NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
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July 21 1986

Docket No. 50-245
B12123

Office of Nuclear Reactor Regulation
Attn: Mr. Christopher I. Grimes, Director
Integrated Safety Assessment Project Directorate
Division of PWR Licensing - B
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

References: (1) J. F. Opeka letter to E. J. Butcher and J. A. Zwolinski, dated October 11, 1985.

(2) F. J. Miraglia letter to J. F. Opeka, dated December 31, 1985.

(3) J. F. Opeka letter to C. I. Grimes, dated February 18, 1986.

(4) J. F. Opeka letter to C. I. Grimes, dated August 23, 1985.

(5) C. I. Grimes letter to R. M. Kacich, dated January 3, 1986, and attached Final Report, "Review of Risk Based Evaluation of Integrated Safety Assessment (iSAP) Issues for Millstone Unit No. 1."

(6) Generic Letter 85-03, "Clarification of Equivalent Control Capacity for Standby Liquid Control Systems," dated January 28, 1985.

(7) NEDE-31096-P, "Anticipated Transients Without Scram - Response to NRC ATWS Rule, 10 CFR 50.62", dated December 1985.

(8) NEDC-22166, "Power Suppression and Boron Remixing Mechanism for General Electric Boiling Water Reactor Emergency Procedure Guidelines", dated August 1983.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 1
ISAP Topic 1.18 - Anticipated Transients Without Scram

In Reference (1), Northeast Nuclear Energy Company (NNECO) provided information regarding plans for addressing Millstone Unit No. 1's compliance

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with the NRC's final rule on Anticipated Transients Without Scram (ATWS), 10 CFR 62. The only remaining open issue for Millstone Unit No. 1 is compliance with 10 CFR 50.62(c)(4) for equivalent control capacity for the Standby Liquid Control System (SLCS). NNECO proposed to address this requirement in the context of the Integrated Safety Assessment Program (ISAP).

In Reference (2), the NRC Staff stated that 10 CFR 50.62(d) requires that NNECO provide a schedule for compliance with 10 CFR 50.62(c)(4). The Staff stated that although the ATWS issue has been approved for inclusion in the scope of the ISAP review, that approval "does not carry with it an automatic exemption from regulatory requirements." The Staff therefore requested that NNECO provide:

1. A date by which ATWS modifications will be accomplished;

2. A request for an exemption from the schedular requirement of 10 CFR 50.62(d); or

3. A date by which NNECO will request a permanent exemption from the applicable ATWS requirements.

In Reference (3), NNECO responded to the Staff's request. NNECO stated that based on its ISAP evaluation, summarized in Reference (4), the proposed SLCS modifications would result in a small increase in public safety. The NRC Staff concurred with this evaluation in Reference (5). NNECO therefore proposed to request a permanent exemption from 10 CFR 50.62(c)(4) by May 30, 1986. The date was extended to mid-July via telephone conversations with the Staff.

In order to quantitatively justify an exemption from 10 CFR 50.62(c)(4), NNECO was preparing to undertake a plant-specific ATWS analysis for Millstone Unit No. 1. However, the high cost of a plant-specific ATWS analysis has forced us to reevaluate all of our options, including upgrading the SLCS system to a control capacity equivalent to an 86 gpm/13 weight percent sodium pentaborate system.

We do, however, continue to believe that the existing SLCS, in conjunction with the emergency operating procedures and other plant-specific features (Isolation Condenser, Feedwater Coolant Injection System), are adequate to ensure the public health and safety in the event of an ATWS. These procedures and plant features are briefly summarized below. In addition, it must also be noted that the ATWS event for which upgrading of SLCS will provide an improvement, is outside of the design basis and has a low probability of occurrence. Nonetheless, a SLCS upgrade would represent an improvement in safety and additional assurance that Millstone Unit No. 1 can adequately respond to an ATWS event.

The ATWS rule requires that each BWR have a SLCS with a minimum flow capacity and boron content equivalent in control capacity to 86 gallons per minute (gpm) of 13 weight percent sodium pentaborate solution. However, as stated by the NRC in Reference (6), this requirement is based on plants with a 251-inch vessel inside diameter. Normalized per the analysis described in Reference (7) for Millstone Unit No. 1, with a 224-inch diameter vessel, the rule requires a SLCS with a 68 gpm injection rate.

