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SUBJECT: LER 93-014-01:on 930803,discovered inadequate backup overcurrent protection for containment penetrations due to inadequate design analysis using inaccurate & incomplete documentation.Changed plant procedure.W/930901 ltr.

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

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September 1, 1993
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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. 93-014-01

Transmitted herewith is Licensee Event Report No. 93-014-01 for the WNP-2 Plant. 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. This revision is submitted based on additional noncompliances found during performance of the corrective actions.

Sincerely,

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

JVP/DAS/cgeh
Enclosure

cc: Mr. B. H. Faulkenberry, NRC - Region V
Mr. R. Barr, NRC Resident Inspector (Mail Drop 901A, 2 Copies)
INPO Records Center - Atlanta, GA
Mr. D. L. Williams, BPA (Mail Drop 399)

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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)
INADEQUATE BACKUP OVERCURRENT PROTECTION FOR CONTAINMENT PENETRATIONS

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)
0 8	0 3	9 3	9 3	-- 0 1 4	-- 0 1	0 9	0 1	9 3		0 5 0 0 0
										0 5 0 0 0

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)	0 9 9	20.402(b)	20.405(C)	50.73(a)(2)(iv)	77.71(b)
		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
D. A. Swank, Licensing Engineer	AREA CODE 5 0 9 3 7 7 - 4 5 6 3

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
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (16)

On March 25, 1993, an Electrical Engineer found five electrical lighting circuits associated with Primary Containment that were not turned off during plant operation and did not have adequate backup overcurrent protection. This condition could cause failure of the impacted Primary Containment electrical penetrations. This problem was discovered as part of an Electrical Calculation Improvement Program being carried out by Engineering at WNP-2. All circuits entering Primary Containment must be properly protected with primary and secondary overcurrent protection or shut off procedurally during power operation. It was found that procedures did not address shutting off five circuits that feed 120 volt receptacles within containment. The backup protection to these circuits was found to be too large to protect the containment penetrations. Additional inadequate penetration overcurrent protection conditions were found on August 3, 1993, during performance of Further Corrective Action Number 4. The penetration conductors and supported equipment were declared inoperable.

Immediate action was taken by opening the breakers feeding the five involved electrical circuits.

The root cause of this event was a less than adequate design analysis using inaccurate and incomplete documentation.

Abstract (Cont'd)

Further corrective action was taken by changing Plant Procedure PPM 1.3.4, Operating Data and Logs, to require the impacted circuit breakers be verified in the tripped condition at least once per day when the plant is in Modes 1, 2, or 3. In addition, the Technical Specifications and the FSAR are being changed to reflect the condition of the circuits. For the August 3, 1993 identified condition, all but two of the deficiencies were corrected. The Technical Specification actions are being met for the remaining two items.

The event posed no threat to the health and safety of either the public or plant personnel.

Plant Conditions

Power Level - 99%
Plant Mode - 1

Event Description

On March 25, 1993, an Electrical Engineer found five electrical lighting circuits that were not required by procedure to be shutoff during power operation. With the associated breakers closed and with inadequate backup overcurrent protection an overcurrent condition in conjunction with the single failure of the primary overcurrent protection device could cause failure of the involved Primary Containment electrical penetrations. This problem was discovered as part of an Electrical Calculation Improvement Program being carried out by Engineering at WNP-2. The original calculation (Calculation Number 02.03.12) provided to the Supply System by the architectural engineer was being updated to verify compliance with Regulatory Guide 1.63, Electric Penetration Assemblies in Containment Structures for Nuclear Power Plants, by checking the overcurrent protection of each wire. During the update of this calculation, it was found that the following lighting circuits for the Primary Containment were not procedurally controlled and did not have adequate backup overcurrent protection for their penetrations.

