Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

Dominion

AUG 22 2003

Docket No. 50-336
B18953

RE: 10 CFR 50.73(a)(2)(v)(A)
10 CFR 50.73(a)(2)(i)(B)

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

Millstone Power Station, Unit No. 2
Licensee Event Report 2003-003-01
The Charging System Did Not Perform Its Design Function
in Response to Falling Pressurizer Level

This letter forwards Licensee Event Report (LER) 2003-003-01. This LER is revision 1 to LER 2003-003-00, which documented an event at Millstone Power Station, Unit No. 2 that occurred on March 7, 2003. Revision 0 of the LER was submitted on May 2, 2003, pursuant to 10 CFR 50.73(a)(2)(v)(A), an event or condition that could have prevented fulfillment of a safety function, and 10 CFR 50.73(a)(2)(i)(B), any operation or condition prohibited by the plant's Technical Specifications.

There are no regulatory commitments contained within this letter.

Should you have any questions regarding this submittal, please contact Mr. David W. Dodson at (860) 447-1791, extension 2346.

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.

Stephen P. Sarver, Director
Nuclear Station Operations and Maintenance

Attachments (1): LER 2003-003-01

cc: H. J. Miller, Region I Administrator
R. B. Ennis, NRC Senior Project Manager, Millstone Unit No. 2
Millstone Senior Resident Inspector

IE22

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Attachment 1

Millstone Power Station, Unit No. 2

LER 2003-003-01

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

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

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TITLE (4)

The Charging System Did Not Perform Its Design Function in Response to Falling Pressurizer Level

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	07	2003	2003	- 003 -	01	08	22	2003	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)		50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)	X	50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		Specify in Abstract below or
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		In NRC Form 366A
	20.2203(a)(2)(v)	X	50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
David W. Dodson, Manager, Licensing.	860-447-1791, Ext. 2346

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	CB	RV	Crosby	Y					

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
☐ YES (If yes, complete EXPECTED SUBMISSION DATE).	☒ NO				

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

On March 7, 2003, at 1439 with the plant in MODE 1 at approximately 100 percent power, an automatic reactor trip occurred while performing Reactor Protective System matrix logic and trip path relay testing. The reactor trip resulted in Reactor Coolant System cooldown, and a drop in pressurizer level followed by the auto-starting of both standby charging pumps in addition to the one in operation. The combined flow of the three pumps fell and became erratic, varying from a high of 50 gpm to a low of 0 gpm. Because of this unexpected response, plant operators declared all three charging pumps inoperable and entered the Action Statement for Technical Specification 3.0.3. Pressurizer level was restored using a charging pump aligned to the alternate charging flow through the high-pressure safety injection line, and a plant cooldown was commenced.

The Direct Cause of this event was that the Charging Pump Discharge Pulsation Dampeners were inadequately designed to prevent pressure spikes caused by simultaneous pump starts. The Root Cause of this event was a high tolerance for repeat Safety Device Precursor actuation. Specifically, the repeated lifting of the Charging Pump discharge relief valves was tolerated without sufficient consideration of the cause (pressure spike).

The corrective action for the Direct Cause is to design and install improved discharge pulsation dampeners. The Corrective Actions for the Root Cause are to revise the Corrective Action Program Description to include guidance, which ensures trends of "Safety Device Precursors" are investigated with an apparent cause investigation, and to develop a list of "Safety Device Precursors," which will include as a minimum; relief valve lifts, circuit breaker trips, and blown fuses. Application/implementation of the list will be documented in appropriate guidance documents (e.g. equipment reliability trend guidance of the system health reports procedure).

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

1. Event Description

On March 7, 2003, at 1439 with the plant in MODE 1 at approximately 100 percent power, an automatic reactor trip occurred while performing Reactor Protective System matrix logic and trip path relay testing. The trip happened during monthly Reactor Protection System testing, and was caused by faulty wiring in the test circuit. The reportability aspects associated with the reactor trip are covered in Licensee Event Report 2003-002-00.

Following the trip, the automatic opening of both the Condenser Dump valves and the Atmospheric Dump Valves was impaired, so that six steam generator Safety Relief Valves lifted. The Reactor Coolant System (RCS) [AB] cooldown associated with the reactor trip resulted in a drop in pressurizer [PZR] level. The drop in pressurizer level auto-started both standby charging pumps. 'C' pump continued operating. As soon as the standby pumps started, the combined flow of the three pumps became erratic, varying from a high of 50 gpm to a low of 0 gpm. During this time, flow was observed coming from the telltale on all three charging pump discharge relief valves, indicating that the relief valve bellows had failed. This was a result of the relief valves chattering. The relief valves, which discharge to their respective pump inlet lines, were operating at or close to the full recirculation mode. Because of this unexpected response, plant operators declared all three charging pumps inoperable and entered the Action Statement for Technical Specification 3.0.3.

