

EXPIRES 04/30/98

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: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO THE INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 P33), 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

TITLE (4)

Non-QA lamps installed in the QA Category 1 Reactor Protection System

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	
04	23	97	97	-- 021 --	00	05	23	97	FACILITY NAME	DOCKET NUMBER	
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)									
N		20.2201(b)			20.2203(a)(2)(v)			50.73(a)(2)(i)		50.73(a)(2)(viii)	
POWER LEVEL (10)		000									
		20.2203(a)(1)			20.2203(a)(3)(ii)			X 50.73(a)(2)(iii)		50.73(a)(2)(x)	
		20.2203(a)(2)(i)			20.2203(a)(3)(ii)			50.73(a)(2)(iii)		73.71	
		20.2203(a)(2)(ii)			20.2203(a)(4)			50.73(a)(2)(iv)		OTHER	
		20.2203(a)(2)(iii)			50.36(c)(1)			50.73(a)(2)(v)		Specify in Abstract below in NRC Form 366A	
		20.2203(a)(2)(iv)			50.36(c)(2)			50.73(a)(2)(vii)			

LICENSEE CONTACT FOR THIS LER (12)

NAME

R. G. Joshi, MP2 Nuclear Licensing

TELEPHONE NUMBER (include Area Code)

(860) 440-2080

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)

YES (If yes, complete EXPECTED SUBMISSION DATE).

X NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR

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

On April 23, 1997, an investigation was completed which indicated that a burned out lamp had failed with an internal short circuit. This investigation was initiated due to an April 8, 1997, event in which a technician noticed a burned out lamp on channel B Low Reactor Coolant Pump (RCP) Speed trip unit and an unusual indicator light configuration on the Reactor Protection System (RPS) BC matrix. The technician was preparing to perform a surveillance test at the time of discovery. When he removed the burned out lamp in the trip unit for the Low RCP Speed trip unit, the other lights returned to normal. The failed lamp was replaced with a new lamp. After further investigation it was postulated that had this failure occurred during operation, there is a possibility that the BC trip matrix could have been unavailable. The other five trip matrices were not affected and would have caused a trip if required. The investigation found that Non-QA lamps were being used in the RPS, a QA Category 1 system, contrary to system design basis. At the time of discovery the unit was defueled.

The cause of this event was an inadequate scope of review in response to NRC Information Notice 94-68: Safety Related Equipment Failures Caused by Faulted Indicating Lamps.

As corrective action an engineering evaluation of low voltage lamp circuit design in safety related equipment which was not reviewed as part of the Information Notice 94-68 response shall be performed. This evaluation will determine if lamp isolation is adequate or if a fault tolerant design exists. It will also evaluate possible interaction between QA and non-QA systems. This action will be completed before entering MODE 4 from the current outage.

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TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
Millstone Nuclear Power Station Unit 2	05000336	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 3
		97	021	00	

TEXT (If more space is required, use additional copies of NRC Form 368A) (17)

I. Description of Event

On April 23, 1997, an investigation was completed which indicated that a burned out lamp had failed with an internal short circuit. This investigation was initiated due to an April 8, 1997, event in which a technician noticed a burned out lamp and an unusual indicator light configuration on the Reactor Protection System (RPS) Channel B (BC matrix). The technician was preparing to perform a surveillance test at the time of discovery. When he removed the burned out lamp in the trip unit for the Low Reactor Coolant Pump (RCP) Speed trip, the other lights returned to normal. The failed lamp was replaced with a new lamp. After further investigation it was postulated that had this failure occurred during operation, there is a possibility that the BC trip matrix could have been unavailable. The other five trip matrices were not affected and would have caused a trip if required. The investigation found that Non-QA lamps were being used in the RPS, a QA Category 1 (Cat-1) system, contrary to system design basis. At the time of discovery the unit was defueled.

This condition is being reported pursuant to 10 CFR 50.73(a)(2)(ii)(B) a condition that is outside the design basis of the plant.

II. Cause of Event

The cause of this event was an inadequate scope of review in response to NRC Information Notice 94-68: Safety Related Equipment Failures Caused by Faulted Indicating Lamps.

III. Analysis of Event

The RPS Channels provide the information to initiate protective action through bistable trip units. There are four independent, redundant measurement channels for each monitored parameter providing independent measurement of the same variable by each of the protective channels, A, B, C, & D. Each channel output is a bistable trip unit with three trip relay contacts. These contacts are arranged in six logic matrices, AB, AC, AD, BC, BD, & CD, forming an "any 2 out of 4" coincidence trip logic for the four protective channels. Each logic matrix has 4 matrix relays which are normally energized. In parallel with each matrix relay is a lamp which is illuminated when the matrix relay is energized. Deenergizing the 4 matrix relays from any one of the 6 logic matrices results in a plant trip (Control Element Assemblies insert into the core). Thus, if one trip matrix fails to operate, any one of the remaining five can initiate a trip.

The shorted lamp in the channel B Low RCP Speed trip unit allowed power to reach the BC logic matrix relays through a circuit which was created by the shorted lamp. A preliminary review of the circuit shows the matrix relays would have about half of the normal voltage applied to them. This would not be enough voltage to pick up the matrix relays, however, if they were energized (normal operating condition, deenergize to trip) it may or may not be enough voltage to prevent the matrix relays from dropping out, when required, to produce a trip. A shorted lamp will affect only the matrix in which it is installed, and it would have no effect on the other 5 matrices.

For the purpose of system analysis, the use of Non-QA lamps in the QA Cat-1 RPS could introduce multiple common mode failures where more than one channel or matrix could be affected. Since Non-QA lamps are used, single failure analysis cannot be used.

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

The NRC issued Information Notice 94-68 which identified safety related equipment failures caused by faulted indicating lamps. In response to IN 94-68 Northeast Nuclear Electric Company (NNECO) conducted a review of safety related circuits for all three Millstone units. This review identified and corrected some indicating lamp designs which did not provide isolation of the lamp from the control circuit. However, at unit 2, this review only included the 120 volt AC and DC indication lamp circuits. The low voltage circuits (i.e. 28 volt) were not reviewed because there was no history of shorted lamps in these circuits and it was believed that the filament in the low voltage lamps were not large enough to fail and cause an internal short.

In light of the fact that only one of the 6 matrices is affected by a failed lamp and this is the first known failure of its kind in a RPS, this is not considered to be a safety significant condition.

IV. Corrective Action

As corrective action an engineering evaluation of low voltage lamp circuit design in safety related equipment which was not reviewed as part of the information Notice 94-68 response shall be performed. This evaluation will determine if lamp isolation is adequate or if a fault tolerant design exists. It will also evaluate possible interaction between QA and non-QA systems. This action will be completed before entering MODE 4 from the current outage.

V. Additional Information

Similar Events

No previous similar events involving a lamp failure which could cause a channel or train failure to actuate were found.

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