

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTOR REQUEST 508 HOURS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH, U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20540 AND TO THE PAPERWORK REDUCTION PROJECT (3150-0100), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) TROJAN NUCLEAR PLANT

DOCKET NUMBER (2) 05000344 1 OF 05

TITLE (3) Inadequate Original Design of Control Room Emergency Ventilation System Coolers  
Results in Plant Operation in an Unanalyzed Condition

EVENT DATE (4)			LER NUMBER (5)		REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISED NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER (8)
05	16	90	90	015	010	07	02	90	N/A	050000
										050000

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 43 (Check one or more of the following) (11)

OPERATING CODE (1)	5	20 002(b)	20 002(e)	20 720a(2)(iii)	72 71(a)
POWER LEVEL (10)	0.100	20 002b(1)(ii)	20 002b(1)(i)	20 720a(2)(iv)	72 71(b)
		20 002b(1)(iii)	20 002b(2)	20 720a(2)(v)	OTHER (Specify in Appendix B and in Test RRC Form 2004)
		20 002b(1)(iv)	20 720a(2)(vi)	20 720a(2)(vii)	
		20 002b(1)(v)	X 20 720a(2)(viii)	20 720a(2)(viii)	
		20 002b(1)(vi)	20 720a(2)(ix)	20 720a(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME: E. W. Ford, Compliance Engineer

TELEPHONE NUMBER: 503 556-5577

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC (14)	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC (14)
N/A									

SUPPLEMENTAL REPORT EXPECTED (15)

EXPECTED SUBMISSION DATE (15): 04 30 90

YES (16) OR (17) EXPECTED SUBMISSION DATE:  NO

ABSTRACT (Limit to 1000 words) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50)

On May 16, 1990, the Trojan Nuclear Plant was in the 1990 refueling outage. During a design review of the Control Room Emergency Ventilation System, it was discovered that the system's calculated cooling capacity was not adequate, and that Control Room temperature could exceed the design limit of 110 degrees F during a design basis accident when offsite power remained available. The Control Room heat load is higher when offsite power is available than when it is lost because more equipment and lighting in the Control Room remain energized. This condition was the result of an inadequate original design. Corrective Actions: In 1988, a supplemental cooling system was installed to help the Control Room Emergency Ventilation System maintain lower Control Room temperatures. The supplemental cooling system was upgraded to meet safety related, Seismic Category I criteria and is now considered a required portion of the Control Room Emergency Ventilation System. The design calculation related to the Control Room heat loads has been revised to reflect the worst-case heat load conditions under which the Control Room Emergency Ventilation System must operate (i.e. when offsite power remains available). Final Control Room temperature calculations will be performed and the results will be reported in a supplement to this Licensee Event Report.

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TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-20), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20548, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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		YEAR	SEQUENTIAL NUMBER	VERSION NUMBER		
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TEXT IS MADE AVAILABLE TO THE PUBLIC AND IS SUBJECT TO THE NRC Agency Information Policy (17)

**EVENT DESCRIPTION**

On May 16, 1990, the Trojan Nuclear Plant was in Mode 5 (Cold Shutdown). The 1990 refueling and maintenance outage was in progress. During a design review of the Control Room Emergency Ventilation System, it was discovered that the system's calculated cooling capacity was not adequate, and that Control Room temperature could exceed the design limit of 110 degrees F during a design basis accident when offsite power remained available. The Control Room heat load is higher when offsite power is available than when it is lost because more equipment and lighting in the Control Room remain energized. The Trojan Final Safety Analysis Report, Section 9.4.1, Control Room Area Ventilation System, states, in part, the Control Room Emergency Ventilation System will provide minimum ventilation requirements under any postulated abnormal conditions or accident conditions (this includes accident conditions when offsite power remains available).

The Control Room Emergency Ventilation System is relied upon to maintain the habitability envelope and to maintain the Control Room temperature within analyzed limits under accident conditions or a toxic chemical release. The Control Room Emergency Ventilation System's ability to perform its design cooling function could not be confirmed under the current analytical assumptions, therefore the plant was considered to be in an unanalyzed condition. This report is submitted to fulfill the requirements of 10 CFR 50.73 (a)(2)(ii)(A). This condition was also reported to the NRC via the Emergency Notification System on May 18, 1990, in accordance with the requirements of 10 CFR 50.72.

This report should have been submitted no later than June 18, 1990, in accordance with the requirements of 10 CFR 50.73 (a)(1). It was delayed until July 2, 1990, due to difficulties encountered in its preparation and approval. This was discussed with NRC Region V personnel on June 18, 1990, as recommended in Supplement 1 to NUREG 1022, Licensee Event Report System.

**CAUSE**

This condition was the result of an inadequate original design.

According to the Trojan Nuclear Plant Architect-Engineer, a design basis accident without a loss of offsite power was not considered in sizing of the Control Room Emergency Ventilation System coolers. This resulted in under-estimating the heat load the coolers were required to remove.

