

NRC Form 366
(9-83)

U.S. Nuclear Regulatory Commission
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L I C E N S E E E V E N T R E P O R T (L E R)

FACILITY NAME (1) Arkansas Nuclear One, Unit Two (ANO-2) DOCKET NUMBER (2) PAGE (3)
05010101 31 61 8110F015

TITLE (4) Vibration Induced Closure of Air Volume Distribution Damper in the Control Room Emergency
Air Conditioning System Results in Degraded System Cooling and Air Mixing Capability

EVENT DATE (5) LER NUMBER (6) REPORT DATE (7) OTHER FACILITIES INVOLVED (8)

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)
01	21	1988	1988	01	01	01	21	1988	ANO-1 N/A	05010101 31 61 8110F015

OPERATING MODE (9) 1 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:
(Check one or more of the following) (11)

Operating Mode (9)	20.402(b)	20.405(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(c)	50.36(c)(1)	50.36(c)(2)	50.73(a)(2)(i)	50.73(a)(2)(ii)	50.73(a)(2)(iii)	50.73(a)(2)(iv)	50.73(a)(2)(v)	50.73(a)(2)(vi)	50.73(a)(2)(vii)	50.73(a)(2)(viii)(A)	50.73(a)(2)(viii)(B)	50.73(a)(2)(ix)	73.71(b)	73.71(c)	Other (Specify in Abstract below and in Text, NRC Form 366A)	
POWER LEVEL (10) 0910																							

L I C E N S E E C O N T A C T F O R T H I S L E R (1 2)

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Area Code 501191614-1311010

C O M P L E T E O N E L I N E F O R E A C H C O M P O N E N T F A I L U R E D E S C R I B E D I N T H I S R E P O R T (1 3)

Cause	System	Component	Manufacturer	Reportable to NPRDS	Cause	System	Component	Manufacturer	Reportable to NPRDS										
B	V	I	D	M	P	A	2	2	O	N									

S U P P L E M E N T R E P O R T E X P E C T E D (1 4)

EXPECTED SUBMISSION DATE (15) Month Day Year

Yes (If yes, complete Expected Submission Date) No

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

On 2/11/88, during an air balance of the control room emergency air conditioning system, an observed degraded system flow led to the discovery that a volume damper in the system ductwork to the ANO-1 control room was closed. The damper was opened and system flow returned to normal. It is believed that the volume damper closed due to vibration. A wingnut attached to the damper operating shaft and used to secure the damper in position was tightened to minimize inadvertent closure. The system provides emergency cooling and air mixing for the ANO-1 and ANO-2 control rooms. The closed volume damper degraded the system total air flow and the occurrence was determined to be a condition that alone could have prevented the fulfillment of a safety function. The occurrence was also a condition prohibited by Technical Specifications (TS) for both units. The safety significance of this event is minor in that other cooling methods were available and could have been used and air mixing would have occurred due to pressurization by the control room emergency recirculation and filtration system. Future corrective actions include reviews to evaluate if safety-related volume dampers in other plant ventilation systems are susceptible to inadvertent closure. This finding was identified during implementation of a design change which is part of a comprehensive program to improve control room habitability systems reliability. Related events are 50-313/86-003 and 50-313/87-008.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Arkansas Nuclear One, Unit Two	DOCKET NUMBER (2) 051010131618	LER NUMBER (6)			PAGE (3) 010210F105
		Year 88	Sequential Number 04	Revision Number 0	

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

I. Description of Event

A. Plant Status

At the time of discovery of this event on 2/11/88, both units, ANO-1 and ANO-2, at Arkansas Nuclear One were operating near full power. ANO-2 was preparing for a refueling outage scheduled to start on 2/12/88.

B. Component Identification

The affected component was a volume damper located in the control room emergency air conditioning system (CREACS) ductwork (EIS identifier is BV-DMP). The function of this damper is to control the volume of the air flow distributed to the ANO-1 portion of the control room from the system. The CREACS consists of two redundant air handling units (AHU), their associated cooling units, and the air distribution system (see attached figure). The two redundant AHU fans are located in the ANO-2 control room and take suction directly from the control room. They discharge to a common air distribution system upstream of the volume damper to ANO-1. The air distribution system consists of backdraft dampers at the discharge of each fan, ductwork, volume dampers, and air registers. The design air flow of the system is approximately 10,000 cubic feet per minute (cfm).

