UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 124

TO FACILITY OPERATING LICENSE NO. NPF-49

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 3

DOCKET NO. 50-423

1.0 INTRODUCTION

By letter dated July 14, 1995, the Northeast Nuclear Energy Company (the licensee), submitted a request for changes to the Millstone Nuclear Power Station, Unit No. 3 Technical Specifications (TS). The requested changes would revise the frequency of those surveillance requirements for the emergency core cooling systems (ECCS) that now require that the surveillances be performed "at least once per 18 months" to specify that the surveillances be performed "at least once each refueling interval." The application was submitted in accordance with the guidance in NRC Generic Letter (GL) 91-04, "Changes in Technical Specification Surveillance Intervals to Accommodate a 24-Month Fuel Cycle" dated April 2, 1991.

2.0 EVALUATION

Millstone Unit 3 shutdown for the fifth refueling outage on April 14, 1995, and started up in Cycle 6 on June 7, 1995. During the outage, the core was reloaded with fuel designed for a nominal 24 months of operation. To permit operation with this longer fuel cycle, the licensee has submitted 7 applications, in addition to the subject application, to support the nominal 24-month fuel cycle surveillance extensions. This application pertains to the ECCS.

2.1 Design Bases

The ECCS is an integrated set of subsystems that perform emergency coolant injection and recirculation functions to maintain reactor core coolant inventory and adequate decay heat removal following possible major breaks in the reactor coolant or steam system piping, multiple steam generator tube ruptures or rupture of a control rod drive mechanism. The coolant injection function is performed during a relatively short-term period after a pipe break, followed by realignment to a recirculation mode of operation to maintain long-term core cooling. The ECCS consists of the centrifugal charging, the high pressure safety injection (HPSI) and the residual heat removal (RHR) pumps, the passive cold leg accumulators, the containment recirculation pumps, the containment recirculation coolers, the RHR heat

exchangers and the refueling water storage tank (RWST), along with the associated piping, valves, instrumentation and other related equipment.

The HPSI system provides high pressure coolant injection capability and consists of parallel redundant flow trains. Each flow train contains a pump, piping and associated valves. Four accumulators are provided on each ECCS cold leg injection point.

The RHR system performs the low pressure injection function and consists of parallel redundant flow trains. Each RHR flow train consists of a pump, a heat exchanger and associated piping and valves.

The RWST is the water source for both the high and low pressure injection systems during emergency coolant injection. Both systems inject coolant into all four reactor coolant system (RCS) cold legs. The HPSI system can also inject into all four hot legs, while the RHR system, operating in the low pressure safety injection mode, can inject into two hot legs.

After the injection phase is completed, emergency coolant recirculation is performed by the containment recirculation system pump drawing suction from the containment sump and discharging to the pump suctions of either the HPSI or charging pumps, or directly to the RCS cold legs. Heat is transferred from the containment recirculation system heat exchangers to the Reactor Plant Component Cooling Water System by the RHR heat exchangers.

2.2 Technical Specification Changes

3/4.5.2 ECCS Subsystems - T_{avg} Greater Than or Equal to 350°F.

2.2.1 Overpressure Protection of RHR System and Visual Inspection of Containment Sump

Surveillance Requirement 4.5.2.d currently requires that each ECCS subsystem shall be demonstrated OPERABLE:

d. At least once per 18 months by:

1) Verifying automatic interlock action of the RHR system from the Reactor Coolant System by ensuring that with a simulated or actual Reactor Coolant System pressure signal greater than or equal to 390 psia the interlocks prevent the valves from being opened.

2) A visual inspection of the containment sump and verifying that the subsystem suction inlets are not restricted by debris and that the sump components (trash racks, screens, etc.) show no evidence of structural distress or abnormal corrosion.

The licensee proposes to change the surveillance interval from once per 18 months to once each refueling interval.

2.2.2 Automatic Valve Positions, Automatic Start of the Charging, Safety Injection and RHR Pumps and Cut-Off from RWST

Surveillance Requirement 4.5.2.c. currently requires that each ECCS subsystem shall be demonstrated OPERABLE:

e. At least once per 18 months, during shutdown, by:

1) Verifying that each automatic valve in the flow path actuates to its correct position on a Safety Injection actuation test signal, and

2) Verifying that each of the following pumps start automatically upon receipt of a Safety Injection actuation test signal:

a) Centrifugal charging pump,

b) Safety Injection pump, and

c) RHR pump.

3) Verifying that the Residual Heat Removal pumps stop automatically upon receipt of a Low-Low RWST Level test signal.

