

# NORTHEAST UTILITIES



The Connecticut Light And Power Company  
Western Massachusetts Electric Company  
Holyoke Water Power Company  
Northeast Utilities Service Company  
Northeast Nuclear Energy Company

General Offices: Seiden Street, Berlin Connecticut

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(203) 865-5000

March 4, 1994  
MP-94-154

DONALD B. MILLER, Jr.  
SENIOR VICE PRESIDENT - MILLSTONE

Re: 10CFR50.73(a)(2)(ii)

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

Reference: Facility Operating License No. DPR-65  
Docket No. 50-336  
Licensee Event Report 94-002-00

Gentlemen:

This letter forwards Licensee Event Report 94-002-00 required to be submitted within thirty (30) days pursuant to 10CFR50.73(a)(2)(ii), as an event or condition outside the design basis of the plant.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

Donald B. Miller, Jr.  
Senior Vice President - Millstone Station

DBM/VJ:clc

Attachment: LER 94-002-00

cc: T. T. Martin, Region I Administrator  
P. D. Swetland, Senior Resident Inspector, Millstone Unit Nos. 1, 2 and 3  
G. S. Vissing, NRC Project Manager, Millstone Unit No. 2

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CERT# P 266578 629

# LICENSEE EVENT REPORT (LER)

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 90.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (ANBB 7714), 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 6
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TITLE (4)  
Failure to Meet Acceptable Isolation Requirements Between Class 1E Protection Instrument Channels

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	04	94	94	002	00	03	04	94		05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9) 1	THIS REPORT IS BEING SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)									
POWER LEVEL (10) 100%	20.402(b)			20.405(c)			50.73(a)(2)(v)			73.71(b)
	20.405(a)(1)(i)			50.36(c)(1)			50.73(a)(2)(v)			73.71(i)
	20.405(a)(1)(ii)			50.36(c)(2)			50.73(a)(2)(vi)			OTHER
	20.405(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(vii)(A)			(Specify in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iv)			X 50.73(a)(2)(f)			50.73(a)(2)(vii)(B)				
20.405(a)(1)(v)			50.73(a)(2)(ii)			50.73(a)(2)(x)				

LICENSEE CONTACT FOR THIS LER (12)

NAME William J. Temple, Site Licensing	TELEPHONE NUMBER (include Area Code) (203) 437-5904
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

At approximately 1420 hours, on February 4, 1994, an engineering review revealed that safety grade electrical isolation requirements were not satisfied. The event was determined to be a condition outside the design basis of the plant. Two non-safety related, interconnected, pressure control (PC) channels are powered from separate Class 1E vital instrument buses via Foxboro Spec 200 instrument rack power supplies. The isolation device between the two PC channels is not a qualified isolator and there was no in depth analysis to demonstrate that the existing configuration provided acceptable electrical isolation. It was postulated that a fault could potentially propagate between the 2 channels of safety-related protection instruments also housed in the cabinets and compromise their independence from a single failure.

No immediate operator actions were required. A failure modes evaluation concluded that no adverse conditions existed which could preclude actuation of the protection instruments, and thus, safe operation of the plant.

The root cause of the event is attributed to personnel error due to inadequate interface of design and equipment condition. A design interpretation error during a previous design change process resulted in the compromising of 2 (out of 4) safety-related instrument channels.

As corrective action, a design change to provide isolation between the two instrument channels will be completed in the near future.

A review of other Spec 200 instrument channels will be completed by April 30, 1994.

**LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION**

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FACILITY NAME (1)  Millstone Nuclear Power Station Unit 2	DOCKET NUMBER (2)  05000336	LER NUMBER (6)			PAGE (3)  02 OF 6
		YEAR 94	SEQUENTIAL NUMBER - 002 -	REVISION NUMBER 00	

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

I. Description of Event

At approximately 1420 hours, on February 4, 1994, while in Mode 1 at 100% power, an engineering review of the pressurizer pressure control loop, P-100X & P-100Y wiring, revealed that safety grade channel isolation requirements of IEEE Std 384-1981, "Standard Criteria for Independence of Class 1E Equipment and Circuits," were not satisfied. On February 15, 1994, the event was determined to be a condition outside the design basis of the plant. The two (2) non-Class 1E (non safety-related) pressure control channels are powered from the Class 1E vital instrument buses via the Foxboro Spec 200 instrument rack power supplies. Due to the lack of a (IEEE Std. 384) qualified isolator between the two pressure control channels and the lack of an in depth analysis to demonstrate that the existing configuration provided acceptable electrical isolation, it was postulated that a fault could potentially propagate between the 2 channels of safety-related instruments and compromise their independence from a single failure.

