

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) <b>Surry Power Station, Units 1 &amp; 2</b>	DOCKET NUMBER (2) <b>0 5 0 0 0 2 8 0</b>	PAGE (3) <b>1 OF 0 5</b>
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TITLE (4)  
**Degraded IRSP Motor Power Feeder Cables and Motor Leads**

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		
<b>0 1</b>	<b>2 6</b>	<b>8 9</b>	<b>8 9</b>	<b>0 0 3</b>	<b>0 0</b>	<b>0 2</b>	<b>2 7</b>	<b>8 9</b>			
									DOCKET NUMBER(S) <b>0 5 0 0 0</b>		
									<b>0 5 0 0 0</b>		

OPERATING MODE (9) <b>N</b>	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)									
POWER LEVEL (10) <b>0 0 0</b>	20.402(b)	20.405(e)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	73.71(b)					
	20.405(a)(1)(i)	50.38(c)(1)		50.73(a)(2)(v)	73.71(c)					
	20.405(a)(1)(ii)	50.38(c)(2)		50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)					
	20.405(a)(1)(iii)	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)(x)							

LICENSEE CONTACT FOR THIS LER (12)		TELEPHONE NUMBER	
NAME <b>M. R. Kansler, Station Manager</b>	AREA CODE <b>8 0 4</b>	TELEPHONE NUMBER <b>3 5 7 1 - 3 1 8 4</b>	

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
<b>X</b>	<b>B   E</b>	<b>C   B   L</b>	<b>C   5   8   8</b>	<b>Y</b>					
<b>X</b>	<b>B   E</b>	<b>I   M   0</b>	<b>G   0   8   0</b>	<b>Y</b>					

SUPPLEMENTAL REPORT EXPECTED (14) <input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH <b>0 8</b>	DAY <b>1 8</b>	YEAR <b>8 9</b>
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On January 20, 1989 Unit 1 and 2 were in cold shutdown. During the installation of the Unit 1 "B" Inside Recirculation Spray Pump (IRSP) motor, damage to the insulation of one of the motor power feeder cables was observed. The damaged area was located inside the flexible conduit connecting the motor leads at the junction box to the rigid conduit containing the field run cable leads. An inspection was conducted on the Unit 1 "A" and Unit 2 "A" and "B" motors feeder cables. Damage to the braided outer jacket of the feeder cable was noted with some minor flaws and scratches on the insulation. On January 26, 1989, a report on these findings was made to the NRC. Samples of the damaged field cable were shipped to an independent laboratory to determine the failure mode. Subsequent inspections of the pump motors identified concerns in the motor leads' sealing area. The motors were shipped to the manufacturer to perform a failure analysis of the motor leads and to repair the insulation. At this time, operability of the Unit 1 "B" motor and the Unit 2 "B" motor has been determined to be in question. A special task team has been formed to determine the cause of the damage to the IRSP motor leads and cables. Inspections of other motors will be performed. Additional corrective actions will be implemented following the completion of the task team investigation.

*Handwritten signature/initials*

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

1.0 Description of the Event

On January 20, 1989 Units 1 and 2 were in Cold Shutdown (CSD). During the installation of the Unit 1 "B" Inside Recirculation Spray Pump (IRSP) motor {EIIS-BE} following maintenance on the pump, damage to the insulation of one of the motor power feeder cables {EIIS-CBLS} was observed. The insulation damage was such that the conductor was visible. The damaged area was located inside the flexible conduit connecting the motor leads at the junction box to the rigid conduit containing the field run cable leads. As a result of this observation, a complete inspection of the Unit 1 "B" IRSP motor feeder cables was initiated. The inspection included the examination of cables from the flexible conduit to the containment penetration area, including removal of the cable from the rigid conduit for examination.

The power cable is a triplex cable with 4/0 copper conductors covered with a silicon rubber insulation and a glass braid jacket. Based on the cable damage on the Unit 1 "B" IRSP motor, an inspection of the three other IRSP motors in Unit 1 and 2 was conducted. The inspection of the power feeds to the Unit 1 "A" IRSP motor and Unit 2 "A" & "B" pump motors revealed damage to the braided outer jacket of their cables in the area of the flexible conduit. In some cases, minor flaws and scratches were noted on the cable, but they did not breach the insulation. On January 26, 1989, a 10CFR50.72 four hour report on these findings was made to the Nuclear Regulatory Commission (NRC).

Another area of concern identified during subsequent inspections was in the motor leads sealing area. There are six motor leads, two per phase, exiting the motor housing through the sealing area. These leads are insulated with Kapton insulation covered with a glass tape (for mechanical protection from wearing against the sealing material) and covered with a varnish coating. The Kapton insulation of the motor leads on the Unit 2 "B" IRSP was damaged. Preliminary reports from the pump manufacturer indicate that the motor leads on the other pumps were damaged to the point where the glass tape had frayed; however, the Kapton insulation remained intact.

