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

LIC-13-0182
December 27, 2013

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

Reference: Docket No. 50-285

Subject: Licensee Event Report 2013-017, Revision 0, for the Fort Calhoun Station

Please find attached Licensee Event Report 2013-017, Revision 0. This report is being submitted pursuant to 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(v) and 10 CFR 50.73(a)(2)(vii). 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

LPC/epm

Attachment
c: M. L. Dapas, NRC Regional Administrator, Region IV
J. M. Sebrosky, NRC Senior Project Manager
L. E. Wilkins, 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 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)

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4. TITLE

Containment Spray Pump Design Documents do not Support Operation in Runout

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
10	31	2013	2013	017 -	0	12	27	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)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☒ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☒ 50.73(a)(2)(v)(B)
- ☒ 50.73(a)(2)(v)(C)
- ☒ 50.73(a)(2)(v)(D)
- ☒ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

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)*

Fort Calhoun Station (FCS) has identified that design basis documents for the containment spray (CS) pumps SI-3A, SI-3B and SI-3C did not fully support pump operation during runout conditions which could occur under certain system configurations. On October 31, 2013, additional design work was completed which showed that the CS pumps would not meet their required mission time under specific accident scenarios. However, the analysis also showed that the containment peak pressure for the limiting design basis accident occurs at 202.3 seconds, which is prior to the CS delay time of 228.2 seconds. Therefore, the peak containment pressure would not be affected by this failure.

FCS has completed a calculation necessary to support a temporary modification which throttles the CS pump discharge valves to increase system resistance. A new CS pump curve has been issued to include operation in the extended pump operating range. A permanent modification to prevent CS pump runout is being pursued.

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NARRATIVE

BACKGROUND

Fort Calhoun Station (FCS) is a two-loop reactor coolant system of Combustion Engineering (CE) design.

The FCS Updated Safety Analysis Report contains the following:

Containment Heat Removal Systems - There are two independent systems, each system consists of two 100% capacity trains (i.e., the containment spray (CS) system, which utilizes two redundant pumps, and the containment air recirculation system, which utilizes two redundant trains of coolers).

The CS system reduces the temperature of the containment atmosphere by direct contact of the cool spray with the hotter containment atmosphere. The containment air recirculation and cooling system cools the containment atmosphere by recirculation of the hot gases through water cooled surface coolers.

The containment design pressure is 60 psig at 305 degrees Fahrenheit (F). The maximum pressure and temperature from a loss-of-coolant accident (LOCA) is 54.47 psig and 277.44 degrees F. These figures include the effects of the zirconium-water and other chemical reactions and take no credit for the safety injection system. A margin of 5.53 psig and 27.56 degrees F is provided above the maximum accident conditions.

EVENT DESCRIPTION

Fort Calhoun Station (FCS) has identified that design basis documents for the containment spray (CS) pumps SI-3A, SI-3B and SI-3C did not fully support pump operation during runout conditions which could occur under certain system configurations. On October 31, 2013, additional design work was completed which showed that the CS pumps would not meet their required mission time under specific accident scenarios.

The CS pumps are required to operate in response to a main steam line break (MSLB) in containment to ensure that containment pressure is maintained below the 60 psig design pressure. Analysis performed shows that this function cannot be assured under a one pump delivering flow to both CS headers condition because of motor overload. A single failure of the pump/motor coupling of a CS pump would result in a runout condition of the remaining pump and failure of the motor due to overload prior to the end of the required mission time.

This report is being submitted pursuant to 10 CFR 50.73(a)(2)(i)(B) any operation or condition which was prohibited by the plant's Technical Specifications, 10 CFR 50.73(a)(2)(v) any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to:(B) remove residual heat; (C) control the release of radioactive material; or (D) mitigate the consequences of an accident, and 10 CFR 50.73(a)(2)(vii) any event where a single cause or condition caused at least one independent train or channel to become inoperable in multiple systems or two independent trains or channels to become inoperable in a single system designed to: (B) remove residual heat; (C) control the release of radioactive material; or (D) mitigate the consequences of an accident.

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NARRATIVE

CONCLUSION

Changes to the CS system and mode of operation of the CS pumps eliminated the long term use of these pumps. The current design basis only requires pump operation for the first 20 minutes after a MSLB. The changes to the system operation eliminated previous deficiencies related to insufficient net positive suction head (NPSH) being available during the safety injection and recirculation phases of a loss of cooling accident (LOCA) and eliminated the need to use the CS pumps post-recirculation actuation signal (RAS). However, review of current design basis documents indicates weakness in following areas:

- No formal evaluation of the pump motor performance at the extended flow rates and increased break horsepower (BHP) requirements was performed.
- The pump curves were not revised to show the extended flow region of the pump.
- The design basis calculation did not contain an updated case for the single failure of a pump shaft resulting in single pump flow through two headers, which represents the maximum flow case for one pump.

Analysis shows that the containment peak pressure for the limiting case occurs at 202.3 seconds, which is prior to CS delay time of 228.2 seconds. Therefore, the peak containment pressure would not be affected by the failure of the CS pumps.

CORRECTIVE ACTIONS

Temporary Modification EC 62416, Throttle Discharge Valves HCV-2958, HCV-2968 and HCV-2978, was installed to set the CS pump discharge valves to a position which ensures that the CS pumps will remain within their design envelope for flow, NPSH and BHP.

The station revised affected emergency operating procedures.

A permanent modification to prevent CS pump runout is being pursued.

SAFETY SIGNIFICANCE

Analysis of the containment pressure response to a main MSLB accident shows that the containment peak pressure for this limiting case occurs at 202.3 seconds. This is prior to the CS delay time of 228.2 seconds. The results confirmed that the peak containment pressure reached in this accident is not affected by the failure of the CS pumps.

SAFETY SYSTEM FUNCTIONAL FAILURE

This event does result in a safety system functional failure in accordance with Nuclear Energy Institute, NEI-99-02, Regulatory Assessment Performance Indicator Guideline, Revision 7.

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NARRATIVE

PREVIOUS EVENTS

LER 2013-003, High Pressure Safety Injection Pump Runout.

Beyond the corrective action to address the runout condition of the high pressure safety injection pumps, LER 2013-003 also contains corrective actions to verify the design and licensing bases:

Identify and define the licensing bases for the emergency core cooling system (ECCS) pump functions and assure licensing bases documentation is current, accurate, complete, and retrievable. This action applies to HPSI, low pressure safety injection (LPSI), and CS systems. This action is replicated from RCA 2013-05570 (FCS Design and Licensing Basis Configuration Control) and is modified to prioritize and accelerate the licensing bases reviews and revisions for ECCS pumps to the initial phases of the RCA 2013-05570 projects.

Identify and define the design bases for the ECCS pump functions and assure design bases documentation remains current, accurate, complete, and retrievable. This action applies to HPSI, LPSI, and CS systems. This action is replicated from RCA 2013-05570 (FCS Design and Licensing Basis Configuration Control) and is modified to prioritize and accelerate the design bases reviews and revisions for ECCS pumps to the initial phases of the RCA 2013-05570 project.