The wiring permits the pressurizer (0-10Vdc) low voltage control signal to pass from cabinet RC30A to RC30B via an isolated current to voltage (H2V) converter card. The common leg of both cabinets became connected due to the wiring configuration of the H2V card (refer to the attached figure). If a catastrophic fault in the form of a voltage surge from the 120VAC feed or +15/-15 Vdc power supply, or a ground fault were to occur, the fault could affect both cabinets. Each cabinet power supply also feeds an independent channel of safety-related (Class 1E) reactor protective system (RPS)/Engineered Safety Features Actuation System (ESFAS) instrument loop. Therefore, the wiring deficiency could affect the safety-related instrument loops if the fault were to cause failures of the +15/-15 Vdc power supply units in each cabinet. Cabinet RC30A is powered from safety train (Facility Z1) 120 Volt Vital Instrument AC (VIAC) bus VA10. Cabinet RC30B is powered from safety train (Facility Z2) 120 Volt VIAC bus VA20.

A failure analysis was conducted which concluded that no credible failures existed which would preclude actuation of the protection channels, and thus safe operation of the plant.

II. Cause of Event

The root cause of the event is attributed to personnel error due to inadequate interface of design and equipment condition. A design interpretation error during a previous design change process resulted in the compromising of 2 (out of 4) safety-related instrument channels.

A pressurizer pressure control design change installed QA, Class 1E components, with consideration given to maintaining acceptable isolation, increasing reliability and minimizing the likelihood of exposure to a single failure. However, an error was made in the interpretation of what constitutes a qualified isolator. The H2V card was misapplied as an isolation device for the pressurizer pressure control channels. The lack of qualified isolation was not identified during the design change review process. As a result, the design change potentially compromised 2 channels of reactor protective system (RPS) equipment (refer to Attachment 1 for list). No supporting analysis was performed to justify the lack of adequate/qualified isolation as required to meet the requirements of IEEE Std. 279-1971, "Criteria for Protection Systems for Nuclear Power Generating Stations."

The isolation concern was not identified during the design review process due to a lack of familiarity with the Spec 200 isolation/design scheme. The design review indicated that isolation was reviewed and the isolation scheme was determined to be acceptable. High potential sources such as annunciators, pressurizer heater control circuits were isolated from the low potential Spec 200 circuitry via HGA auxiliary relays. The HGA relays are located in the main control panels so as to maximize the distance between the control circuitry and power source.

EXPIRES: 5/31/95

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

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FACILITY NAME (1)  Millstone Nuclear Power Station Unit 2	DOCKET NUMBER (2)  05000336	LER NUMBER (6)			PAGE (3)  03 OF 6
		YEAR  94	SEQUENTIAL NUMBER  - 002 -	REVISION NUMBER  00	

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The most recent review, however, concluded there was no analysis to substantiate the claim that the isolation scheme is adequate. Pursuant to the requirements of IEEE 279-1971, adequate isolation must be demonstrated by either testing or analysis. The Millstone Unit 2 FSAR indicates that the Class 1E reactor protective system instrument channels meet the (physical separation as well as electrical isolation) requirements of IEEE 279-1971.

III. Analysis of Event

The event is reportable pursuant to 10CFR50.73(a)(2)(ii), as a condition outside the design basis of the plant. This event was initially assessed to be not reportable on February 4, 1994. The event was determined to be reportable on February 15, 1994, as a condition outside the design basis of the plant pursuant to 10CFR50.72(b)(1)(ii) & 10CFR50.73(a)(2)(ii). An immediate notification was completed on February 15, 1994.

The pressurizer pressure channels P-100X & P-100Y are non safety-related, classified non 1E control circuits used to maintain programmed pressurizer pressure. The loops are powered from vital AC buses Facility Z1-VA10 for P-100X and Facility Z2-VA20 for P-100Y. The output of one channel is selected to control pressurizer/reactor coolant pressure. Both channels are recorded in the Control Room at main control board CO3. Outputs are indicated on CO3 and at the hot shutdown panel (C21). High and low pressure alarms are also provided. The associated transmitters, PT-100X & PT-100Y, are environmentally and seismically qualified, and the control loop (Spec 200) components were purchased and installed to meet Class 1E Quality Assurance standards.

