Omaha Public Power District
444 South 16th Street Mall
Omaha, NE 68102-2247

LIC-12-0091
June 29, 2012

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Reference: Docket No. 50-285

Subject: Licensee Event Report 2011-010, Revision 1, for the Fort Calhoun Station

Please find attached Licensee Event Report 2011-010, Revision 1, dated, June 29, 2012. This revision provides the direct cause of the event and updated corrective actions. Changes are noted by revision bars. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(v)(A), (B), (C) and (D). This letter contains no commitments. If you should have any questions, please contact me.

Sincerely,

D. J. Bannister
Vice President and Chief Nuclear Officer

DJB /rmc

Attachment
c: E. E. Collins, Jr., NRC Regional Administrator, Region IV
L. E. Wilkins, NRC Project Manager
J. C. Kirkland, NRC Senior Resident Inspector
INPO Records Center

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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.

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE

Fire Causes a Circuit Breaker to Open Outside Design Assumptions

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
6	7	2011	2011	- 010 -	1	6	29	2012	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

5

10. POWER LEVEL

0

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☒ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☒ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☒ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☒ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Erick Matzke	402-533-6855

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On June 7, 2011, a bus fault in load center 1B4A initiated a switch gear fire that resulted in the opening of a circuit breaker which supplies power to load center 1B3A, associated with the opposite train. A fire in one fire area that resulted in a loss of power to a load center associated with the opposite train is not in compliance with 10 CFR 50, Appendix R. The analysis assumes that a fire in a fire area affecting one train of power will be isolated such that power associated with the redundant train will be maintained.

The direct cause of the circuit breaker trip was improperly configured zone selective interlock jumpers on circuit breaker 1B3A. The zone selective interlock jumpers were properly configured and the circuit breaker returned to service.

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NARRATIVE

BACKGROUND

Fort Calhoun Station (FCS) is a two-loop reactor coolant system of Combustion Engineering (CE) design. The plant has six safety-related 480 Vac buses and three 480 Vac safety related "island" cross-tie buses. The island buses are fed from one side or the other of the main 480 Vac buses. Load center 1B3A and 1B3C normally feed island buses in the east switchgear room, and 1B4B normally feeds an island bus in the west switchgear room. Non-segregated bus work connects each island bus to its alternate power supply on the opposite switchgear side. The 480 Vac bus main feeder and bus tie circuit breakers are NLI/Square D Masterpact circuit breakers with Micrologic trip units.

EVENT DESCRIPTION

On June 7, 2011, a bus fault in load center 1B4A initiated a switch gear fire that resulted in the opening of a circuit breaker which supplies power to load center 1B3A, associated with the opposite train. The fact that a fire in one fire area resulted in a loss of power to a load center associated with the opposite train is inconsistent with assumptions made in the 10 CFR 50, Appendix R Safe Shutdown analysis. This compliance analysis assumes that a fire in a fire area affecting one train of power will be isolated such that power associated with the redundant train will be maintained. Although there was local indication at the circuit breaker that the 1B3A main feeder circuit breaker opened due to an overcurrent condition, other available information does not conclusively indicate that a fault that should have opened the 1B3A main feeder circuit breaker actually occurred. This event is being reported per 10 CFR 50.73(a)(2)(v)(A), (B), (C) and (D).

CONCLUSION

During normal plant operation, 480 Vac load center main and appropriate bus tie circuit breakers are expected to remain closed to provide 480 Vac power to their associated buses. In the event of a fault on the associated bus, a load center main or bus tie circuit breaker should open to isolate the fault without opening the next circuit breaker upstream, i.e., the circuit breakers should coordinate to isolate the fault by preserving power to loads not directly impacted by the fault.

The original main and bus tie GE AK-50 circuit breakers were equipped with oil dashpot overcurrent trip devices. Due to reliability concerns, the oil dashpots were replaced with GE RMS 9 solid state overcurrent trip devices in 1993. Due to spurious operation of these trip devices, they were replaced with Westinghouse Amptector trip devices in 1996. Reliability improved with the Amptector trip devices; however, due to aging concerns, the circuit breakers were replaced with Square D Masterpact NW circuit breakers equipped with Micrologic overcurrent trip units in a 2009 modification.

Extensive analysis and vendor testing of the 1B3A main and bus tie circuit breakers that were in-service at the time of the June 7, 2011, 1B4A fire was performed. The circuit breakers were tested in a configuration to replicate field conditions at the time of the fire as closely as possible. Approximately 12,500 amps were applied to both circuit breakers to simulate a fault. If the circuit breakers are properly coordinated, the bus tie circuit breaker should open in approximately 0.3 seconds and the main circuit breaker should remain closed. Contrary to expectations, the main circuit breaker tripped in 0.05 seconds and the bus tie circuit breaker did not open which indicated that the circuit breakers would not coordinate when subjected to a fault current.

