10CFR50.73

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

August 11, 2003

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

Serial No.: 03-426
SPS: TJN R1'
Docket No.: 50-280
License No.: DPR-32

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.

Report No. 50-280/2003-003-00

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. The male connector pins for the movable, lift and stationary coils for all control rod drive mechanisms on Unit 1 and Unit 2 will be inspected and repaired, as necessary, no later than the next refueling outage for each unit.

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

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 **EXPIRES 7-31-2004**

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)	DOCKET NUMBER (2)	PAGE (3)
SURRY POWER STATION , Unit 1	05000 - 280	1 OF 5

TITLE (4)

Control Rod Electrical Connector Pin Defect Results in Manual Reactor Trip

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 05000-
06	13	2003	2003	-- 003 --	00	08	11	2003	FACILITY NAME	DOCKET NUMBER 05000-

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)			
POWER LEVEL (10)	0 %	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)	X 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)	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	TELEPHONE NUMBER (Include Area Code)
Richard H. Blount, Site Vice President	(757) 365-2000

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	AA	CON	A380	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 June 13, 2003 at 0535 hours a Unit 1 manual reactor trip occurred while the reactor was critical during startup physics testing. The manual reactor trip was initiated due to a control rod misalignment that resulted from an electrical connector pin which was partially recessed and not making a good connection. At the time of the manual trip, the reactor was in startup physics testing below the point of adding heat, and reactor power was approximately 1 x 10-8 amps. The operating staff acted promptly and appropriately to stabilize the unit at hot shutdown at 0555 hours. All required systems functioned as designed during the trip. Following repositioning of the connector pin, post maintenance testing and startup physics testing were completed satisfactorily. The unit was taken critical and placed on line on June 17, 2003 at 0419 hours. The male connector pins for the movable, lift and stationary coils for all control rod drive mechanisms on Unit 1 and Unit 2 will be inspected, and repaired as necessary, no later than the next refueling outage for each unit. This report is being submitted in accordance with 10CFR50.73(a)(2)(iv)(A) for the manual trip of the reactor.

1.0 DESCRIPTION OF THE EVENT

On June 12, 2003 at 2022 hours, Unit 1 commenced startup physics testing following a reactor head replacement and refueling outage. On June 13, 2003 at 0425 hours, while inserting Shutdown Bank "B" ("B" SDB) during startup physics testing, the indication for control rod J7 showed a rapid drop from approximately 100 steps to 47 steps. Insertion of Shutdown Bank "B" was stopped and control rod J7 indication remained at 47 steps. The startup physics test was suspended, in accordance with the startup physics test procedure. An evaluation as to whether this was a misaligned control rod or an indication problem found no problems with the indication for control rod J7. At 0535 hours the reactor was manually tripped from critical due to misaligned control rod J7, and the startup physics test was terminated.

The operating staff acted promptly and appropriately. Proper response of the automatic protection systems following manual actuation of a reactor trip was verified. All required systems functioned as designed during the trip. At 0545 hours, a shutdown margin calculation and a normal boration was initiated. At 0555 hours, Unit 1 was stabilized at hot shutdown with reactor coolant system temperature approximately 547 degrees Fahrenheit. At 0728 hours, the boron concentration was verified to ensure adequate shutdown margin.

At 0851 hours a non-emergency, four-hour notification was made to the NRC pursuant to 10 CFR 50.72(b)(2)(iv)(B).

This report is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A) for a manual actuation of the reactor protection system (RPS).

2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

This event resulted in no significant safety consequences or implications. At the time of the manual trip, the reactor was below the point of adding heat, and reactor power was approximately 1 x 10-8 amps. The control rod malfunction resulted in control rod insertion which decreased reactivity, and control rods promptly inserted when manually tripped. Rod control was capable of performing its design basis function of rapidly releasing the control rods to insert negative reactivity on a reactor trip signal. All required systems functioned as designed during the manual reactor trip. Feedwater isolation occurred as expected. Because of not being needed due to plant conditions, there was no safety injection or auxiliary feedwater actuation. There were no radiation releases due to this event. Therefore, the health and safety of the public were not affected.