Because the design of the P-100X & P-100Y channels resulted in the tying together of two channels of safety-related circuits, the condition resulted in the potential reduction of protective channel independence, if a fault were to occur. This configuration was contrary to the Millstone Unit 2 FSAR stipulation that reactor protective system channels meet the isolation requirements of IEEE Std. 279-1971. The instruments affected are listed on Attachment 1.

This event has minimal safety consequences based on the following considerations. The likelihood of a fault which could prevent actuation of protective systems is not considered a credible single failure event. A failure modes evaluation concluded that the credible faults (i.e., a line to line fault, a short or open circuit) would result in actuation of the protective channels (which is a conservative action), and would not prevent fulfillment of a safety function.

IV. Corrective Action

No immediate corrective action was required by plant operators in response to this event. A failure analysis was conducted which concluded that no credible failures existed which would preclude actuation of the protection channels and thus safe operation of the plant. A review of other Spec 200 instrument channels is being performed to identify any further problems/common mode failure concerns. The review currently has not identified additional reportable concerns. The entire review will be completed by April 30, 1994.

As corrective action, a design change is planned to be completed in the near future to provide isolation for the two pressurizer pressure channels and thus RC30A & B in order to maintain a design basis consistent with the FSAR description.

The present design change controls and enhanced engineering knowledge with respect to component isolation should prevent recurrence. However, a copy of this report will be routed to the design engineering groups to increase awareness.

**LICENSEE EVENT REPORT (LER)  
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PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET,  
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FACILITY NAME (1)  Millstone Nuclear Power Station Unit 2	DOCKET NUMBER (2)  05000336	LER NUMBER (6)			PAGE (3)  04 OF 6
		YEAR  94	SEQUENTIAL NUMBER -- 002 --	REVISION NUMBER 00	

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

V. Additional Information

There have been no similar events with the same root cause and/or sequence of events. The Spec 200 equipment are manufactured by Foxboro. There were no component design deficiencies identified during the review of this event. This event discusses a design deficiency resulting from misapplication of components.

**EIIS Codes**

Systems

Engineered Safety Features Actuation System - JE  
Instrument and Uninterruptible Power System - Class 1E - EF  
Panels System (Cabinets) - JL  
Plant Protection System - JC  
SPEC 200 Instrumentation and Controls

Components

Annunciators - ANN  
Auxiliary Relays - RLY  
Converter (current to voltage) - CNV  
(Current/Voltage) Isolator - IB/EB  
Control Panels (Cabinet) - CAB

