

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of  
digits/characters for each block)ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY  
INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE  
INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY.  
FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND  
RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY  
COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION  
PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC  
20503

FACILITY NAME (1)

Cook Nuclear Plant Unit 1

DOCKET NUMBER (2)

05000-315

PAGE (3)

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TITLE (4)

Auxiliary Building ESF Ventilation System May Not be Capable of Maintaining ESF Room Temperatures Post-Accident

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 NAME	DOCKET NUMBER	
04	20	1999	1999	012	00	05	20	1999	D.C. Cook, Unit 2	05000-316	
OPERATING MODE (9)			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
5			20.2201 (b)				20.2203(a)(2)(v)		50.73(a)(2)(i)	50.73(a)(2)(viii)	
POWER LEVEL (10)			20.2203(a)(1)				20.2203(a)(3)(i)		50.73(a)(2)(ii)	50.73(a)(2)(x)	
			20.2203(a)(2)(i)				20.2203(a)(3)(ii)		50.73(a)(2)(iii)	73.71	
			20.2203(a)(2)(ii)				20.2203(a)(4)		50.73(a)(2)(iv)	OTHER	
			20.2203(a)(2)(iii)				50.36(c)(1)		X 50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A	
			20.2203(a)(2)(iv)				50.36(c)(2)		50.73(a)(2)(vii)		

## LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Ms. Brenda W. O'Rourke, Compliance Engineer	(616) 465-5901 x2604

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

## SUPPLEMENTAL REPORT EXPECTED (14)

X	YES	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	(If Yes, complete EXPECTED SUBMISSION DATE).			10	31	1999

Abstract (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On April 20, 1999, during performance of the Expanded System Readiness Review (ESRR) for the Auxiliary Building Ventilation Systems, it was concluded that there is insufficient assurance that the Engineered Safety Features Ventilation (AES) system is capable of performing its safety and accident mitigation function. This conclusion was based on a preliminary evaluation of numerous identified system deficiencies taken in the aggregate. Specifically, significant errors in calculations for auxiliary building Engineered Safety Features cubicle temperatures expected during postulated accident scenarios, vulnerability of AES damper control air system modification to single failure; and lack of missile protection for the Component Cooling Water pump area supply fans. Based on the combined effects of these deficiencies, the ability of the AES system to maintain auxiliary building temperatures to within safety-related equipment design temperatures under accident conditions cannot be assured.

The preliminary causes for identified conditions are: inadequate control of system design inputs; failure to adequately implement single failure design criteria during the modification process; and lack of a clear definition in design and licensing documents regarding design requirements for system protection against missile effects.

A comprehensive action plan is being developed to determine the auxiliary building design temperatures required to be maintained by the AES ventilation system. In addition, a single failure analysis for the AES ventilation system will be performed to identify failures that could prevent the system from performing its design and safety function. Based on the results of the completed evaluation, information regarding the safety significance, and corrective and preventive actions will be provided in an update to this LER.



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TEXT (If more space is required, use additional copies of NRC Form (366A) (17))

**Conditions Prior to Event**

Unit 1 was in Mode 5, Cold Shutdown

Unit 2 was in Mode 5, Cold Shutdown

**Description of Event**

On April 20, 1999, during performance of the Expanded System Readiness Review (ESRR) for the Auxiliary Building Ventilation Systems, it was concluded that there is insufficient assurance that the Engineered Safety Features Ventilation (AES) system is capable of performing its safety and accident mitigation function. This conclusion was based on a preliminary evaluation of numerous identified system deficiencies taken in the aggregate. Specifically, significant errors in calculations for auxiliary building Engineered Safety Features (ESF) cubicle temperatures expected during postulated accident scenarios, combined with small design margins that existed between calculated room temperatures and design requirements; vulnerability of AES damper control air system modification to single failure; and lack of missile protection for the Component Cooling Water (CCW) pump area supply fans which could result in a single catastrophic failure-generated missile impacting both trains of AES. Based on the combined affects of these deficiencies, the ability of the Unit 1 and 2 AES systems to maintain auxiliary building temperatures to within safety-related equipment design temperatures under all accident conditions cannot be assured.

In accordance with the requirements of 10CFR50.72(b)(2)(iii)(D), a 4 hour notification was made to the NRC on April 20, 1999, at 1645 hours, for any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident.

**Cause of Event**

The preliminary cause for the use of non-conservative and incorrect assumptions in auxiliary building heat load calculations is due to inadequate control of system design inputs. This issue was previously identified in AEP:NRC:1260GH, dated March 19, 1999, "Enforcement Actions 98-150, 98-151, 98-152 and 98-186, Reply to Notice of Violation Dated October 13, 1998."