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The Square D Masterpact NW circuit breaker Micrologic overcurrent trip units contain an optional Zone Selective Interlock (ZSI) that when used, allow adjacent circuit breakers to communicate with each other to minimize opening time during a fault. The ZSI feature is not part of the FCS design and was not available In the original GE circuit breakers. The consequence of not disabling the ZSI feature of the main circuit breaker is that the circuit breaker will open when it senses the fault current with no intentional time delay (i.e., the main circuit breaker will trip instantaneously before the bus tie circuit breaker).

An inspection of the 1B3A main circuit breaker wire jumpers revealed that the direct cause of the 1B3A main circuit breaker opening was that wire jumpers were not properly configured to disable the ZSI, thus allowing the main circuit breaker to open during the 1B4A fire instead of the 1B3A bus tie circuit breaker.

Vendor documents state that the Masterpact NW breakers are supplied with the ZSI feature disabled. However, the cause analysis made the assumption that the 1B3A circuit breaker/cradle assembly was received at FCS without the ZSI feature properly disabled. Vendor factory acceptance testing, FCS receipt inspection, and post modification testing of the new circuit breakers failed to identify the wired jumper error on circuit breaker/cradle assembly 1B3A, because the test module used to perform the acceptance testing bypassed the ZSI zone feature.

Additionally, the FCS design change process did not provide guidance to evaluate design features of new components in regard to the possibility that they may adversely affect required performance characteristics if not properly installed.

CORRECTIVE ACTIONS

- The 1B3A circuit breaker ZSI was disabled and the circuit breaker returned to service.
- The remaining 11 Masterpact NW main and bus tie circuit breaker wired jumpers were inspected and the ZSI on these circuit breakers were found to be correctly disabled. Since the ZSI on the remaining 11 Masterpact NW circuit breakers were properly disabled, the potential for the opening of other redundant safety-related circuit breakers did not exist at the time of the 1B4A fire.
- Circuit breaker maintenance procedures were revised to verify that the appropriate ZSI remain disabled.
- Appropriate design control procedures were revised to require FCS personnel to contrast features of new equipment with the original equipment including a consideration of potential adverse impact of new features on required performance characteristics; require modifications to test in the as-built condition whenever possible; and document critical parameters within the design change process.
- Additional corrective actions are being tracked in the FCS corrective action program.

This LER revision documents an event that occurred on June 7, 2011. This event was initially reported in LER-2011-010-0 on January 16, 2012. The anomalous response of circuit breaker 1B3A was recognized during the switchgear fire that occurred on June 7, 2011, and documented in a condition report on June 16, 2011. The initial review by Operations focused on the current operating conditions and the successful resetting of circuit breaker 1B3A. However, the unanticipated opening of 1B3A was not recognized as a reportable event until the switchgear fire root cause analysis investigation identified that the opening of circuit breaker 1B3A could have been caused by initiators other than the switchgear fire. The station paradigm inappropriately concluded that reportability could be evaluated at a later date since current operating conditions were not challenged, and that the 60-day reporting window commenced when the event was determined to be reportable. In addition, FCS resources were focused on flood response and

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mitigation due to the extensive flooding that occurred along the Missouri River beginning in June 2011. FCS had declared a Notice of Unusual Event on June 6, 2011, due to rising river level and river projections, and resources were focused on flood response and asset protection. The anomalous operation of circuit breaker 1B3A was determined to be reportable on November 15, 2011. FCS has been systematically addressing issues that have been identified since June 2011 in response to the flooding conditions, switchgear fire, and increased oversight. This LER was submitted beyond the 60-day regulatory reporting requirement due to non-conservative decisions with respect to procedural and regulatory reportability requirements and resource constraints caused by the operating challenges which began in June 2011.

SAFETY SIGNIFICANCE

At the time of the fire on June 7, 2011, FCS was in refueling Mode 5 and shutdown cooling was not lost during the event. However, due to the tripping of both redundant trains of safety-related 480 Vac power, spent fuel pool cooling was lost. Spent fuel pool cooling was restored in approximately two hours with only minimal heat up (3 degrees F) of the spent fuel pool cooling water which had a time to boil of 80 hours. Based on this there was no actual impact on the health and safety of the public.

SAFETY SYSTEM FUNCTIONAL FAILURE

This event does result in a safety system functional failure in accordance with NEI-99-02.

PREVIOUS EVENTS

LER 2011-008 documents the fire associated with this event.