



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

LIC-12-0166
November 16, 2012

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

Reference: Docket No. 50-285

Subject: Licensee Event Report 2012-003, Revision 1, for the Fort Calhoun Station

Please find attached Licensee Event Report 2012-003, Revision 1, dated November 16, 2012. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(ii)(B).

No commitments are being made in this letter.

If you should have any questions, please contact me.

Sincerely,

Louis P. Cortopassi
Vice President and CNO

LPC/rjr

Attachment

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

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|--|--------|-----------|---|---|------------|-----------------------|---|--------------------------------|-------------------------------------|--|--|---------------------|-------------------------------------|---------------|--|--|-----|------|--|--|--|--|--|--|--|--|--|--|--|--|--|
| NRC FORM 366 (10-2010) | | | | U.S. NUCLEAR REGULATORY COMMISSION | | | | APPROVED BY OMB: NO. 3150-0104 | | | | EXPIRES: 10/31/2013 | | | | | | | | | | | | | | | | | | | |
| <h2 style="margin: 0;">LICENSEE EVENT REPORT (LER)</h2> <p style="margin: 0;">(See reverse for required number of digits/characters for each block)</p> | | | | | | | | | | | | | | | | 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. | | | | | | | | | | | | | | | |
| 1. FACILITY NAME <div style="text-align: center; padding-top: 5px;">Fort Calhoun Station</div> | | | | | | | | | | 2. DOCKET NUMBER <div style="text-align: center; padding-top: 5px;">05000285</div> | | | | | 3. PAGE <div style="text-align: center; padding-top: 5px;">1 OF 3</div> | | | | | | | | | | | | | | | | |
| 4. TITLE <div style="text-align: center; padding-top: 5px;">Non-Conservative Error in Calculation for Alternate Hot Leg Injection Results in Unanalyzed Condition</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | |
| 03 | 12 | 2012 | 2012 | - 003 | - 1 | 11 | 16 | 2012 | FACILITY NAME | | | | | DOCKET NUMBER | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 05000 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 05000 | | | | | | | | | | | | | | | | | |
| 9. OPERATING MODE <div style="text-align: center; padding-top: 10px;">5</div> | | | 11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. POWER LEVEL <div style="text-align: center; padding-top: 10px;">0</div> | | | <input type="checkbox"/> 20.2201(b) <input type="checkbox"/> 20.2201(d) <input type="checkbox"/> 20.2203(a)(1) <input type="checkbox"/> 20.2203(a)(2)(i) | | | | <input type="checkbox"/> 20.2203(a)(3)(i) <input type="checkbox"/> 20.2203(a)(3)(ii) <input type="checkbox"/> 20.2203(a)(4) <input type="checkbox"/> 50.36(c)(1)(i)(A) | | | | <input type="checkbox"/> 50.73(a)(2)(i)(C) <input type="checkbox"/> 50.73(a)(2)(ii)(A) <input checked="" type="checkbox"/> 50.73(a)(2)(ii)(B) <input type="checkbox"/> 50.73(a)(2)(iii) | | | | <input type="checkbox"/> 50.73(a)(2)(vii) <input type="checkbox"/> 50.73(a)(2)(viii)(A) <input type="checkbox"/> 50.73(a)(2)(viii)(B) <input type="checkbox"/> 50.73(a)(2)(ix)(A) | | | | | | | | | | | | | | | | |
| | | | <input type="checkbox"/> 20.2203(a)(2)(ii) <input type="checkbox"/> 20.2203(a)(2)(iii) <input type="checkbox"/> 20.2203(a)(2)(iv) | | | | <input type="checkbox"/> 50.36(c)(1)(ii)(A) <input type="checkbox"/> 50.36(c)(2) <input type="checkbox"/> 50.46(a)(3)(ii) | | | | <input type="checkbox"/> 50.73(a)(2)(iv)(A) <input type="checkbox"/> 50.73(a)(2)(v)(A) <input type="checkbox"/> 50.73(a)(2)(v)(B) | | | | <input type="checkbox"/> 50.73(a)(2)(x) <input type="checkbox"/> 73.71(a)(4) <input type="checkbox"/> 73.71(a)(5) | | | | | | | | | | | | | | | | |
| | | | <input type="checkbox"/> 20.2203(a)(2)(v) <input type="checkbox"/> 20.2203(a)(2)(vi) | | | | <input type="checkbox"/> 50.73(a)(2)(i)(A) <input type="checkbox"/> 50.73(a)(2)(i)(B) <input type="checkbox"/> 50.73(a)(2)(v)(C) | | | | <input type="checkbox"/> 50.73(a)(2)(v)(D) | | | | <input type="checkbox"/> OTHER Specify in Abstract below or in NRC Form 366A | | | | | | | | | | | | | | | | |
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| 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 <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) | | | | | | | | | | <input checked="" type="checkbox"/> NO | | | 15. EXPECTED SUBMISSION DATE | | | MONTH | DAY | YEAR | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>A non-conservative error was identified in the input calculation for post-LOCA cooling flow (post-RAS (recirculation actuation signal)). The calculation used an incorrect (non-conservative) input for LPSI pump performance. The associated procedure (EOP/AOP Attachment 11) as written does not provide adequate direction during the Alternate Hot Leg Injection mode of operation. Therefore, the procedural guidance may not ensure the completion of the safety function of providing adequate core cooling during the Alternate Hot Leg Injection mode of operation under a worst case scenario.</p> <p>The apparent cause was identified to be inadequate use of vendor oversight when design information was transmitted to the vendor. The analysis also identified a contributing cause of inadequate review of the calculation provided by the vendor during the owner acceptance process. Procedural requirements to conduct peer reviews prior to transmitting design information to vendors and contractors preparing safety-related calculations have been incorporated into the governing procedures. Additional corrective actions will revise the deficient calculation and procedure.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|----------------------|-----------|---------------|----------------------|------------|---------|
| Fort Calhoun Station | 05000285 | YEAR | SEQUENTIAL NUMBER | REV NO. | 2 OF 3 |
| | | 2012 | - 003 | - 1 | |

