

**Virginia Electric And Power Company
Surry Power Station
5570 Hog Island Road
Surry, Virginia 23883**

July 20, 2000

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555-0001

Serial No.: 00-250A
SS&L/BCB
Docket No.: 50-280
50-281
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DPR-37

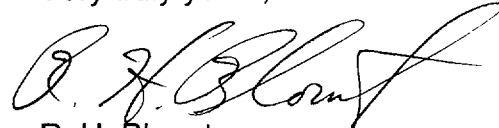
Dear Sirs:

Pursuant to 10CFR50.73, Virginia Electric and Power Company hereby submits the following Licensee Event Report supplement applicable to Surry Power Station Units 1 and 2.

Report No. 50-280, 50-281/2000-001-01

This report has been reviewed by the Station Nuclear Safety and Operating Committee and will be forwarded to the Management Safety Review Committee for its review.

Very truly yours,



R. H. Blount
Acting Site Vice President
Surry Power Station

Enclosure

IED

Commitments contained in this letter:

1. A category 1 root cause evaluation (RCE) has been initiated for this event. The conclusions from the RCE will be evaluated and approved corrective actions needed to prevent the recurrence of a similar event will be implemented.
2. A more structured preventive maintenance program for ventilation system filters will be established to ensure satisfactory performance.

cc: United States Nuclear Regulatory Commission
Region II
Atlanta Federal Center
61 Forsyth Street, SW, Suite 23 T85
Atlanta, Georgia 30303-8931

Mr. R. A. Musser
NRC Senior Resident Inspector
Surry Power Station

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 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the 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. If 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.

FACILITY NAME (1)

SURRY POWER STATION , Unit 1

DOCKET NUMBER (2)

05000 - 280

PAGE (3)

1 OF 7

TITLE (4)

Filtered Exhaust Fan Failure Results In Technical Specifications Violation

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	DOCUMENT NUMBER
04	18	2000	2000	-- 01 --	01	07	20	2000	Surry Unit 2	05000-281
									FACILITY NAME	DOCUMENT NUMBER
										05000-
OPERATING MODE (9)		N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)		100 %	20.2201(b)		20.2203(a)(2)(v)		X	50.73(a)(2)(i)		50.73(a)(2)(viii)
			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)			50.73(a)(2)(v)		Specify in Abstract below
			20.2203(a)(2)(iv)		50.36(c)(2)			50.73(a)(2)(vii)		or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME

E. S. Grecheck, Site Vice President

TELEPHONE NUMBER (Include Area Code)

(757) 365-2001

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)

YES		X	NO		EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
(If yes, complete EXPECTED SUBMISSION DATE).								

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

On April 18, 2000, Unit 1 was at Cold Shutdown and Unit 2 was at 100% power. While testing the ventilation exhaust system, both fans automatically started as designed, but subsequently tripped. One fan was returned to service and a 7 day Technical Specification (TS) action statement was entered. Additional testing on April 19 concluded that the fans could not be relied upon to operate in parallel. A prior change to fan flow controls was preliminarily identified as the cause. The control setpoints were adjusted and after testing, the action statement was exited.

Additionally, while testing on April 18, 2000, a Unit 1 damper failure rendered both fans inoperable for a short period causing Unit 2 to be in a 6 hour TS action statement to Hot Shutdown. Testing verified that the failed damper did not impact Unit 2 and the action statement was exited. A condition in which both fans were inoperable also occurred on June 21, 2000. This condition resulted from a soiled supply filter and the system operating configuration, which was permitted by procedural changes implemented to address the April 2000 ventilation transients.

A root cause evaluation was initiated for these events and approved corrective actions will be implemented. This event resulted in no safety consequences or significant implications. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(i)(B).

