

WOLF CREEK

NUCLEAR OPERATING CORPORATION

Donna Jacobs
Vice President Operations and Plant Manager

MAY 05 2004

WO 04-0024

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

Subject: Docket No. 50-482: Licensee Event Report 2004-003-00,
Automatic Start of "B" Emergency Diesel Generator Due To Start-
Up Transformer Cable Ground Fault

Gentlemen:

The enclosed Licensee Event Report (LER) 2004-003-00 is being submitted pursuant to 10 CFR 50.73(a)(2)(iv)(A) regarding an Engineered Safety Features Actuation at Wolf Creek Generating Station.

Wolf Creek Nuclear Operating Corporation has made no commitments in the enclosed LER.

If you should have any questions regarding this submittal, please contact me at (620) 364-4246 or Mr. Kevin Moles at (620) 364-4126.

Sincerely,



Donna Jacobs

DJ/rlg

Enclosure

cc: J. N. Donohew (NRC), w/e
D. N. Graves (NRC), w/e
B. S. Mallett (NRC), w/e
Senior Resident Inspector (NRC), w/e

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.

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4. TITLE
Automatic Start of "B" Emergency Diesel Generator Due To Start-Up Transformer Cable Ground Fault

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	06	2004	2004	003	00	05	05	2004	FACILITY NAME	DOCKET NUMBER
										05000
										05000

9. OPERATING MODE	1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)								
10. POWER LEVEL	100	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)	<input checked="" type="checkbox"/> 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	Specify in Abstract below or in NRC Form 366A				
		20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)						
		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)						

12. LICENSEE CONTACT FOR THIS LER	
NAME Kevin J. Moles, Manager Regulatory Affairs	TELEPHONE NUMBER (Include Area Code) (620) 364-4126

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	EA	CBL5	K080	Y					

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE		
YES (if yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/>	NO		MONTH	DAY	YEAR

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

On March 6, 2004, Wolf Creek Generating Station (WCGS) was operating at 100 percent steady state power. At 9:47 P.M. Central Standard Time, startup transformer neutral ground relays 251N-2T1 and 251N-4T1 tripped which initiated protective lockout and transformer trip relays for the startup transformer, tripping the transformer and resulting in a loss of power to the Engineered Safeguards Feature (ESF) bus NB02. The loss of power to the transformer that normally powers this bus resulted in the automatic start, and subsequent loading of the "B" Emergency Diesel Generator (EDG.)

The cause of the transformer trip was due to a cable fault in the cable connected to the startup transformer's "X" winding "C" phase (X-C) bushing, caused by water that had collected in the cable through connecting lug inspection holes.

The safety significance of this event is low. This event is bounded by the current licensing basis analysis as reported in WCGS Updated Safety Analysis Report (USAR) section 15.2.6 "Loss of Non Emergency AC Power to the Station Auxiliaries." All safety-related equipment operated as expected. There were no adverse effects to the health and safety of the public.

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

Background:

The start-up transformer (XMR01) [EIS Code: EA] provides electrical power from the switchyard and is the normal power source to the safety-related, Engineered Safeguards Feature (ESF) 4KV NB02 bus [EIS Code: ED]. This transformer is a 345 kilovolt (kV) to 13.8 kV transformer with two windings ("X" winding and "Y" winding) on the low voltage (13.8 kV) side. Each winding has an "A", "B", and "C" phase bushing. Connected to each bushing are two 2,000 MCM (thousand circular mils) sized cables that are routed to their respective Medium Voltage System (PA) [EIS Code: EA] electrical bus and one 250 MCM cable that is connected to the nearby capacitor bank. The NB02 bus is protected by undervoltage relays, which detect a loss of power condition to the XMR01 transformer, and in turn de-energize the NB02 bus. The ESF load shedder and emergency load sequencer (LSELS) [EIS Code: EK] then initiates a signal to start the "B" emergency diesel generator (EDG) [EIS Code: EK] and restores the necessary loads to NB02.

Plant Conditions Prior to the Event:

MODE – 1
Power – 100 percent
Normal Operating Temperature and Pressure

Event Description:

On March 6, 2004, Wolf Creek Generating Station (WCGS) was operating at 100 percent steady state power. At 9:47 P.M. Central Standard Time, the XMR01 neutral ground overcurrent relays 251N-2T1 and 251N-4T1 tripped which initiated the XMR01 protective lockout and transfer trip relays and tripped the transformer.

Following the loss of power to safety bus NB02, the load shedder and emergency load sequencer (LSELS) initiated a signal to start the "B" emergency diesel generator (EDG). LSELS then sequenced the necessary loads back onto the safety bus NB02. During the operation of the "B" EDG, a fuel oil leak developed on a return line tubing. The "B" EDG continued to operate while minor repairs were made. "B" EDG was performing its intended safety function prior to the repairs and throughout the event.

The "B" centrifugal charging pump (CCP) [EIS Code: CB] started when it was sequenced onto bus NB02 by the LSELS. There was a minor pre-existing leak on the mechanical seal of this pump. The seal deflector shield was not able to contain the leakage from the seal with the pump running. This caused spread of contamination in the pump room. Because the "B" CCP was not required to be running, a decision was made to place the pump in "pull-to-lock" to stop the pump and minimize the spread of contamination within the pump room. A dedicated operator was stationed to start the pump if required.