The licensee proposes to change the surveillance interval from once per 18 months to once each refueling interval and to delete the words "during shutdown."

2.2.3 Correct Position of Throttle Valves

Surveillance Requirement 4.5.2.g. 2) currently requires that each ECCS subsystem shall be demonstrated OPERABLE by verifying the correct position of each electrical and/or mechanical position stop for the following ECCS throttle valves:

2) At least once per 18 months.

ECCS Throttle Valves

Valve Number	Valve Number
3SIH*V6	3SIH*V25
3SIH*V7	3SIH*V27
3SIH*V8	3SIH*V107
3SIH*V9	3SIH*V108
3SIH*V21	3SIH*V109
3SIH*V23	3SIH*V111

The licensee proposes to change the surveillance interval from once per 18 months to once each refueling interval.

2.2.4 Flow Balance Tests

Surveillance Requirement 4.5.2.h currently requires that each ECCS subsystem shall be demonstrated OPERABLE by performing a flow balance test, during shutdown, following completion of modifications to the ECCS subsystems that alter the subsystem flow characteristics and to perform specified verifications. The licensee proposes to delete the words "during shutdown."

2.3 Justification For Changes

In accordance with the guidance in GL 91-04, for each of the proposed changes in surveillance intervals, the licensee has reviewed the historical plant maintenance and surveillance results to support their conclusion that extending the surveillance intervals does not have a significant effect on operability of the ECCS or safety of plant operation.

Generic Letter 91-04 stated that licensees may omit the TS qualification that surveillances be performed "during shutdown." Because the terms "Hot" and "Cold" Shutdown are defined in the TS as operating modes or conditions, the restriction to perform certain surveillances during shutdown could be misinterpreted. The generic letter noted that if the performance of a refueling interval surveillance during plant operation would adversely affect safety, the licensee should postpone the surveillance until the plant is shutdown for refueling or in a condition or mode consistent with safe conduct of that surveillance. In the application, the licensee stated that they agreed with this position. Deletion of the term "during shutdown" is, therefore, acceptable.

2.3.1 Overpressure Protection of RHR System and Visual Inspection of Containment Sump

As noted above, the RHR is a relatively low pressure injection system. The RHR system isolation valves are normally closed and are only opened for residual heat removal after the reactor system pressure is reduced to approximately 390 psia. There are three motor-operated valves in series for each of the two RHR pump suction lines from the reactor coolant system hot legs. Two valves located close to the containment walls, one inside containment and one outside containment, are provided with interlocks. Each of the two valves is interlocked so that it cannot be opened unless the reactor system pressure is below approximately 390 psia. The interlocks for each train are independent and diverse. If a valve were to open or to remain open when primary system pressure was being increased, an alarm will sound alerting the operators to take action. The licensee's evaluation of past surveillances and preventative and corrective maintenance records indicated that the circuits remained within the acceptance criteria and that there was no indication of time dependent drift. The records provide reasonable assurance that extending the surveillance interval will not degrade the performance of the interlocks. The proposed change is, therefore, acceptable.

The four containment recirculation pumps take suction from a common containment sump which is enclosed by a protective screen assembly. Three stages of trash rejection are provided: grating, coarse mesh and a fine mesh. The assembly is divided at the centerline by fine mesh screening so that failure of either half does not adversely affect the other half. The containment recirculation pumps from each subsystem take suction from each half of the sump. If half of the screen assembly should become clogged, water is still available to all suction points via the screening separating the two sections of the sump. There is also a 1½ inch grating at elevation -24 feet, 6 inches, which covers the sump and acts as a vortex breaker to prevent air entrainment in the pumps.

The licensee's review of the past four inspections of the containment sump and subsystem suction inlets did not indicate any evidence of structural distress or abnormal corrosion of the containment subcomponents and did not indicate any significant debris that could restrict the subsystem suction inlets. In all cases, the inspection acceptance criteria were met. A review of corrective maintenance records show that no corrective maintenance has been necessary or performed. It is also noted that no preventive maintenance is required on an 18 month basis. Based on the above evaluation, the proposed change is considered acceptable.

2.3.2 Automatic Valve Positions, Automatic Start of the Charging, Safety Injection and RHR Pumps and Cut-Off from RWST

Surveillance Requirement 4.5.2.e.1 verifies the operability of each automatic valve in the ECCS flow path. Surveillance Requirement 4.5.2.e.2 verifies the operability of each charging pump, safety injection pump and RHR pump by verifying that each of the pumps start automatically upon receipt of a safety injection (SI) test signal.

