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

LIC-13-0039
April 1, 2013

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

Reference: Docket No. 50-285

Subject: Licensee Event Report 2013-003, Revision 0, for the Fort Calhoun Station

Please find attached Licensee Event Report 2013-003, Revision 0, dated April 1, 2013. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(ii)(B) and 10 CFR 50.73(a)(2)(v)(D). There are no new commitments being made in this letter.

If you should have any questions, please contact Terrence W. Simpkin, Manager, Site Regulatory Assurance, at (402) 533-6263.

Sincerely,

Louis P. Cortopassi,
Site Vice President and CNO

LC/epm/rjr

Attachment
c: A. T. Howell, NRC Regional Administrator, Region IV
L. E. Wilkins, NRC Project Manager
J. M. Sebrosky, NRC Project Manager
J. C. Kirkland, NRC Senior Resident Inspector

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 205 55-0001, 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)

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4. TITLE

Calculations Indicate the HPSI Pumps will Operate in Run-out During a DBA

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
1	30	2013	2013	003 -	0	04	01	2013	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)*

At approximately 1721 Central Standard Time, on January 30, 2013, during hydraulic evaluations for the alternate hot leg injection project, Design Engineering determined that design basis calculations indicated that the high pressure safety injection (HPSI) pumps would operate in a run-out condition under worst case design basis accident conditions. Previous changes to the operation of the HPSI pumps and the containment spray pumps have resulted in an increase in the injection phase time and an increase in HPSI pump flow during the accident. This could have resulted in the HPSI pumps operating in run-out for longer than the one hour manufacturer's recommended time limit.

A preliminary causal analysis identified that the station failed to obtain vendor technical information on HPSI pump performance in a 10 CFR 50, Appendix B, Quality Assurance validated format. An analysis of HPSI pump performance during the injection phase will be performed and design or procedural actions to prevent HPSI pump operation in the extended flow region and to ensure that sufficient net positive suction head is available will be taken.

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NARRATIVE

BACKGROUND

Fort Calhoun Station (FCS) is a two-loop reactor coolant system of Combustion Engineering (CE) design. The Updated Safety Analysis Report (USAR) Section 6.2 provides the following information concerning the design basis of the safety injection system which includes three high pressure safety injection (HPSI) pumps.

> The safety injection system is designed to prevent fuel and cladding damage that could interfere with adequate emergency core cooling, and to limit the cladding-water reaction to less than approximately 1 percent for all break sizes in the primary system piping up to and including the double-ended rupture of the largest reactor coolant pipe, for any break location, and for the applicable break time.
>
> The safety injection system also provides rapid injection of borated water for added shutdown capability during rapid cooldown of the reactor coolant system caused by a rupture of a main steam line. No fuel damage would result from this accident with safety injection system operation, even with the most reactive control element assembly (CEA) stuck in its fully withdrawn position. The system requirements during a main steam line rupture are discussed in Section 14.12, Main Steam Line Break Accident (MSLB).
>
> The system requirements during a design basis large break loss of coolant accident (LOCA) are met with the assumption of three of the four safety injection tanks delivering borated water to the core and with one HPSI pump delivering approximately 75 percent of its rated flow to the core and one low-pressure injection pump delivering approximately 75 percent of its rated flow to the core.

EVENT DESCRIPTION

At approximately 1721 Central Standard Time (CST), on January 30, 2013, during hydraulic evaluations for the alternate hot leg injection project, Design Engineering determined that design basis calculations indicated that the HPSI pumps would operate in a run-out condition under worst case design basis accident conditions. Previous changes to the operation of the HPSI pumps and the containment spray pumps have resulted in an increase in the injection phase time and an increase in HPSI pump flow during the accident. This could have resulted in the HPSI pumps operating in run-out for longer than the one hour manufacturer's recommended time limit. This condition was entered into the station's corrective action program (2013-02100).

