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Palisades Nuclear Plant: 27780 Blue Star Memorial Highway, Covert, MI 49043

**G B Slade**  
General Manager

January 6, 1994

Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT -  
LICENSEE EVENT REPORT 93-014 - FAILURE OF ELECTRICAL CONTAINMENT PENETRATIONS  
TO MEET DESIGN FEATURES DESCRIBED IN TECHNICAL SPECIFICATIONS AND FSAR

Licensee Event Report (LER) 93-014 is attached. This event is reportable in  
accordance with 10CFR50.73(a)(2)(ii)(B) as a condition outside the design  
basis of the plant.

  
Gerald B Slade  
General Manager

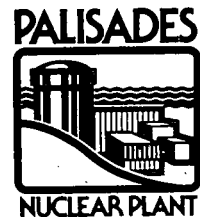
CC Administrator, Region III, USNRC  
NRC Resident Inspector - Palisades

Attachment

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) <b>Palisades Plant</b>	DOCKET NUMBER (2) 0   5   0   0   0   2   5   5	PAGE (3) 1   OF   0   4
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TITLE FAILURE OF ELECTRICAL CONTAINMENT PENETRATIONS TO MEET DESIGN FEATURES DESCRIBED IN TECHNICAL SPECIFICATIONS AND FSAR

EVENT DATE (5)			LER NUMBER (8)			REPORT DATE (6)			OTHER FACILITIES INVOLVED (8)													
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES													
1	2	0	7	9	3	9	3	-	0	1	4	0	0	0	1	0	6	9	4	N/A		
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)																						
OPERATING MODE (9) N			20.402(b)			20.405(c)			60.73(a)(2)(iv)			73.71(b)										
POWER LEVEL (10) 1   0   0			20.405(a)(1)(i)			60.38(c)(1)			60.73(a)(2)(v)			73.71(c)										
			20.405(a)(1)(ii)			60.38(c)(2)			60.73(a)(2)(vii)			OTHER (Specify in Abstract below and in Text, NRC Form 386A)										
			20.405(a)(1)(iii)			60.73(a)(2)(ii)			60.73(a)(2)(viii)(A)													
			20.405(a)(1)(iv)			60.73(a)(2)(iii)			60.73(a)(2)(viii)(B)													
			20.405(a)(1)(v)			60.73(a)(2)(iii)			60.73(a)(2)(x)													

LICENSEE CONTACT FOR THIS LER (12)

NAME		TELEPHONE NUMBER	
Cris T. Hillman, Staff Licensing Engineer		AREA CODE 6   1   6	7   6   4   -   8   9   1   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)

YES If yes, complete EXPECTED SUBMISSION DATE (15)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (16)	MONTH	DAY	YEAR

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

On December 7, 1993, at 1240 hours, with the plant operating at 100% power, it was determined that the containment electrical penetrations in the north and southwest penetration rooms did not meet all the design criteria specified in the Palisades Final Safety Analysis Report (FSAR) and the Technical Specifications. In each room, a non-seismic nitrogen system is connected to each electrical penetration between the double barriers. Furthermore, the bottles and connecting piping for the nitrogen system to the southwest penetration room lie outside the auxiliary building and, therefore, are not tornado protected.

The cause of this event was inadequate design control. The design of the electrical penetrations was modified in 1970 and again in 1982 without recognizing all of the design requirements of the electrical penetrations as containment isolation boundaries.

Corrective action for this event includes evaluating appropriate actions to address the deficiencies in the electrical penetration design, evaluating the containment isolation boundaries for the electrical penetrations, incorporating electrical penetration design requirements for the nitrogen supply into plant design documents, implementing permanent corrective action for the electrical penetration design deficiency, and providing a lessons learned memo to plant engineers emphasizing the evaluation of functional interfaces when making changes to plant equipment.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (3)						PAGE (4)						
		YEAR	-	SEQUENTIAL NUMBER	-	REVISION NUMBER		OF						
PALISADES PLANT	0   5   0   0   0   2   5   5	9	3	-	0	1	4	-	0	0	0   2		OF	0   4

EVENT DESCRIPTION

On December 7, 1993, at 1240 hours, with the plant operating at 100% power, it was determined that the containment electrical penetrations [NH;PEN] in the north and southwest penetration rooms did not meet all the design criteria specified in the Palisades Final Safety Analysis Report (FSAR). The deficiency was identified during design engineering of a modification to the nitrogen supply for the north penetration room.

