

**Northeast
Nuclear Energy**

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The Northeast Utilities System

MAR 22 1996

Docket No. 50-336
B15611

Re: 10 CFR 50.73

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

This letter forwards Licensee Event Report (LER) 96-007-00 documenting an event that occurred at Millstone Nuclear Power Station, Unit No. 2 on February 20, 1996. This LER is being submitted pursuant to 10 CFR 50.73(a)(2)(i).

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

P. M. Richardson
Director - Millstone Unit No. 2

Attachment: LER 96-007-00

cc: T. T. Martin, Region I Administrator
P. D. Swetland, Senior Resident Inspector, Millstone Unit No. 2
G. S. Vissing, NRC Project Manager, Millstone Unit No. 2

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LICENSEE EVENT REPORT (LER)

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST 500 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.

FACILITY NAME (1) Millstone Nuclear Power Station Unit 2	DOCKET NUMBER (2) 05000336	PAGE (3) 1 of 5
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TITLE (4)
Reactor Coolant System Cooldown Rate Exceeded Technical Specification Limit

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	20	96	96	007	00	02	21	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)							
POWER LEVEL (10)		56%	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(2)(i)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 50.73(a)(2)(vii)
			<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(viii)
			<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(vi)	<input type="checkbox"/> 73.71
			<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME G. P. van Noordennen, Nuclear Licensing Supervisor	TELEPHONE NUMBER (Include Area Code) (860)440-2084
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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
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE).	<input checked="" type="checkbox"/> NO								

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

On February 20, 1996 at 2000 hours, with the plant in Mode 1 at 56% power, an engineering review discovered that the Reactor Coolant System (RCS) cooldown rate requirements of the Technical Specifications (TS) Limiting Condition for Operation (LCO) 3.4.9.1(b) were not satisfied during RCS cooldowns that occurred on April 24, 1994, July 28, 1994, and December 15, 1995. The action requirements for TS 3.4.9.1 specify that an engineering evaluation be performed to determine the structural integrity of the RCS and its acceptability for continued operation. This evaluation was not performed until February 20, 1996. This event is being reported pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B), "any operation or condition prohibited by the plant's Technical Specifications."

The cause of this event was the original surveillance procedure and heatup/cooldown software did not use the temperature sensor that most closely represents the temperature seen by the reactor vessel downcomer.

Corrective actions include changes to the plant operating procedures, changes to the plant heatup/cooldown monitoring computer program, and operator training involving these events.

There were no automatic or manually initiated safety systems activated as a result of this event.

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

I. Description of Event

On February 20, 1996 at 2000 hours, with the plant in Mode 1 at 56% power, an engineering review discovered that the Reactor Coolant System (RCS) cooldown rate requirements of the Technical Specifications (TS) Limiting Condition for Operation (LCO) 3.4.9.1 (b) were not satisfied during RCS cooldowns that occurred on April 24, 1994, July 28, 1994, and December 15, 1995. The engineering review concluded that the RCS cooldown rate was as high as 42°F to 45°F in a one hour period during each of the three events. These events occurred during and immediately after the transition from reactor coolant pump (RCP) operation to shutdown cooling (SDC) operation. These cooldown rates were determined to exist for approximately one to two minutes. Additionally, cooldown rates between 33°F and 40°F occurred at least once, during each of the cooldowns noted, with a duration of 45 to 60 minutes. Each of these rates exceed the LCO limit of 30°F per hour when RCS T_{AVG} is between 200°F and 300°F. During the plant cooldowns, operators were unable to determine that the cooldown rate limit specified by TS LCO 3.4.9.1 (b) had been exceeded, since neither the operating procedures nor the plant process computer calculated RCS cooldown rates utilizing the appropriate temperature sensor.

There were no immediate operator actions required in response to this event. Additionally, there were no automatic or manually initiated safety systems activated as a result of this event.

II. Cause of Event

The apparent cause of this event was the original surveillance procedure and heatup/cooldown software did not use the temperature sensor that most closely represents the temperature seen by the reactor vessel downcomer. This error resulted in operations personnel being unable to accurately assess the cooldown rate when transitioning from RCP operation to shutdown cooling.

