July 8, 1981

Docket No. 50-245
LS05-81-07-012

Mr. W. G. Counsil, Vice President
Nuclear Engineering and Operations
Northeast Nuclear Energy Company
Post Office Box 270
Hartford, Connecticut 06101

Dear Mr. Counsil:

SUBJECT: SEP TOPIC V-11.A, REQUIREMENTS FOR ISOLATION OF HIGH AND LOW PRESSURE SYSTEMS, SAFETY EVALUATION FOR MILLSTONE UNIT 1

Enclosure 1 is the final version of our contractor's technical evaluation of SEP Topic V-11.A. This report replaces the report forwarded by my letter dated January 13, 1981 and has been revised to reflect the comments contained in your letter of May 8, 1981.

Enclosure 2 is the staff's safety evaluation for this topic. Enclosure 2 is based upon Enclosure 1. As a result of our safety evaluation of Topic V-11.A, we are proposing modifications to the RWCU inboard suction isolation valve control circuitry.

The need to actually implement these changes will be determined during the integrated plant safety assessment. This topic assessment may be revised in the future if your facility design is changed or if NRC criteria relating to this topic are modified before the integrated assessment is completed.

Sincerely,

Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing

Enclosures:
As stated

cc w/enclosures:
See next page

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Mr. W. G. Counsil

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(Enclosure 1)

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SEP TECHNICAL EVALUATION REPORT
ELECTRICAL, INSTRUMENTATION, AND CONTROL FEATURES FOR ISOLATION OF HIGH AND LOW PRESSURE SYSTEMS

FINAL DRAFT

MILLSTONE NUCLEAR STATION, UNIT 1

Docket No. 50-245

June 1981

6-16-81

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SEP TECHNICAL EVALUATION REPORT
ELECTRICAL, INSTRUMENTATION, AND CONTROL FEATURES FOR
ISOLATION OF HIGH AND LOW PRESSURE SYSTEMS

MILLSTONE NUCLEAR STATION, UNIT 1

1.0 INTRODUCTION

The purpose of this review is to determine if the electrical, instrumentation, and control (EI&C) features used to isolate systems with a lower pressure rating than the reactor coolant primary system are in compliance with current licensing requirements as outlined in SEP Topic V-11A. Current guidance for isolation of high and low pressure systems is contained in Branch Technical Position (BTP) EICSB-3, BTP RSB-5-1, and the Standard Review Plant (SRP), Section 6.3.

2.0 CRITERIA

2.1 Residual Heat Removal (RHR) Systems. Isolation requirements for RHR systems contained in BTP RSB-5-1 are:

(1) The suction side must be provided with the following isolation features:

(a) Two power-operated valves in series with position indicated in the control room.

(b) The valves must have independent and diverse interlocks to prevent opening if the reactor coolant system (RCS) pressure is above the design pressure of the RHR system.

(c) The valves must have independent and diverse interlocks to ensure at least one valve closes upon an increase in RCS pressure above the design pressure of the RHR system.

(2) The discharge side must be provided with one of the following features:

(a) The valves, position indicators, and interlocks described in (1)(a) through (1)(c) above.

(b) One or more check valves in series with a normally-closed power-operated valve which has

its position indicated in the control room If this valve is used for an Emergency Core Cooling System (ECCS) function, the valve must open upon receipt of a safety injection signal (SIS) when RCS pressure has decreased below RHR system design pressure.

(c) Three check valves in series.

(d) Two check valves in series, provided that both may be periodically checked for leak tightness and are checked at least annually.

2.2 Emergency Core Cooling System. Isolation requirements for ECCS are contained in SRP 6.3. Isolation of ECCS to prevent overpressurization must meet one of the following features:

(1) One or more check valves in series with a normally-closed motor-operated valve (MOV) which is to be opened upon receipt of a SIS when RCS pressure is less than the ECCS design pressure

(2) Three check valves in series

(3) Two check valves in series, provided that both may be periodically checked for leak tightness and are checked at least annually.

2.3 Other Systems. All other low pressure systems interfacing with the RCS must meet the following isolation requirements from BTP EICSB-3:

(1) At least two valves in series must be provided to isolate the system when RCS pressure is above the system design pressure and valve position should be provided in the control room

(2) For systems with two MOVs, each MOV should have independent and diverse interlocks to prevent opening until RCS pressure is below the system design pressure and should automatically close when RCS pressure increases above system design pressure

(3) For systems with one check valve and a MOV, the MOV should be interlocked to prevent opening if RCS pressure is above system design pressure and should automatically close whenever RCS pressure exceeds system design pressure.

3.0 DISCUSSION AND EVALUATION

There are three systems at Millstone 1, with direct interface to the RCS pressure boundary, which have a design pressure rating for all or part of the system which is lower than the RCS design pressure. These systems are the Reactor Water Clean-Up (RWCU) system, Low Pressure Coolant Injection (LPCI) system, and Core Spray (CS) system.

