

LICENSEE EVENT REPORT (LER)

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TITLE (4)
MISSING CABLE TRAY COVERS DISCOVERED DURING THE ELECTRICAL POWER RACEWAY WALKDOWN

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	DOCKET NUMBERS(S)	
1	0	2 8 9 3	9 3	0 3 0	0 0	1	1	2 9 9 3		0 5 0 0 0	
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OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)											
POWER LEVEL (10) 1 0 0	<input type="checkbox"/> 20.402(b)			<input type="checkbox"/> 20.405(c)			<input type="checkbox"/> 50.73(a)(2)(iv)			<input type="checkbox"/> 77.71(b)		
	<input type="checkbox"/> 20.405(a)(1)(i)			<input type="checkbox"/> 50.36(c)(1)			<input type="checkbox"/> 50.73(a)(2)(v)			<input type="checkbox"/> 73.73(c)		
	<input type="checkbox"/> 20.405(a)(1)(ii)			<input type="checkbox"/> 50.36(c)(2)			<input type="checkbox"/> 50.73(a)(2)(vii)			<input type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)		
	<input type="checkbox"/> 20.405(a)(1)(iii)			<input type="checkbox"/> 50.73(a)(2)(i)			<input type="checkbox"/> 50.73(a)(2)(viii)(A)					
	<input type="checkbox"/> 20.405(a)(1)(iv)			<input checked="" type="checkbox"/> 50.73(a)(2)(ii)			<input type="checkbox"/> 50.73(a)(2)(viii)(B)					
<input type="checkbox"/> 20.405(a)(1)(v)			<input type="checkbox"/> 50.73(a)(2)(iii)			<input type="checkbox"/> 50.73(a)(2)(x)						

LICENSEE CONTACT FOR THIS LER (12)									
NAME C. D. Mackaman, Licensing Engineer								TELEPHONE NUMBER	
								AREA CODE 5 0 9 3 7 7 - 4 4 5 1	

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)						EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input type="checkbox"/> NO								03	02	94

ABSTRACT (16)

On October 28, 1993, the Supply System discovered seven locations where tray covers were not installed in accordance with electrical separation design criteria. On November 1, 1993, six additional locations of missing cable tray covers were found.

Walkdowns of electrical power raceways are currently in progress as part of commitments made in response to the Inspection Report (IR) 93-13 potential generic concern that noncredited Thermolag installations were not included in the existing cable ampacity derating evaluation performed for NRC Generic Letter 92-08. Thus far, the walkdowns have found the noncredited Thermolag installations at the Supply System not to impact the cable ampacity derating evaluation. However, the walkdowns did find a total of thirteen locations where metal cable tray covers were not installed. Cable tray covers are used as one method to ensure physical independence of redundant safety-related circuits. The absence of these covers violated electrical separation design criteria specified in WNP-2 Plant Specification 200, Section 201, Page 185. In the event of a single failure induced fire in the open power cable trays, faults could be produced in nearby (intruding) safety-related electrical cables that could result in a loss of the redundant safety function.

The root cause of this event was inadequate management methods to fully identify and resolve cable tray and conduit electrical separation problems.

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Abstract (Cont'd)

Immediate corrective actions were taken to establish hourly fire tours of the areas where cable tray covers were missing and to install tray covers to correct the deficiencies. Further corrective actions are to: (1) properly document, evaluate, and correct walkdown identified deficiencies; (2) incorporate as-built information collected during the walkdowns into the design data base; (3) develop methods for design configuration control and feedback of as-built information to assure design data base accuracy; (4) train plant personnel to assure understanding that only trained engineering personnel are to perform electrical separation evaluations; and (5) review and walkdown a sample of plant design changes from the last two refueling outages to verify that electrical separation related mistakes are not recurring.

Plant Conditions

Power Level - 100%

Plant Mode - 1 (Power)

Event Description

On October 28, 1993, the Supply System discovered seven locations where tray covers were not installed in accordance with electrical separation design criteria. On November 1, 1993, six additional locations of missing cable tray covers were found.

Walkdowns of electrical power raceways are currently in progress as part of the commitments made in response to the Inspection Report (IR) 93-13 potential generic concern that noncredited Thermolag installations were not included in the cable ampacity derating evaluation performed for NRC Generic Letter 92-08. Thus far, the walkdowns have found the noncredited Thermolag installations not to impact existing cable ampacity derating calculations. However, the walkdown scope has been increased to include, in part, verification of metal cable tray cover (electrical separation barrier) locations. Cable tray covers are used to ensure physical independence of redundant safety-related circuits in accordance with WNP-2 Plant Specification 200, Section 201, Page 185. A total of thirteen locations of nonconformance to this criteria have been identified during the walkdowns.

