



LIC-12-0140
September 17, 2012

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

Reference: Docket No. 50-285

Subject: Licensee Event Report 2012-016, Revision 0, for the Fort Calhoun Station

Please find attached Licensee Event Report 2012-016, Revision 0, dated September 17, 2012. This report is being submitted pursuant to 10 CFR 50.73(a)(i)(A). The following commitments are being made in this letter.

FCS will correct the affected CVCS and waste disposal piping system socket welded fittings. This action will be completed before plant heatup.

FCS will complete thermal fatigue calculations for CVCS and waste disposal piping to ensure system is in compliance. This action will be completed before plant heatup.

If you should have any questions, please contact me.

Sincerely,

Louis P. Cortopassi
Site Vice President

LPC/epm

Attachment

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

LICENSEE EVENT REPORT (LER)

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

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.

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4. TITLE
Unanalyzed Charging System Socket Welds to the Reactor Coolant System

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
7	17	2012	2012	- 016	- 0	9	17	2012	FACILITY NAME	DOCKET NUMBER
										05000
										05000

9. OPERATING MODE 5	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: <i>(Check all that apply)</i>									
10. POWER LEVEL 0	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)						
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)						
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)							
<input type="checkbox"/> 20.2203(a)(2)(v)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER							
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A							

12. LICENSEE CONTACT FOR THIS LER	
FACILITY NAME Erick Matzke	TELEPHONE NUMBER <i>(Include Area Code)</i> 402-533-6855

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES <i>(If yes, complete 15. EXPECTED SUBMISSION DATE)</i> <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)*

On July 17, 2012, Fort Calhoun Station (FCS) identified a deficiency as part of the analyses being performed in support of resolution to the question as to whether some Class I pipe was potentially not qualified as Class 1. Condition Report (CR) 2012-07724 documented that preliminary results from an Thermal Fatigue Analysis on the chemical and volume control system (CVCS) concluded that; 1) The 2 inch socket welded fittings on Reactor Coolant System (RCS) branch line piping cannot be qualified, and 2) The 2 inch charging lines are considered to be in an unanalyzed condition exceeding thermal cycle fatigue and seriously degraded.

A cause analysis was completed and determined that the CVCS Class 1 piping was constructed using socket welded fittings.

CVCS was declared inoperable. The normal charging headers to the RCS are classified as inoperable until further evaluations or required repairs are performed. CVCS has been isolated to prevent any further thermal transients to the suspect welds. In addition, the affected waste disposal piping line which was scoped under the extent of condition is being addressed under CR 2012-12184. Contingency actions have already been taken to secure the letdown line so no thermal stress may be introduced to those socket welds. The affected welds will be replaced prior to plant heatup.

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NARRATIVE

BACKGROUND

The Fort Calhoun Station (FCS) chemical and volume control system (CVCS) consists in part of three charging pumps that take suction from the volume control tank and return the coolant to the reactor coolant system by way of the shell side of the regenerative heat exchanger. The heat exchanger transfers heat from the letdown coolant to the charging coolant before the charging coolant is returned to the reactor coolant system. Although the three charging pumps start upon receipt of an Engineered Safeguards signal, no credit is taken for charging pump operation in the Updated Safety Analysis Report (USAR) safety analyses and as such these pumps are not classified as Engineered Safeguards equipment. When the USAR safety analyses are more limiting with operation of these pumps, they are assumed to operate. The CVCS piping system used at FCS is from the original plant construction.

The reactor coolant system (RCS) has connections (Waste Disposal) to allow draining the RCS to the radioactive waste processing equipment. The RCS drain lines contain socket welds similar to the CVCS.

EVENT DESCRIPTION

On July 17, 2012, FCS identified (see Condition Report (CR) 2012-07724) a deficiency as part of the analyses being performed in support of resolution to CR 2012-00339 (Class I pipe potentially not qualified). CR 2012-07724 documented that preliminary results from an ASME III NB-3200 Thermal Fatigue Analysis on the CVCS Charging line had concluded that;

1. The 2 inch socket welded fittings on RCS branch line piping cannot be qualified.
2. The 2 inch charging lines are considered to be in an unanalyzed condition exceeding thermal cycle fatigue and seriously degraded.

