

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

June 22, 2001

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

Serial No.: 01-332
SPS: BAG
Docket No.: 50-280
50-281
License No.: DPR-32
DPR-37

Dear Sirs:

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

Report No. 50-280, 50-281/2001-001-00

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 II, Site Vice President
Surry Power Station

Enclosure

IE 22

Commitments contained in this letter:

1. Plans are being made to remove the #1 emergency diesel generator from service for a comprehensive inspection of the lubricating oil system and power pack replacement within the next thirty days
2. The power packs removed from the #1 EDG will be inspected to determine the cause of the increase in silver content
3. The initial as-found lead wire readings measured after installation of new power packs will be compared with readings taken during each eighteen-month preventive maintenance evolution to provide an early indication of piston wrist pin wear
4. EDG lubricating oil will be changed in all three EDGs to the brand recommended by the EDG Owner's Group
5. Procedures will be revised to require the piston cooling oil manifold to be pre-filled following EDG maintenance that drains the manifold

cc: United States Nuclear Regulatory Commission
Region II
Sam Nunn 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

Estimated burden per response to comply with this mandatory information 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 Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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)

FACILITY NAME (1) SURRY POWER STATION , Unit 1	DOCKET NUMBER (2) 05000 - 280	PAGE (3) 1 OF 6
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TITLE (4)
Inoperable Emergency Diesel Generator Results in Technical Specification 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	23	01	01	-- 01 --	00	06	22	01	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)									
	20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)						
POWER LEVEL (10) 100 %	20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)						
	20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)						
	20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)						
	20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER						
	20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	Specify in Abstract below or in NRC Form 366A						
	20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)							
	20.2203(a)(2)(v)	X 50.73(a)(2)(i)(B)	50.73(a)(2)(vii)							
	20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)							
	20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)							

LICENSEE CONTACT FOR THIS LER (12)

NAME R. H. Blount II, Site Vice President	TELEPHONE NUMBER (Include Area Code) (757) 365-2000
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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
X	EK	ENG	E035	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

On April 23, 2001 at 0500 hours with Unit 1 and Unit 2 at 100% reactor power, the #3 emergency diesel generator (EDG) was taken out of service to investigate an increase in silver content in EDG oil samples. An inspection found three cylinders with excessive wear on the piston wrist pin and wrist pin bearing. All twenty power packs (cylinder, cylinder head, piston, rod) were replaced and the #3 EDG was tested and returned to service on April 28, 2001. The cause for the excessive wear was identified to be inadequate lubrication. The cause of the inadequate lubrication is continuing to be pursued. In the interim, the lubrication oil silver content of all the EDGs is being closely monitored.

An evaluation concluded that the #3 EDG was inoperable for a period that exceeded the Technical Specification action statement. In addition, with #3 EDG inoperable, one train of Unit 2 auxiliary feedwater did not have emergency power while the other train was removed from service for a short period of time for testing. Both of the above conditions were therefore reportable pursuant to 10CFR50.73 (a)(2)(i)(B). No conditions adverse to safety resulted from this event and the health and safety of the public were not affected.

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		2001	--001 --	00	

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

1.0 DESCRIPTION OF THE EVENT

The Surry emergency diesel generators (EDGs) [EIS-EK] oil analysis program monitors critical parameters to ensure that EDGs are maintained in accordance with the manufacturer's recommendations. Silver content in the oil is one of the parameters that indicates wear in either the piston wrist pin to insert bearings or the turbo-charger bearing [EIS-EK, MO]. When the silver content exceeds 2.0 parts per million (ppm), actions are recommended by the vendor to identify the cause and correct the condition. The action level established by the EDG vendor is based upon expected even wear patterns in all cylinders.

When an increased trend in silver content from the #3 EDG oil was recognized, the vendor was contacted. Discussions with the vendor concluded that the oil sample results were not expected to impact the operability of the EDG, however, wrist pin and turbo-charger bearing inspections were recommended prior to the next scheduled preventive maintenance outage.