The failure to fully implement this electrical separation design criteria could impact safety-related equipment function. In the event of a single failure induced fire in the open power cable trays, faults could be produced in redundant safety-related electrical cables (circuits) that are routed in nearby (intruding) cable trays or conduit. The safety-related cable faults could result in a loss of the redundant safety function.

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Immediate Corrective Actions

Immediate corrective actions were taken to:

1. Establish hourly fire tours of the areas where cable tray covers were missing to enhance the ability to detect a fire and mitigate the probable effects of a fire.
2. Install cable tray covers as soon as practicable to correct the deficiencies.

Further Evaluation and Corrective Action

Further Evaluation

1. In accordance with 10CFR50.72(b)(1)(ii)(B), the first seven identified locations of electrical separation design criteria nonconformance were reported to the NRC Operations Center. The report was made via the Emergency Notification System (ENS) on October 28, 1993, at 1130 hours (PDT) as "Any event or condition during operation . . . that results in the nuclear power plant being . . . [i]n a condition that is outside the design basis of the plant."

The initial report was updated via the ENS on November 1, 1993, at 1623 hours (PST) when six additional locations of nonconformance with the electrical separation design criteria were found.

2. This event is being reported pursuant to 10CFR50.73(a)(2)(ii)(B) as "Any event or condition . . . that resulted in the nuclear power plant being . . . [i]n a condition that was outside the design basis of the plant. . ."
3. Three separate cable tray separation walkdowns have been conducted since original plant construction to identify and address potential electrical conduit and raceway separation problems.
 - In 1983, a walkdown was conducted to address nonconforming cable tray to conduit configurations identified by the NRC Construction Assessment Team (CAT). The CAT item was closed by the NRC in 1984. The full scope of the areas inspected during the walkdown cannot be determined because only deficiencies were documented.
 - In 1985, a walkdown of all cable trays was conducted to address potential electrical separation deficiencies identified by the Resident NRC Inspector (LER 85-023). The last of the deficiencies identified during the walkdown was corrected in 1988.

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- In 1990, cable tray walkdowns were conducted to verify electrical separation barriers (including covers) for cable trays. Although these walkdowns were intended to include the entire plant, the documentation from these walkdowns indicates that all areas were not evaluated.

- There is evidence that some of the conduit and cable tray separation deficiencies identified during the present walkdowns resulted from work activities performed after construction (e.g., BDC 86-0306-0A). However, in most cases, there is insufficient information to determine if the deficiencies were missed by the previous walkdowns or were created by post-startup work activities.
- Training provided on plant electrical separation criteria has not been adequate. Periodic training on separation criteria is given to design engineers but there has been no continued training for Plant Technical engineers, field engineers, and craft since initial plant startup. In addition, a Quality Assurance audit conducted in response to LER 85-023 determined that Quality Control (QC) inspectors were not adequately trained to inspect for conformance to electrical separation criteria.
- Before 1985, electrical separation criteria were not included in plant procedures related to electrical raceway and cable installation. These procedures were revised in 1985 to include some separation criteria information in response to LER 85-023. However, maintenance procedures, PPM 10.25.54, "Cable Pulling," and PPM 10.25.57, "Raceway Installation," were not adequately revised to assure that electrical separation was maintained.
- Currently, there is no programmatic method to feedback as-built information to Design Engineering.
- The Supply System has recently initiated significant senior management changes to improve previously identified weaknesses in management methods. One area that was identified in the 1993 Systematic Assessment of Licensee Performance (SALP) Report was the Supply System's inadequate and ineffective corrective actions. The new management have clearly expressed their expectation that problems are to be corrected to properly resolve the immediate concern and also to prevent recurrence. Management has reemphasized a commitment to identify and then effectively complete all corrective actions prior to the scheduled date. A corrective action backlog reduction plan has been implemented to track corrective actions and facilitate closure of the actions. Management has also included specific goals for quality and timeliness of corrective actions in supervisory personnel performance plans. These actions, which were committed to in the SALP response, should reduce the chance of recurrence of this problem.

