

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: Selden Street, Berlin Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06414-0270
(203) 665-5000

February 14, 1990
MP-90-170

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

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

Reference: Facility Operating License No. NPF-49
Docket No. 50-423
Licensee Event Report 90-004-00

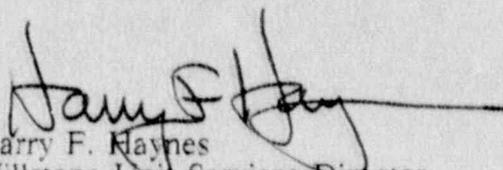
Gentlemen:

This letter forwards Licensee Event Report 90-004-00 required to be submitted within thirty (30) days pursuant to 10CFR50.73(a)(2)(i), any condition prohibited by the plant's Technical Specifications.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: Stephen E. Scace
Director, Millstone Station

BY: 
Harry F. Haynes
Millstone Unit Services Director

SES/JWM:mo

Attachment: LER 90-004-00

cc: W. T. Russell, Region I Administrator
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2 and 3
D. H. Jaffe, NRC Project Manager, Millstone Unit No. 3

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LICENSEE EVENT REPORT (LER)

Estimated burden per response to comply with this information collection request: 50.0 hrs. Forward comments regarding burden estimate to the Records and Reports Management Branch (p-530), U.S. Nuclear Regulatory Commission, Washington, DC 20555, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503.

FACILITY NAME (1) **Millstone Nuclear Power Station Unit 3** DOCKET NUMBER (2) **0 5 0 0 0 4 2 3** PAGE (3) **1 OF 0 3**

TITLE (4) **Failure of Axial Flux Difference Monitor Alarm Due to Inadequate Design and Procedural Inadequacy**

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 NAMES		
0 1	1 5	9 0	9 0	0 0 4	0 0	0 2	1 4	9 0	0 5 0 0 0 0		
<p>THIS REPORT IS BEING SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)</p>											

OPERATING MODE (9) 1	20.402(b)	20.402(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 1 0 0	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)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
	20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME **John W. McConnell, Engineering Technician, Ext. 5284** TELEPHONE NUMBER **2 0 3 4 4 7 - 1 7 9 1**

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRRDS

SUPPLEMENTAL REPORT EXPECTED (14) YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15) MONTH DAY YEAR

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

On January 15, 1990 at 1553, while in Mode 1, at 100% power, 586 degrees Fahrenheit, and 2250 psia, nuclear instrument power range channel N43 became inoperable due to a high voltage power supply failure. The nuclear instrument failure made the Axial Flux Difference (AFD) Monitor Alarm, computer program 3R5, Tilting Factors, inoperable. Manual logging of AFD was started on January 15, 1990 at 2045, but not within the 1 hour limit as required by Technical Specification 4.2.1.1.1.b. The time between the program becoming inoperable and manual logging of AFD was approximately 5 hours. A review of plant data for this period shows that all AFD limits were met during this time interval and there was no significant impact on safety.

The root causes of the event were computer program 3R5 design inadequacy and procedural inadequacy which did not recognize the consequences of an inoperable power range channel on the AFD monitor alarm.

As short term corrective action, a Night Order was issued by the Operations Supervisor to immediately enter Technical Specification 4.2.1.1.1.b whenever a power range channel is inoperable. The actions to prevent reoccurrence included procedure changes to manually monitor AFD with an inoperable power range channel and planned modification to the AFD monitor alarm by June 1, 1990.

**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 Records and Reports Management Branch (p-530), U.S. Nuclear Regulatory Commission, Washington, DC 20555, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503.

FACILITY NAME (1) Millstone Nuclear Power Station Unit 3	DOCKET NUMBER (2) 0 5 0 0 0 4 2 3	LER NUMBER (6)			PAGE (3)	
		YEAR 9 0	SEQUENTIAL NUMBER 0 0 4	REVISION NUMBER 0 0	0 2	OF 0 3

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

I. Description of Event

On January 15, 1990 at 1553, while in Mode 1, at 100% power, 586 degrees Fahrenheit, and 2250 psia, nuclear instrument power range channel N43 alarmed on the alarm printer at 103.5% power. Channel N43 was observed to be fluctuating between 100% and 108% power. Investigation revealed that the high voltage power supply, which is normally set at 800 Volts-DC (VDC), was supplying 2,945 VDC. During the troubleshooting and repair of the power range channel, it was determined that the Axial Flux Difference (AFD) monitor alarm was not indicating properly and the program was inoperable. Manual logging of AFD was started on January 15, 1990 at 2045, but not within the 1 hour limit as required by Technical Specification 4.2.1.1.1.b. Power range channel N43 was returned to service at 2105 on January 15, 1990. Manual logging of indicated AFD was terminated at 2105 on January 16, 1990.