On April 23, 2001 at 0500 hours, with Unit 1 and Unit 2 at 100% reactor power, the #3 EDG was taken out of service to inspect the piston wrist pin and turbo-charger bearings. A seven-day action statement was entered in accordance with Technical Specifications (TS) to return the #3 EDG to service. In addition, two physically independent offsite AC power sources were verified available as required by the TS.

The inspection of the turbo-charger bearings indicated that the bearing condition was satisfactory and no further maintenance was required. Initial inspections of the piston wrist pins revealed that three cylinders (12, 15, and 16) had indications of wear. Lead wire readings taken on all 20 cylinders also indicated that the same three cylinders were either outside or at the upper limit on the piston to head clearance.

A root cause evaluation (RCE) was initiated. Inspections after removal verified excessive wear on the piston wrist pin and wrist pin bearing. No problems were found with the lubricating oil system. No obstructions were identified in the piston cooling oil manifold and piston cooling oil tubes. None of the piston cooling oil tubes were found loose or bent. The oil pump strainers were inspected and found to be unobstructed. In addition, as part of the RCE determination, the cylinder indicating the most wear (16) and a cylinder showing the least wear (3) were sent with their power pack assembly (cylinder, cylinder head, piston, rod) to the EDG vendor for teardown inspection and failure analysis. Another degraded cylinder (15) and another cylinder showing minimal wear (1) were also sent with their power pack assembly to the licensee's Engineering Materials Analysis Laboratory for failure analysis.

All twenty cylinders were replaced with new power packs. Post maintenance testing was completed and the #3 EDG was returned to service on April 28, 2001 at 1640 hours. The TS seven-day action statement was exited.

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The remaining power packs were sent to the vendor to measure actual wrist pin bearing dimensions and assess their condition. The failure analysis indicated that the overall condition of the inspected parts indicated various levels of distress at each cylinder location. However, none of the cylinders showed wear to the degree of the three degraded cylinders.

Based on the findings of the failure analysis, an evaluation determined that the #15 cylinder was near failure. It was considered to have reached this condition during the planned #3 EDG surveillance test run on April 15, 2001. Following this successful surveillance test, the #3 EDG was placed back into service on April 15, 2001 at 0459 hours. It was later removed from service for inspection on April 23, 2001 at 0500 hours. The evaluation concluded that the period of #3 EDG inoperability for this event was April 15, 2001 to April 23, 2001. This condition exceeds the action statement in TS 3.16. In addition, a Unit 2 auxiliary feedwater (AFW) pump [E1IS-BA, P] receiving its emergency power from #2 EDG was taken out of service during this period for TS testing, while the other train did not have emergency power from #3 EDG. The pump was out of service for seven minutes to complete the required testing. The above conditions are reportable pursuant to 10CFR50.73 (a)(2)(i)(B), operation or condition prohibited by the TS.

2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

The electrical power system for Surry Power Station is continuously energized from the external system grid or from onsite EDGs. Should a loss of offsite power (LOOP) occur, the onsite EDGs will power the emergency power system. Three emergency diesel generators provide an independent reliable power source to vital auxiliaries powered from the 4160 VAC emergency buses. One diesel is dedicated to an emergency bus on each reactor unit with the #3 EDG capable of supplying power to an emergency bus on either reactor unit. Each diesel has 100 percent capacity for the affected emergency bus.

The #3 EDG is considered to be inoperable from April 15, 2001 through April 23, 2001. During this period, the #1 and #2 EDGs were fully operable and continued to be available to provide power to the emergency power system should a loss of offsite power have occurred. The Alternate AC (AAC) diesel generator was also fully operable and available during this period.

A probabilistic risk assessment (PRA) was completed that included other equipment removed from service during the period of #3 EDG inoperability. The risk impact due to the unexpected unavailability of the #3 EDG during the eight-day interval is considered to be minor. The assessment determined that both Unit 1 and Unit 2 experienced an approximate increase in Core Damage Probability (CDP) of 2.0E-7 and an increase in Large Early Release Probability (LERP) of 2.0E-9. This increase is less than 1% of the average annual CDP and less than 0.2% of the average annual LERP at Surry. Both figures are well below the minimum threshold for corrective actions specified in NUMARC 93-01.

