

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 INDUSTRY. FORWARD COMMENTS REGARDING BURDEN
ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (IT-
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 3

DOCKET NUMBER (2)

05000423

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TITLE (4)

Inadequate Electrical Separation Between Redundant Protection Trains Associated with Reactor Trip Switches
and Reactor Trip Breaker Indicating Lights.

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
06	10	96	96	015	02	11	22	96	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)							
POWER LEVEL (10)		000	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)	
			20.2203(a)(1)		20.2203(a)(3)(i)		<input checked="" type="checkbox"/> 50.73(a)(2)(ii)		50.73(a)(2)(x)	
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.7	
			20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER	
			20.2203(a)(2)(iii)		50.36(c)(1)		<input checked="" type="checkbox"/> 50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A	
			20.2203(a)(2)(iv)		50.36(c)(2)		<input checked="" type="checkbox"/> 50.73(a)(2)(vii)			

LICENSEE CONTACT FOR THIS LER (12)

NAME

J.M. Peschel, MP3 Nuclear Licensing Manager

TELEPHONE NUMBER (Include Area Code)

(860)437-5840

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).	<input checked="" type="checkbox"/> NO
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EXPECTED
SUBMISSION

MONTH DAY YEAR

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

On June 10, 1996, at 15:30 hours, with the plant in Mode 5 at 0-percent power, it was determined that a noncompliance with electrical separation of redundant protection trains was a condition outside the design basis of the plant. An immediate notification was made on June 10, 1996, pursuant to 10CFR50.72(b)(1)(ii)(B) as a condition outside the design basis of the plant.

Corrective action associated with the June 10th event consisted of detailed walkdowns of vendor supplied equipment and other systems most vulnerable to electrical separation noncompliances. The scope was expanded to include all electrical panels containing redundant Class-1E cables and/or Class-1E and non Class-1E cables. Immediate notifications were made for specific violations on August 9, 1996 and August 19, 1996 pursuant to 10CFR50.72(b)(2)(iii)(D) for the specific conditions found that alone could have prevented the fulfillment of the safety function of systems that are needed to mitigate the consequences of an accident. The additional noncompliances are reportable under 10CFR50.73(a)(2)(vii) as a condition that caused at least one independent train or channel to become inoperable in multiple systems.

The root cause for the electrical separation noncompliances is inadequate job skills for maintaining electrical separation during maintenance and modifications due to inadequate training and staff qualification associated with the electrical separation requirements. In a limited number of cases, the failure to comply with the electrical separation criteria may have existed prior to initial plant startup. These isolated instances would have been due to inadequate inspections by the Architect/Engineer.

Work is in progress correcting identified noncompliances and will be completed prior to plant startup. Training on electrical separation is being developed for applicable plant personnel. In addition, applicable work planning process procedures will be revised to incorporate guidance for electrical separation inspection plan development.

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I. Description of Event

On June 10, 1996, at 15:30 hours, with the plant in Mode 5 at 0-percent power, it was determined that a noncompliance with electrical separation requirements for redundant protection trains was a condition outside the design basis of the plant. A single electrical fault could potentially have rendered the manual Reactor Trip Switch on the Main Control Board inoperable for both A and B Trains. As a result the Reactor Trip Switch on the Main Control Board was declared inoperable and an immediate notification was made on June 10, 1996, pursuant to 10CFR50.72(b)(1)(ii)(B) as a condition outside the design basis of the plant.

The Final Safety Analysis Report (FSAR) specifies that a minimum six-inch separation (or a barrier) applies to spacing between exposed terminals, contacts, and equipment of redundant Class 1E circuits for testing and maintenance purposes. A minimum one-inch separation (or a barrier) is required between redundant wire bundles or Class 1E and non-Class 1E wire bundles. Less than six-inches separation existed between the exposed terminals of the Train A portion of the Reactor Trip Switch and the Train B portion of the Reactor Trip Breaker indicating lights when the condition was identified on June 10, 1996. In addition, less than six-inches separation existed between the Train B portion of the Reactor Trip Switch and the Train A portion of the Reactor Trip Breaker indicating lights on the Main Control Board and less than one-inch separation existed between wire bundles from the contacts associated with the Train A portion of the Reactor Trip Switch and wire bundles associated with the Train B Reactor Trip Indicating Lights. These conditions may have existed since initial plant startup.

