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SUBJECT: LER 93-030-02:on 931028,found seven locations where electrical raceway cable tray cover deficiencies were found. Caused by inadequate management methods.Establishing fire tour of affected areas.W/940819 ltr.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

P.O. Box 968 • 3000 George Washington Way • Richland, Washington 99352

August 19, 1994
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Docket No. 50-397

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

Subject: **NUCLEAR PLANT WNP-2, OPERATING LICENSE NPF-21**
LICENSEE EVENT REPORT NO. 93-030, REVISION 2

Transmitted herewith is Revision 2 to Licensee Event Report (LER) No. 93-030 for WNP-2. This report is submitted in response to the report requirements of 10CFR50.73 and discusses the items of reportability, corrective action taken, and action taken to preclude recurrence.

The original LER reported the discovery of missing electrical power raceway cable tray covers during walkdowns originally undertaken to identify the installation locations of noncredited Thermolag fire barriers. Walkdowns of accessible areas were approximately 50% complete when the LER was issued. Revision 1 to the LER described additional cable tray deficiencies identified during the walkdown of accessible areas completed on January 25, 1994. The remaining accessible areas were walked down prior to plant shutdown for the 1994 (R-9) Refueling Outage. Areas that were inaccessible during plant operation due to high radiation were walked down during the R-9 outage. This revision describes the cable tray deficiencies identified throughout the electrical power raceway walkdown project and satisfies the supplemental reporting commitment of Revision 1. No further revisions to this LER are expected.

Sincerely,

J. V. Parrish (Mail Drop 1023)
Assistant Managing Director, Operations

JVP/CDM
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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Washington Nuclear Plant - Unit 2	0 5 0 0 0 3 9 7	1 OF 6

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 2	0 8	1 9	9 4		0 5 0 0 0
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OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
1	20.402(b)	20.405(C)	50.73(a)(2)(iv)	77.71(b)
POWER LEVEL (10) 1 0 0	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.73(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)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
	20.405(a)(1)(iv)	X 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)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
C. D. Mackaman, Licensing Engineer	AREA CODE 5 0 9 3 7 7 - 4 4 5 1

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

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SUPPLEMENTAL REPORT EXPECTED (14)	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO			

ABSTRACT (16)

On October 28, 1993, with WNP-2 in Mode 1 (Power Operations) at 100% power, the Supply System found seven locations where electrical raceway cable tray covers were not installed in accordance with electrical separation design criteria. These cable tray cover deficiencies were found during electrical power raceway walkdowns being conducted to identify noncredited Thermolag installations. At the conclusion of the walkdowns on June 23, 1994, a total of 166 locations were found with missing cable tray covers or other deficiencies, such as gaps or holes in the cable tray covers.

Cable tray covers provide physical independence of redundant safety-related circuits. The absence of these covers violates WNP-2 electrical separation design criteria. A failure induced fire in an open power cable tray could produce faults in nearby safety-related electrical cables, resulting in a loss of a redundant safety function.

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

Corrective actions included: establishing fire tours of affected areas, correcting cable tray deficiencies, incorporating as-built information into the design data base, developing methods for design configuration control and feedback of as-built information into the design data base, training of plant personnel, and review and walkdown of a sample of recent plant design changes to verify that electrical separation related mistakes are not recurring.

Event Description

On October 28, 1993, with WNP-2 in Mode 1 (Power Operations) at 100% power, the Supply System found seven locations where electrical raceway cable tray covers were not installed in accordance with electrical separation design criteria. These cable tray cover deficiencies were found during walkdowns of electrical power raceways being conducted 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. The Thermolag walkdown scope included verification of metal cable tray cover locations because the cable tray covers are used as electrical separation barriers. At the conclusion of the walkdowns on June 23, 1994, a total of 166 locations were found with missing cable tray covers or other deficiencies, such as gaps or holes in the cable tray covers.

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. 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.

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. Correct the cable tray cover deficiencies. All field work to correct the deficiencies has been completed.

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. Prior to the recently completed walkdowns, three separate cable tray separation walkdowns had 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.

   - 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 the walkdowns indicates that all areas were not evaluated.

4. There was evidence that some of the conduit and cable tray separation deficiencies identified during the recent walkdowns resulted from work activities performed after construction (e.g., BDC 86-0306-0A). However, in most cases, there was insufficient information to determine if the deficiencies were missed by the previous walkdowns or were created by post-startup work activities.

5. Training had not been adequate to assure consistent compliance with plant electrical separation criteria. Although Plant Technical engineers and field engineers were authorized to perform electrical separation evaluations, there had not been continued electrical separation training provided for them 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 plant electrical separation criteria. Periodic training on the plant electrical separation criteria has been provided to design engineers.

6. 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, Plant Procedure Manual (PPM) maintenance procedures 10.25.54, "Cable Pulling," and 10.25.57, "Raceway Installation," were not adequately revised to assure that electrical separation was maintained.

7. 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.

   Unlike the previous electrical raceway walkdowns, the recently completed walkdown had trained dedicated personnel with specific inspection criteria and identified scope. The scope addressed by these walkdowns included applicable plant areas and had been established using plant drawings and as-built tray cover information. The as-built information had been reverified through specific spot inspections and visual walkdowns. Senior management had been involved in oversight of the recent 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.

8. PPM maintenance procedures 10.25.54 and 10.25.57 have been changed to assure that only 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 had been less than adequate.

Three contributing causes were identified:

1. Weaknesses in as-built information in the design data base.

2. Weaknesses in configuration control methodology and procedures to feedback complete as-built information to Design Engineering.

3. Reliance on untrained Plant Technical engineers, field engineers, and QC inspectors for conformance to electrical separation criteria.

Further Corrective Action

1. The electrical power raceway walkdown project and associated activities were completed, assuring that the deficiencies were properly documented, evaluated, and corrected. As-built information was submitted to Design Engineering on June 24, 1994.

2. The as-built information collected during the walkdowns will be incorporated into the design data base by December 31, 1994. Cable ampacity calculations have been completed for as-built raceway configurations and include ampacity derating for non-credited Thermolag installations where applicable.

3. Plant Technical coordinated with Design Engineering and other appropriate departments to develop and implement programmatic methods for electrical separation design configuration control during maintenance and modification activities and as-built information feedback to assure design data base accuracy.

4. Appropriate plant personnel were trained on the changes to PPM maintenance procedures 10.25.54 and 10.25.57 to assure understanding that only personnel trained on the WNP-2 electrical separation criteria are to perform electrical separation evaluations.

5. A sample of plant design changes (BDCs) from the last two refueling outages, that could introduce electrical separation deficiencies, were reviewed and walked down by engineering personnel trained on the electrical separation criteria to verify that electrical separation related mistakes reported in past LERs were not recurring. For the six BDCs reviewed, no electrical separation deficiencies were found.

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 had concluded that installing the missing cable tray covers was 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 in view of the 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.

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. The review of plant design changes from the last two refueling outages for "Further Corrective Action" No. 5, above, found no electrical separation related mistakes.

EIIS Information

Text Reference	EIIS Reference System	EIIS Reference Component
Cable Raceway System	FA	---
Cable	--	CBL
Cable Tray	--	TY
Conduit	--	CND