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March 27, 2007

Document Control Desk  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION  
DOCKET NO. 50-395  
OPERATING LICENSE NO. NPF-12  
LICENSEE EVENT REPORT (LER 2005-003-01)  
PLANT TRIP AND ASSOCIATED FIRE IN 'B' CONDENSATE PUMP MOTOR

Attached is Licensee Event Report (LER) No. 2005-003-01, for the Virgil C. Summer Nuclear Station (VCSNS). The revised report describes a plant trip resulting from a fire in the 'B' Condensate Pump Motor in accordance with 10CFR50.73(a)(2)(iv)(A). Revisions are identified by vertical bars in the right side margin of the attached.

Should you have any questions, please call Mr. Bruce L. Thompson at (803) 931-5042.

Very truly yours,

Jeffrey B. Archie

JT/JBA/dr  
Attachment

c: K. B. Marsh  
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NSRC  
CER (C-05-3349)  
File (818.07)  
DMS (RC-07-0046)

JE22

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory 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 and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects@nrc.gov](mailto:infocollects@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 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.

<b>1. FACILITY NAME</b> Virgil C. Summer Nuclear Station					<b>2. DOCKET NUMBER</b> 05000 395					<b>3. PAGE</b> 1 OF 4				
<b>4. TITLE</b> PLANT TRIP AND ASSOCIATED FIRE IN 'B' CONDENSATE PUMP MOTOR														
<b>5. EVENT DATE</b>			<b>6. LER NUMBER</b>			<b>7. REPORT DATE</b>			<b>8. OTHER FACILITIES INVOLVED</b>					
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME				DOCKET NUMBER	
08	25	2005	2005	3	1	03	27	2007	FACILITY NAME				DOCKET NUMBER	
													05000	
													05000	
<b>9. OPERATING MODE</b> 1			<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>											
<b>10. POWER LEVEL</b> 100%			<input type="checkbox"/> 20.2201(b)			<input type="checkbox"/> 20.2203(a)(3)(i)			<input type="checkbox"/> 50.73(a)(2)(i)(C)			<input type="checkbox"/> 50.73(a)(2)(vii)		
			<input type="checkbox"/> 20.2201(d)			<input type="checkbox"/> 20.2203(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(ii)(A)			<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
			<input type="checkbox"/> 20.2203(a)(1)			<input type="checkbox"/> 20.2203(a)(4)			<input type="checkbox"/> 50.73(a)(2)(ii)(B)			<input type="checkbox"/> 50.73(a)(2)(viii)(B)		
			<input type="checkbox"/> 20.2203(a)(2)(i)			<input type="checkbox"/> 50.36(c)(1)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(iii)			<input type="checkbox"/> 50.73(a)(2)(ix)(A)		
			<input type="checkbox"/> 20.2203(a)(2)(ii)			<input type="checkbox"/> 50.36(c)(1)(ii)(A)			<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)			<input type="checkbox"/> 50.73(a)(2)(x)		
			<input type="checkbox"/> 20.2203(a)(2)(iii)			<input type="checkbox"/> 50.36(c)(2)			<input type="checkbox"/> 50.73(a)(2)(v)(A)			<input type="checkbox"/> 73.71(a)(4)		
			<input type="checkbox"/> 20.2203(a)(2)(iv)			<input type="checkbox"/> 50.46(a)(3)(ii)			<input type="checkbox"/> 50.73(a)(2)(v)(B)			<input type="checkbox"/> 73.71(a)(5)		
<input type="checkbox"/> 20.2203(a)(2)(v)			<input type="checkbox"/> 50.73(a)(2)(i)(A)			<input type="checkbox"/> 50.73(a)(2)(v)(C)			<input type="checkbox"/> OTHER					
<input type="checkbox"/> 20.2203(a)(2)(vi)			<input type="checkbox"/> 50.73(a)(2)(i)(B)			<input type="checkbox"/> 50.73(a)(2)(v)(D)			Specify in Abstract below or in NRC Form 366A					
<b>12. LICENSEE CONTACT FOR THIS LER</b>														
FACILITY NAME VIRGIL C. SUMMER NUCLEAR STATION										TELEPHONE NUMBER (Include Area Code) (803) 931-5042				
<b>13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT</b>														
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX					
E	HH	MO	E120	N	E	HH	20	P304	Y					
<b>14. SUPPLEMENTAL REPORT EXPECTED</b>										<b>15. EXPECTED SUBMISSION DATE</b>				
<input type="radio"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE)										<input checked="" type="radio"/> NO				
<b>ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)</b>														
<p>On 08/25/2005, at approximately 1126, the 'B' Condensate Pump tripped and the 'A' Condensate Pump was started immediately. The 'A' Condensate pump discharge valve was extremely slow to respond to the open signal, resulting in a decreasing Deaerator (DA) level.</p> <p>At 1129, smoke was reported coming from the 'B' Condensate Pump motor. There was no visible flame at this time. At 1133, all Feedwater Booster Pumps (FWBP) and Main Feedwater Pumps (MFP) tripped due to LO-LO DA level. As a result, the Main Turbine tripped causing a Reactor trip with Reactor power greater than 50%.</p> <p>At 1138, the Fire Brigade was assembled to respond to the fire. At 1141, a Notification of Unusual Event (NUE) was declared due to the fire in the Protected Area greater than 15 minutes in accordance with Emergency Plan Procedure (EPP) 001.1. Telephone notification was made in accordance with 10CFR72(A). At 1317, the fire was declared out in the 'B' Condensate Pump. At 1327, the Site downgraded from the NUE.</p> <p>After repairs were completed the unit was restarted and achieved criticality on 08/27/05 at 0603. The Main Turbine was placed on Line on 08/27/05 at 1724. The unit returned to full power operation on 08/28/05 at 1800.</p> <p>The delayed opening of the 'A' discharge valve was determined to be due to wear and galling that led to binding under high dP conditions. All three Condensate Pump discharge valves were replaced or restored to original design in refueling outage (RF16) and will be placed in the plant preventive maintenance program.</p>														

# LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
V. C. Summer Nuclear Station	05000 395	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 4
		2005	-- 003	-- 01	

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

**PLANT IDENTIFICATION**

Westinghouse - Pressurized Water Reactor

**EQUIPMENT IDENTIFICATION**

XPP0042B, 'B' Condensate Pump  
XVB00614A-CO, 'A' Condensate Pump Discharge Valve

**IDENTIFICATION OF EVENT**

At approximately 1126 hours on August 25, 2005, operators noticed 'B' Condensate (CO) pump had tripped. The 'A' CO pump was started. The 'A' CO pump discharge valve, XVB00614A-CO, did not respond as expected. Efforts to open the pump discharge valve, XVB00614A-CO, were unsuccessful and Deaerator (DA) level continued to drop. The operators were instructed to reduce power. During this time frame, smoke was reported issuing from 'B' CO pump motor. The Fire Brigade was dispatched to the scene.

Further attempts to open XVB00614A-CO were unsuccessful. Additional instructions were given to lower power further by 1% per minute in order to regain DA level. At 2.8 feet in the DA, the REACTOR TRIP order was given, but the reactor automatically tripped when Lo-Lo DA level caused the Feedwater Pumps (FWPs) and Feedwater Booster Pumps (FWBPs) to trip, thereby tripping the Main Turbine which tripped the Reactor per the P9 permissive (RX Power >50%). During this event, the fire reported in the 'B' CO pump motor was still not extinguished and a call for offsite assistance was made. At 1141, a NOTIFICATION OF UNUSUAL EVENT (NUE) was declared for a "FIRE IN THE PROTECTED AREA OR SWITCHYARD LASTING LONGER THAN 15 MINUTES". The fire was declared out at 1317 and the NUE was downgraded at 1327.

**EVENT DATE**

08/25/2005

**REPORT DATE**

October 24, 2005 Original submittal  
March 27, 2007 Revision 1

**CONDITIONS PRIOR TO EVENT**

Mode 1, 100% Power

**DESCRIPTION OF EVENT**

At approximately 1126 hours on August 25, 2005, operators noticed 'B' Condensate (CO) pump had tripped. The Exhaust Hood Spray pumps were noticed to be running which would be expected due to low condensate pressure. The 'A' CO pump was started. The 'A' CO pump discharge valve, XVB00614A-CO, did not open as expected. Efforts to open the pump discharge valve, XVB00614A-CO, were unsuccessful. During this time Deaerator (DA) level was continuing to drop. The operators were instructed to reduce power. The Balance of Plant (BOP) operator was instructed to reduce load by manipulating the LOAD LIMITER one/half turn in the DECREASE direction, and the Nuclear Reactor Operator at the Controls (NROATC) was instructed to reduce power by borating 50 gallons.

