



Northeast
Nuclear Energy

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The Northeast Utilities System
Donald B. Miller Jr.,
Senior Vice President - Millstone

Re: 10CFR50.73(a)(2)(i)(A)

Aug. 28, 1995
MP-95-270

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 95-031-00

This letter forwards Licensee Event Report 95-031-00 required to be submitted within thirty (30) days pursuant to 10CFR50.73(a)(2)(i)(A).

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

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

DBM/LJC:clc

Attachment: LER 95-031-00

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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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: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 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 3
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TITLE (4)
Unrecoverable Dropped CEA Due to Power Supply Failure

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
08	03	93	95	031	00	08	28	95	FACILITY NAME	DOCKET NUMBER
										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)									
	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)						
POWER LEVEL (10) 10	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)						
	20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vi)	OTHER						
	20.405(a)(1)(iii)	X 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)	50.73(a)(2)(ii)	50.73(a)(2)(vii)(B)							
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)							

LICENSEE CONTACT FOR THIS LER (12)

NAME Philip J. Lutz, Nuclear Licensing	TELEPHONE NUMBER (Include Area Code) (203) 440-2072
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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
B	AA	RJX	0000	Y					

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 0610 hours on August 3, 1995, the unit conducted a plant shutdown when a dropped Control Element Assembly (CEA) was not able to be aligned with its group in the one hour required by Technical Specification Limiting Condition of Operation (LCO) 3.1.3.1.e.

The plant was at 10% power, 534 degrees Fahrenheit, 2256 psia, and the Main Turbine startup in progress. At 0527 hours, CEA #30 dropped into the core. Operators verified the CEA's position and entered LCO 3.1.3.1.e. An investigation determined the CEA's normal and backup power supplies had failed.

At 0610 hours the Shift Supervisor (SS) determined sufficient time was not available to complete repairs and realign CEA #30 within the one hour time limit. The SS declared the CEA inoperable and entered into Technical Specification 3.0.3 due to inability to meet LCO 3.1.3.1.e.

The cause of CEA #30 dropping into the core was a fault in the Coil Power Programmer (CPP) power supplies. An investigation identified a drop of solder across a capacitor created a short circuit, resulting in a loss of both power supplies.

This event is reportable in accordance with 10CFR50.73(a)(2)(i)(A), the completion of any nuclear plant shutdown required by Technical Specifications.

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 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	LER NUMBER (6)			PAGE (3) 02 OF 03
		YEAR 95	SEQUENTIAL NUMBER 031	REVISION NUMBER 00	

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

I. Description of Event

On August 3, 1995, the unit was at 10% power, 534 degrees Fahrenheit, 2256 psia, and preparing to bring the main turbine on line. At 0527 hours, control element assembly (CEA) #30 dropped into the core. The actual rod position was verified using the Control Element Assembly Position Display System (CEAPDS), the backup scanner, and the plant Integrated Computer System. The plant entered into Limiting Condition of Operation (LCO) 3.1.3.1.e. This LCO requires thermal power to be reduced to less than or equal to 70% within one hour and then realignment of the CEA within 10 steps of its group within the next hour. Since the plant was at less than 70% power, the one hour time limit to realign CEA #30 began when the CEA initially dropped (0527 hours). Operators performed the required steps of Abnormal Operating Procedure (AOP) 2556 "CEA Malfunctions," Section 4.3, "Dropped Rod."

At 0530 hours the plant entered into Mode 2 due to the dropped CEA.

The Instrument and Control technicians investigating the problem observed the power indicating lights on both CEA power supplies were de-energized. Each CEA is powered from two redundant 15 VDC Coil Power Programmer (CPP) power supplies. Each supply contains a green lamp which is normally illuminated, identifying output power is available and a red lamp which signifies a low voltage condition. The power supply fuses were inspected and found in satisfactory condition. The technicians commenced replacement of the CPP power supplies with the installed spares.

At 0610 hours, the Shift Supervisor (SS) determined sufficient time was not available to realign CEA #30 within 10 steps of the remaining Group 1 CEAs. The SS declared the CEA inoperable and the plant entered into Technical Specification 3.0.3. This specifies if a Limiting Condition for Operation is not met within one hour, action shall be initiated to place the unit in a mode in which the specification does not apply. A reactor shutdown commenced to Mode 3.