The evaluation identified additional contributing factors which prevented operations personnel from accurately controlling the cooldown rate. A review of the shutdown cooling system operating procedure (OP 2310), concluded that the procedure does not provide adequate instructions for establishing system conditions prior to stopping the RCPs and establishing SDC. The procedure was determined to be deficient since it did not provide guidance to adequately throttle the reactor building closed cooling water (RBCCW) flow through the SDC heat exchangers in order to control SDC outlet temperature as it is introduced into the RCS.

III. Analysis of Event

TS LCO 3.4.9.1 (b), requires that the RCS cooldown rate be limited to "30°F in any one hour period with T_{AVG} at or below 300°F and above 200°F." This condition was not met, during each of the cooldowns on April 24, 1994, July 28, 1994, and December 15, 1995, when the RCS cooldown rate was as high as 45°F during a one hour period.

The action for LCO 3.4.9.1 requires that "with any of the above limits exceeded, restore the temperature and/or pressure to within the limit within 30 minutes; perform an engineering evaluation to determine the effects of the out-of-limit condition on the structural integrity of the Reactor Coolant System; determine that the Reactor Coolant System remains acceptable for continued operations or be in at least HOT STANDBY within the next 6 hours and reduce the RCS T_{AVG} and pressure to less than 200°F and 500 psia, respectively, within the following 30 hours."

On April 24, 1994, July 28, 1994, and December 15, 1995, operations personnel were unable to detect the exceeded cooldown rate and consequently never recognized that LCO 3.4.9.1(b) had not been met. The required actions for the LCO were not performed until February 20, 1996 at which time an engineering evaluation was completed and

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concluded that the structural integrity of the RCS was not affected and that the RCS remains acceptable for continued operation.

Since the engineering evaluation was not performed until February 20, 1996 and the LCO action requirements were not met, this event is being reported pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B), "any operation or condition prohibited by the plant's Technical Specifications."

The engineering review identified the following operating characteristics associated with shutdown cooling operation:

- The temperature sensor located in the SDC discharge to the RCS cold leg (RTD T351Y) reacts quickly to changes in SDC flow rate and reactor building closed cooling water (RBCCW) flow rate through the SDC heat exchangers. The temperature sensor reacts quickly since it is located, downstream of the discharge of the SDC heat exchangers, and before SDC mixes with the RCS.
- RTD T351Y more conservatively assesses cooldown rates at the reactor vessel downcomer due to changes in SDC system flow and RBCCW temperature changes than RTD T351X which is located on the SDC suction line off of the RCS Loop 2 hot leg. RTD 351X represents the temperature of the RCS water exiting the core region of the reactor vessel.
- The highest cooldown rates were found to occur within a few hours following initiation of SDC. This was determined to be a function of the many manipulations being performed to introduce RBCCW flow through the SDC heat exchangers and to control SDC flow to the RCS.

The plant surveillance procedure used to monitor RCS heatup and cooldown rates required that the RCS cooldown rate be assessed at least once every 30 minutes during a plant cooldown. During SDC operation, the procedure specified the use of RTD T351X temperature values, rather than T351Y, to monitor cooldown rate. The plant computer heatup/cooldown monitoring software program assists the operators and was developed to reflect the same procedure requirements. During the April 24, 1994, July 28, 1994, and December 15, 1995 RCS cooldowns, the RTD T351X temperature, which was being monitored, remained on a steady cooldown rate during SDC system manipulations. However, subsequent review of the RTD T351Y temperature exhibited large temperature swings in conjunction with the same SDC system manipulations. Using only RTD T351X temperature indications to calculate cooldown rate during the three events concealed the magnitude of the reactor vessel downcomer cooldown rate.

IV. Corrective Action

Changes to the plant operating and surveillance procedures, the plant heatup/cooldown monitoring computer program, and the operator training program will be implemented to allow operators to properly monitor and control the RCS heatup/cooldown rate. The procedure changes and operator training will be completed prior to entering mode 4 during plant startup.