NARRATIVE

BACKGROUND

Fort Calhoun Station (FCS) is a two loop Combustion Engineering, pressurized water reactor. The FCS Safety Injection (SI) system consists of three High Pressure Safety Injection (HPSI) pumps, associated piping and valves; three Containment Spray (CS) pumps, associated piping and valves; and two Low Pressure Safety Injection (LPSI) pumps, associated piping and valves. During accident conditions Emergency Operating Procedures (EOPs) and Abnormal Operating Procedures (AOPs) are used to ensure safe operation of the plant.

The primary function of the LPSI system is to provide emergency core cooling following a loss-of-coolant-accident (LOCA). The LPSI system is designed to achieve this in conjunction with the operation of one HPSI pump and one emergency diesel generator during worst case accident conditions.

Long-term cooling and recirculation are mainly accomplished by the HPSI system. However, the LPSI pumps can be used to obtain increased recirculation cooling flow once the reactor coolant system pressure is reduced to approximately the same as the containment building pressure. The LPSI pumps may be used to inject uncooled water, or a portion of their discharge may be diverted through the shutdown cooling heat exchangers before being injected back into the Reactor Coolant System (RCS). If only one HPSI pump is available, one LPSI pump in conjunction with the available HPSI pump will be used for simultaneous hot and cold leg injection in accordance with EOP/AOP Attachment 11, "Alternate Hot Leg Injection," via the shutdown cooling flow path. Hot leg injection is normally accomplished with two HPSI pumps via a cross tie to the Chemical and Volume Control System (CVCS).

EVENT DESCRIPTION

A non-conservative error was identified in the input calculation for post-LOCA cooling flow (post-RAS (recirculation actuation signal)). The calculation used an incorrect (non-conservative) input for LPSI pump performance. The associated procedure (EOP/AOP Attachment 11) as written does not provide adequate direction during the Alternate Hot Leg Injection mode of operation. Therefore, the procedural guidance may not ensure the completion of the safety function of providing adequate core cooling during the Alternate Hot Leg Injection mode of operation under a worst case scenario during the recovery phase of the accident

The minimum analyzed flow for a LPSI pump is 150 gpm. The calculation does not clearly demonstrate that this flow is maintained during some accident conditions. The associated procedure (EOP/AOP Attachment 11) as written does not provide adequate direction during the Alternate Hot Leg Injection mode of operation to ensure this requirement is met.

EOP/AOP Attachment 11 requires that RCS pressure be less than 140 pounds per square inch absolute (psia) as the entry point for the procedure. The LPSI pumps may not be able to meet minimum flow requirements for long term pump operation at this pressure, which could result in pump damage. The minimum analyzed RCS hot leg injection flow of 134 gpm may not be met with current procedural guidance and instrument accuracy limitations. Therefore, procedural guidance may not ensure completion of the safety function of providing adequate core cooling during the Alternate Hot Leg Injection mode of operation under a worst case scenario.

**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

| 1. FACILITY NAME | 2. DOCKET | 6. LER NUMBER | | | 3. PAGE |
|----------------------|-----------|---------------|----------------------|------------|---------|
| Fort Calhoun Station | 05000285 | YEAR | SEQUENTIAL NUMBER | REV NO. | 3 OF 3 |
| | | 2012 | - 003 | - 1 | |

NARRATIVE

On April 25, 2012, at 1622 Central Daylight Time (CDT) an eight-hour notification per 10 CFR 50.72(b)(3)(ii)(B) was made to the Headquarters Operation Office (HOO) (Event Number 478620). This report is being made per 10 CFR 50.73(a)(2)(ii)(B).