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Unlike the previous electrical raceway walkdowns, the present walkdown has trained dedicated personnel with specific inspection criteria and identified scope. The scope addressed by these walkdowns includes all plant areas and has been established using plant drawings and as-built tray cover information. The as-built information has been reverified through specific spot inspections and visual walkdowns. Senior management have been involved in oversight of the present walkdown effort by allocating budget and manpower, and establishing project management oversight. The Supply System believes that these changes in management methods, in conjunction with the following further corrective actions, will correct the long standing cable tray and conduit electrical separation problems at WNP-2.

- Plant maintenance procedures, PPM 10.25.54 and PPM 10.25.57, have been "deviated" (changed without requiring a revision) to assure that only engineering personnel trained on the WNP-2 electrical separation criteria perform electrical separation evaluations.

Root Cause

The root cause for this event was inadequate management methods to fully identify and resolve cable tray and conduit electrical separation problems. Planning and coordination of previous walkdown work activities, control of documentation, training, communication between organizations, and monitoring and assessment of corrective actions have been less than adequate.

Three contributing causes have been identified:

- Weaknesses in as-built information in the design data base.
- Weaknesses in configuration control methodology and procedures to feedback complete as-built information to Design Engineering.
- Reliance on untrained Plant Technical engineers, field engineers, and QC inspectors for conformance to electrical separation criteria.

Further Corrective Action

- The present raceway walkdown scope and associated activities will be completed, assuring that deficiencies are properly documented, evaluated, and corrected. As-built information will be submitted to Design Engineering by July 1, 1994.
- The as-built information collected during the walkdowns will be incorporated into the design data base by December 31, 1994.

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3. Plant Technical will coordinate with Design Engineering and other appropriate departments to develop and implement programmatic methods for design configuration control during maintenance and modification activities and as-built information feedback to assure design data base accuracy. The new methodology will be implemented by March 31, 1994.
4. Appropriate plant personnel will be trained on the new "deviations" to plant maintenance procedures, PPM 10.25.54 and PPM 10.25.57, to assure understanding that only engineering personnel trained on the WNP-2 electrical separation criteria are to perform electrical separation evaluations. Training will be completed by December 3, 1993.
5. A sample of plant design changes (BDCs) from the last two refueling outages, that could introduce electrical separation deficiencies, will be reviewed and walked down by engineering personnel trained on the electrical separation criteria to verify that electrical separation related mistakes reported in past LERs are not recurring. This BDC verification will be completed by March 31, 1994.

Safety Significance

Identified electrical separation deficiencies are likely to have no safety significance. Some of the identified conduits requiring protection may only contain circuits with no safety function. Those circuits within the identified conduits that do have safety functions are not likely to be functionally redundant to those in the redundant division open cable tray. However, to verify this requires considerable evaluation and the Supply System has concluded that installing the missing cable tray covers is more cost effective.

The purpose of the electrical separation criteria is to ensure that a single failure induced, localized cable raceway or enclosure fire does not result in the loss of redundant safety functions. A localized raceway fire resulting from a single failure is extremely unlikely. However, assuming one did occur, the identified separation deficiencies may affect safety-related functions and may result in a degradation of the ability to mitigate the effects of a Design Basis Accident (DBA).

The Supply System believes that there was minimal safety significance associated with the individual electrical separation deficiencies based on the low probability of occurrence. However, the Supply System also believes that there was potentially collective safety significance associated in view of the relatively large number of deficiencies identified and the extended period of time the deficiencies may have existed.

Similar Events

LER 85-023, "10CFR50 Appendix 'R' Cable Fire Protection and Electrical Separation," reported, in part, inadequate electrical separation between raceways carrying "prime" circuits (nonsafety-related circuits connected to a safety-related power supply) due to missing or improperly installed cable tray covers.

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LERs 91-010, 92-021, and 92-031 reported deficiencies associated with electrical separation but the deficiencies did not involve cable trays or conduit.

All of the above similar events involved electrical separation design and installation problems that occurred during original plant construction. However, except for originating during construction, the circumstances surrounding these past events appear unrelated. As a result, these events were previously believed to be random instances of electrical separation criteria nonconformance and not amenable to general corrective action. Of the four events, only LER 85-023 could be viewed as a possible precursor to this event. The LER identified a similar condition where cable tray covers were missing between redundant Class 1E conduits and open Non-Class 1E cable trays which traverse across them. "Further Corrective Action" No. 5, above, should verify that previous electrical separation related mistakes are not recurring.

EIIS Information

Text Reference

Cable Raceway System
Cable
Cable Tray
Conduit

EIIS Reference

System Component

FA	---
---	CBL
---	TY
---	CND