Initial corrective action specified detailed inspections of vendor supplied equipment and other systems most vulnerable to electrical separation noncompliances. The completed inspections identified the following items:

- In sections 1 and 2 of the main control board, fourteen electrical separation noncompliances were identified on August 7, 1996. In each case, the "as-found" condition failed to meet the minimum six-inch separation between exposed terminals, contacts, and equipment of redundant Class 1E circuits and/or the minimum one-inch separation between redundant wire bundles or Class 1E and non-Class 1E wire bundles. These conditions are reportable under 10CFR50.73(a)(2)(vii) as conditions that caused at least one independent train or channel to become inoperable in multiple systems. In no case were redundant trains of a system safety function affected.
- In sections 3 and 4 of the main control board, twenty-one electrical separation noncompliances were identified on August 9, 1996. In each case, the "as-found" condition failed to meet the minimum six-inch separation between exposed terminals, contacts, and equipment of redundant Class 1E circuits and/or the minimum one-inch separation between redundant wire bundles or Class 1E and non-Class 1E wire bundles. These conditions are reportable under 10CFR50.72(b)(2)(iii)(D) and 10CFR50.73(a)(2)(v)(D) as conditions that alone could have prevented the fulfillment of the safety function of systems that are needed to mitigate the consequences of an accident. An immediate notification was made on August 9, 1996 pursuant to 10CFR50.72(b)(2)(iii)(D). The immediate report was associated with Train A and B Pressurizer backup heater and reactor vessel head vent isolation valve instrumentation failing to meet the minimum one-inch separation between redundant wire bundles. A further review concluded that several of the noncompliances identified are also reportable under 10CFR50.73(a)(2)(vii) as a condition that caused at least one independent train or channel to become inoperable in multiple systems. In these cases, no redundant trains of a system safety function were affected.
- In sections 5 and 6 of the main control board, twenty-four electrical separation noncompliances were identified on August 14, 1996. In each case, the "as-found" condition failed to meet the minimum six-inch separation between exposed terminals, contacts, and equipment of redundant Class 1E circuits and/or the minimum one-inch separation between redundant wire bundles or Class 1E and non-Class 1E wire bundles. These conditions are

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reportable under 10CFR50.73(a)(2)(vii) as conditions that caused at least one independent train or channel to become inoperable in multiple systems. In no case were redundant trains of a system safety function affected.

- In sections 7 and 8 of the main control board, ventilation panel VP1 and the post accident sample panel, twenty electrical separation noncompliances were identified on August 19, 1996 and August 29, 1996. In each case, the "as-found" condition failed to meet the minimum six-inch separation between exposed terminals, contacts, and equipment of redundant Class 1E circuits and/or the minimum one-inch separation between redundant wire bundles or Class 1E and non-Class 1E wire bundles. These conditions are reportable under 10CFR50.72(b)(2)(iii)(D) and 10CFR50.73(a)(2)(v)(D) for specific conditions found that alone could have prevented the fulfillment of the safety function of systems that are needed to mitigate the consequences of an accident. An immediate notification was made on August 19, 1996 pursuant to 10CFR50.72(b)(2)(iii)(D). The immediate report was associated with main steam isolation and control building isolation instrumentation failing to meet the minimum six-inch separation between exposed terminals, contacts, and equipment of redundant Class 1E circuits. A further review concluded that several of the noncompliances identified are also reportable under 10CFR50.73(a)(2)(vii) as a condition that caused at least one independent train or channel to become inoperable in multiple systems. In these cases, no redundant trains of a system safety function were affected.

Based on the number of electrical separation noncompliances identified, the inspection scope was expanded to include any equipment that contained both trains of Class 1E cables or Class 1E and non-Class 1E cables. No further instances of noncompliance were identified.