At approximately 0615 hours, the installation of the spare power supplies was completed and power was returned to CEA #30, however, at this time the shutdown was in progress.

At 0703 hours the plant entered Mode 3 and logged out of Technical Specification 3.0.3 and LCO 3.1.3.1.e.

II. Cause of Event

The control power to each CEA is supplied from two redundant 15 VDC power supplies, each capable of providing sufficient power to maintain the Control Element Drive Mechanism energized. The installed power supplies are a custom design by Northeast Utilities and Kirnchuk, Inc. The modular power supply design uses blocking diodes that allow the removal/replacement of a single unit when the CEA is energized. In addition, the design features a sensing circuit that compares the power supply's output voltage with the bus voltage. This will detect a failure within the supply and illuminate a red warning lamp on the affected device. The sensing circuit must monitor bus voltage downstream of the blocking diodes resulting in a common tie point to both power supplies. Although this subjects the power supplies to a potential common mode failure in the sensing circuit, the trade-off advantage to the lack of total circuit independence is the ability to identify a failure of one supply. The power supply design basis does not require circuit independence.

The cause of CEA #30 dropping into the core was a fault in the voltage sensing circuit on one of the power supplies. Investigation of the failed power supply identified a drop of solder located between the lead and the case of a capacitor, creating a short circuit across the capacitor. This caused the 15 VDC output to be shorted to the power supply common, resulting in a loss of both supplies.

Prior to their installation, the power supplies were load tested both by the manufacturer and on-site. After installation in the Control Element Drive System Cabinets, the input power to the power supplies was cycled several times during plant testing. No indications of a short circuit were observed during this time.

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

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		YEAR 95	SEQUENTIAL NUMBER — 031 —	REVISION NUMBER 00	

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

III. Analysis of Event

This event is reportable pursuant to 10CFR50.73(a)(2)(i)(A), the completion of any nuclear plant shutdown required by plant Technical Specifications.

The event had minimal safety consequences. The failure of a CEA power supply causes the CEA to fully insert into the core, a condition addressed in the Final Safety Analysis Report (FSAR), Section 14.4.3.1, and existing plant procedures. As stated in the FSAR, the reactor power initially drops in response to the insertion of negative reactivity into the core, however, the local peaking increases due to the local effect on the power distribution. The worst case is when final power level, increased peaking, and core inlet temperature are maximized, which occurs at full power. The FSAR concludes "The Maximum Peak Linear Heat Rate (LHR) for the rod drop event is such that fuel center line melt is not expected." Since the plant was at 10% power when CEA #30 dropped into the core, this event was bounded by the existing accident analysis. Plant operation was performed in accordance with the operating procedures for the conditions present.

IV. Corrective Action

Upon detection of the dropped CEA, the operating shift implemented the actions specified in AOP 2556, "CEA Malfunction," Section 4.3, "Dropped Rod," and entered the plant into the action statements of LCO 3.1.3.1.e. This provided the appropriate immediate actions for this event.

Instrumentation and Control technicians immediately began to troubleshoot the cause of the dropped CEA. The power supply fuses were inspected and found acceptable, therefore, the power supplies were replaced with the installed spares. This action restored power to CEA #30.

After the investigation determined the cause of the failed power supply, a visual inspection was performed on thirty-five additional units. This represents approximately 20% of the total power supplies available, three installed and thirty-two spares. This inspection reviewed the installation of the capacitors as well as overall quality of the components and workmanship. Based on this review, no additional defects were noted and the power supplies were determined to be acceptable for continued operation.

Although the drop of solder across the capacitor appears to be a power supply fabrication error, the capacitor was returned to the manufacturer (Kemet) to determine if an additional problem existed. Kemet's testing revealed the capacitor did not short internally but was subjected to some overheating, most likely during the installation on the circuit board. The manufacturer stated the solder did not wet to the casing of the capacitor but was mechanically connected (cold solder joint). It is theorized that oxidation or foreign material provided a resistance path between the casing and the solder bridge and over time the resistance decreased to a point which caused the power supply failure. Since the inspection performed on the power supplies did not reveal any similar problems, this failure is considered an isolated case.

V. Additional Information

The power supplies were custom built and supplied by Kimchuk, Inc., Model No. NU-06.

EIS Code: AA

Component Code: RJX

Manufacturer Code: 0000

No similar events have occurred.