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

1.0 DESCRIPTION OF THE EVENT**System Description**

The Auxiliary Building ventilation exhaust system [EIS-VF] is a shared system designed to provide post-accident cooling for critical components and filtration to limit onsite and offsite doses within appropriate limits. The ventilation exhaust system consists of two trains with each train having a central exhaust fan (1-VS-F-58A and 1-VS-F-58B) [EIS-VF,FAN], a charcoal and high efficiency particulate air filter assembly [EIS-VF,FLT], and associated dampers and ducting [EIS-VF,DMP and DUCT]. In the post-accident alignment, the system takes suction from the Auxiliary Building Central area (including the charging pump cubicles) and the affected unit's Safeguards Building. Upon receipt of a safety injection (SI) signal [EIS-JE] from either train, both fans automatically start and run in parallel. The original system design used fan suction pressure to control total discharge flow rate to approximately 36,000 cubic feet per minute (CFM) with parallel fan or single fan operation. In November and December 1999 (58A and 58B, respectively), a design change was implemented to change fan flow control from suction pressure control [EIS-VF,PIC] to discharge airflow control [EIS-VF,FIC] to eliminate the flow instabilities that existed with the suction control system during parallel fan operation.

Technical Specification (TS) 3.22.A requires that both ventilation exhaust filter trains be operable whenever either unit's reactor coolant system temperature and pressure is greater than 350 degrees Fahrenheit and 450 psig. In accordance with TS 3.22.B, if one train is inoperable, it must be returned to operable status within 7 days or the unit is required to shut down. TS 4.12 also requires the ventilation exhaust system to be tested once per 18 months to verify system operability. The test requires, in part, that the automatic start-up, shutdown, and flow path alignment be tested.

Event Description

On April 18, 2000 and April 19, 2000, with Unit 1 at Cold Shutdown (CSD) and Unit 2 operating at 100% reactor power, operators conducted Unit 1 emergency bus [EIS-EB,BU] logic testing. The logic tests include a test of the Auxiliary Building ventilation exhaust system. During the test, two events associated with the operation of the ventilation exhaust system occurred that were determined to be reportable conditions. The following details are provided for each event.

Parallel Exhaust Fan Operation:

During the Unit 1 "H" and "J" emergency bus logic test, an SI signal is simulated and both fans are designed to start automatically and continue to run. On April 18, 2000 at 1240 hours, both filtered exhaust fans automatically started from the SI signal, began coming up to speed, but then tripped. 1-VS-F-58B (58B) fan was reset, it then re-started automatically, and continued to run. 1-VS-F-58A (58A) fan was taken out of service and considered inoperable by placing the controls in pull-to-lock (PTL). With only the 58B

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fan operable, Unit 2 entered a 7 day TS action statement to return 58A fan to operable status.

On April 19, 2000, further testing of parallel fan operation was performed. An SI signal was simulated and again both fans were expected to start automatically and continue to run. At 1102 hours, the 58A and 58B fans started automatically from the SI signal, began coming up to speed, and then 58A fan tripped. 58B fan continued to run following the trip of 58A fan. It was concluded, based on the testing performed on April 18, 2000 and April 19, 2000, that the filtered exhaust fans could not be relied upon to operate in parallel without the possibility of tripping both fans. Therefore, one fan was left in PTL and the 7 day TS action statement entered on April 18, 2000 at 1240 hours for Unit 2 remained in effect.

1-VS-MOD-100B Inlet Damper Failure:

Unit 1 "J" emergency bus logic testing continued on April 18, 2000 with the bus undervoltage testing. At 1301 hours, with the 58A fan in PTL and the 58B fan in auto, the 58B fan started as designed, but then tripped. Following the unexpected trip of the 58B fan and with the 58A fan inoperable in PTL, a 6 hour action statement to place Unit 2 in Hot Shutdown (HSD) was entered in accordance with TS 3.0.1. During a subsequent fan trip, the Unit 1 Safeguards inlet damper [EIS-VF,DMP], 1-VS-MOD-100B (100B), was observed to be in an intermediate position (unexpected) while the redundant damper was closed for the logic test. The 100B damper was secured closed and the 58A fan was tested in the Unit 2 post-accident alignment. Testing verified that the damper failure did not impact Unit 2 and the 6 hour action statement was exited at 1600 hours. Unit 2 remained in the original 7 day TS action statement due to the concern with parallel fan operation.

