your energy partner
OPPD
Omaha Public Power District

Fort Calhoun Station
P.O. Box 550,
Fort Calhoun, NE 68023

LIC-09-0053
August 10, 2009

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

Reference: Docket No. 50-285

Subject: Licensee Event Report 2009-003 Revision 0 for the Fort Calhoun Station

Please find attached Licensee Event Report 2009-003, Revision 0, dated August 10, 2009. This report is being submitted pursuant to 10CFR50.73(a)(2)(i)(B). The following commitments are contained in this submittal:

> A review of operating instructions, in combination with the system elevation drawings, will be conducted to ensure adequate procedural guidance is provided for filling and venting of piping at the high point vents. The review will include those systems covered under Generic Letter 2008-01. The review will be completed by September 30, 2009. (AR 43586)
>
> Procedural revisions to provide guidance for proper fill and venting of the high pressure safety injection cooled suction piping will be developed and issued by September 30, 2009. (AR 43586)

If you should have any questions, please contact me.

Sincerely,

Jeffrey A. Reinhart
Site Vice President

JAR / epm

Attachment

c: E. E. Collins, NRC Regional Administrator, Region IV
A. B. Wang, NRC Senior Project Manager
J. C. Kirkland, NRC Senior Resident Inspector
INPO Records Center

IE22
NRR

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORYCOMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010

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

Void in Safety Injection Piping During Operation Due to Inadequate Procedural Guidance

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
04	30	2009	2009	- 003 -	00	08	10	2009	FACILITY NAME	05000

9. OPERATING MODE: 01

10. POWER LEVEL: 100

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

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

On April 30, 2009, during the first performance of QC-ST-HPSI-0001, "High Pressure Safety Injection Gas Accumulation Detection," a void was discovered on the cooled suction line to high pressure safety injection (HPSI) pump SI-2B. Technical Specification (TS) 2.3(2)e, a 24-hour limiting condition for operation (LCO), was entered. Actions were successfully taken to vent the void. Follow-up ultrasonic testing was done to confirm the location was water filled. The TS LCO was exited approximately 1 hour later. The frequency of the surveillance test was temporarily shortened from quarterly to monthly to allow for increased monitoring of the void. On May 28, 2009, the location was retested and confirmed to be water filled.

The root cause was determined to be the incomplete review and identification of SI system high point vents during the development of SI system drain/refill plans.

A review of operating instructions, in combination with the system elevation drawings, will be conducted to ensure adequate procedural guidance is provided for filling and venting of piping at the high point vents. The review will include those systems covered under Generic Letter 2008-01. The review will be completed by September 30, 2009.

Procedural revisions to provide guidance for proper fill and venting of the HPSI cooled suction piping will be developed and issued by September 30, 2009.

NARRATIVE

BACKGROUND

Fort Calhoun Station (FCS) Technical Specifications (TS) for the safety injection (SI) systems reads, in part, as follows:

2.3 Emergency Core Cooling System, (2) Modification of Minimum Requirements

During power operation, the Minimum Requirements may be modified to allow one of the following conditions to be true at any one time. If the system is not restored to meet the minimum requirements within the time period specified below, the reactor shall be placed in a hot shutdown condition within 12 hours. If the minimum requirements are not met within an additional 48 hours the reactor shall be placed in a cold shutdown condition within 24 hours.

a. One low-pressure safety injection train may be inoperable provided the train is restored to operable status within seven (7) days.

b. One high-pressure safety injection pump may be inoperable provided the pump is restored to operable status within 24 hours.

c. One shutdown heat exchanger may be inoperable for a period of no more than 24 hours.

d. Any valves, interlocks or piping directly associated with one of the above components and required to function during accident conditions shall be deemed to be part of that component and shall meet the same requirements as listed for that component.

e. Any valve, interlock or piping associated with the safety injection and shutdown cooling system which is not covered under d. above but which is required to function during accident conditions may be inoperable for a period of no more than 24 hours.