The charging capability was established via the alternate charging path and with suction aligned to the Refueling Water Storage Tank, and pressurizer level was restored. Once charging flow and pressurizer level were restored, plant cooldown proceeded slowly (due to limited charging flow capability) resulting in a failure to reach MODE 4 within the time required by Technical Specification 3.0.3.

The failure of the Charging system is reportable under the provisions of 10 CFR 50.73(a)(2)(v)(A), an event or condition that could have prevented fulfillment of a safety function. This condition lead to a loss of the primary method of inventory control. Although there is an alternative method to charging (i.e., by RCS depressurization and the use of high pressure safety injection pumps for injection), this condition is still reportable in accordance with NUREG-1022, Rev. 2, regardless of whether or not an alternate safety system could have been used to perform the safety function.

The failure to reach MODE 4 within the time allowed by Technical Specification 3.0.3 is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B), operation or condition prohibited by Technical Specifications.

2. Cause

The Direct Cause and the Root Cause of this event were found to be:

Direct Cause: The Charging Pump Discharge Pulsation Dampeners were inadequately designed to prevent pressure spikes caused by simultaneous pump starts.

Root Cause: A high tolerance for repeat Safety Device Precursor actuation. Specifically, the repeated lifting of the Charging Pump discharge relief valves was tolerated without sufficient consideration of the cause (pressure spike).

3. Assessment of Safety Consequences

The Charging system has three safety functions:
1. ECCS Injection
2. Inventory Control
3. Boration for Reactivity Control

The impacts of a loss of charging on these safety functions are as follows:

1. ECCS Injection. The design basis LOCA and SLB accident analyses demonstrate acceptable results without credit for charging. The current safety analyses, which are approved for incorporation in Chapter 14 of the Final Safety Analysis Report, do not credit charging. Thus, the loss of charging has no impact on ECCS Injection.
2. Inventory Control. As an alternative to charging, inventory control can be achieved by RCS depressurization and High Pressure Safety Injection.
3. Boration for Reactivity Control. Like inventory control, boration can be achieved using High Pressure Safety Injection (HPSI) following RCS depressurization.
4. RCS depressurization with HPSI injection is an alternate safety system in this context. The operators were able to establish charging for inventory control and reactivity control using the alternate line-up through a HPSI header. Thus, these safety functions were also accomplished during the event using an alternate safety system.

Based upon the above evaluation that all the safety functions could still be accomplished, this event has low safety significance. Additionally, a preliminary risk evaluation has been performed as input to the significance determination process. The risk increase associated with the charging pump malfunction was found to be <1.0E-6/year, which corresponds to a green color. The risk evaluation has been submitted to the Region 1 SRA and is currently being reviewed.

4. Corrective Action

The corrective action for the Direct Cause is to design and install improved discharge pulsation dampeners by November 1, 2003.

The corrective actions for the Root Cause to prevent recurrence are:

1. Revise the Corrective Action Program Description (Master Manual 16), by October 29, 2003, to include guidance, which implements a specific trend code for "Safety Device Precursors", and ensures trends of "Safety Device Precursors" are investigated with an apparent cause investigation (Level 2 Condition Report). A list of "Safety Device Precursors," as defined below will also be added.
2. Develop a list of "Safety Device Precursors," by September 24, 2003. The list will include as a minimum;
   a. Relief Valve Lifts,
   b. Circuit Breaker Trips, and
   c. Blown Fuses.

   Document application/implementation of the list in appropriate guidance documents (e.g. equipment reliability trend guidance of the system health reports procedure).

5. Previous Occurrences

No previous similar events were identified.

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

6. Component Failure Information

Relief Valve Failure:

Cause	Installation [B]
EPIX System Name	CVCS (Volume Portion) System Chemical and Volume Control System
Component(s)	Relief Valves 2-CH-324, 2-CH-325 and 2-CH-326 Crosby Relief Valves, Model JRAK-BS type B
Vendor Drawing Number	C99251 Rev. A
Manufacturer per EPIX	Crosby Valve & Gage Co. - now owned by Anderson Greenwood, (ANDEGRCR)
Reportable to EPIX	(Y)

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].