3.1 Reactor Water Clean-Up System. The RWCU system takes suction on the RCS, cools the water by circulation through regenerative and non-regenerative heat exchangers, and lowers the water pressure by the use of a pressure control valve. After passing through the low pressure filter and clean-up portions of the system, the water is pumped at high pressure through the regenerative heat exchanger and back to the reactor via the feed line. The suction side of the system has three motor-operated isolation valves, an inboard valve, a pump suction valve, and a pump bypass valve. Isolation on the discharge side is provided by a MOV and a check valve. The MOVs cannot open if the pressure in the low pressure portions of the system is higher than its designed pressure. They will automatically close on high RWCU system temperature, high RWCU system pressure, low reactor level, or loss of control power. However, the interlocks for these valves all use the same sensors and relays. Each MOV has position indication in the control room.

Isolation provisions of the RWCU system do not meet the current licensing criteria since the interlocks for the isolation valves are not independent as required by BTP EICSB-3.

3.2 Low Pressure Coolant Injection System. The LPCI system takes suction on the suppression pool (or condensate storage tank) and discharges into the reactor vessel. The discharge of each loop has two normally-closed MOVs which cannot be opened unless a LPCI system initiation signal is present and the RCS pressure is below the design pressure of the system. The valves will automatically close if either the LPCI system signal or RCS pressure increases above the LPCI system

design pressure. Each valve has position indication in the control room. The LPCI system is in conformance with isolation provisions of current licensing requirements.

3.3 Core Spray System. The CS system consists of two loops taking suction on the suppression pool and discharging into the reactor vessel through two MOVs (one normally open, the other normally closed) and a testable (air-operated) check valve per loop. All three valve positions are indicated in the control room. The normally-closed MOV will only open upon a CS system initiation signal when RCS pressure has decreased below CS system design pressure. The MOV will automatically close upon clearing the initiation signal or increasing RCS pressure above CS system design pressure. Therefore, the CS system meets the isolation criteria of current licensing requirements.

4.0 SUMMARY

Millstone 1 has three systems with lower design pressure ratings than the RCS which are directly connected to the RCS. The LPCI and CS systems meet current licensing criteria contained in SRP 6.3 for isolation of high and low pressure systems. The RWCU system is not in compliance with BTP EICSB-3 since the isolation valve interlocks are not independent.

5.0 REFERENCES

1. NUREG-075/087, Branch Technical Positions EICSB-3, RSB-5-1; Standard Review Plan 6.3.

2. Millstone 1 Piping and Instrumentation Drawings 25202-26008, -29119, -29128, and 29133.

3. Millstone 1 Electrical Drawings 25202-31001-684, -684A, -685, -686, -687, -745, -746, -773, -798, -858, -859, -863, -864, -868, and -869.

4. Final Safety Analysis Report, Millstone Nuclear Station, Unit 1.

5. Letter, Northeast Utilities (Counsil) to NRR (Crutchfield), dated May 8, 1981.

TOPIC: V-11.A REQUIREMENTS FOR ISOLATION OF HIGH AND LOW PRESSURE SYSTEMS

I. INTRODUCTION

Several systems that have a relatively low design pressure are connected to the reactor coolant pressure boundary. The valves that form the interface between the high and low pressure systems must have sufficient redundancy and interlocks to assure that the low pressure systems are not subjected to coolant pressures that exceed design limits. The problem is complicated since under certain operating modes (e.g., shutdown cooling and ECCS injection) these valves must open to assure adequate reactor safety.

II. REVIEW CRITERIA

The review criteria are presented in Section 2 of EG&G Report 0146J, "Electrical, Instrumentation and Control Features for Isolation of High and Low Pressure Systems."

III. RELATED SAFETY TOPICS AND INTERFACES

The scope of review for this topic was limited to avoid duplication of effort since some aspects of the review were performed under related topics. The related topics and the subject matter are identified below. Each of the related topic reports contain the criteria and review guidance for its subject matter.

V-10.B	RHR Reliability
VI-4	Containment Isolation

Topic V-11.B is dependent on the present topic information for completion.

IV. REVIEW GUIDELINES

The review guidelines are presented in Section 7.3 of the Standard Review Plan.

V. EVALUATION

As noted in EG&G Report 0146J, Millstone Unit 1 has three systems with a lower design pressure rating than the reactor coolant system (RCS) that are directly connected to the RCS. These systems are the Reactor Water Clean-up (RWCU) System, the Low Pressure Coolant Injection (LPCI) System, and the Core Spray (CS) System.

The LPCI and CS systems meet current licensing criteria. The RWCU does not have independent interlocks on the suction valves.

VI. CONCLUSIONS

Because of the severe consequences of a LOCA outside of containment the staff proposes that an independent high pressure interlock be installed on the RWCU inboard suction isolation valve.