Technical Specification 5.2.2a states that all penetrations through the steel-lined concrete structure for electrical conductors, pipe, ducts, air locks, and doors are of the double-barrier design. FSAR Section 5.8.6.2.2 also describes the electrical containment penetrations as being of a double barrier design. In addition, FSAR Section 5.8.6.2 states that all containment penetrations are seismic and tornado protected. The penetrations in the north and southwest penetration rooms do not meet all of these requirements in that, in each room, a non-seismic nitrogen system is connected to each electrical penetration between the double barriers. Furthermore, the nitrogen bottles and connecting piping for the nitrogen system to the southwest penetration room lie outside the auxiliary building and, therefore, are not tornado protected.

This event is reportable to the NRC in accordance with 10CFR50.73(a)(2)(ii)(B) as a condition outside the design basis of the plant.

CAUSE OF THE EVENT

The cause of this event was inadequate design control. The design of the electrical penetrations was modified in 1970 without recognizing all of the design requirements of the electrical penetrations as containment isolation boundaries. The design was further modified in 1982 without recognizing the design requirements of the penetrations.

ANALYSIS OF THE EVENT

The design specification for the electrical penetrations (E-20) required a double barrier design with a 1/4-inch test port on the exterior side of the containment. The original intent was to install a threaded plug in the electrical penetration which could be removed to allow for leak rate testing.

The design was modified in 1970, prior to initial plant operation, to provide a bottled nitrogen supply, pressure gauges, a tubing network, and fill connections to each electrical penetration for the purpose of pressurizing the space between the double barriers with nitrogen as a means of controlling corrosion. The 1970 modification was apparently performed without consideration of seismic requirements. No record of this modification exists, other than a letter directing its installation. In 1982, the nitrogen bottles for the southwest penetration room were relocated to the turbine building to resolve a personnel safety concern during bottle replacement. The 1982 modification did not consider the tornado protection requirements for the system when the nitrogen bottles were relocated.

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		8	3	-	0	1	4	-	0	0

CORRECTIVE ACTION

The evaluation of corrective actions is ongoing and involves researching regulatory and industry design requirements for electrical penetrations, plant specific licensing commitments, design requirements specified by the penetration manufacturer, designs of similar electrical penetrations at other nuclear power plants, and contact with vendors of similar electrical penetrations. This research is complicated by the fact that the vendor of the Palisades electrical penetrations (Viking) is no longer in business. Our initial assessment of the electrical penetration design requirements indicated that the nitrogen supply is important to maintaining the integrity of the electrical penetrations by reducing the potential for humidity induced corrosion of electrical conducting surfaces and contacts. Therefore, our preliminary conclusion is that the nitrogen supply should not be isolated.

The following corrective actions have been developed to address this event:

1. Evaluate appropriate remedial corrective actions to address the deficiencies in the electrical penetration design.
2. Evaluate the ISI containment boundaries for the electrical penetrations in light of this design discrepancy. Revise containment isolation boundary tagging and containment leak rate testing procedures, as appropriate, based on this evaluation.
3. Issue updates to P&IDs, add valve numbers, "Q" list interpretations, and the Equipment Data Base for the north electrical penetration nitrogen purge system.
4. Evaluate the necessity of having a nitrogen purge continuously in the electrical penetration. The evaluation should include the effects for internal corrosion occurring after deletion of the nitrogen purge.
5. Provide a lessons learned memo to plant engineers emphasizing the evaluation of functional interfaces when making changes to plant equipment.

OPERABILITY DETERMINATION

The electrical penetrations are considered operable because the function of the penetrations as a barrier to containment leakage is maintained; however, the level of redundancy, in terms of the number of electrical penetration barriers, may be reduced under certain scenarios (e.g., earthquakes and tornados) due to the design deficiency.

The reduction in the level of redundancy is acceptable on an interim basis because: (1) the integrity of innermost barrier is maintained under all scenarios; (2) the barriers are periodically tested per 10CFR50, Appendix J, to prove their functionality as a containment leakage barrier and; (3) the electrical penetrations have been operated and maintained in accordance with the manufacturer's requirements (i.e., with the space between the barriers filled with nitrogen).

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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The operability requirements for the containment electrical penetration barriers are contained in Section 4.5 of the plant Technical Specifications. Section 4.5, "Containment Tests," addresses the requirements for local leakage test. The electrical penetration barriers have been shown to meet the acceptance criteria in this section. Therefore, interim operation with the electrical penetration design deficiency is authorized by the plant license.

ADDITIONAL INFORMATION

None