AmerenUE
Callaway Plant

PO Box 620
Fulton, MO 65251

December 4, 2006

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

ULNRC05350

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Ladies and Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
FACILITY OPERATING LICENSE NPF-30
LICENSEE EVENT REPORT 2006-003-01
Unexpected Inoperability of the Emergency Exhaust System
Due to Pressure Boundary Inoperability

The enclosed licensee event report revision is submitted in accordance with 10CFR50.73(a)(2)(i)(B), 10CFR50.73(a)(2)(v)(C) and 10CFR50.73(a)(2)(vii) to report the common cause failure of both trains of Control Building supply air isolation dampers resulting in the unexpected inoperability of the Emergency Exhaust System due to pressure boundary inoperability. This revision includes additional discussion on the safety consequences and implications of the event.

This letter does not contain new commitments.

Sincerely,

D. W. Neterer
Manager, Nuclear Operations

JWH/tdp

Enclosure

IE22

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NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE

Unexpected Inoperability of the Emergency Exhaust System due to Inoperable Pressure Boundary

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									None	
03	10	2006	2006	- 003 -	01	12	04	2006	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE

MODE 1

10. POWER LEVEL

100 %

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☒ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☒ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☒ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
K. A. Mills, Supervising Engr Regional Regulatory Affairs/Safety Analysis	(573) 676-4317

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
D	VI	BDMP	A340	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

During post maintenance testing following a preventive maintenance activity, the 'A' train Control Building supply air damper was found unable to travel to a fully open or closed position rendering the damper and associated train of the Emergency Exhaust System inoperable on 3/9/2006. Subsequent stroke testing of the 'B' train Control Building supply air damper was conducted on 3/10/2006 as part of an extent of condition investigation. The 'B' train damper was also found unable to fully open or close, rendering it and the remaining train of the Emergency Exhaust System inoperable on 3/10/2006. Actions initiated to restore the dampers discovered broken tack welds on the damper actuator weld pads of both dampers. A root cause analysis team determined the most likely root cause of the damper failures was the performance of scheduled stroke tests on these dampers occurring shortly after a significant winter weather event in 1995 that had caused icing on the damper blades. Torsional stress against the ice buildup caused significant weakening, if not cracking, of the damper tack welds. Over the ensuing years, cyclic loading of the welds during damper actuations applied stresses to the weakened welds ultimately resulting in the weld failures observed on March 9 and 10, 2006. The root cause team also found that failure to evaluate the 1995 stroking event under the corrective action program and inadequate preventive maintenance practices prevented identification and correction of the degradation prior to failure.

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

I. DESCRIPTION OF THE REPORTABLE EVENT

A. REPORTABLE EVENT CLASSIFICATION

50.73(a)(2)(i)(B) - Operation or Condition Prohibited by Technical Specifications

50.73(a)(2)(v)(C) - Event or Condition That Could Have Prevented Fulfillment of a Safety Function Needed to Control the Release of Radioactive Material

50.73(a)(2)(vii) - Common-cause Inoperability of Independent Trains or Channels Designed to Control the Release of Radioactive Material

B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

Mode 1, 100 Percent Reactor Power

C. STATUS OF STRUCTURES, SYSTEMS OR COMPONENTS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT

No structures, systems or components were Inoperable at the start of the event which contributed to the event.

D. NARRATIVE SUMMARY OF THE EVENT, INCLUDING DATES AND APPROXIMATE TIMES

During performance of an inspect and clean preventive maintenance (PM) task on 3/9/2006 the 'A' train Control Building Supply Air Unit Suction Damper, GKD0129, failed to fully stroke open or closed. The opposite train damper, GKD0128, was also found unable to fully stroke open or closed during an extent of condition investigation.

Dampers GKD0128 and GKD0129 are a model DAA-P-7401 rectangular, Type 1, isolation damper manufactured by American Warming and Ventilation, Inc. These dampers were installed during initial plant construction (circa 1981) and have seen continuous operation since the Emergency Exhaust ventilation system was placed into service.

Dampers GKD0128 and GKD0129 are installed as the Control Building Suction Air supply dampers ('B' and 'A' train, respectively) and are pressure boundary isolation dampers for the Emergency Exhaust ventilation system. Final Safety Analysis Report (FSAR) section 9.4.3 describes the Emergency Exhaust System as serving the Auxiliary Building following a Loss of Coolant Accident (LOCA) to ensure all Emergency Core Cooling System (ECCS) leakage to the Auxiliary Building atmosphere and the Containment air, purged via the hydrogen purge system, are processed. All ductwork, which is not required for operation of the Emergency Exhaust System and penetrates the Auxiliary Building, is automatically isolated. These nonessential systems are provided with two motor operated dampers in a series arrangement at the boundary penetrations, which close automatically following receipt of a Safety Injection Signal (SIS). The Emergency Exhaust System will maintain a negative pressure of 0.25 inches water (gauge) to ensure all leakage is into the building.

PM work on damper GKD0129 was being conducted on 3/9/2006 in accordance with the established PM frequency of 10 years, the last performance being in August 1995. During the pre-job brief for this task it was identified that a damper stroke was not included in the work instruction. Following
(continued)

discussions with the Operations crew a damper stroke was added to the work instruction to verify proper operation on completion of the activity.

The damper seals were found intact with no lubrication of the linkages or bearings required. The damper blades were noted to have some dirt/dust build up on them; however, this did not appear to hamper operation of the damper.

Following this work affected dampers were stroked open and closed one at a time. When damper GKD0129 was stroked the damper blades only moved closed approximately one inch. The damper actuator motor was heard running, but the blades were only slightly deflected. Maintenance workers stopped at that time and questioned if this was the expected response for the damper. Based on further research by the system engineer and the failure of GKD0129 to close in conjunction with a closed indication having been received in the Control Room, the Shift Manger declared GKD0129 inoperable at 1415 on 3/9/2006. In that the dirt/dust buildup was a suspected cause and was initially observed earlier in the morning, entry into the 7-Day Tech Spec action statement, 3.7.13.A (one train of Emergency Exhaust System inoperable), was backdated to 1050 on 3/9/2006. Repair activities were initiated and a corrective action document was issued to address cause and corrective actions.

A subsequent stroke of the opposite train damper, GKD0128, was conducted by Operations as part of an extent of condition investigation. Damper GKD0128 was found to give a dual indication in the Control Room (meaning the damper would not go fully open or fully closed). Damper GKD0128 was declared inoperable and the 24-Hour Tech Spec action statement, 3.7.13.B (two trains of Emergency Exhaust System inoperable due to inoperable Auxiliary Building boundary), was entered and backdated to 0500 on 3/10/2006. Inoperability of damper GKD0128 was backdated based on the date and time that maintenance personnel had reported observing dirt/dust buildup similar to that previously found on the opposite train damper GKD0129.

As a compensatory measure during repairs on GKD0128 and GKD0129, a Control Room Ventilation Isolation lineup was implemented at 1040 on 3/10/2006.

During troubleshooting for GKD0129 focused on the damper's actuator, GKHZ0150, broken tack welds on the damper actuator weld pad were discovered. A subsequent inspection of damper GKD0128 found one of the two tack welds on the weld pad to actuator rod arm for this damper also broken. Repair activities were initiated for both conditions.

As part of continued extent of condition reviews, inspections were conducted on the other potentially affected dampers in the Emergency Exhaust ventilation system. Based on the assumption that dirt buildup on the damper mechanisms precipitated these failures, an Engineering review specified the following dampers as potentially affected by this common cause: Main Steam Enclosure Building Supply Air Unit Suction Damper ('B' train), GFD0028; Main Steam Enclosure Building Supply Air Unit Suction Damper ('A' train), GFD0029; Auxiliary Building Supply Air Damper ('A' train), GLD0046; Auxiliary Building Supply Air Damper ('B' train), GLD0047; Containment Purge System Air Supply Damper ('A' train), GTD0009; and Containment Purge System Air Supply Damper ('B' train), GTD0010.

In the course of these inspections gaps were found between damper blades, when stroked to the closed position, for three of the six dampers: GFD0028, GFD0029 and GLD0047. An Operability Determination was initiated by the Shift Manager for review and disposition of these three dampers.

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Based on local observations of damper closures on 3/10/2006, it appeared the gaps on these dampers were related to a limit switch adjustment issue and not damper binding caused by weld failures. The Operability Determination evaluated the gap for each damper using a conservative estimate of each gap, the number of blades affected and full width of the opening. Each train was evaluated and the opening sizes converted to effective diameters for comparison to predefined allowable openings in the Auxiliary Building pressure boundary. In each case the result was found to be in the acceptable region by a significant margin, allowing the system to maintain the required negative pressure with the dampers closed but exhibiting the estimated gap sizes. These Emergency Exhaust System dampers were considered Operable and activities were initiated to restore the dampers to full qualification.

Work proceeded to repair and restore all affected dampers over the next 26 hours. Repair work on damper GKD0129 was completed with the damper declared Operable following associated stroke testing at 1755 on 3/10/2006. However, to ensure that the Operability Determination addressing dampers with gaps was tracked to completion Tech Spec action statement 3.7.13.B was not exited. The operability determination was subsequently completed and approved by the Shift Manager at 2356 on 3/10/2006 and Tech Spec action statement 3.7.13.B was exited with the Plant remaining in Tech Spec action statement 3.7.13.A.

Restoration work for damper GKD0128 included a weld repair which required damper GKD0129 to be open allowing access to the repair site. As a result, Tech Spec action statement 3.7.13.B was reentered at 0315 on 3/11/2006. During subsequent work to adjust the actuator limit position following weld repairs to GKD0128, the damper was again found not to fully close. Inspection of the damper internal to the ductwork found the newly repaired tack weld, as well as the tack weld on the opposite side weld pad, had broken requiring development of a new repair plan allowing more direct access to the area requiring repair.

Tech Spec action statement 3.7.13.B was exited at 1119 on 3/11/2006 with the restoration of GKD0129, but was reentered at 1410 on 3/11/2006 to continue work on dampers with previously identified closure gaps. Upon completion of repairs and successful stroke testing, GKD0128 was returned to service at 2157 on 3/11/2006. The plant remained in Tech Spec action statement 3.7.13.A for continuing work on 'A' train dampers.

Concurrent with work on GKD0128, additional inspection and cleaning tasks were conducted on the three dampers (GFD0028, GFD0029, and GLD0047) previously identified as having closure gaps. These activities were conducted through the 3/11/2006 PM shift and 3/12/2006 Owl shift. All required maintenance and subsequent Tech Spec surveillance verifications were completed for the 'A' train dampers and Tech Spec action statement 3.7.13.A was exited at 0326 on 3/12/2006 with the Auxiliary Building pressure boundary fully qualified.

A root cause analysis was initiated to evaluate the facts and evidence of this event. The analysis determined that the most likely root cause of the damper failures was associated with the performance of scheduled stroke tests on dampers GKD0128 and GKD0129 occurring shortly after a significant winter weather event in January 1995. The weather event was attributed to a problem experienced with damper GKD0128 during the performance of the scheduled stroke tests where the damper blades were found to close but "spring" back (open) as soon as the actuator close button was released. Further investigation found the damper blades coated with ice. It was later postulated (based on review of the job completion notes) that the ice buildup had occurred following the snow storm two days

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earlier wherein snow, accumulating to a depth nearly covering the outside air intake, had been drawn into the open louvers causing icing on the louvers. This mechanism could impact all four of the damper sets discussed above as they share a common duct associated with this outside air intake. In conjunction with stroke testing, this condition represents a potential common cause failure mechanism impacting the independent trains of each damper set.

Torsional stress against the ice buildup occurred during stroke testing and it is reasonably assumed that this had likely caused significant weakening, if not cracking, of the damper tack welds. Subsequent cyclic loading of the welds during damper actuations applied stresses to the weakened welds ultimately resulting in the weld failures observed on March 9 and 10, 2006.

The root cause analysis also found that failure to evaluate the 1995 stroking event under the corrective action program and inadequate preventive maintenance practices prevented identification and correction of the degradation prior to failure:

1) Other than to assure that the dampers closed, no follow-up inspection of damper blades occurred in response to the icing condition. In addition, scheduled preventative maintenance tasks for GKD0128 and GKD0129 conducted in August 1995 failed to consider the preceding icing event as input to the level of inspection required. Inadequate application of station operating experience contributed to the failure to ensure any adverse conditions created by the earlier icing event were evaluated.

2) No corrective action document was generated to evaluate the icing event and provide for any required follow-up. As a result, the icing event did not receive senior management attention ensuring determination and assurance that the dampers continued to be fully functional following removal of the ice.

E. METHOD OF DISCOVERY OF EACH COMPONENT, SYSTEM FAILURE, OR PROCEDURAL ERROR

As described above, damper failures and closure gaps were identified through local observations following PM or stroking activities during extent of condition evaluations. Discovery of the root and contributing causes occurred through the performance of a root cause analysis in accordance with station guidance.

II. EVENT DRIVEN INFORMATION

A. SAFETY SYSTEMS THAT RESPONDED

No automatic actuations occurred and no safety systems were required to respond to this event.

B. DURATION OF SAFETY SYSTEM INOPERABILITY

The requirements to stroke and otherwise verify that dampers GKD0128 and GKD0129 were able to satisfy design functions have changed since original licensing of the Plant. Through early 2000, stroking of the dampers had been conducted as part of the Auxiliary Building Negative Ventilation Testing to satisfy FSAR section 9.4.3 requirements. Testing was successfully conducted and requirements to maintain greater than 0.25 inches water (gauge) were met for both trains of (continued)

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Emergency Exhaust System in each of the six documented 18-month PM activities conducted during the period of September 1993 through March 2000. Further, except for the stroke time testing conducted in January 1995 discussed above, the train related Actuator Stroke Time testing was also completed satisfactorily during the same time period.

Technical Specification requirements for this portion of the Emergency Exhaust System were instituted with implementation of Improved Technical Specifications (ITS) in 2000. Stroke testing crediting remote indication in the Control Room to show that associated dampers had stroked to the required position became a Tech Spec surveillance conducted to satisfy surveillance requirement 3.7.13.3 with implementation of ITS. Surveillance stroke testing has been completed satisfactorily every 18 months since October 2002. Further, testing of the dampers to properly isolate the Auxiliary Building upon receipt of a valid Control Room Ventilation Isolation Signal per surveillance requirement 3.7.13.4 has also been performed satisfactorily every 36 months since September 2001. As with the prior FSAR PM tasks preceding these surveillances, acceptable test results are based upon achieving at least 0.25 inches water (gauge).

During the icing event and damper stroke time testing in January 1995, it is likely that the tack welds that secure the center damper blade to the drive shaft were overstressed or cracked. The welds likely continued to degrade during subsequent stroking activities. Although the stroke time tests have been acceptable since 1995, with weld failures it is possible that the actuator and damper shaft were turning without actuating the damper blades. As the damper position lights in the control room are fed from limit switches on the actuator (not the damper), this would result in closed indication in control room with the damper actually in the open or mid travel position. This scenario was observed during the 3/9/2006 stroke test of GKD0129.

The surveillances which perform the negative pressure test have significantly exceeded the acceptance criteria both prior to and following the January 1995 event. However, the surveillance results could be affected by the non-safety related (approved plant design, non-seismic) duct which is fully intact during the negative pressure tests. Therefore, there is insufficient evidence to establish the exact time of failure and the dampers are conservatively assumed to have been incapable of performing their specified safety function, to close and provide Auxiliary Building pressure boundary integrity on a safety injection signal, since January 1995.

As a result, entry into applicable Tech Spec action statements and compliance with associated completion times have not been met beginning with the implementation of ITS on 4/30/2000 through the initial entry into Tech Spec 3.7.13.B at 0500 on 3/10/2006 as follows:

3.7.13.B Two trains of Emergency Exhaust System inoperable due to inoperable Auxiliary Building boundary in MODE 1, 2, 3 or 4

- Restore Auxiliary Building boundary to Operable status within 24 hours

3.7.13.C Required action and associated completion time of condition B not met in MODE 1, 2, 3 or 4

- Be in MODE 3 within 6 hours AND
- Be in MODE 5 within 36 hours

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Based on the Modes of applicability and Mode change history, the following periods of Auxiliary Building boundary inoperability have occurred since implementation of ITS:

4/30/2000 - 4/08/2001	344 Days
5/13/2001 - 10/23/2002	529 Days
11/21/2002 - 3/23/2003	123 Days
3/31/2003 - 4/11/2004	378 Days
6/7/2004 - 9/18/2005	469 Days
11/13/2005 - 3/10/2006	118 Days

The total elapsed duration of Auxiliary Building boundary inoperability is approximately 1,961 days in the period between implementation of ITS and the event discovery date of 3/10/2006. Inoperability after discovery was tracked against associated Tech Spec requirements as detailed in the narrative and ended with the Auxiliary Building boundary being declared Operable at 0326 on 3/12/2006.

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT.

This event and the associated degradation of the GKD0128 and GKD0129 dampers did not represent a significant adverse impact on nuclear safety. This conclusion is based on actual plant conditions existing during the period of degradation. Dampers GKD0128 and GKD0129 serve as part of the safety-grade Auxiliary Building pressure boundary, which is credited in the mitigation of offsite and Control Room LOCA dose consequences. Specifically, the Emergency Exhaust System and the Auxiliary Building pressure boundary have safety functions for mitigating the release of radioactivity during the recirculation of sump fluids following a large break LOCA with core damage, but have no function to prevent core damage. Therefore, this event has no impact on core damage frequency.

Standard Review Plan Section 15.6.5, Appendix B, specifies that leakage of ECCS components into the Auxiliary Building be analyzed as a post-LOCA radiological release pathway. The ECCS leakage provides a release pathway for radio-iodines contained in post-LOCA sump fluids. Following a LOCA, the Auxiliary Building would be maintained at a negative pressure by the Emergency Exhaust system. The Emergency Exhaust system includes safety-grade charcoal filtration, which is credited at 90 percent efficiency in the analysis of record. Should the Auxiliary Building pressure boundary become degraded, then the analysis could no longer credit the filtration for mitigating the release of radio-iodines from the Auxiliary Building to the environment. In the absence of other mitigating factors, this would result in a more than minimal increase in offsite and Control Room accident dose consequences sufficient to exceed 10CFR100 offsite dose values and the General Design Criterion (GDC) 19 Control Room dose limits.

The LOCA consequences analysis of record assumes a two gallon per minute (gpm) leak rate of sump fluids into the Auxiliary Building. A portion of this fluid will flash and become airborne. After being processed by the safety-grade Emergency Exhaust charcoal filtration, which is credited as being 90 percent efficient, 10 percent of the airborne radio-iodines would be released to the environment. During the period of degradation of GKD0128 and GKD0129, leakage into the Auxiliary Building was substantially lower than the leak rate used in the analysis of record. Leakage of ECCS components into the Auxiliary Building is routinely measured using surveillance procedures. During the affected timeframe, surveillance results show the sum of all ECCS leakage into the Auxiliary Building was

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typically under 10 drops per minute. This value is significantly below the two gpm value addressed in the analysis of record, and would offset the loss of filtration due to degradation of the Auxiliary Building pressure boundary.

During the period of Auxiliary Building pressure boundary degradation; there was one significant exception to the typical low level of ECCS leakage. During the period between March 31 and April 12, 2004, a degraded pump seal was installed on one of Callaway's Residual Heat Removal (RHR) pumps. The degraded seal was discovered in the course of a planned shutdown for refueling outage 13 when on April 11, 2004, higher than normal leakage was identified. Under post-accident conditions, this seal would have produced a leak rate of sump fluids between 1.9 to 2 gpm. With a degraded Auxiliary Building pressure boundary, the postulated accident in conjunction with this leak rate would have resulted in a more than minimal increase in offsite and Control Room dose consequences sufficient to exceed 10CFR100 offsite dose values and the GDC 19 Control Room dose limits.

However, during the time of the degraded RHR pump seal, non-safety grade ductwork associated with the degraded dampers would have provided a pressure boundary and ensured that the Auxiliary Building exhaust would be processed through the safety grade charcoal filtration of the Emergency Exhaust system. Although this normal ventilation ductwork is non-safety grade, it was intact during the period of the degraded RHR pump seal. The ductwork would be credited as providing a passive pressure boundary. There are no assumptions in the LOCA sequence that would result in a post-accident environment in the Auxiliary Building that would impact this passive pressure boundary. There would be no break location for a LOCA that could impact the location of this ductwork in the Auxiliary Building. Additionally, it should be noted Callaway's Licensing Bases do not require the analysis to assume a simultaneous LOCA and seismic event. Therefore, this ductwork was available to provide a passive pressure boundary during the time of the degraded RHR pump seal. Auxiliary Building pressure surveillance test results applicable to the time of the degraded RHR pump seal included the performance of this ductwork. Each train of Emergency Exhaust provided a negative pressure of at least 0.75 inches of water. The acceptance criterion is 0.25 inches of water per train. As such, the non-safety grade ductwork was providing a passive pressure boundary that mitigated the potential dose consequences during the period affected by higher than normal RHR seal leakage and the degraded safety-related portion of the Auxiliary Building pressure boundary.

Therefore, based on actual plant conditions, the degraded GKD0128 and GKD0129 dampers addressed by this LER did not result in a significant impact on nuclear safety.

III. CAUSE(S) OF THE EVENT AND CORRECTIVE ACTION(S)

The identified root causes (RC) for this event and the associated corrective actions to prevent recurrence (CATPR) developed for evaluation under the corrective action program (CAP) are as follows:

RC 1.1: The level of detail provided in the associated inspection and cleaning PM instructions did not include any guidance relative to inspection of the tack welds on the weld pad for the damper blade to damper actuator rod arm in light of the 1995 icing event.

(continued)

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CATPR 1.1: Revise written instructions for performing inspection and cleaning of dampers GKD0128 and GKD0129 to address lessons learned from this event. Specifically, providing better detail on what to look for in performing inspection of the tack welds on the weld pad to damper actuator rod.

RC 1.2: The inspection of dampers, ductwork and their associated actuators is considered a "skill of the craft" activity not requiring formal training. In that these inspections are infrequently performed an error precursor (i.e., individual capabilities) is presented.

CATPR 1.2: Develop a Performance Assessment Worksheet (training needs analysis) on this event recommending that this event be made an awareness item for discussion during maintenance continuing training (referencing the CAP document for this event as internal operating experience).

RC 1.3: The written instructions for damper PM activities on GKD0128 and GKD0129 did not require inspection of the tack welds. In addition, there are no established PM activities in place for conducting periodic inspections of the other supply air dampers in the Emergency Exhaust ventilation system (i.e., GFD0028, GFD0029, GLD0046, GLD0047, GTD0009 and GTD0010).

CATPR 1.3: Revise (or develop, as appropriate) PM documents for Emergency Exhaust supply dampers in all associated systems to reflect the need for inspection of tack welds at the weld pad to damper actuator rod and reference the CAP document for this event.

RC 2.1: Use of the CAP procedure (in place at the time of the January 1995 event) by plant personnel to document and resolve issues associated with problems on installed equipment was inadequate. Use of the CAP program at the time was burdensome due to perceived misunderstandings in how to effectively use the CAP to identify, resolve and trend equipment performance issues. No specific training had been provided to plant personnel responding to corrective action issues nor was the need to document equipment issues in the CAP reinforced.

CATPR 2.1: No specific corrective actions are proposed under this root cause. Since the original icing event, substantial changes have been made to the controlling procedure for the corrective action program as well as heightened awareness of the need to utilize the CAP to identify problems and concerns with installed plant equipment, processes and programs at the station. Actions taken in response to numerous, high significance level corrective action documents initiated and resolved since the 1995 event are considered adequate corrective actions for this root cause.

RC 2.2: Station management's enforcement of expectations for use of the CAP to document and resolve installed equipment issues was inadequate. At the time of the 1995 event, senior station management had not created and fostered an environment where use of the CAP was a key method to maintain equipment reliability nor was the expectation for use of the CAP in this capacity reinforced.

CATPR 2.2: No specific corrective actions are proposed under this root cause. This determination has the same basis as for CATPR 2.1, above.

RC-2.3: Addresses the same issues as in RC 1.1 and RC 1.3, but in the context of maintenance work package detail

(continued)

CATPR 2.3: Implement controls to assure that physical inspection of dampers is performed following maintenance on all supply air dampers including visual verification of damper positioning during post maintenance stroke testing and adequate work instruction guidance from the station damper bases document.

RC 2.4a: Response to severe winter weather events does not include review of critical air supply dampers for impact on Operability in the presence of icing.

CATPR 2.4a: Implement a written instruction (e.g., "on demand PM" or off-normal operating procedure) which requires a physical inspection of critical air intakes (louvers, damper blades, etc.) for icing issues during severe winter weather events and references appropriate operating experience documents.

RC 2.4b: Current inspection frequencies established for dampers GKD0128 and GKD0129 are insufficient to ensure continued functionality of these dampers. The present PM frequency is 10 years while the guidance in the PM bases documentation for these dampers recommends a six-year frequency. Additionally, the specific inspection tasks recommended in the bases document are not included in the PM instruction.

CATPR 2.4b: Revise the PM frequency for inspecting and cleaning dampers GKD0128 and GKD0129 to reflect the frequency and inspection task content recommended in the damper bases document.

These CATPRS will prevent the event from recurring, or will significantly mitigate the consequences of a future event, as detailed below:

CATPR 1.1, CATPR 1.2 and CATPR 1.3 resolve the issue by removing the potential for Knowledge Based Errors using information gained from review of this incident to establish Rule Based Barriers.

CATPR 2.3 and CATPR 2.4b address application of lessons learned from this event to the Maintenance and Engineering departments; while CATPR-2.4a addresses application of this event as a learning opportunity for the entire site.

IV. PREVIOUS SIMILAR EVENTS

Internal and external operating experience (OE) and corrective action documents were reviewed. No relevant operating experience was identified which had the station acted upon, would have prevented this event. However, the root cause analysis identified a missed opportunity in the area of OE. The 1995 icing event was a significant internal event that, had it been evaluated and applied in subsequent work on the associated dampers may have helped identify the weakened welds earlier and possibly prevented the event.

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V. ADDITIONAL INFORMATION

The system and component codes listed below are from the IEEE Standard 805-1984 and IEEE Standard 803A-1983, respectively.

System: VI
Component: BDMP

Common Cause Inoperability - Potentially Affected Systems/Components

System: VE
Component: BDMP

System: VF
Component: BDMP

System: VA
Component: BDMP