During this time frame, smoke was reported issuing from 'B' CO pump motor. The Fire Brigade was dispatched to the scene.

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**DESCRIPTION OF EVENT (Continued)**

The BOP operator was instructed per procedure to reduce CO flow to the DA slightly by closing down on the DA Flow Control Valve in order to reduce CO delta-p enough to enable XVG00614A-CO to open. This proved unsuccessful. Further instructions were given to lower power further by 1% per minute in order to regain DA level. The decision was made to insert a MANUAL REACTOR TRIP if DA level approached 2.5 feet narrow range. At 2.8 feet, the REACTOR TRIP order was given, but the reactor tripped when LO-LO DA level caused the Feedwater Pumps (FWPs) and Feedwater Booster Pumps (FWBPs) to trip, thereby tripping the Main Turbine which tripped the Reactor per the P9 permissive (RX Power >50%).

The Control Room entered EOP-1.0, REACTOR TRIP/SAFETY INJECTION ACTUATION, and then EOP-1.1, REACTOR TRIP RECOVERY, to stabilize the plant. At 1139, a call for offsite assistance was made. At 1141, a NOTIFICATION OF UNUSUAL EVENT (NUE) was declared for a "FIRE IN THE PROTECTED AREA OR SWITCHYARD LASTING LONGER THAN 15 MINUTES". At 1253, a small flame was noted in the pump motor housing upon removal of an inspection cover. At no time had flames been seen external to the motor housing. At 1317, the fire was declared out with a re-flash watch stationed. The NUE was downgraded at 1327.

**CAUSE OF EVENT**

The cause of the trip of the 'B' Condensate Pump was determined to be a phase to ground short in the motor windings. A root cause evaluation is being performed to determine the root cause(s) of the failure of XVG00614A-CO to open.

The cause of the delayed opening of the condensate pump discharge valve was addressed by Root Cause Analysis Report RCA 05-3349. The root cause team used the Failure Modes analysis (FMA) to determine the cause. The analysis identified that the valve shafts and bearings were severely worn and galled which led to binding under high dP conditions. None of the three Condensate Pump discharge valves had ever been inspected for bearing wear since original installation. There are no vendor recommendations for periodic replacement or inspection.

**ANALYSIS OF EVENT**

When the 'A' CO Pump started and XVG00614A-CO failed to open, DA level decreased to the trip set point tripping all Feedwater Pumps and Feedwater Booster Pumps. This in turn tripped the Main Turbine, which tripped the Reactor per the P9 permissive (Rx Power >50%).

All plant equipment responded to the trip as designed.

Wear and galling were found on the valve shafts at the bearing locations and in both the upper and lower bearings in the valve body. The wear in these load bearing surfaces created a binding of the valve load bearing surfaces which could not be overcome under high dP conditions. Diagnostic testing of VCSNS air operated valves performed on all new components in RF16 showed a higher than expected opening load requirement. This, coupled with the as-found degraded valve internals, supports the conclusions developed by the root cause team.

A review of the vendor manual determined that neither preventive maintenance nor operation information was provided. Discussions with the vendor indicated that no specific guidance is provided for these simple type valves.

**CORRECTIVE ACTIONS**

Condition Evaluation Report (CER) C-05-3349 was generated to document the event and perform a root cause evaluation to determine additional appropriate corrective actions for the failure of XVG00614A-CO to open. The discharge valve for the standby Condensate Pump was failed in the open position. During the Fall 2006 refueling outage XVG00614A-CO was disassembled and repaired.

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**CORRECTIVE ACTIONS (CONT'D)**

During RF16, all three Condensate Pump discharge valves were replaced or restored to original design.

Additional corrective actions, as determined through RCA 05-3349, include implementation of a periodic preventive maintenance inspection of the bearings and shafts. Additionally, an engineering review will be performed for other critical active butterfly valves to determine if they need to be included in the inspection program.

**PRIOR OCCURRENCES**

A similar event occurred in 1999, (CER 99-0007), where XVG00614A-CO took eight minutes to open. However, in that event, the plant did not trip.