Manufacturer

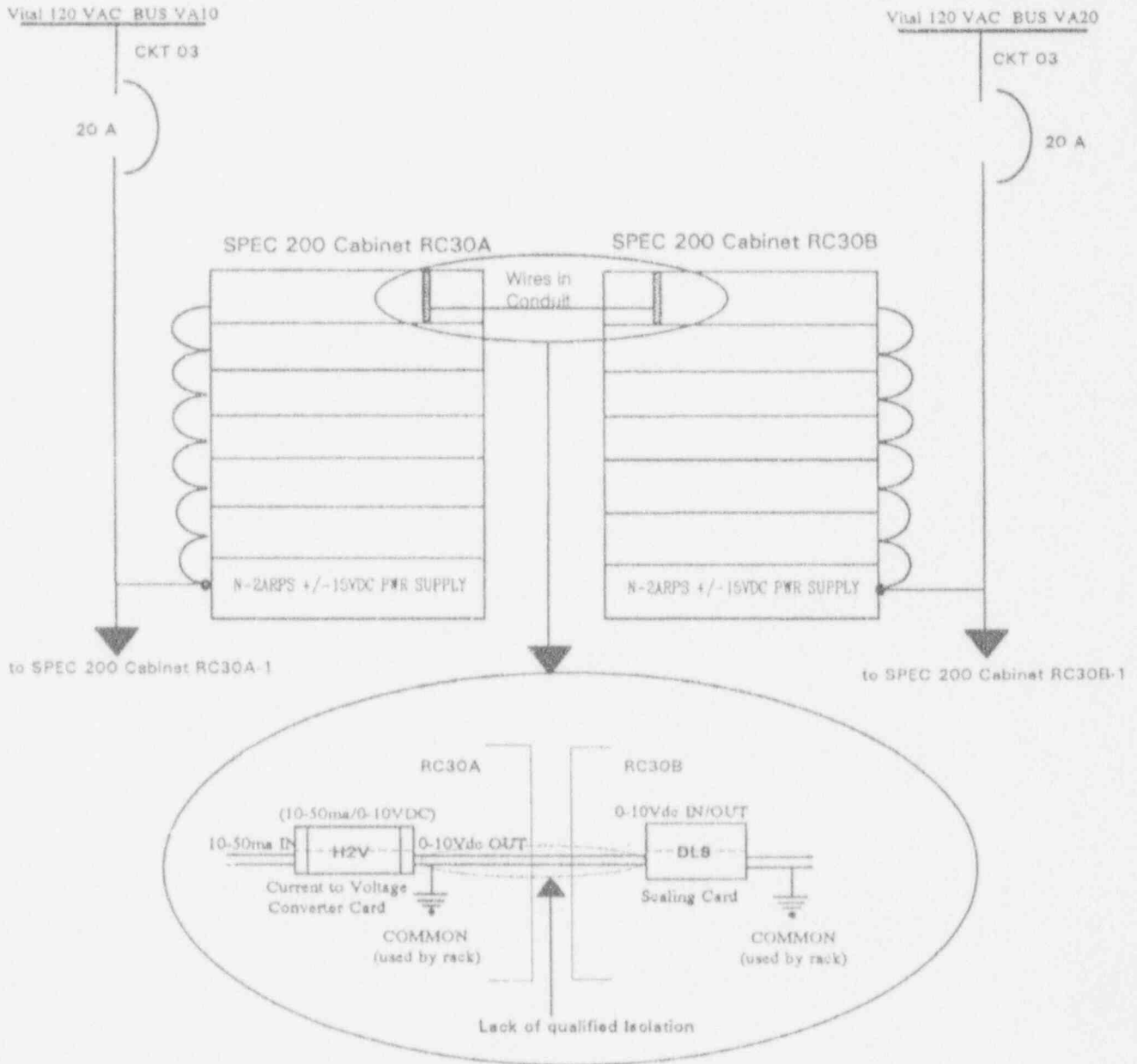
Foxboro Company - F180

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FACILITY NAME (1)  Millstone Nuclear Power Station Unit 2	DOCKET NUMBER (2)  05000336	LER NUMBER (6)			PAGE (3)  05 OF 6
		YEAR 94	SEQUENTIAL NUMBER 002	REVISION NUMBER 00	

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FACILITY NAME (1)  Millstone Nuclear Power Station Unit 2	DOCKET NUMBER (2)  05000336	LER NUMBER (6)			PAGE (3)  06 OF 6
		YEAR 94	SEQUENTIAL NUMBER - 002 -	REVISION NUMBER 00	

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**Attachment 1  
List of Instruments Associated with RC30A & RC30B**

Instrument Channel	Comments
Pressurizer Pressure	(P) - Reactor Rx trip on High Pressurizer Pressure
Reactor Coolant Pump speed sensing	(P) - Rx trip on Low Speed
Reactor Coolant flow	(P) - Rx trip on Low Flow Rate
Auxiliary Feedwater flow (AFW) to #1 & #2 Steam Generators/AFW flow control valve control.	(E) - AFW Valves fail full open allowing full flow to S/Gs and AFW pumps start.
#1 and #2 Steam Generator level - Channels A & B	(P)(E) - Provides Lo Steam Generator levels (Rx trip) and Lo-Lo S/G Level AFW actuation.
#1 and #2 Steam Generator pressure - Channels A & B	(P)/(E) - Provides Main Steam Line Isolation Signal and Rx trip.
Containment pressure - Channels A & B	(P)/(E) - Provides high Containment pressure ESF function: gives Containment Isolation Actuation Signal (CIAS) or Containment Spray Actuation Signal (CSAS) and Rx trip.
Containment pressure - wide range - Channels A & B	Provides no protective function
#1, #2, #3 & #4 Safety Injection Tank Level	Provides no protective function
#1, #2, #3 & #4 Safety Injection Tank Pressure	Provides no protective function
Unit No. 2 Stack Air Flow Indication and Control	Provides no protective function

**NOTES:**

A "(P)" designates a Reactor Protective Circuit

An "(E)" designates an Engineered Safety Features (ESF) Actuation Circuit

There are four channels of protective systems cabinets RC30A-D, which provide signals to the Reactor Protective and Engineered Safety Features Actuation Systems.