An Event Review Team (ERT) was established to investigate an event which resulted in exceeding the heatup limits of LCO 3.4.9.1 on January 4, 1996 (LER 96-001-00). The scope of the ERT was expanded to include evaluation of the cooldown events in this LER. The ERT recommendations will be evaluated and additional corrective actions developed as appropriate.

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V. Additional Information

Similar Events

LER 96-001-00
LER 96-011-00

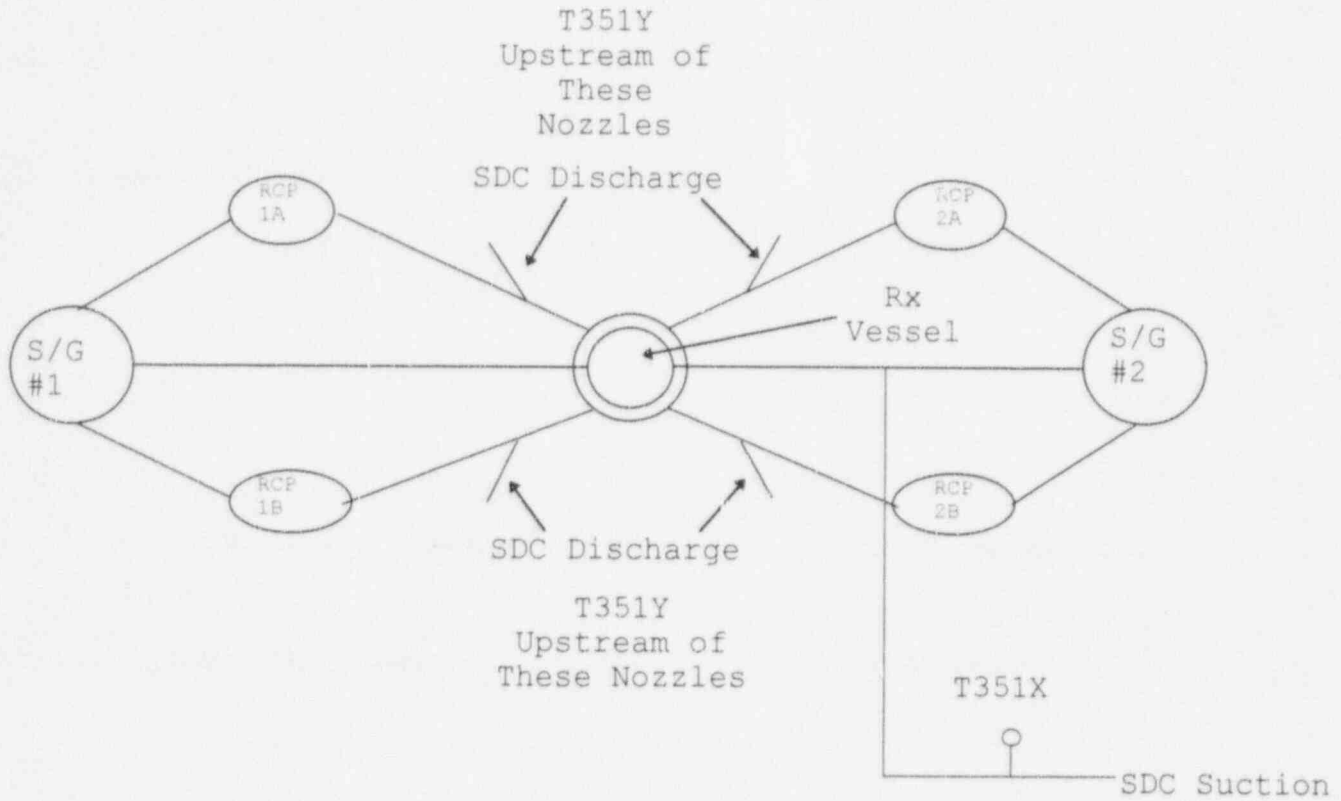
Manufacturer Data

None

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Shutdown Cooling System - RCS Penetrations Versus Locations of T351X & 351Y