The original design basis of the Millstone Unit No. 1 SLCS was to achieve cold shutdown, with no control rods inserted, in less than 125 minutes -- assuming the main condenser is available. Enhancing the SLCS flow rate does not offer any noticeable advantage in mitigating ATWS scenarios with main condenser available. NNECO, however, has considered an ATWS with the main condenser isolated and core heat therefore discharged into the torus. The most severe, limiting transient in this category is a transient initiated by closing of the main steam isolation valves (MSIVs).

The reactor trip system at Millstone Unit No. 1 is a reliable system. To enhance this reliability in response to the ATWS rule, NNECO has already implemented alternate rod insertion modifications. In the Millstone Unit No. 1 Probabilistic Safety Study (PSS) and ISAP evaluation of this topic, NNECO conservatively (as recognized by the Staff in Reference (5)) assumed a probability of a reactor failure to trip on demand of 5.4×10^{-5}. A failure to trip, combined with closure of the MSIVs (making the main condenser unavailable), is therefore a very low probability event.

Even in this scenario, the Millstone Unit No. 1 design includes plant-specific features enhancing its ability to withstand torus heat-up due to the ATWS. Specifically, Millstone Unit No. 1 does not rely upon water from the torus for either short term decay heat removal or long term cooling. First, while injecting boron by the SLCS, the operator will rely upon the feedwater coolant injection (FWCI) system to maintain water level in the reactor pressure vessel (RPV). The FWCI pump takes suction from the hotwell, which is replenished from the condensate storage tank. There is no reliance for RPV inventory make-up from the torus via the low pressure coolant injection (LPCI) system. Second, long term cooling is available from the Isolation Condenser (IC). Unlike most other BWRs, the IC at Millstone Unit No. 1 allows removal of decay heat without reliance on LPCI pumps and water from the torus. Both FWCI and IC therefore avoid the impact on core cooling of the potential LPCI unavailability due to increased torus temperature.

In addition, the emergency procedures direct the operator to take the appropriate actions to mitigate the ATWS with the 43 gpm SLCS. To briefly recap, in an ATWS event initiated by MSIV closure, the transient progresses as follows. The MSIVs close and the control rods fail to insert. The recirculation pumps trip automatically on high pressure in the RPV. The core power decreases to 30-35%, but gradually returns to 50-55% as colder feedwater maintains the RPV level. Millstone Unit No. 1 Emergency Operating Procedure (EOP) 575 directs the operator to start the SLCS to inject boron before the torus temperature reaches 110°F. EOP 575 also requires the operator to lower RPV water level while still maintaining the water level above the top of active fuel to reduce the core flow rate and decrease core power. See Reference (8) for further details.

Meanwhile, with the MSIVs closed, the safety/relief valves cycle, discharging steam into the torus. The operator would have been required by procedure to initiate torus cooling when the torus temperature reached 90°F. However, because the heat input to the torus would be greater than the heat removal by the containment cooling system, the torus would slowly heat up. EOP 580 instructs the operator to maintain the heat capacity temperature limit. Therefore, the operator, if necessary, will depressurize the RPV to remain within

that limit. Subsequently, after the 270 pounds of boron have been injected, the procedures direct the operator to raise the water level to mix the boron. Finally, the operator will use IC to provide long term decay heat removal.

These existing operating procedures and the 43 gpm SLCS are sufficient to assure safe shutdown and to assure that torus temperature will not exceed the temperature where the containment integrity is threatened. Nevertheless, NNECO acknowledges the concern that if torus temperature reaches the heat capacity temperature limit, and RPV pressure must be decreased below the low pressure pump (LPCI or Core Spray) shutoff head and the operators fail to take the appropriate actions, the low pressure pumps would inject. Therefore, emergency procedures specifically caution the operator to prevent injection, and if necessary, to pull the fuses.

In summary, although NNECO believes Millstone Unit No. 1 can adequately respond to an ATWS event using existing equipment and procedures, an upgraded SLCS would serve to improve the margin of safety at the plant. In conjunction with the Integrated Safety Assessment Program, NNECO currently expects to complete its evaluation and provide by the end of August, 1986 either a scope and schedule for any necessary modifications to upgrade the SLCS or a permanent exemption request.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

J. F. Opeka

J. F. Opeka
Senior Vice President

C. Sears

By: C. F. Sears
Vice President