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Trojan Nuclear Plant
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October 23, 1992
RDM-530-92

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington DC 20555

Gentlemen:

Licensee Event Report No. 92-029 is attached. This report discusses an inoperable three-hour fire barrier caused by inadequate construction of a wall during original plant construction.

Sincerely,

R. D. Machon
General Manager
Trojan Nuclear Plant

c: Mr. John D. Martin
Regional Administrator, Region V
U.S. Nuclear Regulatory Commission

Mr. David Stewart-Smith
State of Oregon
Department of Energy

Mr. R. C. Barr
USNRC Resident Inspector
Trojan Nuclear Plant

LER Distribution

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Trojan Nuclear Plant	0 5 0 0 0 3 4 5	1 OF 8

TITLE (4) Inadequate Construction of Turbine Building Wall Caused Inoperability of The Wall as a Three-Hour Fire Barrier

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 NUMBER(S)
09	23	92	92	- 0 2 9 -	0 0	10	23	92	N/A	0 5 0 0 0
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OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (11)			
1	0 5 2	__ 20.402(b)	__ 20.405(c)	__ 50.73(a)(2)(iv)	__ 73.71(b)
		__ 20.405(a)(1)(i)	__ 50.36(c)(1)	__ 50.73(a)(2)(v)	__ 73.71(c)
		__ 20.405(a)(1)(ii)	__ 50.36(c)(2)	__ 50.73(a)(2)(vii)	_X_ OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		__ 20.405(a)(1)(iii)	_X_ 50.73(a)(2)(i)	__ 50.73(a)(2)(viii)A	Special Report
		__ 20.405(a)(1)(iv)	__ 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)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER AREA CODE	TELEPHONE NUMBER
D. L. Claridge, Compliance Engineer	503	556-5541

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	
N/A											

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

ABSTRACT (16)

On September 23, 1992, the Trojan Nuclear Plant was operating in Operational Mode 1 at 52 percent power. Engineering personnel inspecting the Turbine Building wall adjacent to the yard transformer area identified several deficiencies involving the construction of the wall and two penetrations. The deficiencies render the wall incapable of providing the three-hour fire barrier rating required to protect safety-related areas inside the Turbine Building from a transformer fire. The wall was declared inoperable and appropriate compensatory measures, per Trojan Technical Specification (TTS) 3/4.7.9, "Penetration Fire Barriers," were taken. The cause of the barrier degradation and one of the degraded penetrations is inadequate construction of the wall during original construction. The cause of the other degraded penetration is inadequate installation of a roll-up fire door by the fire door vendor. Corrective actions will include repairing the wall and penetrations to provide the three-hour fire rated barrier. There were no safety consequences resulting from this event. This report is being submitted to fulfill the reporting requirements of 10 CFR 50.73(a)(2)(i) and the Special Report required by TTS 3/4.7.9.

INTRODUCTION

On September 23, 1992, the Trojan Nuclear Plant was operating in Operational Mode 1 at 54 percent power. Trojan Engineering personnel were inspecting the wall joint on the 63' level of the west Turbine Building wall, when it was determined that the lath and plaster seal that provides the three-hour fire rated joint seal was missing. Further inspection identified two additional deficiencies with the wall. The first is that the Iso-Phase Bus Cooler penetration on the 72'6" elevation has two open gaps on each side of the blockout. The second is the hood of the roll-up railroad bay door on the 45' level does not extend all the way to the wall, leaving a gap at the top of the door.

The missing lath and plaster seal resulted in a degraded fire barrier. The two additional items noted above are degraded three-hour fire barrier penetrations. It has been determined that the barrier and the two penetrations have been non-functional for greater than seven days. Trojan Technical Specifications (TTS) 3/4.7.9, "Penetration Fire Barriers," requires that all three-hour rated fire penetration barriers protecting safety-related areas be functional at all times. This report is submitted to fulfill the requirements of 10 CFR 50.73(a)(2)(i)(B), as a condition prohibited by TTS 3/4.7.9. This report is also submitted to fulfill the TTS 3/4.7.9 Action Statement requirement to submit a Special Report when a non-functional penetration barrier required per TTS 3/4.7.9 is not restored to functional status within seven days.

