Northeast
Utilities System

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April 26, 1996

Docket No. 50-423
B15690

Re: 10CFR50.73(a)(2)(i)(A)
and 50.73(a)(2)(ii)(B)

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

This letter forwards Licensee Event Report 96-006-00, which is submitted within thirty (30) days pursuant to 10CFR50.73(a)(2)(i)(A) and 50.73(a)(2)(ii)(B).

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

M. H. Brothers
Unit Director, Millstone Unit No. 3

Attachment: LER 96-006-00

cc: T. T. Martin, Region I Administrator
A. C. Cerne, Senior Resident Inspector, Millstone Unit No. 3
V. L. Rooney, NRC Project Manager, Millstone Unit No. 3

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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TITLE (4)

Plant Shutdown Required by Technical Specifications, for Auxiliary Feedwater Containment Isolation Valves Declared Inoperable

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	30	96	96	006	00	04	26	96	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
		20.2201(b)	20.2203(a)(2)(v)	[X] 50.73(a)(2)(i)	50.73(a)(2)(viii)
POWER LEVEL (10)	100	20.2203(a)(1)	20.2203(a)(3)(i)	[X] 50.73(a)(2)(ii)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
William J. Temple, Nuclear Licensing Supervisor	(860)437-5904

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION	MONTH	DAY	YEAR
[ ] YES (If yes, complete EXPECTED SUBMISSION DATE).	[X] NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On March 30, 1996, at 15:52, with the plant in Mode 1 at 100-percent power (587 degrees Fahrenheit and 2250 psia), a manual plant shutdown to cold shutdown was initiated in accordance with Technical Specification Limiting Condition for Operation (LCO) 3.6.3, Containment Isolation Valves. The shutdown was required when the auxiliary feedwater (FWA) turbine pump supplied containment isolation valves were declared inoperable. Plant systems responded normally to the shutdown. No Engineered Safety Features Actuations were required or were initiated as part of this shutdown.

The isolation valves were declared inoperable based on an interpretation of the requirements of GDC 57, "Closed System Isolation Valves." This GDC is interpreted to require that each barrier be designed to withstand the maximum containment design pressure. A vendor analysis, shop testing on a spare valve, and field testing of an installed valve determined that the valves would not remain closed against the containment design basis pressure.

A review concluded that the safety significance with respect to the unit's accident analysis was minimal. The valves were capable of remaining closed against a back pressure of up to about 10 psid, which exceeds the maximum containment back pressure postulated to exist on the valves given a passive failure in a design basis accident.

Plant personnel working with the valve vendor have instituted a design change which made the valves capable of withstanding a backpressure greater than the containment design pressure of 45 psid. As action to prevent recurrence, a review of all other GDC 57 penetrations was performed. No other similar conditions were identified.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

I. Description of Event

On March 30, 1996, at 15:52, with the plant in Mode 1 at 100-percent power (587 degrees Fahrenheit and 2250 psia) a manual plant shutdown to cold shutdown was initiated in accordance with Technical Specification Limiting Condition for Operation (LCO) 3.6.3, Containment Isolation Valves. The shutdown was required when the auxiliary feedwater (FWA) turbine pump supplied containment isolation valves (3FWA*HV36A, B, C & D) were declared inoperable. Plant systems responded normally to the shutdown. No Engineered Safety Features Actuations were required or were initiated as part of this shutdown.

Valves 3FWA*HV36A through D are dual function valves. These valves provide containment isolation in accordance with General Design Criteria 57, "Closed System Isolation Valves" (GDC 57), and are available to throttle FWA flow from the turbine driven FWA pump. The valves are two stage pilot operated Target Rock solenoid valves. Each valve is located within approximately ten feet of containment. Each turbine pump supplied line shares a common penetration with a motor driven pump supplied FWA line. Valves 3FWA*HV36A and D are located at an elevation of approximately 37 feet in the A and C recirculation spray (RSS) heat exchanger cubical. Valves 3FWA*HV36B and C are located at an elevation of approximately 24 feet in the B and D RSS heat exchanger cubical.

A design concern with these valves was identified on March 28, 1996, during a comprehensive review of the FWA turbine supply line containment isolation / throttle valves, which was undertaken as part of the development of a Technical Specification (TS) change associated with high energy line break (HELB) and motor supplied FWA line throttling at reactor power less than 10 percent. This TS change intended to continue to utilize these valves as isolation valves to prevent pressurization of the FWA turbine supplied lines. The concern was discovered when the vendor was contacted to determine the backpressure capability of the valves.

Upon discovery of the concern, an initial operability determination concluded that there was reasonable assurance that the valve's differential pressure capability for the containment isolation function was adequate to maintain containment isolation. However, subsequent to a bench test of a spare valve, management concluded that the valves would be declared inoperable due to a noncompliance with GDC 57.