Circuit No. 19 & 21 of Lighting Panel E-LP-3DAC
Circuit No. 16 & 17 of Lighting Panel E-LP-6BAC
Circuit No. 19 of Lighting Panel E-LP-6BAB

On August 3, 1993, with the plant in Operational Condition 3, Hot Shutdown, additional penetration protection problems were found during performance of Further Corrective Action 4 identified in this LER. In order to limit the load carried by individual penetration conductors, prior to initial plant startup several loads were divided to penetrate containment through two conductors. An assumption was made by the Architect Engineer that the current would be carried equally by each conductor. Since the cables leading to the penetrations were of different lengths, however, this assumption was not valid due to the added resistance inherent in the longer cable runs. Thus, one cable of the pair could carry a significantly larger

portion of the load. Although the primary penetration protection devices were sized to protect the electrical penetration, the secondary overcurrent protection was inadequately sized for the range of postulated overcurrent heating. This condition was identified during a detailed review of the containment penetration overcurrent protection device calculation in August 1993. The secondary overcurrent protection for these valves was changed from circuit breakers to fuses in 1989 to satisfy coordination requirements. Neither the circuit breakers or the fuses satisfy the secondary overcurrent protection requirements because of the difference in lengths in the parallel paths through the electrical penetrations specified by the Architect Engineer. The valves affected by this condition are listed below:

MS-V-16 - Main Steam (MS) Drain Valve
RWCU-V-1 - Reactor Water Cleanup (RWCU) Outboard Containment Isolation Valve
RHR-V-9 - Shutdown Cooling Inboard Containment Isolation Valve
RCIC-V-63 - Reactor Core Isolation Cooling (RCIC) Steam Isolation Valve
RCC-V-40 - Reactor Closed Cooling Water (RCC) Inboard Containment Isolation Valve
RHR-V-123B - Residual Heat Removal (RHR) Testable Check Bypass Valve
RCIC-V-76 - Reactor Core Isolation Cooling (RCIC) Steam Isolation Bypass Valve
RHR-V-123A - Residual Heat Removal (RHR) Testable Check Bypass Valve

On August 3, 1993, it was also determined that the parallel path secondary overcurrent protection devices for the inboard main steam isolation valve position indications were inadequately sized. This deficiency was corrected as described in the Further Corrective Action section. The primary overcurrent protection devices were adequate.

Immediate Corrective Action

Compensatory action was taken by opening the breakers feeding the five involved electrical circuits which feed 120 volt outlets in Primary Containment.

On August 3, 1993, the affected valves and overcurrent protection devices were declared inoperable and the appropriate Technical Specification Action statements were entered and actions taken. The applicable Technical Specifications included 3.8.4.2 (Penetration Overcurrent Protective Devices), 3.6.3 (Primary Containment Isolation Valves), and 3.4.9.1 (Residual Heat Removal).

Further Evaluation Root Cause, and Corrective Action

A. Further Evaluation

1. This event is being reported per the requirements of 10CFR50.73(a)(2)(ii)(B) as " . . . a condition that was outside the design basis of the plant . . . ." The event was also called in to the NRC Operations Center on March 26, 1993, and August 3, 1993, as required by 10CFR50.72(b)(1)(ii)(B).

2. Interviews with engineering personnel disclosed that in the late 1970s the Three Mile Island Accident raised a concern about ignition sources in the Primary Containment. As part of this concern, potential ignition sources were evaluated in the containment including lighting circuits. It was determined that all lighting in the containment would be deenergized and procedurally controlled in Modes 1 through 3. In February 1982, the original draft of the Technical Specifications added Section 3.8.4.1 that listed two Lighting Panels supplying circuits inside Primary Containment. The interviews identified that the circuits described in this LER should have been part of that amendment.

3. A review of the WNP-2 electrical penetrations to verify compliance to Regulatory Guide 1.63 was performed in 1981. The result of this review was documented in the Supply System response to FSAR question 040.034. Tables associated with the response to this question list approximately 300 line items where penetration conductors, circuit data, and both primary and secondary overcurrent devices are listed.

4. The evaluation performed in 1981 made incorrect assumptions and contained errors associated with the plotting of the I^2t characteristics for Westinghouse supplied penetrations. The most significant of the incorrect assumptions was that breakers and fuses from various manufacturers have similar characteristics. Although the characteristics may be similar between manufacturers, there were enough differences to lead to improper conclusions. In addition, the curves developed as part of calculation 02.03.12 consistently reflect a higher current carrying capability than the curves provided by Westinghouse for the electrical penetrations. This resulted in the identification of circuits with inadequate backup overcurrent protection. Primary overcurrent protection devices are properly sized.