1-VS-F-58B Trip:

On June 21, 2000, with Units 1 and 2 at 100% power, the Fuel Building exhaust was aligned to the 58B filter train while fuel inspections were being performed. The 58A fan was in PTL and both units were in a TS 3.22 action statement, requiring the 58A filter train to be returned to an operable status within 7 days or the units to be shutdown. At 1851 hours (approximately five minutes after fuel handling operations had ceased), the 58B fan tripped. With both filter trains inoperable, a TS 3.0.1 action statement was entered requiring both units to be placed in Hot Shutdown within 6 hours. At 1854 hours, the 58A fan was placed in the automatic mode of operation and the TS 3.0.1 action statement was exited.

A condition prohibited by TSs existed (for Unit 2) on April 18, 2000 when one exhaust fan was inoperable in PTL and the other exhaust fan tripped due to a Unit 1 damper failure. On April 19, 2000 it was concluded that a condition prohibited by TSs also existed (for Unit 1 and Unit 2) in that both exhaust fans would not start without the possibility of both fans tripping. The condition was discovered during the testing of the

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Auxiliary Building ventilation exhaust system and had existed since the implementation of the fan flow control design change in November and December 1999. A condition prohibited by TSs also existed for both units on June 21, 2000 when one exhaust fan was inoperable in PTL and the other exhaust fan tripped. These conditions are being reported pursuant to 10 CFR 50.73(a)(2)(i)(B).

2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

The purpose of the Auxiliary Building Ventilation Exhaust Filter System is to provide ventilation (cooling) to the safety related equipment needed to mitigate a Design Basis Accident (DBA), and filtration of the Auxiliary Building ventilation central exhaust and the Safeguards Building exhaust to maintain control room operator and offsite doses within the appropriate limits. Each filter train alone is capable of providing the necessary ventilation and filtering requirements.

The current dose analysis of record for a DBA does not credit the immediate operation of the Auxiliary Building Ventilation Exhaust Filter System. Filtration of Emergency Core Cooling System (ECCS) [EIS-BP] leakage is assumed to begin 30 minutes post-accident. In addition, the safety-related equipment in the Safeguards and in the charging pump cubicles can operate well in excess of 30 minutes without ventilation.

- On April 18, 2000, the Unit 1 Safeguards inlet damper 100B was observed to be in intermediate position (partially open) prior to the 58A fan trip at 1316 hours. Unit 1 was at CSD and did not require the ventilation exhaust filtration system to be operable. However, if Unit 1 was operating and the ventilation exhaust filtration system was needed to mitigate an accident, both trains of Unit 1 SI would be expected to actuate and the redundant damper, 100A, would open to provide sufficient air flow. The 100A damper could also be opened from the control room if both trains of SI did not activate. Since the 100B damper remained capable of being closed, Unit 2 was not affected.
- With no damper failure, at least one fan would continue to run. Only one filter train is needed to provide the necessary air flow to meet ventilation and filtration requirements. Without at least one fan running, reasonable operator actions can be taken from the control room to reset and re-start one filtered exhaust fan. Station emergency operating procedures directed the operator to ensure that at least one fan is running. The operator actions could be completed within a sufficient time for the ventilation exhaust filtration system to fulfill its safety function.
- The 58B fan trip on June 21, 2000; was caused by a soiled Fuel Building ventilation supply filter. This filter is not part of, and has no effect on, the post-loss of coolant accident (LOCA) alignment of the auxiliary ventilation system. Had an SI signal been initiated following the 58B fan trip, the exhaust from the Safeguards building and the

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charging pump cubicles would have automatically realigned to the filter trains and a control room operator would have started the 58A and/or 58B fan(s) in accordance with emergency operating procedures. These actions would have occurred well within the time required for the auxiliary ventilation system filter trains to perform their specified safety function.

The auxiliary ventilation exhaust fans are explicitly included in the Surry Power Station probabilistic risk assessment (PRA) model and have been determined not to be risk significant components. If one or both fans fail after automatically starting, the trip will be annunciated in the control room, immediately alerting the operators. The time available in the PRA model for operators to perform the required action of resetting one fan is long, compared to the time required for the operators to perform that action. The "available time" is the time until Recirculation Mode Transfer (for isotopic concerns), or the time until a charging pump overheats due to inadequate ventilation (for cooling concerns). Because the available time is well in excess of the required time, the probability of its completion is very high.

In conclusion, this event resulted in no safety consequences or significant implications and the health and safety of the public were not affected.