The Class I portion of the CVCS system is comprised of the charging piping (RCS inflow) and the letdown piping (RCS outflow). Both piping systems contain 2 inch socket welded fittings that are subjected to the various fluid thermal transients. The typical socket welded fittings experience high transient thermal stress and fatigue due to the abrupt changes in thickness and transitions between the piping, fillet welds and fittings. The most severe transient for the charging and letdown piping is intermittent manual charging and the loss of letdown (respectively) which were derived from actual plant transients.

FCS calculation FC06484 (ASME Class 1 Piping Analysis for the Pressurizer Spray Piping December 1994) for the pressurizer spray piping was thought to be the limiting case and bound the CVCS piping system. During an extended power uprate (EPU) evaluation (January 2012) of the CVCS system, this bounding case was questioned and later determined to be incorrect (see CR 2012-00339). FCS personnel, working with the original equipment manufacturer of the plant, self-identified this issue as part of the resolution of CR 2012-00339. The vendor created a detailed failure effects analysis of a 2 inch socket welded end tee-fitting. The thermal fatigue FEA used most limiting case.

These boundary conditions represent the worst case of the Class I portion of the charging and letdown piping. The model could not be shown to pass code fatigue requirements for one cycle, whereas FCS has had approximately 73 cycles.

The normal charging headers to the RCS were classified as inoperable until further evaluations or required repairs could be performed. The plant is currently in mode 5 and the fittings are currently able to maintain an RCS boundary during current shut down conditions. The charging headers are not required for current plant conditions to support Technical Specification (TS) 2.2.1. As compensatory action, affected CVCS piping has been danger tagged shut to prevent any further thermal transients to the suspect welds.

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The issue was recognized on July 17, 2012, at 1000 Central Daylight Time (CDT). The HOO was notified on September 17, 2012, at 1404 CDT per 10 CFR 50.72(b)(3)(ii)(A). As an interim action shut down cooling purification has been secured and charging has been isolated to the RCS.

CONCLUSION

Direct Cause

Socket welds in CVCS Class 1 piping were subjected to severe thermal transients under normal operation that were beyond their design basis under normal operation.

Root Cause:

The CVCS Class 1 piping system was constructed using socket welded fittings.

Based on the evaluation above, transients of the same and similar components have occurred at FCS. Therefore, an extent of condition exists in the following piping lines:

CVCS piping lines CH-2049 (RCS nozzle to the regenerative heat exchanger), CH-2014 (sheet 4 & 6 from HCV-248 and HCV-249 to RCS nozzle) and CVCS piping line CH-2048 (letdown line downstream of the regenerative heat exchanger).

Waste disposal system piping line WD-2072 up to valve RC-113 (connected to the CVCS letdown line). CR 2012-12184 has been written to document the piping line WD-2072 up to valve RC-113 is scoped under this extent of condition.

CORRECTIVE ACTIONS

Interim Actions

The chemical and volume control system was declared inoperable. The normal charging headers to the RCS are classified as inoperable until further evaluations or required repairs are performed. CVCS has been isolated to prevent any further thermal transients to the suspect welds. In addition, the affected waste disposal piping line which was scoped under the extent of condition is being addressed under CR 2012-12184. Contingency actions have already been taken to secure the letdown line so no thermal stress may be introduced to those socket welds.

Actions to Prevent Recurrence

FCS will correct the affected CVCS and waste disposal piping system socket welded fittings. This action will be completed before plant heatup.

FCS will complete thermal fatigue calculations for CVCS and waste disposal piping to ensure system is in compliance. This action will be completed before plant heatup.

Additional actions will be tracked in the stations corrective action system.

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SAFETY SIGNIFICANCE

The potential consequence is a small break loss of coolant accident (LOCA). The CVCS piping failure event is enveloped by the small break LOCA as described in the USAR. This type of event at power operations will cause the plant to be shut down. As previously mentioned no credit is taken for operation of the CVCS system. The High Pressure Safety Injection (HPSI) System and the Low Pressure Safety Injection (LPSI) System would not be affected by either of these failures and would remain available to maintain reactor coolant system inventory.

SAFETY SYSTEM FUNCTIONAL FAILURE

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

PREVIOUS EVENTS

Fort Calhoun Station has not reported any similar issues with socket welds.