The preliminary cause for AES damper design single failure vulnerability is failure of the design change process to identify the potential adverse impact on the AES system created by the modification to the damper control air system in 1997.

The preliminary cause for CCW pump area supply fan susceptibility to missile effects is lack of a clear definition in design and licensing documents regarding AES design requirements for protection against missile effects.

**Analysis of Event**

This LER is submitted in accordance with 10CFR50.73(a)(2)(v)(D) for a condition that could prevent the fulfillment of the safety functions of the AES system that are needed to mitigate the consequences of an accident:

The AES system safety and accident mitigation function is to provide sufficient cooling to the auxiliary building general areas and ESF equipment rooms required to operate during accident conditions. This includes the CCW, Containment Spray, Residual Heat Removal, Charging and Safety Injection equipment rooms. The AES system also maintains the auxiliary building at a negative pressure relative to the outside environment to ensure radioactive contamination released during an accident is contained within the auxiliary building, filtered and exhausted to the environment via a monitored release path. In addition, Technical Specification 3.7.6.1 requires that two independent AES ventilation system fan/filter exhaust trains be operable in Modes 1 through 4.

Calculations were developed to establish the auxiliary building heat loads, ESF cubicle room and general area temperatures during normal, shutdown and accident conditions. During the ESRR review of these calculations, numerous discrepancies were identified. For example, calculation of auxiliary building area temperature during accident conditions

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did not include the heat load for the CCW system piping. This equipment is considered a significant heat load in the auxiliary building and excluding it from the calculation could result in non-conservative auxiliary building area temperature values. In addition, these values serve as input assumptions to other auxiliary building ventilation calculations. As a result, actual auxiliary building area and ESF cubicle room temperatures could impact the qualification of the ESF equipment located in the areas served by the AES and CCW pump area ventilation systems.

The AES ventilation system consists of two fan/filter exhaust trains (one in standby) which draws air from the auxiliary building through the equipment cubicles from a common vent duct, and discharges the exhaust to the outside atmosphere via the vent stack. Each train consists of a roughing filter, high efficiency particulate air (HEPA) filters, and a normally closed pneumatically operated face damper. In addition, each train contains a bypass duct with a normally open pneumatically operated bypass damper which directs air flow around the charcoal adsorbers. During normal operation, one fan/filter unit operates continuously, directing the exhaust air through the roughing and HEPA filters, bypassing the charcoal filters, and discharging to the unit vent. This operation aids in air distribution within the auxiliary building, isolates the atmosphere in the cubicles by inducing a draft through the entering portals and removes any heat generated within the enclosures.

In 1997, a modification to the damper control air system included the installation of solenoid valves in the air lines to the face and bypass dampers. During the performance of surveillance test 12 OHP 4030 STP.25A/B, on two separate occasions, the face damper solenoid valve failed, resulting in the face damper failing to open while the bypass dampers remained closed. For non-SI initiated events, a failure of the face damper solenoid to open the face damper or the bypass damper solenoid to open the bypass damper in response to a control signal could result in both the face and bypass dampers being in the closed position, blocking all air flow through the affected train.

In the event of a Phase B Isolation signal, the standby train is energized and the bypass dampers automatically close and the face dampers open to exhaust air directly through the charcoal filters, roughing and HEPA filters. Although the single failure of either the bypass or face damper solenoid valve would render one train of AES inoperable, it would not impact the capability of the standby fan/filter train from performing its safety and accident mitigation function.

The AES system design includes three vaneaxial supply fans located in the CCW equipment room which are located side by side, and connected to a common intake plenum and discharge duct. Because vaneaxial fans are susceptible to fan blade failures, the fan blades are a potential missile source which could impact the function of adjacent safety related components. As a result, failure of the CCW pump area supply fans could impact the ability of the AES system to maintain ESF cubicle temperatures to within equipment design temperatures, impacting the qualification of the ESF equipment.

Because of the numerous system deficiencies identified during the ESRR, a comprehensive action plan is being developed to evaluate the identified conditions. Until the aggregate effect of these conditions on AES system performance is evaluated, the overall safety impact cannot be determined.

**Corrective Actions**

A comprehensive action plan is being developed to determine the auxiliary building design temperatures required to be maintained by the auxiliary building ventilation systems. In addition, a single failure analysis for the AES ventilation system will be performed to identify failures which could prevent the system from performing its design and safety function. Based on the results of the completed evaluation, additional information regarding safety significance, including corrective and preventive actions will be provided in an update to this LER.

**Previous Similar Events**

LER 315/97-023-00