CONCLUSION

The apparent cause was identified to be inadequate use of vendor oversight when the design information for calculation FC06644, "LPSI Pump SI-1A and SI-1B Performance, IST Acceptance and Hot Leg Injection (HLI) EOP/AOP Attachment 11," (In-Service Test (IST)) was transmitted to the vendor. The analysis also identified a contributing cause of inadequate review of the calculation provided by the vendor during the owner acceptance process.

CORRECTIVE ACTIONS

The corrective action for the apparent cause was to incorporate a procedural requirement in PED-QP-3, "Calculation Preparation, Review and Approval" and PED-QP-5, "Engineering Analysis Preparation, Review, and Approval," to use PED-QP-38, "External Transmittal of Design Information," when transmitting design information to vendors and contractors preparing safety-related calculations. This corrective action has been completed. Additionally, FCS has incorporated a more extensive owner acceptance procedure and an owner acceptance review checklist into PED-QP-3.

Additional corrective actions will revise calculation FC06644 (due November 30, 2012) and EOP/AOP Attachment 11, Alternate Hot Leg Injection (due November 16, 2012).

SAFETY SIGNIFICANCE

The Updated Safety Analysis Report (USAR) described post-recirculation actuation signal safety function of the LPSI pumps may be affected by this condition. Part of the LPSI pump function as described in USAR Section 6.2 is to deliver core cooling and makeup water following a LOCA or MSLB via the alternate hot leg injection flow path. This safety function is implemented by EOP/AOP Attachment 11. Based on the correct pump curve for the LPSI pumps, the flow and pressure requirements stated in EOP/AOP Attachment 11 cannot be achieved. This is because RCS pressure is too high and the pumps will be operating at or near shut off head. Operation of the LPSI pumps at these conditions for an extended period of time could cause pump degradation or failure. As noted in the background information, long-term cooling and recirculation are mainly accomplished by the HPSI system. Failure of the HPSI system and the normal LPSI hot leg injection path requiring use of the alternative flow path is very unlikely. Therefore, 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 EVENTS

No previous qualifications issues with hot leg injection have been identified.

LICENSING CORRESPONDENCE REVIEW FORM

LIC-12-0166

Date Issued: 11/6/12

Requested Return Date: 11/9/12

| Review/Approval | | Information | |
|---------------------|--|---------------|--|
| L. Cortopassi | | Lynn Smith | |
| Terrence W. Simpkin | | V. Naschansky | |
| S. Miller | | | |
| Corey Cameron | | | |
| S. Swearngin | | | |
| A. Hackerott | | | |
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Subject LER 2012-003 Rev1, "Non-Conservative Error in Calculation for Alternate Hot Leg Injection Results in Unanalyzed Condition"

Please review and approve the attached draft correspondence (referenced above). In order to document your review for our records, please sign this form and return it to the Licensing Coordinator. If no notification is received by the requested return date, your concurrence with no comment will be assumed.

Technical Coordinator (Ext.)

Erick Matzke 6855
Licensing Coordinator (Ext.)

[] Approved with no comment. [] Approved pending resolution of comments as noted.

Comments: _____

Reviewer's Signature

Date

LICENSING CORRESPONDENCE REVIEW FORM SUMMARY

LIC-12-0166

Date Issued: 11/6/12

Requested Return Date: 11/9/12

| Name | Date Comments Received | No Comments ¹ | Comments - How Resolved ² |
|---------------|------------------------|--------------------------|--------------------------------------|
| L. Cortopassi | none | | |
| T. Simpkin | 11/7/12 | | Corrected |
| S. Miller | 11/7/12 | X | |
| S. Swearngin | none | | |
| C. Cameron | 11/9/12 | X | |
| V. Naschansky | none | | |
| L. Smith | none | | |
| A. Hackerott | 11/8/12 | | Corrected as able. |
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Subject LER 2012-003 Rev1, "Non-Conservative Error in Calculation for Alternate Hot Leg Injection Results in Unanalyzed Condition"

NOTE – This submittal does ____ does not X include documents/files on CD-ROM.³

| | |
|---|------|
| NL Comment Coordinator Signature | Date |
| Responsible Dept. Manager (if required) | Date |
| Review by Nuclear Licensing Supervisor | Date |

¹ Attach only signed Licensing Correspondence Review Form.

² Attach necessary documentation.

³ Ensure that the CD-ROM files are formatted properly for electronic information exchange (EIE) to the NRC. (Reference NL-17)