Equipment performance over the last four operating cycles was evaluated by the licensee to determine the impact on extending the frequency of Surveillance Requirement 4.5.2.e.1 and 4.5.2.e.2. This evaluation included a review of the past surveillance results, preventive maintenance records, and the frequency and type of corrective maintenance.

The review indicated that the automatic valves in the 'A' and 'B' trains actuated as required in response to the SI test signal in each case. In all cases, the charging pump and the charging pump cooling pumps, SI pumps and SI pump cooling pumps, and RHR pumps started automatically in response to the SI test signal.

A review of the preventive maintenance records for all the above pumps revealed that no mechanical preventive maintenance is required on an 18 month basis. For the above pumps, an oil change is performed on an 18 month basis but the manufacturer does not require oil changes unless there is oil discoloration or foreign particles appear in the oil. The oil change could be performed with the plant on line if necessary. Hypot testing of the motors and cables has shown a very low failure rate.

Corrective maintenance work performed on these pumps during the last four operating cycles involved minor gasket leaks and oil level adjustments. In all cases, repairs were able to be performed with no adverse impact on plant operation.

In addition to the 18 month surveillance which verifies the pumps start on receipt of an SI test signal, the pump differential pressure and vibration are monitored by the inservice testing program (Specification 4.0.5) on a quarterly basis. Also, Surveillance Requirement 4.5.2.b.2 verifies that each valve (manual, power-operated, or automatic) in the flow path is in its correct position at least once per 31 days. These surveillances provide additional assurance that the ECCS subsystem components will be operable and will perform their integrated function. On the basis of the above evaluation, the proposed changes are acceptable.

The RWST low-low level setpoint stops the RHR pumps which is alarmed to alert the operator to realign the ECCS from injection to the recirculation mode following a design basis accident. Surveillance Requirement 4.5.2.e.3 verifies that the RHR pumps stop automatically upon receipt of a low-low RWST level test signal. A review of the past surveillance results indicate that these instruments were calibrated within the acceptance criteria and there was no indication of linear time dependent drift with regard to the circuit components.

The review of past preventive maintenance and corrective maintenance activities did not identify any significant activities that were required to correct component failures. On the basis of the above, there is reasonable assurance that extending the surveillance interval from 18 to 24 months will not degrade the capability of the equipment of performing the intended functions. The proposed changes to the TS are, therefore, acceptable.

2.3.3 Correct Position of Throttle Valves

Surveillance Requirement 4.5.2.g.2 verifies the operability of certain ECCS throttle valves by checking the correct position of each electrical and/or mechanical position stop. The licensee evaluated the performance of the throttle valves over the last four operating cycles including a review of past surveillance results, preventive maintenance records and the frequency and type of corrective maintenance. The review of surveillance results indicate that the valve positions were within acceptable tolerance for all surveillances performed, except in cases where the valves had maintenance performed. Valves were restored to their throttle position at the completion of maintenance activity.

Corrective maintenance performed on these valves was limited to packing adjustments and replacements. After each maintenance activity, the valve was restored to its required throttle position. A review of preventive maintenance records revealed that no preventive maintenances are performed on an 18 month basis.

Based on the above, extending the surveillance frequency from 18 to 24 months is very unlikely to affect the operability of these throttle valves. The proposed change to the TS is, therefore, acceptable.

2.4 Trisodium phosphate storage baskets

In the July 14, 1995 submittal, the licensee provided a discussion of Surveillance Requirement 4.5.5 which requires verification each REFUELING INTERVAL that there is a minimum total of 974 cubic feet of trisodium phosphate in the storage baskets. This page was revised by Amendment No. 115 on May 26, 1995, which was after the first of the licensee's submittals for TS changes to accommodate a 24 month refueling cycle. The staff's previous assessment took into account that "refueling interval" would likely be 24 months. There are no changes required to surveillance requirement 4.5.5 and no additional evaluation is necessary.

2.5 Probabilistic Risk Assessment

As discussed in the NRC staff's safety evaluation on the first submittal (May 1, 1995) related to a 24-month fuel cycle, the licensee's staff performed a probabilistic risk assessment (PRA) of the proposed TS changes to supplement the deterministic type assessment discussed above. The PRA review concluded that there was a negligible or minimal impact on postulated core damage frequency by the changes in surveillance intervals. The independent risk assessment fully supports and confirms the deterministic evaluation that the change in surveillance frequencies results in no significant reduction in the margin of safety and are acceptable.

3.0 STATE CONSULTATION

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

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. 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 (60 FR 58402). 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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