

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

November 24, 2003

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

Serial No.: 03-579  
SPS: TJN R0"  
Docket No.: 50-281  
License No.: DPR-37

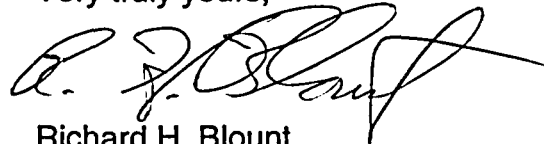
Dear Sirs:

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

Report No. 50-281/2003-002-00

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,



Richard H. Blount,  
Site Vice President  
Surry Power Station

Enclosure

Commitment contained in this letter:

1. Five breakers on Unit 1 and two breakers on Unit 2 will be refurbished with the retrofit upgrade repair kit during or prior to the next scheduled outage of sufficient duration.

IE22

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. G. J. McCoy  
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 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.

FACILITY NAME (1) <b>SURRY POWER STATION , Unit 2</b>						DOCKET NUMBER (2) <b>05000 - 281</b>		PAGE (3) <b>1 OF 4</b>	
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TITLE (4) <b>Inside Recirculation Spray Pump Breaker Failed to Close Due To Mechanical Binding</b>									
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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		DOCKET NUMBER	
09	23	2003	2003	-- 002 --	00	11	24	2003	FACILITY NAME		DOCKET NUMBER	
												05000-
												05000-

OPERATING MODE (9)		N		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)								
POWER LEVEL (10)		000 %		20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)		
				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 <b>Richard H. Blount, Site Vice President</b>						TELEPHONE NUMBER (Include Area Code) <b>(757) 365-2000</b>			

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
B	ED	BKR	B851	Y						

SUPPLEMENTAL REPORT EXPECTED (14)						EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).						X	NO			

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

On September 23, 2003, while performing a surveillance test with Unit 2 in cold shutdown, Inside Recirculation Spray (ISRS) pump 1B breaker 24J-4 failed to close when a simulated automatic closure signal was generated. At the time of the failure, Unit 1 was at 100% reactor power. The breaker is considered to have been inoperable since its previous successful test on April 3, 2002.

The root cause evaluation (RCE) determined that the cause for the failure is mechanical binding due to interference between the moving parts of the breaker 24J-4 operating mechanism. A spare breaker was refurbished with a retrofit upgrade repair kit and installed as breaker 24J-4. The retrofit upgrade repair kit improves the design by reducing the inherent gaps in the operating mechanism. Other safety related Unit 1 and Unit 2 breakers have been or will be refurbished with the retrofit upgrade repair kits.

A probabilistic risk assessment due to ISRS pump 1B inoperability determined that the integrated risk for this event was of low significance. This report is submitted in accordance with 10CFR50.73(a)(2)(i)(B), any operation or condition, which was prohibited by the plant's Technical Specifications.

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

**1.0 DESCRIPTION OF THE EVENT**

On September 23, 2003, while performing a periodic test with Unit 2 in cold shutdown, breaker 24J-4 [EIIIS-ED, BKR] for Inside Recirculation Spray (ISRS) pump 1B failed to close when a simulated automatic closure signal was generated. The breaker was in the test position and open to support surveillance testing. When the breaker was removed from its cubicle, the breaker closing springs did not discharge as expected. A manual attempt to locally close the breaker was made but the breaker remained open. A manual charging handle was then inserted and a slight agitation of the manual charge lever closed the breaker.

A review indicated that this breaker was last operated successfully during an April 3, 2002 test. Technical Specification 3.4 requires that four recirculation spray subsystems, including recirculation spray pumps, shall be operable when a unit's reactor coolant system temperature or pressure exceeds 350 degrees Fahrenheit (F) or 450 psig, respectively. During power operation, the requirements may be modified to allow one ISRS subsystem to be inoperable for 72 hours. Due to the breaker failure, the ISRS pump 1B was assumed to be inoperable for longer than allowed, therefore, this report is submitted in accordance with 10CFR50.73(a)(2)(i)(B) for any operation or condition which was prohibited by Technical Specifications.

**2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS**

Surry Unit 2 has four subsystems of Recirculation Spray (RS) that are used for containment depressurization and sump cooling. Each subsystem has one spray header supplied by a RS pump and cooled by a RS heat exchanger. A probabilistic risk analysis concluded that any one of the four RS subsystems is sufficient to ensure containment pressure and temperature limits can be maintained. The integrated risk for this event was determined to be of low significance.

**3.0 CAUSE**

Following surveillance testing, the breaker was taken to the breaker shop and cycled 30 times successfully, including 5 cycles at reduced control system voltage. The breaker was then disassembled. Areas of wear were noted on the oil lite bearing, primary close latch, and primary latch roller bearing. The breaker was re-assembled using the original parts and was cycled approximately 300 times successfully. The breaker was then disassembled and bluing was placed on the primary close latch roller bearing to trace the primary latch lever and roller bearing movement. When the breaker was again re-assembled and tested, the bluing showed movement toward the charging cam. Based on the findings noted during disassembly and comparisons with retrofit kit replacement parts,

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

the following is considered to be the failure mechanism. When the circuit breaker charged, the primary close latch that should rest on the face of the roller bearing slid between the roller bearing and the charging cam. The primary close latch wedged between the roller and charging cam. When the breaker was electrically signaled to close, the closing spring tension further wedged the cam roller, and the breaker closing motion ceased. When the manual charging device was used, it pulled the charging cam through the wedged condition allowing the breaker to close.

The root cause evaluation determined that the failure of the ISRS pump 1B model 0 ABB K-Line 600 series breaker was mechanical binding due to interference between the moving parts of the breaker 24J-4 operating mechanism. The original model 0 operating mechanism has inherent gaps between the various moving component parts. These gaps allowed misalignment of the various moving parts, creating the potential for binding or interference in the moving parts.

**4.0 IMMEDIATE CORRECTIVE ACTION(S)**

After the breaker failed to close in the test position, the breaker was removed from its cubicle. A manual charging handle was then inserted and a slight agitation of the manual charge lever closed the breaker. The breaker was then reinstalled into the cubicle and cycled two times with satisfactory results. The breaker was returned to the test position to allow surveillance testing to be completed and no further problems were noted with the breaker.

**5.0 ADDITIONAL CORRECTIVE ACTIONS**

A spare breaker was refurbished with a retrofit upgrade repair kit and installed in 24J-4. A retrofit upgrade repair kit for the model 0 K-Line 600 series breaker improves the design by reducing the inherent gaps in the operating mechanism.

**6.0 ACTIONS TO PREVENT RECURRENCE**

Review of equipment history indicates Units 1 and 2 have other safety-related breakers similar to breaker 24J-4. Two Unit 1 and four Unit 2 safety related breakers that receive automatic safety system closure signals were refurbished with the retrofit upgrade repair kit. Five breakers on Unit 1 and two breakers on Unit 2 will be refurbished with the retrofit upgrade repair kit during or prior to the next scheduled outage of sufficient duration. The schedule for the remaining breakers is considered appropriate due both to the infrequent occurrence of malfunction of similar breakers (failure history), and due to the infrequent failure probability indicated by the repetitive, successful testing of the 24J-4 breaker following detection of the malfunction.

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

**7.0 SIMILAR EVENTS**

None

**8.0 MANUFACTURER/MODEL NUMBER**

ABB K-Line 600 series circuit breaker model 0

**9.0 ADDITIONAL INFORMATION**

None