Technical Specification 4.2.1.1.1.b requires that the indicated AFD for each operable excor detector be monitored and logged at least once per hour for the first 24 hours and at least once per 30 minutes thereafter, when the AFD monitor alarm is inoperable and power is greater than 15% power.

II. Cause of Event

The root causes of the event were design and procedural inadequacy. The AFD monitor alarm was not designed to provide accurate information if a power range channel became inoperable. The Instrumentation and Control Department procedures and the alarm response for an inoperable power range channel did not require Shift Management to enter Technical Specification 4.2.1.1.1.b when greater than 15% power.

III. Analysis of Event

This event is reportable pursuant to 10CFR50.73(a)(2)(i), as a condition prohibited by Technical Specifications. Manual logging of AFD was not initiated within the 1 hour time limit required by Technical Specification 4.2.1.1.1.b.

The Technical Specification for AFD required that the AFD be maintained within the target band of +3% to -12% about the target flux difference for a core average accumulated burnup of greater than 3000 megawatt days per metric ton of uranium (MWD/MTU). For a core average burnup of less than 3000 MWD/MTU, the target band is $\pm 5\%$ about the target flux difference. The safety analysis allows for a deviation of 3% between actual core AFD and indicated AFD. Operation of the core with indicated AFD outside of the target band is allowed between 15% and 90% power, but is limited to a cumulative penalty deviation time of 1 hour during the previous 24 hours. With power greater than 90% and indicated AFD outside of the target band, AFD must be restored to within the target band or power reduced to less than 90% within 15 minutes.

A detailed review of the operation of the AFD monitor alarm showed that during potential worst case plant conditions the AFD could have been outside of its target band by as much as 4% more than what is allowed by the safety analysis. If a condition had existed where AFD was near the extreme ends of the target band (i.e., +3 or -12 from the target), a low nuclear instrument channel failure could have caused the calculated value of AFD to be reduced by as much as 4%. This would have occurred without a comparable change in the alarm setpoints. As such, the operator would have been alerted to the alarm condition late.

During the period the alarm was inoperable, plant data indicates that actual AFD remained within 0.5% of the target at all times which was well within the operating limits for AFD. The actual error introduced by the N43 failure was on the order of 0.8% versus the potential maximum of 4%. In addition, backup instruments and recorders independent of the R5 computer program also determine AFD for the operator.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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

III. Analysis of Event (cont.)

There have been numerous occasions when a power range instrument was inoperable due to corrective maintenance or surveillance with power greater than 15%. During these occasions AFD should have been monitored in accordance with Technical Specification 4.2.1.1.1.b. A review of plant data and knowledge of plant conditions indicate that at no time were Technical Specifications limits exceeded.

IV. Corrective Action

Immediate corrective action was to begin manual logging of AFD in accordance with Technical Specification 4.2.1.1.1.b at 2045 on January 15, 1990. Channel N43 was repaired and the R5 program started calculating AFD properly at 2105 on January 15, 1990.

As short term corrective action, a Night Order was issued by the Operations Supervisor to immediately enter Technical Specification 4.2.1.1.1.b whenever a power range channel is inoperable. Subsequently, the Instrument Failure Response procedure was changed to require Shift Management to enter Technical Specification 4.2.1.1.1.b when a power range instrument fails and power is greater than 15%.

The AFD monitor alarm program will be modified to correct for an inoperable power range detector by June 1, 1990.

Unit 3 Instrumentation and Controls Department has modified all the appropriate procedures to inform the operators that program R5 is inoperable when testing the power range detectors and to enter Technical Specification 4.2.1.1.1.b when power is greater than 15%.

V. Additional Information

There are no similar events with the same root cause and underlying concerns. However, LER 86-026-00 and LER 89-029-00 document events when the R5 alarm was inoperable, but due to different root causes. In LER 86-026-00, the root cause was a cognitive failure of personnel to realize the computer failure rendered the AFD monitor alarm inoperable. In LER 89-029-00, the root cause was procedural inadequacy in that a software modification procedure did not specify adequate restoration guidelines. The corrective action was to provide specific procedural guidance on implementation of, and restoration from, software modifications. Therefore, the corrective actions discussed in LER 86-026-00 and 89-029-00 would not have prevented this occurrence.

EIIS Codes

Systems

Computer System - ID
Incore/Excore Monitoring System - IG

Component

Axial Flux Differential Monitor Alarm - ALM