II. Cause of Event

The condition has existed as part of the original design and operation of the FWA system. A review of the architect engineer procurement specification for these valves indicated that the specification provided no requirements for containment isolation

The isolation valves, 3FWA*HV36A through D, were declared inoperable based on an interpretation of GDC 57. GDC 57 penetrations are associated with closed systems that penetrate containment. Two barriers are required for containment isolation. The first barrier is the secondary side piping (including the steam generator) inside containment. The second barrier is the isolation valve outside containment. Although not stated therein, an interpretation of GDC 57 is that both barriers must be designed to withstand maximum containment pressure during any accident conditions. GDC 57 specifically requires that the valve be located outside containment and that the valve be automatic, locked closed, or capable of remote manual operation. These valves are open / fail open valves, are located outside containment and are capable of remote manual operation.

The valves were declared inoperable under GDC 57, because they had been determined to be not capable of remaining closed against a maximum containment accident pressure of approximately 38.6 psig. A vendor analysis, shop testing on a spare valve, and field testing of an installed valve determined that the valves would not remain closed against the containment design basis pressure. Therefore, the valves were declared inoperable.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

III. Analysis of Event

Containment isolation valves 3FWA*HV36A - D were declared inoperable and the plant complied with Technical Specification LCO 3.6.3 which required a plant shutdown. An immediate notification of a shutdown required by Technical Specifications, was performed in accordance with 10CFR50.72(b)(1)(i)(A).

Based on a review of the Millstone Unit 3 Final Safety Analysis Report, and design and licensing documents, it was concluded that the safety significance with respect to the Unit's accident analysis was minimal. This review determined that the capability of the valve to remain closed with a back pressure of up to about 10 psid exceeded the maximum back pressure postulated to exist on the valve for any design basis accident. This conclusion was based on the following accident considerations:

1. A passive failure of the pressure boundary is only required in the long term (i.e., the FWA pipe wall would not fail until at least 24 hours after the accident initiation).
2. The maximum containment pressure is approximately 4.5 psid 24 hours after accident initiation.
3. These valves fail in the open position and the safest position for these valves is open. Therefore, back leakage is of only secondary concern with respect to assuring an open flow path to containment in the event of an accident.
4. Actual leakage of radioactive material through the two upstream, seismic, safety class 3 check valves that exist in each flow path outside containment would be negligible.
5. Containment isolation valves 3FWA*HV36A-D perform no significant containment isolation function to limit offsite dose during any FSAR Chapter 15 accident.

Although the safety significance of this event was determined to be small with respect to the Unit's accident analysis, declaring the valves inoperable due to noncompliance with GDC 57, required a plant shutdown in accordance with LCO 3.6.3.

IV. Corrective Action

As immediate corrective action the Unit was shutdown in an orderly manner.

Plant personnel working with the valve vendor have instituted a design change which made the valves capable of withstanding a backpressure greater than the containment design pressure of 45 psid. The manufacturer indicates that the modified valves are now capable of closing with a back pressure in excess of 1350 psid. The throttling capability of the valve remains unchanged. The main disc assembly in each valve was modified to accommodate two check valves (1/4-inch and 3/8-inch check valves). Each check valve ports pressure to the main disc assembly control volume. One communicates with the supply side and the other communicates with the discharge side of the valve. The original design contained a port (without check valve) that communicated between the supply side and the main disc assembly control volume. Porting pressure, from both the supply and discharge sides of the valve, to the main disc assembly control volume assures adequate closing force on the valve disc. The modification had no impact on the throttling capability of the valves. Shop testing and field testing demonstrated the adequacy of the design for leak tightness. A verification of modulating capability of the valves will be performed prior to entering Mode 2 (i.e., steam pressure required to run the FWA turbine driven pump is not available until Mode 3).

As action to prevent recurrence, a review of all other GDC 57 penetrations was performed. No other similar conditions were identified as discussed in the Additional Information section below.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

V. Additional Information

Generic Letter 91-15, "Operating Experience Feedback Report, Solenoid-Operated Valve Problems at U.S. Reactors," identified the design flaw inherent in the subject valves. The review performed to close out GL 91-15 failed to identify valves 3FWA*HV36A - D as valves affected by GL 91-15. A preliminary review of all containment isolation valves was performed to verify that all remaining containment isolation valves meet the pressure requirements of GDC 54, 55, 56 and 57. The review emphasis was directed toward GDC 57 penetrations which provide flow into containment. All remaining containment isolation valves were determined to meet the GDC pressure requirements. An investigation into other aspects of GL 91-15 is continuing.

The closure of these containment isolation valves was also credited for high energy line break (HELB) isolation of the FWA turbine supplied lines during startup, hot shutdown and hot standby as part of the corrective actions associated with LER 94-006, "Auxiliary Feedwater Pipe Restraints Inadequate Design Due to Design Error." The isolation pressure required for HELB is greater than the pressure for containment isolation. Therefore, the corrective action taken to resolve LER 94-006 was adversely affected. As noted above, these valves are now capable of isolation in the back flow direction for pressure in excess of 1350 psid. This pressure is greater than the maximum normal pressure due to motor operated FWA pump operation. Thus, the design improvement also restores effective corrective action for LER 94-006-00.

Similar Events

No similar events have been identified.

Manufacturer Data

EIIS System Code
Auxiliary/Emergency Feedwater System - BA

EIIS Equipment Code
Containment Isolation Valve - ISV

Valve Type: Two stage pilot operated solenoid valve
Manufacturer: Target Rock
Model Number: 81AB-005-1
Design Pressure: 1850 psi