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Based upon availability of the Unit 1 and Unit 2 EDGs during the event and the minimal risk of #3 EDG being out of service, this event resulted in no safety consequences or significant implications. The health and safety of the public were not affected.

3.0 CAUSE

The RCE concluded that the cause of the piston wrist pin bearing degradation was inadequate lubrication. The cause of the inadequate lubrication is inconclusive at this time. Inspections conducted during the diesel maintenance outage found no oil lubrication system problems.

Two potential causes that may have contributed to the inadequate lubrication are being addressed. First, by design a delay in full lubrication oil flow to the piston area occurs following a diesel start. The auxiliary lubricating oil system does not lubricate the main and piston wrist pin bearings with the EDG in standby. Although this delay may increase component wear rates for the period of delay, the station diesels have operated since initial plant operation without observed conditions similar to that found on April 23, 2001. Second, an increase in silver content in the oil was observed in the #3 EDG after an oil change that involved a change in oil manufacturers. The change in oil manufacturers was necessitated by the discontinuation of the previously specified oil. The new oil met and continues to meet the specifications prescribed by the diesel manufacturer.

4.0 IMMEDIATE CORRECTIVE ACTION(S)

In accordance with the TS, when the #3 EDG was taken out of service on April 23, 2001, two physically independent offsite AC power circuits were verified to be operable and re-verified every eight hours while the diesel was out of service. Vendor assisted inspections were performed on the piston wrist pin and the turbo-charger bearing. Lead wire readings were taken to verify piston to cylinder head clearance. Based on the results of these inspections, a decision was made to replace all twenty power packs. An inspection of the lubricating oil system was performed and no problems were identified. A root cause evaluation was initiated.

Oil analysis results for the #1 and #2 EDG were reviewed. The #1 EDG has slightly elevated silver that remains at a level that requires increased monitoring but no immediate corrective action. The silver content in #2 EDG remains at normal levels and does not require any action. The lubricating oil specifications were reviewed and found to be in conformance with both oil vendor and EDG manufacturer specifications. A critical parameter is the concentration of zinc, due to its chemical interaction with silver. A review of oil analysis results for the past five years documented that zinc concentrations in oil were well below the

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vendor specifications and is not considered to be a contributor to the excessive wear noted on the silver bearings.

5.0 ADDITIONAL CORRECTIVE ACTIONS

Degraded power pack assemblies were sent to the EDG vendor and to the licensee's Engineering Materials Analysis Laboratory for tear down inspection and component failure analysis.

Post maintenance testing was completed satisfactorily following replacement of all twenty power packs. During return to service testing, three oil samples were taken. One sample was taken for baseline analysis, one sample was taken following the first 1-hour period at 80% load, and again at the end of the 6-hour return to service run. The results were acceptable with minimal silver content detected. On April 28, 2001 at 1640 hours, the #3 EDG was returned to service based upon satisfactory post maintenance testing and the results of the post maintenance oil samples.

Oil samples will continue to be monitored for silver content following each monthly surveillance test. Plans are to remove the #1 EDG from service for a comprehensive inspection of the lubricating oil system and replacement of power packs within the next thirty days. In addition, the power packs removed from the #1 EDG will be inspected to determine the cause of the increase in silver content.

6.0 ACTIONS TO PREVENT RECURRENCE

Although the cause of the inadequate lubrication is inconclusive at this time, the identified possible contributors will be addressed by the following actions to reduce the probability of a similar event from occurring in the future:

- The initial as-found lead wire readings measured after installation of new power packs will be compared with readings taken during each eighteen-month preventive maintenance evolution to provide an early indication of piston wrist pin wear
- EDG lubricating oil will be changed in all three EDGs to the brand recommended by the EDG Owner's Group
- Procedures will be revised to require the piston cooling oil manifold to be pre-filled following EDG maintenance that drains the manifold
- As an enhancement, a lubrication modification will be reviewed for implementation on the Surry EDGs

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7.0 SIMILAR EVENTS

None

8.0 MANUFACTURER/MODEL NUMBER

General Motor EMD Model 999-20 with engine type 20-645E4 with a Model A20 Generator

9.0 ADDITIONAL INFORMATION

None