DESCRIPTION OF EVENT

Background

The exterior west wall of the Turbine Building separates fire area Y1, the yard transformer area, from fire area T1, the Turbine Building main area. The main and substation transformers are located within 50 feet of the north end of the west wall of the Turbine Building. Therefore, the west wall of the Turbine Building (Fire Barrier T-063-27) is required by Appendix A to Branch Technical Position (APCSB) 9-5.1, "Guidelines for Fire Protection for Nuclear Power Plants", to provide a three-hour fire barrier. Fire Area T1 contains several safety-related areas, such as: the Emergency Diesel Generator Rooms (Fire Areas T5 and T6); the Train A Engineered Safety Features Switchgear Room (Fire Area T8); the diesel and turbine-driven Auxiliary Feedwater Pump rooms (Fire Areas T2 and T3); and the AFW control panel room (Fire Area T4); all of which are fully enclosed within three-hour fire rated barriers. However, Train A safety-related cable trays above the 69' slab, near the east wall of the Turbine Building, are not located within a three-hour fire rated enclosure.

Discussion

The exterior west wall of the Turbine Building between elevations 45' and 63', from column 41 to 8'11" south of column 59, is made of 6-inch thick precast concrete panels with approximately 1/2-inch to 3/4-inch gaps between the panels. The gaps are sealed with a three-hour fire rated sealant (grout). The wall between elevation 63' and 93', from column 41 to 8'11" south of column 59, is composed of a metal siding over 6-inch thick precast concrete panels, with the gaps sealed with grout. All areas above the 93' elevation are made of non-rated metal siding.

On September 23, 1992, Contract personnel inspecting the Turbine Building west wall to plan for repairs to the precast concrete panel vertical joints observed light coming through the wall at the 63' elevation. Trojan Engineering personnel inspected the 63' wall joint at column 58, and found that the 1-1/2 inch lath and plaster seal, required by Trojan design, was missing. Trojan design drawings specify that the 1-1/2 inch lath and plaster seal is the primary feature providing the required three-hour fire rating at the 63' wall joint. Thus, the wall section from column 51 to column 60 was determined to be nonfunctional.

On October 5, 1992, Engineering personnel performing additional inspections of the west wall observed that the Iso-Phase bus duct penetration has two open gaps on each side of the blockout. This penetration is located at elevation 72'6", near column 56. The gaps do not provide the required three-hour fire rating. This section of the wall is included in the section declared nonfunctional on September 23, 1992.

On October 6, 1992, the soffit metal along the outside of the wall was removed for inspection of the 63' wall joint from column 41 to column 60. Engineering personnel inspected the wall joint and found that the 1-1/2 inch lathe and plaster seal was missing down the entire length of the fire rated wall section (column 41 to 60). It was also discovered that Fire Door 114 was inoperable as a three-hour fire rated barrier due to installation deficiencies. Fire Door 114 is a large roll-up door for the railroad bay, located in the Turbine Building west wall at elevation 45', from column 43 to 45. When the door was installed in 1988 to replace the original door, the hood was not extended to the wall. This left a gap between the top of the hood assembly and the wall.

IMMEDIATE ACTIONS TAKEN

The action statement of TTS 3/4.7.9 was implemented within one-hour of the discovery that the west wall of the Turbine Building did not provide the required three-hour rated fire barrier. The actions taken were to verify that fire detection equipment on at least one side of the penetration was operable, and to initiate a continuous

fire watch inside the Turbine Building. When the problem with Fire Door 114 was identified, the continuous fire watch was moved outside so that one person could watch the entire outside surface of the fire barrier.

A design drawing review was performed to identify any other Plant walls that use lath and plaster seals, and to determine whether the wall joint designs used on other plant exterior walls at elevation 63' provide the required fire rating. It was determined that only the Turbine Building west wall design specifies this type of seal, and that Plant fire rated exterior boundaries at the 63' construction joint have sufficient designs to provide the required fire rating. It was also determined that the original lath and plaster design would provide only a one-hour rated fire seal, and that a change is required to provide a three-hour rated fire seal.