3.0 CAUSE

Investigation found that Pin "D" of the electrical connector [EIIS- AA, CON], for the control rod J7 movable gripper coil connector on the reactor head, was partially recessed and not making a good connection. This male connector is disconnected from and reconnected to the female connector for each control rod drive mechanism (CRDM) for each refueling. Additionally, the CRDM was further disassembled for the reactor vessel head replacement during this outage. Following the reconnection, electrical resistance readings for the failed connector were taken prior to the startup physics testing and found to be satisfactory. The control rod J7 existing male connector was installed in 1988 and has not previously exhibited any similar problem. The cause of the misposition of the connector pin could not be absolutely determined. It appears that the pin was subjected to a mechanical impact, displacing the pin off its rubber retainer detent. The displacement was such that electrical continuity was maintained since continuity checks were satisfactory at cold shutdown. However, as the reactor underwent heatup, differential expansion of associated materials resulted in differential movement of the associated components (male, female connectors, pins, etc.), resulting in an intermittent loss of continuity during CRDM testing. The CRDM includes three magnetic coils for controlling movement of the control rod, which are the movable gripper coil, stationary gripper coil, and lift coil. During control rod movement, if the stationary gripper coil turned off and released the control rod before the movable gripper coil had energized and engaged, then the control rod would drop into the core.

4.0 IMMEDIATE CORRECTIVE ACTION(S)

Because the drop of a control rod could have been caused by corrosion product deposition in the control rod drive mechanism, an immediate corrective action was to exercise the control rods. Corrosion products can be lodged between the movable gripper coil's cylindrical armature and the tube in which it rides, thus making the movable gripper's operation sluggish. Exercising the control rods has been an effective method of dislodging corrosion particles at other nuclear plants, and has been an effective retest that could be performed to resolve the issue.

On June 13, 2003 at 1415 hours, a control rod exercise test for Shutdown Bank "B" was commenced. At 1449 hours the control rod exercise test was stopped during insertion of "B" SDB when control rod E5 indicated a sudden drop of 24 steps. Because the reactor was in hot shutdown, control rod E5 met the Technical Specification definition of operable for shutdown modes. At 1552 hours, control rod exercise testing was commenced, withdrawing "B" SDB. At 1553 hours, the control rod exercise test was stopped during withdrawal of "B" SDB, when control rod J7 indicated a sudden drop of 55 steps. Reactor trip breakers were opened. During this testing, the reactor was subcritical when the two control rods indicated dropping into the core. The opening of the reactor trip breakers was a step in the test procedure. Therefore, this was not reportable since the manual trip

actuation resulted from and was part of a pre-planned sequence during testing.

5.0 ADDITIONAL CORRECTIVE ACTIONS

A trouble-shooting plan was developed to take electrical current profiles while moving control rods in accordance with the control rod exercise test procedure. On June 14, 2003 at 0027 hours, control rod exercise procedural testing began with the withdrawal of Shutdown Bank "B". Again, control rod J7 repeatedly dropped. Since control rod J7 current profiles indicated that the malfunction was not a control cabinet problem, CRDM electrical resistance measurements were made on J7. The testing results indicated that the movable gripper coil had an electrical open circuit. At 0200 hours the reactor trip breakers were opened.

At 1200 hours, all control rod banks with the exception of Shutdown Bank "B were exercised in accordance with procedure with no abnormalities noted.

At 1241 hours, a containment entry was made for control rod J7 trouble shooting. It was discovered that the J7 electrical connector at the reactor pressure vessel head had Pin "D" partially recessed and not making a good connection. The pin was repositioned to the proper extension and the cable was reconnected. CRDM coil electrical resistance readings were obtained and were satisfactory.

By 1600 hours, a control rod exercise test was performed and it was verified that "B" SDB moved freely from 0 steps to 230 steps and returned to 0 steps. Control Banks "B" and "C" were also withdrawn to 230 steps and inserted to 0 steps to verify indication response. Indications were fully satisfactory. Control rod E5 responded correctly and no additional problems were identified in the current profiles taken during the control rod exercising. Control rods E5 and J7 were fully operable.

At 2044 hours on June 14, 2003 startup physics testing was recommenced. The unit startup continued and Unit 1 was placed on line on June 17, 2003 at 0419 hours.

6.0 ACTIONS TO PREVENT RECURRENCE

The male connector pins for the movable, lift and stationary coils for all CRDMs on Unit 1 and Unit 2 will be inspected, and repaired as necessary, no later than the next refueling outage for each unit.

7.0 SIMILAR EVENTS

On April 29, 1997 during the performance of startup physics testing, Unit 1 reactor was manually tripped from a power level of 1 x 10-7 amps. The reactor was tripped after a

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

control rod urgent failure had been received with the control rods out of sequence for rod swap testing. The cause of the control rod failure was a defective lift phase control card, which was replaced. The rod control system tested satisfactorily on April 30, 1997. Unit 1 startup recommenced and the reactor was made critical on May 1, 1997.

8.0 MANUFACTURER/MODEL NUMBER

The control rod J7 male connector is a Westinghouse 4393B10H01.

9.0 ADDITIONAL INFORMATION

None.