

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Callaway Plant Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 4 8 3 1 OF 0 8										PAGE (3) 1 OF 0 8	
TITLE (4) Inoperable Control Room Emergency Ventilation System: 1) Personnel Error Caused Pressure Boundary Breach 2) Misposition of Flow Balancing Damper - Cause Unknown																					
EVENT DATE (5) MONTH DAY YEAR 0 6 0 8 8 7 8 7				LER NUMBER (6) SEQUENTIAL NUMBER REVISION NUMBER 0 1 3 0 1				REPORT DATE (7) MONTH DAY YEAR 1 1 0 4 8 7				OTHER FACILITIES INVOLVED (8) FACILITY NAMES DOCKET NUMBER(S) 0 5 0 0 0 0									
OPERATING MODE (9) 1		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)																			
POWER LEVEL (10) 1 0 0		20.402(b)				20.405(c)				50.73(a)(2)(iv)				73.71(b)							
		20.405(a)(1)(i)				50.36(c)(1)				X 50.73(a)(2)(v)				73.71(c)							
		20.405(a)(1)(ii)				50.36(c)(2)				X 50.73(a)(2)(vii)				OTHER (Specify in Abstract below and in Text, NRC Form 365A)							
		20.405(a)(1)(iii)				X 50.73(a)(2)(i)				50.73(a)(2)(viii)(A)											
		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)(ix)											
LICENSEE CONTACT FOR THIS LER (12)																					
NAME W. H. Sheppard - Superintendent, Outages R. D. Affolter - Superintendent, Systems Engineering												TELEPHONE NUMBER AREA CODE 3 1 4 6 7 6 - 8 2 0 4 6 7 6 - 8 2 4 0									
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																					
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS											
X	V I	D M P	A 3 4 0	N																	
SUPPLEMENTAL REPORT EXPECTED (14)												EXPECTED SUBMISSION DATE (15)									
YES (If yes, complete EXPECTED SUBMISSION DATE)												X NO									

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

1) Control Room (CR) Emergency Ventilation System (CREVS) Train 'A' failed to meet a positive pressure test on 7/9/87 due to unsealed penetrations at the CR pressure boundary breached on 6/8, 6/11, and 7/6. 2) On 8/14/87 a mispositioned damper was discovered on CREVS Train 'B'. The impact on CR doses as analyzed in the Final Safety Analysis Report was initially incorrectly assessed. Subsequent evaluation indicates Train 'B' was inoperable for an undetermined period of time.

Since Train 'A' had been routinely removed from service for maintenance and testing, both trains have been simultaneously rendered inoperable and Technical Specification 3.0.3 unknowingly entered. The unit was in Mode 1 - Power Operation at 100% power for discovery of both events.

Event 1 was due to utility personnel not recognizing that the penetrations would affect CR pressurization during planning of the design work. Event 2's cause cannot be determined.

Penetrations were sealed and a Night Order was issued to temporarily prohibit CR breaches. Procedure guidance will be made for evaluating the breaching of barriers at the CR boundary. Trains 'A' and 'B' were flow balanced. Damper balance positions will be added to operating procedures and the dampers will be positively secured in position. Personnel involved were counseled.

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APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/88

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

EVENT 1: CONDITIONS AT TIME OF EVENT AND DISCOVERY

Mode 1 - Power Operation, Reactor Power 100%

EVENT 2: CONDITIONS AT TIME OF DISCOVERY

Mode 1 - Reactor Power 100%

INTRODUCTION (reference Figure 1 - Control Room Emergency Ventilation System)

Event 1: Event 1 is documented pursuant to 10 CFR 50.73(a)(2)(i), 50.73(a)(2)(v), and 50.73(a)(2)(vii) and is reported 30 days from the discovery date. Both independent trains of the Control Room Emergency Ventilation System⁽¹⁾ (CREVS) were inoperable from approximately 6/8/87 to 1820 CDT on 7/9/87 due to breached electrical penetration seals⁽²⁾. This prevented required Control Room (CR) pressurization and is a condition prohibited by Technical Specification (T/S) 3/4.7.6.

On 10/27/87, during utility follow-up actions to LER 87-013-00, another reportable CR pressure boundary breach was identified. A hole was drilled through the CR floor on 11/6/84 and was not sealed until 2/15/85 to support the routing of electrical conduit⁽³⁾ for a design change. Plant conditions during this event included Mode 1 at various power levels, Mode 2 - Startup, and Mode 3 - Hot Standby.

Event 2: The following event is documented pursuant to 10 CFR 50.73(a)(2)(i) and 50.73(a)(2)(v). The timing of this supplement is based on the reportability determination date (10/5/87). On 8/14/87, the "CR Air Conditioning (A/C) Unit 'B' Discharge to Heating, Ventilation, and Air Conditioning (HVAC) Equipment Room Manual Damper",⁽⁴⁾ GK00324, was found mispositioned. The potential impact of the mispositioning of this damper on post accident doses to CR personnel was not recognized by utility engineering personnel. Following the identification of a concern by an NRC inspector on 9/10/87, subsequent utility evaluation identified that doses to CR personnel may have exceeded limits previously evaluated in the Final Safety Analysis Report (FSAR). Although accurate quantitative estimates of this impact were not complete, reasonable assurance was obtained on 10/5/87 that doses to CR personnel as previously evaluated in the FSAR would have been significantly increased and this event was determined to be reportable. The unit was in Mode 6 - Refueling on the date of this determination. With the absence of a source term from Emergency Core Cooling System⁽⁵⁾ (ECCS) pump room leakage,

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CREVS Train 'B' was considered to be operable in Modes 5 - Cold Shutdown and 6. Based on assumed inoperability of Train 'B' for an undetermined period of time and routine removal of Train 'A' from service for surveillance testing and maintenance, both CREVS trains have been simultaneously rendered inoperable and T/S 3.0.3 has unknowingly been entered.

DESCRIPTION OF EVENT 1

On approximately 6/8/87, 6/11/87, and 7/6/87, contract maintenance personnel breached electrical penetration seals located along the CR pressure boundary to support a design change to Area Radiation Monitoring System annunciators. (6) Upon discovery, the chronology of the event was as follows:

7/9/87 (times are approximate)

- 1735 - Utility Operations and Engineering personnel commenced the performance of Engineering Surveillance Procedure ESP-GK-03009, "Control Building Pressure Test" to meet test specifications of T/S 4.7.6.e.3. The requirement is to demonstrate CREVS operability once per 18 months by "verifying that the system maintains the control room at a positive pressure of greater than or equal to .25 inches Water Gauge relative to the outside atmosphere during system operation."
- 1737 - Train 'A' Control Room Ventilation Isolation Signal (CRVIS) was initiated by the surveillance procedure.
- 1806 - 2000 The CR did not achieve the required pressure as indicated by a temporary test gauge. Upon notification, the shift supervisor initiated investigations into the cause of the failure including checks of the test gauge, inspections of penetrations, checks for leaking dampers, incorrect flows, and other leaking seals. During this period, four breached electrical penetrations were found and immediately plugged. However, CR pressure only increased to approximately .15 inches Water Gauge. CREVS Train 'A' was declared inoperable by the shift supervisor upon review of the surveillance test results.
- 2350 - A fifth breached electrical penetration was discovered in annunciator cabinet, RK045-C1. (7) It was determined that this condition in conjunction with the previously identified breached electrical penetrations was a common mode failure to both CREVS trains. The inoperability of both CREVS trains is prohibited by T/S 3/4.7.6 and entry into T/S 3.0.3 was declared.
- 2400 - The penetration in RK045-C1 was sealed. CR pressure increased to .26 inches Water Gauge, CREVS Train 'A' was declared operable, and T/S 3.0.3 was subsequently exited.

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7/10/87

0200 to 0235 - Upon realignment from the Train 'A' CRVIS, a Train 'B' CRVIS was manually initiated in accordance with the surveillance procedures. The CR pressurized to .62 inches Water Gauge satisfying the surveillance requirement. Based on the results of the Train 'B' test and an on-the-spot evaluation, the previous entry into T/S 3.0.3 was declared to have been in error since Train 'B' apparently had sufficient capacity to more than offset the previously discovered common mode leaks.

7/13/87

An engineering evaluation was initiated to confirm that CREVS Train 'B' had been operable with breached penetrations. This evaluation would also address a method to determine the size of the penetration allowed and yet maintain the operability of Train 'B'.

7/31/87

When the evaluation was presented to the On-Site Review Committee (ORC), it required an in-service test of Train 'B' in order to determine the effect of penetrations. This method was not approved until further evaluations were completed. The Engineering Staff was requested to calculate the size of CR penetration that would cause Train 'B' to become inoperable.

8/6/87

The engineering evaluation determined that the combination of breached electrical penetrations, identified on 7/9/87, rendered both trains of CREVS inoperable per T/S 3/4.7.6. A four hour ENS phone call was made at 1135 CDT per 10 CFR 50.72(b)(2)(iii).

DESCRIPTION OF EVENT 28/14/87

During a utility follow-up inspection to LER 87-013-00 on the difference in CR pressure between the CREVS Trains, utility Systems Engineering personnel found GKD0324 throttled closed, producing a flow rate of 160 cubic feet per minute (CFM) into the CR A/C and Filtration room. Due to concerns that restoring the flow to design values could result in decreasing the pressurization of the CR, and an initial assessment by engineering personnel that CR operability was not affected by this damper, GKD0324 was left in its as-found condition.

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8/19/87

An engineering change was initiated to verify the operability assessment which had been made and to request a change in design flow rates.

9/10/87

During an inspection, an NRC inspector questioned if mispositioning of this damper could have an adverse impact on CR doses. An Incident Report was initiated to address the inspector's concern.

10/5/87

Results of preliminary calculations indicated doses to CR personnel could result in a significant increase above those evaluated in the FSAR. Therefore, a four hour ENS phone call was made at 1830 CDT on 10/5/87 per 10 CFR 50.72(b)(2)(iii).

ROOT CAUSE

Event 1: The root cause of Event 1 is attributed to utility personnel errors during the planning of the design change which breached the CR electrical penetrations. Personnel failed to recognize that the electrical penetrations were located at the CR pressure boundary and breaching them would therefore affect T/S 3/4.7.6 requirements. Programmatically, breaching the penetrations was only considered from a fire protection standpoint.

Event 2: Utility engineering personnel reviewed the Control Building HVAC preoperational test, flow balancing procedures, and numerous work authorizing documents. No conclusions could be made regarding when or how the damper mispositioning occurred. The preoperational test recorded .48 inches Water Gauge on Train 'A' and .26 inches on Train 'B' on 5/25/84. Subsequent surveillance testing recorded .36 inches on Train 'A' and .62 inches on Train 'B' on 3/4/86. This data indicates that GKD0324 may have been correctly positioned at the time of the preoperational test, and had been subsequently mispositioned. However, no documentation could be found to substantiate this possibility. The root cause of Event 2 cannot be determined.

CORRECTIVE ACTIONS AND ACTIONS TO PREVENT RECURRENCE

Event 1:

1. An Operations Night Order was issued to prohibit CR boundary breaches until further investigation was completed.

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2. In a follow-up inspection, one Train 'A' isolation damper was found to leak but was still operational. This leakage did not significantly contribute to the failure on 7/9/87. CREVS dampers are inspected on a periodic basis. A work request has been written to repair this particular damper.
3. This event has been discussed with personnel involved. Personnel involved in planning design changes and corrective maintenance will also review this event.
4. An administrative procedure will be revised to provide guidance for evaluating the impact of breaching any barrier which is a portion of the CR pressure boundary.

Event 2:

1. The CREVS Train 'B' flow balance was satisfactorily performed on 10/8/87. The flow balance for CREVS Train 'A' was verified.
2. Manual balancing dampers whose positions are critical for the system to meet its safety-related design basis will be marked and secured in their proper position. The damper positions will then be added to the normal operating procedures during the verification of system alignment.
3. Engineering personnel were counseled on the importance of timely generation of plant Incident Reports to identify, track, and resolve significant deviations from safety-related design parameters.

SAFETY SIGNIFICANCE

Event 1: The design basis for the CREVS ensures that the CR will remain habitable for operations personnel during and following all credible accident conditions. With either CREVS train capable of providing design pressurization flow to the CR, a positive pressure would have been maintained relative to the surrounding areas. It should be noted that the CREVS was supplying filtered air to the control room and the filtration system was capable of filtering the recirculated air even though the CR could not be maintained at .25 inches Water Gauge as required by T/S's. Since both CREVS trains were capable of providing required flows, an adequate level of protection for CR personnel would have been provided. In the event of any inleakage, the operators would be aware of increasing radiological exposure due to CR inleakage via the local rad monitor⁽⁸⁾, which provides indication of radiological conditions.

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Event 2: An evaluation was performed by Union Electric's architect engineer utilizing measured values for containment leakage rate and a reduced value for ECCS pump room leakage. This calculation was performed for an unpressurized CR. A comparative summary of the dose values are shown below:

	Revised Analysis	FSAR	General Design Criterion (GDC) - 19
Whole Body (Rem)	0.21	0.48	< 5
Thyroid (Rem)	28.40	18.70	< 30
Beta Skin (Rem)	3.80	8.60	< 30

With the exception of the periods noted in discussion of Event 1, the CREVS was capable of maintaining the CR at a positive pressure of greater than .25 inches Water Gauge. Based on this consideration and the results of the evaluation documented above, an adequate level of protection would have been provided for CR personnel.

Previous Occurrences: None

Footnotes

The system and component codes listed below are from IEEE Standards 805-1983 and 803A-1983, respectively.