C. Sequence of Events

On 2/11/88, ANO test engineers were performing an air balance of the ANO-1 and ANO-2 control room emergency air conditioning system. During performance of this test, the total system flow was found to be less than that required by the Technical Specifications (TS). A volume damper which controls the volume of air flow to the ANO-1 control room was found closed, presenting a flow restriction in the system. The damper was opened and flow returned to within the required value. Air balancing of the system was completed 2/11/88.

II. Event Cause

A. Event Analysis

Both ANO-1 and ANO-2 are equipped with separate redundant non-safety-related air conditioning systems which provide control room cooling under normal plant conditions. The emergency air conditioning system is a safety-related shared system provided for both unit's control rooms. An additional emergency cooling unit (VUC-9) is also installed in the ANO-1 control room as a backup unit for ANO-1, but is not capable of providing adequate cooling during design basis accidents considering worst case meteorological conditions.

The emergency air conditioning system provides cooling to the control rooms in the event normal cooling is lost due to equipment problems or due to a loss of offsite power. It also provides cooling and air mixing in the event of isolation of the control rooms following a design bases loss-of-coolant accident or a toxic gas (chlorine) release. The system total air flow is balanced to achieve a desired air distribution to the different areas of the control rooms. This air balance is controlled by manually adjusting volume dampers in the system ductwork. The original air balance of the system was performed 4/20/78. No subsequent air balancing is known to have occurred until 2/11/88. Surveillance testing performed every 18 months would have identified any past problems relating to degraded flow.

In preparation for implementation of a design change during the ANO-2 refueling outage to enhance the reliability, maintainability, and capacity of the common control room emergency air conditioning system, air flow distribution was to be rebalanced to reflect revised calculated cooling loads. Specifically, a 70 percent/30 percent split of air flow between ANO-2/ANO-1 control rooms was to be rebalanced to a 60 percent/40 percent distribution by readjusting the existing volume dampers in the ductwork.

A workplan was developed for performing the flow balancing. On 2/11/88, Plant Modifications test engineers performed the workplan. The initial measured total system air flow was found to be less than expected by approximately 2500 cubic feet per minute (CFM). The air flow to the ANO-1 control room was measured as only 424 cfm versus an expected air flow of 3000 cfm.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Arkansas Nuclear One, Unit Two	DOCKET NUMBER (2) 051010131618	LER NUMBER (6)			PAGE (3) 010310105
		Year 88	Sequential Number 004	Revision Number 0	

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

An examination of a volume damper in the air distribution ductwork to ANO-1 indicated that the damper was closed. This restricted air flow to the ANO-1 control room and caused the total system air flow to be less than the value required by the TS for operability of the system. The test engineers opened the damper and the measured system air flow increased from a total of approximately 7500 cfm to 10,284 cfm, with approximately 3898 cfm to ANO-1. This achieved the desired 60 percent/40 percent air flow distribution between the ANO-1 and ANO-2 control rooms.

ANO-1 TS 3.9, Control Room Emergency Air Conditioning and Isolation Systems, requires two independent circuits of this system to be operable whenever reactor building integrity is required. ANO-2 TS 3/4.7.6, Control Room Emergency Air Conditioning and Air Filtration System, requires two independent systems to be operable in Modes 1, 2, 3, and 4. ANO-2 TS 4.7.6.1.1.b requires demonstration of operability of the system by performance of an 18-month surveillance to verify a total system flow rate of 9900 cfm plus or minus 10 percent (8910 cfm to 10,890 cfm). With the volume damper in the air supply to ANO-1 closed, the total system flow was degraded. The most recent 18-month system air flow TS surveillance test was performed on 9/2/87. The flow was not degraded at that time indicating that the damper closure occurred sometime between 9/2/87 and 2/11/88. A monthly surveillance test was performed 2/10/88 which indicated no abnormal temperatures in the ANO-1 control room.

The volume damper found closed is located in a normally inaccessible vertical section of ductwork above the ANO-2 control room false ceiling near the front control room operating panels. It is not in an area where it would be subjected to inadvertent closure. The control room emergency air conditioning system is operated twice per 31 days during testing of the redundant supply fans. Each fan is operated for at least one hour to demonstrate cooling capability of the system and flow rates are verified every 18 months as required by the TS. None of these previous tests had indicated a problem with the volume damper or a degradation of system air flow. The damper is secured in position by a wingnut attached to the damper operating shaft external to the ductwork. It is believed that over the 10-year period of operation of the system, the wingnut vibrated loose finally allowing the damper to close.

