2) that the proposed TS containment spray interlock trip level setting will provide adequate NPSH to assure successful operation of a single LPCI pump in the containment cooling mode; and (3) that the changes provide an adequate level of safety.

The NRC staff, therefore, finds the proposed TS change acceptable.

4.0 EMERGENCY CIRCUMSTANCES

NNECO, in its September 11, 1990, letter, requested that, pursuant to 10 CFR 50.91(a)(5), the proposed TS change be approved on an emergency basis. NNECO stated that emergency approval is appropriate because "...an emergency situation exists, in that failure to act in a timely way would result ... in prevention of ... resumption of operation" the situation could not have been avoided and because the proposed amendment does not involve a significant hazards consideration. As stated in Section 2.0 of this safety evaluation, NNECO identified the safety concern and entered the TS action statement that required the plant be placed in the shutdown condition on September 7, 1990. The licensee identified appropriate corrective actions, which, among other things, required a change to the Millstone Unit 1 TS that if acted upon by the NRC under normal conditions would require that Millstone Unit 1 remain in the shutdown condition for at least 30 days.

NNECO was granted a Temporary Waiver of Compliance from the requirements of TS Table 3.2.2 to allow the licensee to return Millstone Unit 1 to power operations on September 11, 1990. NNECO has implemented the proposed TS and the associated procedure changes and trained the operators in the new procedures. In granting the Temporary Waiver of Compliance, the NRC staff recognized that emergency circumstances existed that warranted prompt approval in that failure to act would result in Millstone Unit 1 remaining unnecessarily shutdown, that the situation could not have been avoided, and that the amendment, as discussed in Section 5.0 of this safety evaluation, does not involve a significant hazards consideration.

5.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92 state that the Commission may make a final determination the license amendment involves no significant hazards consideration if operations of the facility, in accordance with the amendment, would not:

- (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or

- (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or
- (3) involve a significant reduction in a margin of safety.

The proposed amendment has been evaluated against the standards in 10 CFR 50.92. It does not involve a significant hazards consideration because the change would not:

1. Involve a significant increase in the probability or consequences of an accident previously analyzed.

There are two design basis accidents that are potentially impacted by changing the containment spray interlock setpoint: Steam Line Break Inside Containment and Loss of Coolant Accident (LOCA). These two accidents were analyzed for their effects on (A) environmental qualification of equipment, (B) containment spray mode of LPCI, (C) EOP spray initiation limit, and (D) low pressure ECCS post-accident NPSH requirements. Each of these effects are addressed separately below.

A. Equipment Qualification (EQ)

The maximum post-accident containment temperature is reached as a result of a steam line break inside containment. The composite EQ profiles were developed based on a break spectrum assuming that drywell sprays are not used.

The proposed change only has a potential effect on the long term containment cooling mode of LPCI. The maximum post-accident containment pressure is reached following a design basis large break LOCA. The peak value is not affected by the proposed change since the peak value is reached before containment sprays can be used and the accident analysis does not assume use of the sprays. EQ was based on the peak post-accident containment pressure.

Therefore, this proposed change has no impact on EQ.

B. Containment Spray Mode of LPCI

For both the steam line break inside containment and the LOCA, the proposed change affects the time periods during which the containment spray mode of LPCI can be used. This change does not affect the way the containment spray mode of LPCI runs when it is operating. There are no adverse consequences associated with the smaller window of use because the bounding long-term post-accident design basis accident LOCA containment response is not adversely affected and the maximum containment temperature was determined assuming no use of containment sprays.

C. EOP Spray Initiation Limit

This proposed TS amendment changes the conditions under which containment sprays can be used. The change in the containment spray initiation limit has no adverse impact because following a design basis LOCA or steam line break, containment pressure will go well above the initiation limit and the change in post-accident temperature is bounded by the previous analysis which assumed no use of containment sprays.

D. Low Pressure ECCS Post-Accident NPSH

By increasing the containment spray initiation limit, the available NPSH will be increased, which is a positive impact on possible consequences.

Therefore, the proposed TS change, which only involves a change in the initiation setpoint, will not lead to an increase in the probability or consequence of any transient or accident previously analyzed.

2. Create the possibility of a new or different kind of accident from any previously evaluated.

This proposed change does not impact plant response for any bounding accident since the bounding accidents do not assume the use of containment sprays for accident mitigation. No new failure modes were identified for this change. Therefore, changing the containment spray interlock setpoint does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Involve a significant reduction in margin of safety.

As discussed in the Basis statement for TS 3.5.B, the basis for the containment spray interlock is to "... prevent inadvertent pressure reduction below that required for NPSH." This proposed change to the TS is necessary to ensure that this basis is maintained and, therefore, there is no reduction in a margin of safety.

6.0 STATE CONSULTATION

In accordance with the Commission's regulations, representatives of the state of Connecticut were consulted and they had no comments.

7.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to the 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 made a final no significant hazards consideration determination with respect to this amendment. 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.

8.0 CONCLUSION

We have 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, and (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.

Dated: September 17, 1990

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