CAUSE OF THE NON-FUNCTIONAL BARRIER

Root Cause - Unsealed Barrier Joint (Column 41 to 60)

The root cause of the missing lath and plaster seal is construction error during original plant construction. The lath and plaster seal required by design was not installed.

Root Cause - Open Gaps At Iso-Phase Bus Penetration

The root cause of the open gaps on each side of the blockout at the Iso-Phase Bus Duct Penetration is construction error during original plant construction. Applicable design drawings do not show the open gaps. The original design criterion was to construct the wall to a four-hour fire rating. Review of the overall wall construction shows this criterion was not adequately followed during original construction.

A contributing factor as to why the problems identified in this report have not been identified before is that past procedures for penetration seal surveillances only specified visual inspections for individual numbered penetration seals. Thus, unnumbered or unlisted penetrations, and fire barriers as separate units, were not being inspected prior to 1992. Current inspection procedures for fire area boundary surveillances now require that the entire barrier be inspected, to verify barrier components meet the proper fire protection requirements. This fire area boundary surveillance is in it's first cycle. Therefore, an inspection on the overall Turbine Building west wall has never been performed. The current fire area boundary surveillance has not yet inspected this barrier.

Root Cause - Degraded Roll-up Fire Door 114

The root cause of the degraded fire door is inadequate installation by the door vendor.

Door 114 was installed by Crawford Door Company in November, 1988. The Crawford personnel properly installed the main door assembly but did not take the extra steps to extend the hood to the wall, since the entire door assembly is slightly farther off the face of the wall than normal. The vendor installers should have realized that the open gap between the hood and the wall was not appropriate for a fire rated door installation. The Plant Modifications job coordinator apparently was not familiar with fire protection requirements and did not realize that the open gap would prevent the door from providing the required three-hour fire rating.

A contributing factor to the inadequate installation of the door is that there were no procedural controls in place to ensure a qualified Fire Protection Engineer inspected the installation of the new fire door. This procedural deficiency still existed at the time this event was discovered, and will be corrected in accordance with our Corrective Action Program.

PLANS AND SCHEDULE FOR RESTORING PENETRATIONS TO FUNCTIONAL STATUS

PGE intends to restore to functional status that portion of the west wall of the Turbine Building that is required to provide a three-hour fire barrier (elevation 45' to 93' and columns 42 to 8'11" south of column 59). To accomplish this, the following actions will be taken:

1. Fire Door 114 will be repaired to remove the gap between the door hood and the wall.

2. The two open gaps on each side of the blockout for the Iso-Phase Bus Cooler penetration on the 72'6" elevation of the west Turbine Building wall are being evaluated to determine corrective actions necessary to achieve compliance with the three-hour fire rating requirement.

3. A three-hour fire rated sealant will be installed in the wall joint at the 63' elevation of the west turbine building wall between columns 41 and 60.

These activities will be completed by April 30, 1993.

SAFETY CONSEQUENCES AND IMPLICATIONS

There were no safety consequences resulting from this event. There has not been a fire in either of the affected fire areas, since the wall was originally constructed, that would have challenged the barrier.

The implication of this event is that the portion of the west wall of the Turbine Building that is required to provide a three-hour fire barrier (elevation 45' to 93' and columns 42 to 8'11" south of column 59) would not have been able to do so, had a fire occurred in either fire area. With less than a three-hour fire rating, the degraded barrier could have potentially allowed fire propagation between Fire Areas T1 (Turbine Building main area, Rooms 84 and 87NW) and Y1 (Yard Area).

The yard transformers are not safety-related and are not required for safe shutdown. There are no paths of intervening combustibles to other yard safety-related components. Thus, there would be no safety consequences associated with a Turbine Building fire spreading to the yard transformers. Therefore, the only fire path that is potentially safety significant is a fire spreading from the yard transformers to the Turbine Building. The potential effects that the deficiencies identified in the west Turbine Building wall could have caused, had a fire occurred in the yard area, are summarized below:

The missing lath and plaster seal could have allowed fire and hot gas propagation into the Train Bay (Room 84), into the west end of hydrogen seal tank area (Room 87NW), and through the 3/4-inch gap between the Train "A" EDG west wall and Turbine Building exterior wall (columns 45 to 51).