3.0 **CAUSE**

A category 1 root cause evaluation (RCE) has been initiated for this event. A preliminary cause of the failure of both fans to operate in parallel without tripping is design configuration and analysis.

- The 1999 design change failed to adequately consider the consequences of having both fans operating simultaneously while being controlled by the discharge airflow. During parallel fan operation, both fans attempted to reach 36,000 cfm each; however, they tripped prior to reaching the desired flow rate. Inlet ducting is limited in size and with the fans attempting to reach 36,000 cfm, the low suction pressure trip setpoint was exceeded.
- The testing requirements following the design change implementation did not specify testing the fans in parallel operation. Tests conducted on each fan after the change demonstrated satisfactory operation while controlled by the discharge airflow. Procedural guidance related to parallel fan operation flow instabilities associated with the suction pressure control system remained in place. Parallel fan operation testing was required prior to removal of this procedural guidance.

The cause for the single operating fan to trip on April 18, 2000 was the failure of the Unit 1 Safeguard inlet damper 100B. A loose coupling between the actuator and the damper caused the failure of the damper.

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The 58B fan trip on June 21, 2000 was caused by a soiled Fuel Building ventilation supply filter. The condition of the filter lowered the suction pressure below the fan trip setpoint. The 58A fan had been placed in PTL (and therefore considered inoperable) as permitted by operating procedure changes that resulted from the April 2000 auxiliary ventilation transients.

4.0 IMMEDIATE CORRECTIVE ACTION(S)

With Unit 2 in a 6 hour TS action statement to place the unit in HSD, the Unit 1 Safeguard inlet damper 100B was secured in the closed position and single fan operation (58A fan) was verified to be operable when aligned to the Unit 2 post-accident alignment. The 6 hour TS action statement for Unit 2 was then exited. The 58B fan was subsequently tested while aligned to the Unit 2 post-accident alignment and it also operated satisfactorily.

Due to the concern with parallel fan operation, one 58 fan was maintained in PTL and the original 7 day TS action statement for Unit 2 remained in effect.

Approximately three minutes after the 58B fan trip on June 21, 2000, a control room operator placed the 58A fan in the automatic mode of operation in accordance with an annunciator response procedure.

5.0 ADDITIONAL CORRECTIVE ACTIONS

On April 23, 2000, the flow control setpoint for each of the filtered exhaust fans was adjusted such that the combined flow rate of both fans equaled the desired flow rate of the Unit 1 or Unit 2 post-accident alignment. The fans were started simultaneously with the ventilation in a Unit 2 post-accident alignment and both fans operated satisfactorily without tripping. Procedure changes and associated training were completed that verifies that both fans are operating after an SI or, if only one fan was found to be operating, the flow control setpoint would be adjusted to the desired flow rate. On April 24, 2000 at 1630 hours, both filtered exhaust fans were declared operable and the 7 day TS action statement was exited.

Prior to Unit 1 start-up, the loose coupling between the actuator and the damper on Unit 1 Safeguards inlet damper 100B was repaired and the damper was returned to service. In addition, the 58 fans were started simultaneously with the ventilation in a Unit 1 post-accident alignment and both fans operated satisfactorily without tripping.

The soiled condition of the Fuel Building supply filter was corrected.

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6.0 ACTIONS TO PREVENT RECURRENCE

A category 1 root cause evaluation (RCE) has been initiated for this event. The conclusions from the RCE will be evaluated and approved corrective actions needed to prevent the recurrence of a similar event will be implemented.

A more structured preventive maintenance program for ventilation system filters will be established to ensure satisfactory performance.

7.0 SIMILAR EVENTS

LER 2-94-001-00, Both Trains of Auxiliary Ventilation Exhaust Inoperable.

The 58A vent exhaust fan tripped with redundant fan out of service for testing. The ventilation exhaust filter was aligned for containment purge. System perturbations were believed to have caused flow anomalies that tripped the operating fan.

LER 2-94-002-00, Both Trains of Auxiliary Ventilation Exhaust Inoperable.

The 58A ventilation exhaust fan tripped with redundant fan out of service for testing. The filter damper locking device was loose

8.0 MANUFACTURER/MODEL NUMBER

Not Applicable

9.0 ADDITIONAL INFORMATION

None