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Lugs are placed on the end of the motor leads and field cables and are bolted together with a heat-shrink insulating material covering the connection. A lug on one of the motor leads for the Unit 2 "B" pump came off when the heat-shrink insulation was removed.

On January 29, a 10CFR50.72 four hour report was made to the NRC identifying the condition noted in the pump's motor lead sealing area and deficiencies in the motor lead lugs.

Following the in-house inspection, samples of the damaged field cable were shipped to an independent laboratory to determine the failure mode. The pump motors were shipped to the manufacturer to perform a failure analysis of the motor leads and to repair the motor leads insulation.

2.0 Safety Consequences and Implications

The Recirculation Spray (RS) system consists of four independent trains, each train containing a pump, (two pumps inside containment and two pumps outside containment), a heat exchanger, and a discharge spray ring. The RS system is used in conjunction with the containment spray system following a design basis accident. It provides the necessary cooling and depressurization of the containment and is capable of maintaining the containment pressure below atmospheric for an extended period. Each of the four trains of the RS system is 50% capacity.

Operability of the Unit 1 "B" IRSP is in question due to its damaged feeder cable. It has not been determined how long the cable had been in this condition. The operability of the Unit 2 "B" IRSP is in question due to the damaged insulation on the motor lead and the lug that became detached. An engineering evaluation will be conducted to determine the operability of the pumps following the receipt of the final report on the "as found" condition of the motor leads from the pump manufacturer.

The initial evaluation of the Units 1 and 2 "A" IRSPs indicates they were operable. Additional evaluations are being performed to provide further verification of operability and will be completed prior

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

to unit startup. All the motors operated satisfactorily during periodic testing prior to the shutdown for the current outages. Therefore, the health and safety of the public were not affected.

3.0 Cause

Samples of the damaged power cables have been shipped to an independent laboratory and are being analyzed to determine the cause of failure.

Based on the inspections at the laboratory, the damage to the field cable appears to be mechanical with no signs of aging or thermal degradation. It appears that the damage was most likely caused by the handling of the flex conduit and not from the initial cable installation. This is supported by the fact that the exposed conductor on the Unit 1 "B" pump was bright, indicating recent damage.

The cause of the separation of the lug from the conductor is under evaluation.

4.0 Immediate Corrective Action(s)

No immediate actions were required since both units were in cold shutdown.

5.0 Additional Corrective Action(s)

Following the observation of the damage to the Unit 1 "B" pump, an inspection of the remaining three pumps was initiated. In addition, the following actions have been or will be performed:

- Cables to the other IRSP motors were removed and inspected to determine if similar damage existed inside the rigid conduit. No additional damage was identified.
- New field cables will be installed on the IRSPs. Cable inspections will be expanded to inspect for similar damage in other silicon rubber cable applications.

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- Cables suspected of having cracks through the insulation will be tested on site for adequate resistance. Operability concerns will be addressed following the results of the testing.
- Motor leads on the IRSPs will be extended and their insulation reconstructed.
- Inspections will be performed on other motors that have motor lead interface fabrication details similar to the IRSPs. In addition, other motors will be checked for lugging and termination detail adequacy and for cable damage inside the flex conduit.

6.0 Action(s) Taken to Prevent Recurrence

A special task team has been formed to determine the cause of the damage to the IRSPs. In addition to the actions described above, any additional corrective actions required will be implemented following the completion of the task team's investigation. Any potential generic implications will be addressed.

7.0 Similar Events

None.

8.0 Manufacturer/Model Numbers

Cable - Continental 4/0 Tri Plex Silicone Rubber Insulated Glass Braid Covered.

Motors - General Electric/5K6319XJ1D, 300 HP 1780RPM vertical

VIRGINIA ELECTRIC AND POWER COMPANY  
Surry Power Station  
P. O. Box 315  
Surry, Virginia 23883

February 27, 1989

U. S. Nuclear Regulatory Commission  
Document Control Desk  
016 Phillips Building  
Washington, D.C. 20555

Serial No.: 89-004  
Docket Nos.: 50-280  
50-281  
License Nos: DPR-32  
DPR-37

Gentlemen:

Pursuant to Surry Power Station Technical Specifications, Virginia Electric and Power Company hereby submits the following Licensee Event Report for Units 1 and 2.

REPORT NUMBER

89-003-00

This report has been reviewed by the Station Nuclear Safety and Operating Committee and will be reviewed by Safety Evaluation and Control.

Very truly yours,

*David A. Christian*  
for

M. R. Kansler  
Station Manager

Enclosure

cc: Regional Administrator  
Suite 2900  
101 Marietta Street, NW  
Atlanta, Georgia 30323

*JED*  
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