System Description

A safeguards actuation signal starts two of the three 100 percent capable high-pressure safety injection (HPSI) pumps, the two low-pressure safety injection (LPSI) pumps, and opens the twelve SI line isolation valves. The third 100 percent capable SI pump (SI-2C) may be manually aligned to either of the two HPSI injection headers. SI-2C is manually actuated as required during plant operations. The SI pumps take suction from two independent suction headers which are supplied with borated water from the safety injection and refueling water tank (SIRWT). The pumps discharge into the reactor coolant system through the four SI nozzles. For long term core cooling, a continuous source of borated water is provided by recirculating containment water. Recirculation is automatically initiated by low water level in the SIRWT. Transfer to the recirculation mode may be manually initiated. The automatic recirculation signal shuts down the LPSI pumps, opens both recirculation line isolation valves, and closes the two SIRWT suction header isolation valves and both minimum flow line isolation valves to isolate the tank from the recirculated containment water. The HPSI pumps continue to operate in order to provide core cooling water.

In the recirculating mode, the HPSI pumps initially take suction directly from the containment. Subsequently, cooled water from the containment spray system may be manually aligned to the suction of the HPSI pumps to provide long term core cooling. This is a preferred method of operation, but is not necessary to meet core cooling requirements. The LPSI pumps may be used to inject cooled water when the system pressure permits. For long term cooling, after a loss of coolant accident (LOCA), a provision is made for maintaining core cooling and boric acid flushing by simultaneous hot and cold leg injection. The SI flow is injected simultaneously into hot and cold legs through the pressurizer auxiliary spray system and SI nozzles, respectively. This injection mode provides cooling for the reactor coolant system and prevents boric acid precipitation/accumulation in the reactor vessel following a LOCA.

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NARRATIVE

EVENT DESCRIPTION

In response to Generic Letter (GL) 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," the Omaha Public Power District (OPPD) committed to: 1) develop new surveillance procedures for managing gas accumulation in safety systems and 2) develop and issue a new program basis document, PBD-32, "Managing Gas Accumulation in Safety Systems."

The response to GL 2008-01 included the development of five surveillance tests to monitor for voids within the applicable systems. This included surveillance test QC-ST-HPSI-0001, "High Pressure Safety Injection Gas Accumulation Detection," which specifically assesses the condition of the HPSI system. The surveillance test uses ultrasonic testing (UT) examination to identify voids in select piping locations. Each location has an acceptance criterion that is based on calculations performed on the system. Locations selected were based on review of detailed grade maps developed from laser templating of the piping performed during the 2008 refueling outage (RFO).

On April 30, 2009, during the first performance of QC-ST-HPSI-0001, one rejectable void was discovered on the cooled suction line to HPSI pump SI-2B. After notification of the Shift Manager, TS 2.3(2)e, a 24-hour limiting condition for operation (LCO) was entered. Contingency actions were successfully taken to vent the void. A follow-up UT examination was done to confirm the location was water filled. The TS LCO was exited approximately 1 hour later. The frequency of the surveillance test was temporarily shortened from quarterly to monthly to allow for increased monitoring for potential changes to the void. On May 28, 2009, the location was retested and confirmed to have remained water filled.

Due to the location of the void (at a high point within the normally unused section of the HPSI cooled suction line) it was determined that the void was not the result of gas intrusion or in-leakage. This section of piping is normally under static pressure due to the pressure head available from the SIRWT. As a result, the most likely time for the void to have been formed was during the 2008 RFO when maintenance activities would have required the SI system suction lines to be drained and re-filled. Based on the period from the end of the 2008 RFO to the time of discovery of the void, April 30, 2009, this made HPSI pump SI-2B inoperable for greater than the TS allowed 24 hours. A root cause analysis was performed in conjunction with the discovery of the void formation on April 30, 2009. As a part of that analysis, additional engineering evaluation of the available data determined that the void likely existed longer than the 24 hours allowed by TS. Based on this evaluation, the date of discovery, for this report, was determined to be June 11, 2009, instead of the date of the void discovery on April 30, 2009. This event is being reported pursuant to 10CFR50.73(a)(2)(i)(B).

CONCLUSION

A root cause analysis (RCA) was conducted to determine the cause for the development of the void. Due to the time that had transpired since the 2008 RFO and the lack of specific recall regarding the review of prints and walk downs, the RCA team was not able to determine why one or more of these planning activities failed to identify the impact on the cooled suction header.

Given that adequate information did exist (via isometric prints and through visual inspection), the incomplete review and identification of SI system high points during the development of SI system drain/refill plans is considered the root cause.