The safety significance of the volume damper being closed is considered minor in that the system cooling capability was degraded but not non-functional. This degradation could have resulted in the system not being capable of performing its design function of maintaining the control room temperature below 85 degrees Fahrenheit. However, the control room instrumentation is qualified for operation with ambient temperature as high as 104 degrees Fahrenheit. Additionally, emergency air conditioner unit, VUC-9, located in the ANO-1 control room could have been operated to provide additional cooling if necessary. The effect of the damper closure on air mixing between the control rooms during a control room isolation condition is considered to be minimal in that air mixing between the control rooms would still have occurred due to pressurization of the control rooms by filtered outside air from the emergency recirculation and filtration system (ERFS) which takes suction and discharges on the ANO-1 side of the control room. The control rooms are separated by a wall with a permanent louvered opening for air flow between the rooms. Air from ANO-1 would flow to ANO-2 due to the higher pressure in ANO-1 from the ERFS operation.

B. Root Cause

The root cause of the volume damper closure was considered to be failure to provide a locking device on the damper positioning handle wingnut to prevent the wingnut from loosening by vibration. Apparently, during original design and construction of the system, this type of failure mode was not recognized. Additionally, the effect on operability of the CREACS system resulting from a failure of this single component was not adequately considered during initial design of the system.

C. Basis for Reportability

On 3/10/88 this event was reviewed by the Plant Safety Committee and determined to be reportable per 10CFR50.73(a)(2)(i)(B) as a condition prohibited by the plant's TS. The event is also reportable per 10CFR50.73(2)(v) as a condition that alone could have prevented the

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		Year	Sequential	Revision	
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Arkansas Nuclear One, Unit Two	0151010131618	88--	004--	00	0141015

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

fulfillment of a safety function of a system needed to mitigate the consequences of an accident, in that it degraded total system design flow of the CREACS which assures that the control room environment is maintained following a design basis accident.

On 3/31/88 during preparation of this report, it was determined that this event was also reportable per 10CFR50.72(2)(iii) and the required NRC notification was made at 1630 hours on 3/31/88.

III. Corrective Action

A. Immediate Action

The damper was opened and the system flow was measured and balanced immediately upon discovery of the condition. The wingnuts on all of the volume dampers in this system were securely tightened to minimize or prevent inadvertent closure of the dampers due to vibration.

B. Subsequent Action

Actions were initiated to determine the cause of the volume damper closure, the length of time the condition had existed, and corrective actions to prevent recurrence. Engineering action was completed evaluating the design of the position control device, i.e., wingnuts used for the CREACS volume damper to determine if a better method should be used to ensure the dampers cannot inadvertently move from the required position.

C. Future Actions

The results of the engineering evaluation related to position control of the CREACS volume dampers will be reviewed and changes to the design of the position control device of the CREACS volume dampers will be made as necessary. A review will be conducted to evaluate if safety-related volume dampers in other plant ventilation systems are susceptible to inadvertent closure. Actions will be taken as necessary to address the findings of this review.

This event was discovered during performance of a special test as part of a comprehensive programmatic review of control room habitability systems. This program was initiated by AP&L to provide a comprehensive review of control room habitability systems. Efforts are continuing in an attempt to identify areas needing improvements to enhance the overall design and operation of these systems.

IV. Supplemental Information

A. Similar Events

Other events related to control room habitability system deficiencies were reported in the following Licensee Event Reports:

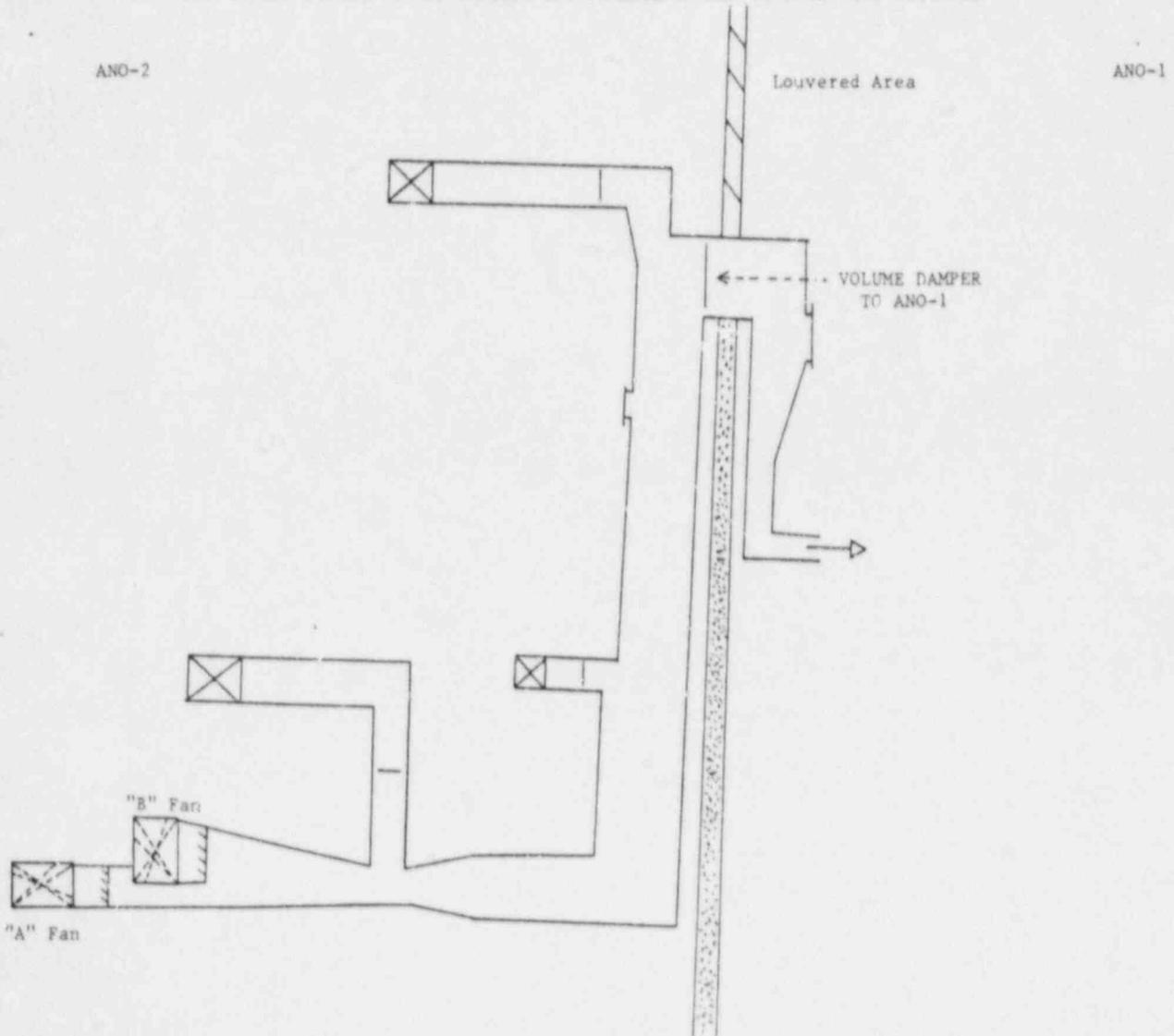
50-313/86-003 - Breaches in Control Room Isolation Integrity Capability, and

50-313/87-008 - Inadequate Design Modification Create Inleakage in Excess of the Design Basis for Control Room Habitability Following a Loss of Coolant Accident.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Arkansas Nuclear One, Unit Two	DOCKET NUMBER (2) 0151010103618	LER NUMBER (6)			PAGE (3) 015101015
		Sequential	Revision		
		Year	Number	Number	
TEXT (If more space is required, use additional NRC Form 366A's) (17) 8 8 -- 0 0 4 -- 0					

SIMPLIFIED SKETCH OF ANO CONTROL ROOM EMERGENCY AIR CONDITIONING DUCTWORK





ARKANSAS POWER & LIGHT COMPANY

April 11, 1988

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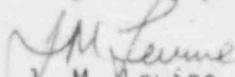
U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

SUBJECT: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Licensee Event Report 368/88-004-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i) and 10CFR50.73(a)(2)(v), attached is the subject report concerning closure of an air volume distribution damper in the control room emergency air conditioning system resulting in degraded system cooling capability and air mixing.

Very truly yours,


J. M. Levine
Executive Director,
Nuclear Operations

JML:DJM:dm
attachment

cc w/att: Regional Administrator
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