In December of 1990, the FCS emergency operating procedures were revised to require the HPSI pump operation at full capacity until specific stop and throttle criteria are met. In March of 1991, FCS received a letter from the manufacturer that indicated that the HPSI pumps are capable of operating in the extended flow region, beyond the maximum tested flow of 425 gpm, but it is undesirable. The manufacturer's letter indicated that a one hour time limit should be imposed on the time the HPSI pumps are allowed to operate in run-out to minimize the potential for accelerated wear of pump internal components. At the time, emergency procedures limited HPSI pump flow to 400 gpm. However, the stop and throttle criteria for HPSI pumps that had been implemented in December 1990 could have resulted in HPSI pumps operating in run-out, greater than 425 gpm, during the injection phase after a LOCA contrary to the vendor limit.

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Additionally, changes made to the containment spray logic in August 2008 had removed the automatic start of the containment spray pumps after a LOCA. This resulted in extending the length of time for the injection phase after a LOCA, which could have resulted in the HPSI pumps operating run-out for longer than the one hour time limit. It wasn't until recent run-out flow evaluations were performed in February and March of 2013, that FCS realized the impact of the changes made to the system.

At approximately 1721 CST on February 7, 2013, a late 8-hour notification was made to the Headquarters Operations Office (HOO), under 10CFR50.72(b)(3)(ii)(B), any event or condition that results in the nuclear power plant being in an unanalyzed condition that significantly degrades plant safety (Event Number 48730). The late notification was entered into the station's corrective action program (CR 2013-05070). This written report is being submitted in accordance with 50.73(a)(2)(ii)(B), any event or condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety, and 10 CFR 50.73(a)(2)(v)(D), any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident. If additional reporting criteria are identified during the causal analysis, the results will be published in a supplement to this LER.

CONCLUSION

A preliminary causal analysis identified that the station failed to obtain vendor technical information on HPSI pump performance in a 10 CFR 50, Appendix B, QA validated format. If the result of the ongoing causal analysis identifies additional information or corrective actions that would significantly change the reader’s perception of the significance or consequences of the event or results in substantial changes to the corrective actions, a revised LER will be submitted.

CORRECTIVE ACTIONS

The corrective actions to be taken are: (1) Perform analyses of HPSI pump performance in the injection phase and take design or procedural actions to prevent operation in the extended flow region and to ensure sufficient net positive suction head (NPSH) is available, (2) Develop and issue an engineering evaluation process to evaluate requests on plant conditions outside expected values, issues where technical information or evaluation is required, and other issues previously performed using uncontrolled "white papers", and (3) Develop and issue engineering review guidance for vendor/contractor design changes to ensure thorough and rigorous reviews by design engineering. If the result of the ongoing causal analysis identifies additional information or corrective actions that would significantly change the reader’s perception of the significance or consequences of the event or results in substantial changes to the corrective actions, this LER will be submitted.

SAFETY SIGNIFICANCE

HPSI pumps are credited in USAR Section 6.2 to respond to design basis accidents, including a Large Break Loss of Coolant Accident. The HPSI pumps must be able to operate reliably to supply sufficient water for core cooling. However, HPSI pump operation is unreliable when operated in the extended flow region of the manufacturer's pump curve during the injection phase. The available NPSH is insufficient to support pump operation in the extended flow region. As a result, one or more of the HPSI pumps may be damaged and fail to provide core cooling during a design basis LOCA resulting in core damage. However, for a design basis large break LOCA, both the HPSI and LPSI pumps are designed to operate for accident mitigation.

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SAFETY SYSTEM FUNCTIONAL FAILURE

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

PREVIOUS EVENTS

Fourteen LERs with event dates since January 1, 2010, were identified with the same reporting criteria. Several of these LERs have causal analyses which are still in progress. Since the condition described in this LER was a result of actions taken by the station in 1990 and 2008 and an incorrect vendor document in 1991, it is a legacy condition that would not have been prevented by any corrective actions taken by the station since January 2010.