II. Cause of Event

The root cause for the electrical separation noncompliances occurring since system turnover is inadequate job skills for maintaining electrical separation during the performance of maintenance and modifications. This has been due to inadequate training and staff qualification associated with the electrical separation requirements identified in engineering specifications and the FSAR. Lack of training applies to personnel who have been performing maintenance and implementing modifications and to planners in work control. Contributing to this was a failure to develop adequate inspection plans for electrical separation criteria that resulted in inspections of inadequate scope.

In a limited number of cases the failure to comply with the electrical separation criteria may have existed prior to initial plant startup. These isolated instances would have been due to inadequate inspections by the Architect/Engineer.

III. Analysis of Event

The Final Safety Analysis Report (FSAR) specifies that a minimum six-inch separation (or a barrier) is required between exposed terminals, contacts, and equipment of redundant Class 1E circuits. A minimum of one-inch of separation (or a barrier) is required between redundant wire bundles for Class 1E and non-Class 1E wire bundles. These separation requirements are to prevent common cause failures and to provide physical protection between redundant Class 1E circuits during testing and maintenance.

There were no adverse safety consequences from this condition, in that the unit has not experienced an event as a result of a failure in electrical separation nor has it experienced an event which was aggravated by a failure in electrical separation of circuits or equipment. However, this condition is significant because the potential existed that these conditions could have prevented the fulfillment of the safety function of a system or systems needed to mitigate

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the consequences of an accident, or had caused at least one independent train or channel to become inoperable in multiple systems

Based on a detailed investigation it has been concluded that the electrical separation of wiring internal to panels was provided in accordance with applicable specifications. Between 1983 and 1985, substantial modifications performed on the main control boards were adequately inspected for electrical separation in accordance with applicable specifications.

Between 1985 and 1996, many of the components associated with non-compliance with the six-inch separation criteria were caused by post startup maintenance and modification activities. However, in a few cases, no maintenance activities could be identified which would have caused specific violations. Therefore, isolated cases of non-compliance with the six-inch, contact to contact, separation criteria may have existed prior to initial plant startup as a result of inadequate inspections. A review of work orders associated with post startup maintenance and modification activities indicates that inspection plans failed to adequately identify electrical separation as an inspection attribute. In addition during this period no detailed training regarding requirements for electrical separation had been provided to individuals responsible for performance of maintenance and modifications.

IV. Corrective Action

No immediate actions were required on June 10, 1996 as the plant was in a shutdown condition at the time of discovery and remained shutdown for unrelated reasons. Immediate corrective action was required for the Control Building Isolation noncompliance that was discovered on August 19, 1996. An entry into the Technical Specification Limiting Condition for Operation was made, and necessary repairs were initiated. In addition, various components in multiple systems were declared inoperable after it was identified that the circuit and/or equipment failed to meet the applicable criteria for electrical separation.

Detailed inspections of vendor supplied equipment and other systems most vulnerable to electrical separation noncompliances were performed in response to the conditions discovered on June 10, 1996. Due to the number of noncompliances identified, the inspection scope was expanded to include any equipment that might have contained both trains of Class 1E cables or Class 1E and non-Class 1E cables. All inspections internal to electrical panels have been completed. These inspections identified additional separation noncompliances.

Additional corrective actions include:

- Maintenance and modifications activities performed internal to panels which could potentially impact electrical separation and were performed during the period from June 1996 to November 1996 will be reviewed to ensure compliance with electrical separation criteria. This review will be completed prior to May 31, 1997.
- Identified electrical separation noncompliances will be corrected prior to entry into mode 4.
- A training module on electrical separation will be implemented as continuing training for applicable personnel from the implementing and Engineering departments. Initial training will be completed by March 31, 1997.
- Applicable work planning process procedures will be revised by January 1, 1997 to incorporate guidance for electrical separation inspection plan development.

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V. Additional Information

None

Similar Events

None

Manufacturer Data

EIIS System Code

Plant Protection System (Manual Reactor Trip) - JC
 Reactor Coolant System (Pre: surizer Heater) - AB
 Reactor Coolant System (Head Vent Isolation) - AB
 Main Steam (Drain line) Isolation - SB
 Control Building Isolation - VI

Architect Engineer

Stone & Webster Engineering Corp.