Between columns 45 and 51, the 3/4-inch gap between "A" EDG west wall and exterior wall is sealed by a steel girder at elevation 64'. Thus, no flame propagation could pass up between the walls. Any hot gases would have to travel down and sideways below elevation 64' to enter Room 84 or 87NW. Due to the barrier configuration, only relatively small amounts of hot gases would be expected to enter Rooms 84 and 87NW. There are no intervening combustibles or safety-related equipment near the 3/4-inch gap openings.

The missing lath and plaster seal from column 41 to 45, and the degraded Fire Door 114, could have allowed flame and hot gas propagation into the Train Bay (Room 84). However, the full area sprinkler system in Room 84 would have prevented fire propagation to the Turbine Building areas containing safety-related equipment. The largest effect of a yard fire on these deficient penetration seals would be hot gases rising up the Turbine Building north equipment floor opening and diffusing or stratifying above the 93' operating floor. Turbine Building elevation 93' and above contains no safety-

related or safe shutdown equipment.

The missing lath and plaster seal from columns 51 to 60, and the Iso-Phase bus duct openings, could have allowed flame and hot gas propagation into the Turbine Building hydrogen seal oil tank area (Room 87NW). However, sprinkler systems in Rooms 84 and 87NW, supplemented by manual fire suppression activities, would have prevented fire propagation to the Turbine Building areas containing safety-related equipment. There is a potential that the non-safety related cable trays passing within three feet of the west wall in this area could be ignited. However, the fire would have to travel approximately 75 feet horizontally to reach the nearest safety-related equipment.

A Fire Area T1 fire concurrent with a loss of off-site power has been analyzed in PGE 1012. The analysis concluded that safe shutdown could be achieved following such an event.

In addition to the fire alarm and suppression systems located in the Turbine Building, the transformer area in Fire Area Y1 is also provided with several fire detection and suppression features designed to restrict transformer fires. Each transformer is set on a concrete pad that is surrounded by a four to five foot wide rock-filled concrete pit or trench. The trenches are provided with twelve inch underground drains that are piped to an oil-water separator, which is located some distance away from the Turbine Building. The trenches and drains are designed to contain and remove both transformer oil and water (spray from a transformer deluge system). This arrangement will reduce the amount of transformer oil available to feed a fire, thus minimizing a potential fire's duration and intensity.

There are three-hour rated barriers located between each transformer, such that one transformer fire will not propagate to another transformer. The arrangement of these barriers will also prevent a single transformer fire from threatening both Rooms 84 and 85. Each transformer is also protected by an automatic water deluge system, which is heat-actuated. There are manual hose stations in the Turbine Building and fire hydrants in the yard area to support manual fire suppression activities.

The transformer and Turbine Building fire protection features discussed above are adequate to ensure that a transformer fire would not spread to safety-related areas or to safe shutdown equipment, even with the identified barrier degradations. Therefore, the presence of the barrier degradations in the west Turbine Building wall has not compromised nuclear safety or safe shutdown capability

PREVIOUS SIMILAR EVENTS

Deficiencies in the installation, inspection and maintenance of fire barrier penetrations, such as the degraded fire door and the Iso-Phase bus penetration gaps identified in this report, have been the subject of several Special Reports and Licensee Event Reports at Trojan. As a result, these deficiencies have received increased management attention. This attention has resulted in development of more rigorous penetration seal surveillance programs.

The barrier deficiency involving the lack of the lath and plaster wall joint seal has not been reported before at Trojan, since the west wall of the Turbine Building is the only three-hour rated wall with this type of design. As stated earlier, past procedures for fire barrier penetration surveillances did not require inspections of the fire barriers as separate units. As a result of increased management attention to fire barrier penetration deficiencies, current inspection procedures for fire area boundary surveillances now require that the entire barrier be inspected, to verify all fire barrier components meet the proper fire protection requirements.

The most recent fire barrier penetration deficiencies, discovered during performance of the eighteen-month fire barrier penetration surveillance required by TTS 3/4.7.9, have been reported in LER 92-026. Due to the length of time required to conduct the surveillance of fire barrier penetrations, additional fire barrier and barrier penetration problems discovered as a result of that surveillance program will be reported in supplements to LER 92-026, as stated in the original report submitted on September 24, 1992.