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-30), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20548 AND TO THE PAPERWORK REDUCTION PROJECT (3160-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

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TEXT OF THIS REPORT IS REQUIRED, USE ADDITIONAL NRC FORM 302A (1/77)

CORRECTIVE ACTIONS

In 1988, a supplemental cooling system was installed to help the Control Room Emergency Ventilation System maintain lower Control Room temperatures. This was done to enhance equipment reliability and Control Room habitability. During the 1990 refueling outage, the supplemental cooling system was upgraded to meet safety related, Seismic Category I criteria. It is now considered a required portion of the Control Room Emergency Ventilation System. Operation of the supplemental cooling system, in conjunction with the Control Room Emergency Ventilation System, provides sufficient cooling capacity to maintain Control Room temperature within design limits under accident conditions.

On May 25, 1990, the design calculation related to the Control Room heat loads was revised to reflect the worst-case heat load conditions under which the Control Room Emergency Ventilation System must operate (i.e. when offsite power remains available). This calculation is the point of reference for design questions regarding the Control Room Ventilation Systems' heat removal capabilities.

The assessment that the Control Room temperature would exceed its design limit under accident conditions, with offsite power available, was based upon preliminary calculations. The calculations will be finalized and the results will be reported in a supplement to this Licensee Event Report.

SAFETY SIGNIFICANCE

As stated in the Trojan Final Safety Analysis Report, Section 9.4.1.1.1, Control Room Ventilation Systems: The Control Room Emergency Ventilation System is required to provide the cooling, ventilation and air filtration to maintain habitability of the Control Room and integrity of the equipment in the Control Room when the outside air is contaminated by either toxic gas or radioactive material. This requirement does not provide exception for the availability of offsite power. Because of the inadequate system design, analysis shows that prior to 1988, when the supplemental cooling system was installed, the Control Room would not have had adequate cooling if offsite power remained available during an accident or toxic chemical release. The instruments and controls in the Trojan Control Room are analyzed to remain functional at temperatures as high as 110 degrees F. Without sufficient cooling, the Control Room temperature could have exceeded 110 degrees F. This could have affected the operability

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST. SEE HQS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-500), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20545, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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TEXT IF MORE THAN 8 RECORDS AND SECTIONS NRC Form 2000-1 (17)

of the instruments and controls and hampered the operators in performance of required tasks.

The calculation related to the Control Room temperatures under accident conditions includes several conservative assumptions. These assumptions and an analysis of their effect upon Control Room temperature are discussed below.

Assumption: Service Water temperature is 75 degrees F.

The service water system is supplied from the Columbia River. A review of the weekly average temperature of the river since 1987 was performed. During that time period, the temperature ranged from a low of 34.9 degrees to a high of 71.4 degrees F. The lower temperatures would improve the cooling capability of the Control Room Emergency Ventilation System and result in lower Control Room temperatures.

Assumption: Outdoor peak air temperature is 91 degrees F.

This temperature is used because it is higher than temperatures achieved 99 percent of the time during the summer months. Outdoor air temperatures lower than 91 degrees F would improve the ability of the building to transfer heat to the environment and reduce Control Room temperatures.

Assumption: No credit was taken for the heat sink capabilities of the Control Room concrete walls or floor.

The walls and floor are massive concrete structures which are capable of absorbing a substantial amount of heat. The effect of their heat sink capabilities would reduce the rate of Control Room temperature rise, and reduce the maximum temperature achieved as heat loads are reduced following an accident.

Trojan Technical Specification 4.7.6.1, Control Room Emergency Ventilation System, requires each train of the system to be tested every 31 days. In order for the surveillance requirements to be satisfied, the Control Room temperature must remain less than or equal to 110 degrees F for the ten hour duration of the test. Records of testing performed to fulfill this surveillance requirement for the summer months of 1986 and 1987 (prior to installation of the supplemental cooling system) were reviewed. The highest Control Room temperature achieved during these tests was 87 degrees F. The Control Room heat loads would not vary significantly between accident conditions or normal operations. The results of the periodic testing confirm the conservatism in the design calculations and provide reasonable assurance that the

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 500 HRS FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH IF 500 U.S. NUCLEAR REGULATORY COMMISSION WASHINGTON DC 20545 ADD TO THE PAPERWORK REDUCTION PROJECT (3150-0104) OFFICE OF MANAGEMENT AND BUDGET WASHINGTON DC 20503

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TEXT IS OMB 3150-0104 AND REPORTS MGMT BRANCH NRC Form 1500 (1/17)

Control Room Emergency Ventilation System would have performed its function.

Even if it is assumed that the Control Room Emergency Ventilation System had insufficient cooling capacity, it is unlikely that temperatures would have been allowed to get as high as 110 degrees F. The operators in the Control Room would have noticed the increasing temperature and could have taken action to restart the Normal Ventilation System, start up supplemental cooling systems, or shut down unnecessary equipment to reduce the Control Room heat load.

This condition only affected the ability of the Control Room Emergency Ventilation System temperatures within limits under design basis accident conditions when offsite power remained available. Because the system was never challenged under these conditions, this event had no effect upon the health and safety of the public.

**PREVIOUS SIMILAR EVENTS**

Two previous Licensee Event Reports regarding deficiencies with the design of the Control Room Emergency Ventilation System were identified. The numbers and titles of those reports are listed below.

LER #	Title
86-02	Control Room Emergency Ventilation System Degradation due to Equipment Failure and Design Deficiency
88-18	Excessive Unfiltered In-leakage Could Have Prevented Control Room Emergency Ventilation System From Performing Safety Function