Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

June 27, 2010
NOC-AE-10002567
File No.: G25
10 CFR 50.73

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

South Texas Project
Unit 2
Docket No. STN 50-499
Licensee Event Report 2-2010-001, Revision 1:
Essential Cooling Water System Leak

Reference: L. W. Peter, STP Nuclear Operating Company, to NRC Document Control Desk, Licensee Event Report 2-2010-001, "Essential Cooling Water System Leak," dated March 8, 2010 (NOC-AE-10002528) (ML100710689)

Pursuant to 10 CFR 50.73, the STP Nuclear Operating Company (STPNOC) submitted the referenced Unit 2 Licensee Event Report (LER) 2-2010-001 to address an incident in which a leak was found in Essential Cooling Water (ECW) system return line from a Component Cooling Water heat exchanger. The ECW train was subsequently declared inoperable. Because the train was inoperable longer than was allowed under Technical Specifications, this condition is reportable under 10 CFR 50.73(a)(2)(i)(B). This revision to the LER corrects the date at which the ECW system train is presumed to have become inoperable, clarifies the associated corrective actions, and updates their status. Revised text is marked by change bars in the margin.

This event did not have an adverse effect on the health and safety of the public.

There are no commitments contained in this Licensee Event Report. Corrective actions will be processed in accordance with the STP Corrective Action Program.

If there are any questions on this submittal, please contact either P. L. Walker at (361) 972-8392 or me at (361) 972-7158.

L. W. Peter
Plant General Manager

PLW
Attachment: LER 2-2010-001, Revision 1: Essential Cooling Water System Leak

STI: 32690580

IE22
NRR

cc:
(paper copy)

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

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

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 Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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
Essential Cooling Water System Leak

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 N/A	DOCKET NUMBER N/A
12	14	09	2010	- 001 -	1	06	27	2010	FACILITY NAME N/A	DOCKET NUMBER N/A

9. OPERATING MODE
1

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

NAME	TELEPHONE NUMBER (Include Area Code)
Philip L. Walker, Staff Licensing Engineer	361-972-8392

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
NA									

14. SUPPLEMENTAL REPORT EXPECTED		15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)*	x NO				

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

On December 22, 2009, Unit 2 Essential Cooling Water (ECW) