LICENSEE EVENT REPORT (LER) Form Rev. 2.0

Facility Name (1)	Docket Number (2)	Page (3)
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Title (4)
Control Room Emergency Ventilation System Air Filtration Unit Inoperable due to Airflow Rate in Excess of Technical Specifications Allowable.

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)
0 9	1 0	1999	1999	0 0 4	0 1	1 2	0 8	1999		0 5 0 0 0 2 6 5
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OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)					
1	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)		
POWER LEVEL (10) 1 0 0	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)	50.73(a)(2)(vii)	Other (Specify in Abstract below and in Text		
	20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)			
	20.405(a)(1)(iv)	X 50.73(a)(2)(ii)	50.73(a)(viii)(B)			
	20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)			

LICENSEE CONTACT FOR THIS LER (12)

Name	TELEPHONE NUMBER
Charles Peterson, Regulatory Affairs Manager, ext. 3609	AREA CODE 3 0 9 6 5 4 - 2 2 4 1

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)		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)

ABSTRACT:

At approximately 1445 hours on September 10, 1999, with Unit 1 and Unit 2 at 100% power, the Control Room Emergency Ventilation System (CREVS) Air Filtration Unit (AFU) was declared inoperable, when the AFU airflow rate was found to have exceeded the maximum allowed by Technical Specifications (TS). Initial investigation identified that the high AFU airflow rate was caused by the incorrect setting of a damper following a maintenance activity conducted on September 1, 1999. The damper was set incorrectly due to an inaccurate measurement of the AFU airflow, which resulted in the AFU inlet damper being throttled open too far. This situation went undetected until the Control Room (CR) Emergency Filtration Monthly Test was performed nine days later. Upon discovery, the damper was repositioned and the airflow rate was returned to within the TS band.

The safety significance of this event was minimal. The CREVS was capable of performing its safety function. Had a Loss of Coolant Accident occurred, the CREVS was capable of meeting the CR dose requirements with the high AFU airflow rate condition. The health and safety of the general public and CR personnel were not affected.

The root cause of this event was the inaccurate AFU airflow measurement taken during the post-maintenance testing conducted on September 1, 1999. This resulted in the AFU inlet damper being set incorrectly.

PLANT AND SYSTEM IDENTIFICATION:
General Electric - Boiling Water Reactor - 2511 MWt rated core thermal power.

EVENT IDENTIFICATION:
Control Room Emergency Ventilation System Air Filtration Unit Inoperable due to Airflow Rate in Excess of Technical Specifications Allowable.

A. CONDITIONS PRIOR TO EVENT:

Unit:	1	Event Date:	September 10, 1999	Event Time:	1445 hours
Reactor Mode:	1	Mode Name:	Power Operation	Power Level:	100%

This report was initiated by Licensee Event Report 254/99-004

Power Operation (1) - Mode switch in the RUN position with average reactor coolant temperature at any temperature.

B. DESCRIPTION OF EVENT:

At 0500 hours on September 1, 1999, with Unit 1 and Unit 2 operating at 100% power, a planned Limiting Condition for Operation (LCO) entry was made for scheduled maintenance on the Control Room Emergency Ventilation System (CREVS) [VI] Air Filtration Unit (AFU). As part of the out-of-service boundary, the AFU inlet damper (AO ½-5741-332) [DMP], which is used to set the AFU airflow rate, was shut.

At approximately 2000 hours on September 1, 1999, maintenance activities on the CREVS AFU were completed, and the AFU was started on the 'A' Train of the Control Room Ventilation system for post-maintenance testing. As part of the post-maintenance testing, the AFU airflow rate was required to be measured to ensure it had been restored to the Technical Specification (TS) band of 1800 – 2200 scfm.

The AFU inlet damper limit stop, which had been shut during a maintenance activity, was adjusted to the position it was believed to have been in prior to being taken out of service. The AFU inlet damper limit stop was repositioned using the "counting of turns" method (i.e., the number of turns used to shut the damper was recorded, and the limit stop was adjusted by the same number of turns when the out of service was cleared). There is no damper position indicator, other than an open/closed limit switch. Operations and Instrument Maintenance Department personnel were dispatched to measure the AFU airflow rate, and to adjust the AFU inlet damper if required.

The AFU airflow rate was measured by pitot tube and was initially found to be 1532 scfm, which is below the TS lower limit of 1800 scfm. Damper AO ½-5741-332 was then adjusted to restore the AFU airflow rate to within the 1800 – 2200 scfm band required by TS. Following completion of the post-maintenance adjustment of damper AO ½-5741-332, the AFU airflow rate was determined by pitot tube measurement to be 1885 scfm. Note: This was subsequently determined to be an incorrect measurement.

At approximately 2045 hours on September 1, 1999, all post-maintenance testing was completed and the LCO was exited. Following completion of this planned maintenance activity, the AFU was not operated, and the AO ½-5741-332 was not worked on or re-adjusted, until the monthly surveillance procedure was performed on September 10, 1999.

At 1445 hours on September 10, 1999, Unit 1 and Unit 2 were at 100% Power. Surveillance procedure QCOS 5750-02, "Control Room Emergency Filtration System Monthly Test," was in progress. During the surveillance, the CREVS AFU is operated on the 'B' Train of the Control Room Emergency Ventilation system. The AFU airflow rate was measured by pitot tube, and found to be 2317 scfm, which exceeded the TS upper airflow limit of 2200 scfm. At approximately 1520 hours on September 10, 1999, the AFU airflow rate was lowered to within the acceptable TS airflow band in accordance with surveillance procedure QCOS 5750-02. TS compliance was restored and the system was declared operable.

As part of the investigation, at approximately 1300 hours on September 28, 1999, a special test was conducted, which measured the AFU airflow rate by pitot tube with the AFU operating on the 'A' and 'B' trains of the Control Room Ventilation System. This test was conducted using the "as-left" AO ½-5741-332 damper setting, from the monthly surveillance QCOS 5750-02 performed on September 10, 1999. The results of the test revealed that the AFU airflow rate was within the allowed TS band of 1800 – 2200 scfm when the AFU was operated on both the 'A' and 'B' trains of the Control Room Ventilation system. This confirmed that the damper position was stable and that the AFU airflow rate was within TS allowable.

C. CAUSE OF THE EVENT:

The root cause of this event was the inaccurate AFU airflow measurement taken during the post-maintenance testing conducted on September 1, 1999. Two possible explicit causes, which could have resulted in the inaccurate AFU airflow rate measurement, were identified:

1) An airflow instrument tubing or fitting air leak on the velocity pressure sensing line to the airflow instrument.

2) Partial blockage of the pitot tube velocity pressure tip and/or velocity pressure tubing.

A test was conducted which verified that there were no component problems or failures in the CREVS, which could have caused the high airflow rate condition.

The inaccurate AFU airflow measurement resulted in the AFU inlet damper being opened too far. This condition caused the AFU airflow to be too high during the monthly surveillance on September 10,1999.

The investigation also identified the following contributing factors:

1) The AFU airflow characteristics are different when the AFU is operated on Train 'A' of the CR HVAC system.

2) The AFU inlet damper did not have a position indicator. The lack of a damper position indicator resulted in the inability to compare the final damper position following post-maintenance testing conducted on September 1, 1999, to previous damper settings.

D. SAFETY ANALYSIS:

This event was not safety significant.

The CREVS does not mitigate the off-site dose consequences of a release. Therefore, the off-site dose would not be affected. The health and safety of the public was not affected.

The CREVS was capable of performing its safety function. Had a LOCA occurred, the CREVS was capable of meeting the CR dose requirements with the high AFU airflow rate condition. The health and safety of the general public and CR personnel were not affected.

The design basis function of the CREVS AFU is to provide a source of filtered makeup air to the Control Room Emergency Zone in the event of a LOCA. The filtered makeup air provided by the AFU is used to pressurize the Control Room Emergency Zone following a LOCA, after isolation of the Control Room Emergency Zone occurs. The design basis safety function was maintained throughout the course of the event.

Operation of the CREVS AFU at an airflow rate of 2317 scfm would not have exceeded the differential pressure limits for any of the mechanical air filters [FLT] in the AFU. Therefore, the AFU would have performed as designed and removed the requisite amounts of particulate airborne radioactivity had a Loss of Coolant Accident (LOCA) occurred in this condition.

Operation of the CREVS AFU at an airflow rate of 2317 scfm would have not impacted the ability of the CREVS to pressurize the Control Room Emergency Zone to the TS limit of $\geq$ 1/8 inch wg. Had a LOCA occurred in this condition, the Control Room envelope would have met the positive pressure requirement in the Control Room Habitability Study.

Off-site testing, performed by the CR HVAC charcoal vendor, was conducted simulating an AFU airflow rate of 2333 scfm. The special testing revealed that the charcoal efficiency at the higher airflow rate still met the charcoal efficiency requirement assumed in the current Control Room dose analysis of greater than 99%. The actual charcoal efficiency was determined to be 99.941% at the higher airflow rate. This conclusively proves that the charcoal adsorbers would have been capable of removing the requisite amounts of radioactive material had a LOCA occurred during the period that the AFU inlet damper limit stop was improperly positioned.

Since the on-site and off-site dose would not have been affected, there is no safety significance to this event.

E. CORRECTIVE ACTIONS:

Corrective Actions Completed:

1. The AFU airflow was adjusted to meet TS requirements during the performance of surveillance procedure QCOS 5750-02.

2. The AFU was operated on Train 'A' and Train 'B' of the Control Room Ventilation systems. The AFU airflow was verified to meet TS requirements on each train.

3. The AFU inlet damper actuator has been marked with position indication arrows, which will line up when the AFU inlet damper opens to the correct throttle position. This action was completed on September 29, 1999.

Corrective Actions to be Completed:

1. Control Room HVAC surveillance procedures will be revised to contain appropriate steps to ensure that the correct AFU inlet damper throttle position is checked when the AFU is placed in operation.

2. Instrument Maintenance (IM) Department personnel that perform pitot tube measurements will be briefed on this event and the need to check airflow measuring equipment for fitting and tubing leaks and for pitot tube and sensing line blockage when measuring airflow using a pitot tube.

3. The use of pitot tube airflow instruments when performing flow measurement by pitot tube traverse will be added to the Job Assignment Matrix, and special training and qualification requirements will be incorporated for personnel performing a pitot tube traverse.

F. PREVIOUS OCCURRENCES:

A search of LERs over the past three years identified the following events:

LER 254/96-023 - The Control Room Emergency Filtration system failed to maintain required airflow due to a cognitive personnel error, which allowed the flow instrument loop to be incorrectly calibrated.

LER 254/98-023 - The inaccuracy of the Control Room Emergency Ventilation system (CREVS) Air Filtration Unit (AFU) airflow instrument resulted in the AFU airflow rate and AFU differential pressure exceeding Technical Specification (TS) limits.

The two previous events relate to calibration and accuracy deficiencies with the installed AFU airflow rate instrument, and are not directly applicable to the pitot tube measurement problems associated with this event.

The second event relates to this event in that a properly functioning installed AFU air flow instrument would have precluded use of a pitot tube.

G. COMPONENT FAILURE DATA:

There were no component failures associated with this event.