5. This event was discovered as part of the Electrical Engineering Calculation Improvement Program. Because this effort is not complete it may generate additional reportable items. These will be reported as revisions to this LER.

6. There were no structures, components, or systems that were inoperable prior to the start of this event that contributed to the event.

B. Root Cause

The root cause of this event was a less than adequate design analysis using inaccurate and incomplete documentation prior to plant operation. This led to the approval and installation of a design that was not in compliance with regulatory requirements.

C. Further Corrective Action

1. Plant Procedure PPM 1.3.4, Operating Data and Logs, was changed to require breakers for LP-3D-A-C circuits 19 and 21, LP-6B-A-C circuits 16 and 17, and LP-6B-A-B circuit 19 be verified in the tripped condition at least once per day when the plant is in Modes 1, 2, or 3.

2. Technical Specification 3.8.4.1, AC Circuits Inside Primary Containment will be modified. The additional circuit breakers that required deenergization will be added or Generic Letter 91-08 will be used to remove this list of equipment from the Technical Specifications. This request to revise the Technical Specification will be made by October 30, 1993.

3. The response to FSAR Question 040.034 will be modified to eliminate the circuits that do not have adequate redundant overcurrent protection. This FSAR update is dependant on completion of Item 4 below. The 1994 FSAR revision will include this updated information.

4. Electrical distribution system calculations are currently being reviewed and updated on an ongoing basis under the Calculation Improvement Program. The condition described in this report involved an update of the calculation on Primary Containment Electrical Penetration Short Circuit Capability. Update of this calculation is expected to be complete by October 29, 1993.

5. With the exception of valves RHR-V-123A/B, wiring changes have been made to provide adequate primary and backup overcurrent protection for the listed valves/electrical penetrations and main steam isolation valve position indication circuits. For RHR-V-123A/B, the valves have been removed from service, declared inoperable, and will remain inoperable in Operation Conditions 1, 2, and 3. Since these two valves are not currently used for either normal or emergency operations, the ultimate disposition for these valves is being evaluated. If no action is taken to permanently remove power from these two valves, wiring changes will be made to meet the design requirements during the next refueling outage scheduled for April 1994.

Safety Significance

The circuits associated with this event feed electrical receptacles inside Primary Containment. During power operation the Primary Containment is normally inerted and no equipment is operated from these receptacles. The receptacles are mainly used during refueling outages when Primary Containment is not required. The circuit breakers feeding these circuits protect the penetration if a fault occurs. There is a low probability of having high fault currents at the time Primary Containment is needed (Loss of Coolant Accident conditions) combined with the failure of the primary overcurrent protection device. For the valves identified with inadequate secondary overcurrent protection, the primary overcurrent protection is adequate. For the electrical penetration failure to have had any impact on safety it would have required an overcurrent condition coincident with both a failure of the primary protection fuse to blow and a LOCA. It is concluded there is no safety significance associated with this event.

Similar Events

There have been no similar events involving adequacy of overcurrent protection of electrical penetrations. There have been other reportable events associated with electrical calculations. LERs 89-034 and 92-027 were written on inadequate coordination of overcurrent protection on 480 volt Motor Control Centers. LER 91-033 discussed inadequate fuse coordination on the 250 volt DC system. LER 93-003 documented inadequate coordination of primary undervoltage on the 4.16 kV vital buses.

EIIS Information

Text Reference	EIIS Reference System	EIIS Reference Component
Primary Containment	BD	--
Lighting Panel E-LP-3DAC	EC	LP
Lighting Panel E-LP-6BAC	EC	LP
Lighting Panel E-LP-6BAB	EC	LP
MS-V-16	SB	V
RWCU-V-1	CE	ISV
RHR-V-9	BO	ISV
RCIC-V-63	BN	ISV
RCC-V-40	CC	ISV
RHR-V-123B	BO	V
RCIC-V-76	BN	V
RHR-V-123A	BO	V
Main Steam Isolation Valve	SB	ISV