- (1) System - VI
- (2) System - KP; Component - SEAL
- (3) Component - CND
- (4) System - VI; Component - DMP
Manufacturer - American Warming and Ventilating Inc.
Model No. - DAA-P-3110
- (5) Systems - BP, BQ, CB
- (6) Systems - IB, IL; Component - ANN
- (7) System - IB; Component - CAB
- (8) System - IL; Component - MON
- (9) System - JE; Component - SWGR
- (10) Component - FLT
- (11) Component - ADS
- (12) Component - EHTR
- (13) Component - SEP

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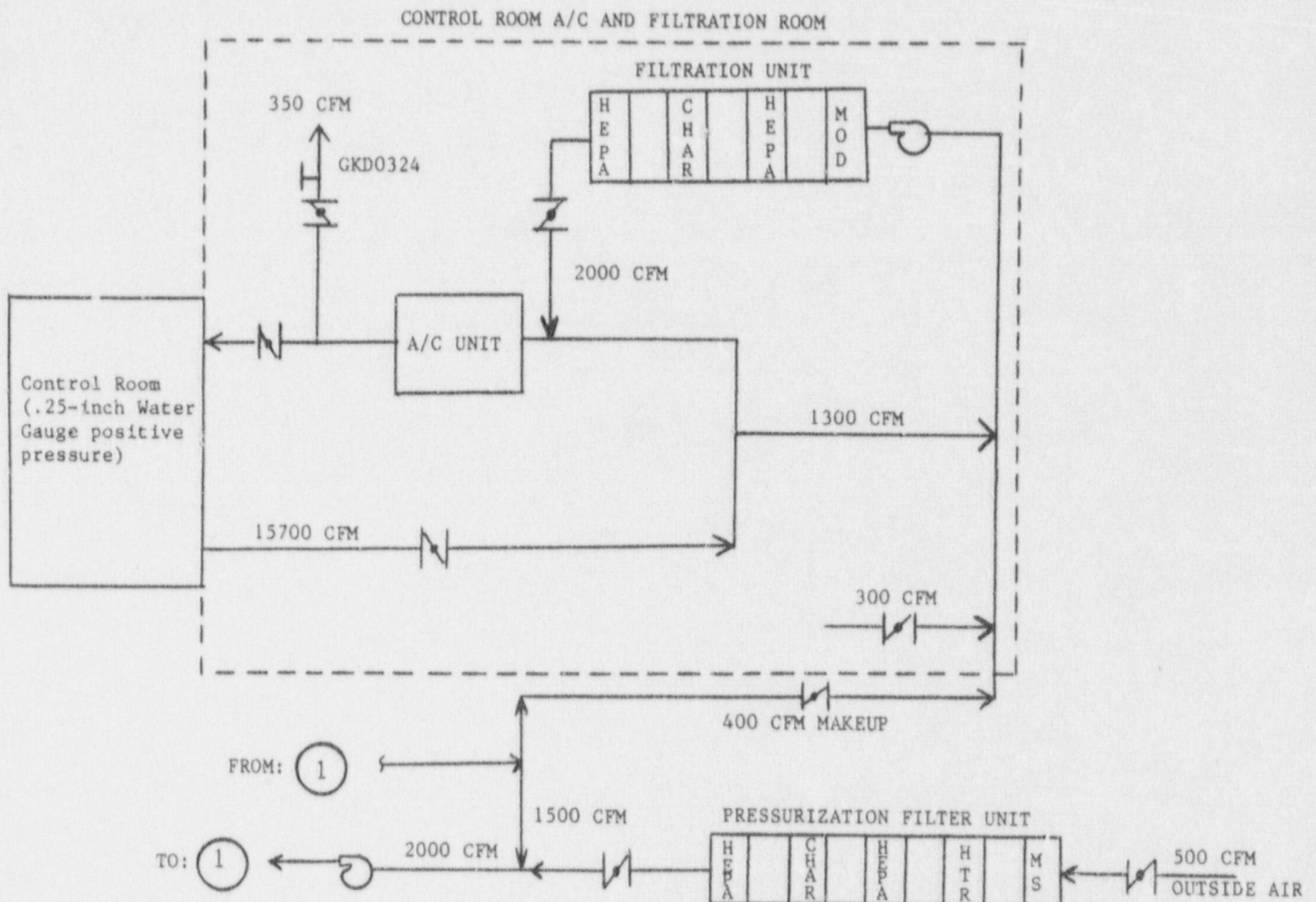
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LEGEND

MOD - Moderate Efficiency Filter⁽¹⁰⁾

HEPA - High Efficiency Particulate Filter

CHAR - Charcoal Absorber⁽¹¹⁾HTR - Heater⁽¹²⁾MS - Moisture Separator⁽¹³⁾

- 1 Engineered Safety Features
Switchgear⁽⁹⁾ Rooms
Upper/Lower Cable Spreading Rooms
Mechanical Equipment Rooms

FIGURE 1. CONTROL ROOM EMERGENCY VENTILATION SYSTEM