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The minor seal leak did not impact the operability of the "B" CCP.

The "B" Auxiliary Feedwater (AFW) [EIS Code: BA] pump started when it was sequenced on bus NB02 by LSELS. Because both main feedwater pumps were still operating, this caused additional water to be provided to the feedwater and condensate systems, which resulted in an increasing level condition in the hotwell for the main condenser. When the hotwell reached a high level, the hotwell began to "reject" water to the condensate storage tank (CST) [EIS Code: KA]. To avoid a high temperature condition in the CST, the "B" AFW pump was placed in pull-to-lock. The same operator stationed to start the "B" CCP if required was assigned to start the "B" auxiliary feedwater pump in the event it was required. The operability of the "B" AFW pump was not affected.

All other safety-related equipment operated as expected.

There were no significant maintenance or operating evolutions in progress at the time of the trip, nor were there any major pieces of equipment out of service.

Basis for Reportability:

The actuation of the "B" EDG due to the loss of power to the NB02 ESF bus described in this event is reportable per 10 CFR 50.73(a)(2)(iv)(A), which requires reporting of "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B) of this section."

Paragraph (B)(8) of 10 CFR 50.73(a)(2)(iv) includes "Emergency ac electrical power systems, including: emergency diesel generators (EDGs); hydroelectric facilities used in lieu of EDGs at the Oconee Station; and BWR dedicated Division 3 EGS."

Root Cause:

The startup transformer XMR01 tripped due to a fault in the 250 MCM cable connected to the transformer's "X" winding "C" phase (X-C) bushing. The direct cause of the cable fault is water in the cable. This was identified during the subsequent inspection of the transformer. Water gradually migrated along the termination material between the stress control tube and the cable insulation, eventually making its way to the cable shield. This migration of water also created a current path to the grounded cable shield, resulting in the ground fault of the 250 MCM cable. This cable has lugs at both ends. These lugs have inspection holes that allow an inspection to ensure the conductor is fully inserted into the cable. The most likely path for moisture and water to enter the cable is via these inspection holes. This condition had existed since initial plant construction.

Available construction documents indicate that the installation of these cable connection lugs with

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inspection holes was allowed during initial plant construction. No program controls were found to preclude moisture intrusion when lugs with inspection holes were used in outdoor applications.

The root cause is inadequate programmatic controls to preclude moisture intrusion when cable lugs with inspection holes were used in outdoor applications.

Corrective Actions:

Visual observations and a Doble test of the startup transformer was performed, which indicated there was no internal damage to the transformer. The transformer rodent protector and the 250 MCM capacitor cable at the X-C bushing were damaged and were replaced. Five other 250 MCM cables were considered susceptible to water intrusion, and were therefore replaced. The X-C bushing and the two 2,000 MCM cables connected to the X-C bushing showed some signs of slight heating and discoloration from smoke particles, but this was characterized as cosmetic damage, not requiring immediate repair.

Other equipment at WCGS was evaluated to establish the extent of this condition. Locations in the plant that could have a similar cable configuration include the unit auxiliary transformer and transformers at the circulating water screen house. The terminations for each of the circulating water screen house transformers are enclosed in compartments, and thus the cables for these transformers are not considered susceptible to water intrusion. The six 250 MCM capacitor cables at the unit auxiliary transformer were replaced with new cables in September 2000. Since this type of cable degradation occurs over a long period of time, the inspection and any necessary repair of these cables will be performed during the next refueling outage.

The startup transformer and the unit auxiliary transformer also have 2,000 MCM sized cables that carry power to the PA bus. During power operation, the unit auxiliary transformer provides the normal power supply to the PA buses. The significant load carried during the majority of the operating cycle provides sufficient heat to preclude accumulation of moisture in these cables. As such, the inspection of the cables associated with the unit auxiliary transformer is not necessary.

During shutdown conditions, the startup transformer provides power to the PA buses. However, during power operations throughout most of the operating cycle, this transformer provides minimal power, and the 2,000 MCM cables generally carry less than 250 amps load. WCGS will inspect the lugs on all the power cables to the PA bus from the startup transformer during the next refueling outage to determine if additional actions are necessary.

Actions to revise applicable technical documents, specifications, and procedures to preclude moisture intrusion into cables when using lugs with inspection holes in outdoor applications are in development within the WCGS corrective action program.

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Safety Significance:

The safety significance of this event is low. This event is bounded by the current licensing basis analyses as reported in WCGS Updated Safety Analysis Report (USAR) section 15.2.6 "Loss of Non Emergency AC Power to the Station Auxiliaries." During the operation of the "B" EDG, a fuel oil leak developed on a return line tubing. The "B" EDG continued to operate while minor repairs were made. "B" EDG was performing its intended safety function prior to the repairs and throughout the event. The "B" CCP was secured to minimize pump seal leakage, and the "B" AFW pump was secured to minimize the addition of unnecessary heat to secondary makeup water. This event resulted in no adverse effects on the health and safety of the public.

Operating Experience/Previous Events:

A review of Wolf Creek Nuclear Operating Corporation LERs submitted over the last 5 years revealed no events related to water intrusion into electrical cables.