NARRATIVE

CONCLUSION (continued)

Based on a review of SI system related maintenance and operational activities, the void identified in the cooled suction header of the SI system was determined to have resulted from draining and refilling activities conducted during the 2008 RFO. Review of clearances, procedures and refill plans developed for these activities determined that no explicit step-by-step procedure instructions existed for guiding the refill and venting of the SI suction header. This is considered a contributing cause since it is not possible to determine if these instructions, had they been available at the time, would have included steps to ensure the cooled suction line was included in any SI system venting (or flushing) activity.

CORRECTIVE ACTIONS

Immediate Actions

The void was vented and the HPSI system piping returned to operable status on April 30, 2009.

Long Term Corrective Actions

A review of operating instructions, in combination with the system elevation drawings, will be conducted to ensure adequate procedural guidance is provided for filling and venting of piping at the high point vents. The review will include those systems covered under Generic Letter 2008-01. The review will be completed by September 30, 2009.

Procedural revisions to provide guidance for proper fill and venting of the high pressure safety injection cooled suction piping will be developed and issued by September 30, 2009.

Additional actions will be controlled by the corrective action program.

SAFETY SIGNIFICANCE

The ability of the HPSI system to perform its required safety function can be reasonably assured if it can be shown that the alternate HPSI train (SI-2A/2C) was available during the period of time the rejectable gas void existed in the cooled suction piping to HPSI pump SI-2B.

The emergency/abnormal operating procedural attachment provides the operator the option of manually aligning the HPSI cooled suction piping from the containment spray system to the suction of the HPSI pumps to provide long term core cooling. The LPSI pumps may also be used to inject cooled water when system pressure permits. While the cooled suction function is an original capability of the system, it is not a credited safety function.

The normal borated water sources are from the SIRWT during the injection phase and the containment sump during the recirculation phase of a design basis accident (DBA). These flow paths were not impacted by the existence of the gas void in the HPSI cooled suction piping. However, had the operators aligned cooled suction from the containment spray system to SI-2B, the pump may have become gas bound or damaged from ingestion of the gas void.

Analysis has shown that the integrity of the suction piping to the HPSI pump SI-2B would have been maintained in the event of water hammer, thus maintaining system integrity. Therefore, the only area of concern was the availability of the redundant HPSI train (HSPI pumps SI-2A or SI-2C) during the time period the voided condition existed.

NARRATIVE

SAFETY SIGNIFICANCE (continued)

A review of maintenance and surveillance tests performed on the alternate HPSI train (SI-2A and SI-2C) was completed from the 2008 RFO startup (June 2008) through discovery of the void in April 2009. The review was conducted to determine if the alternate train was available for long term core cooling during this condition. No maintenance was identified in maintenance or modification records for the subject time period which would have rendered the alternate train (SI-2A or SI-2C) incapable of being manually aligned for long term core cooling. Diesel surveillance testing or maintenance would not have rendered the 'A' train inoperable for use in long term cooling since HPSI pump SI-2C is on the swing bus and could have been manually aligned to the operable diesel.

The normal automatic SI function of the HPSI system was not impacted by the existence of the gas void. HPSI pump SI-2B would only be affected when aligned to cooled suction for long term cooling.

Considering that the void was located in the HPSI cooled suction piping to HPSI pump SI-2B, it would not have been capable of being transported to the pump suction during the normal injection and recirculation phase of a DBA. In accordance with the emergency operating procedures (EOPs), during recirculation the operator is permitted to align a portion of the cooled water from the containment spray system to the suction of HPSI pump SI-2B to provide long term core cooling. While a void could have potentially rendered SI-2B inoperable, SI-2A or SI-2C was available for manual alignment as directed by the EOPs for long term core cooling, if desired. Therefore, this condition did not result in a loss of a required safety function. Since this demonstrates the ability of the HPSI system to maintain its design function during the period that the void existed in the system, this event had minimal impact on the health and safety of the public.

SAFETY SYSTEM FUNCTIONAL FAILURE

This event does not result in a safety system functional failure in accordance with NEI-99-02.

PREVIOUS SIMILAR EVENTS

LER 1997-017 reported a potential for voiding in the LPSI system.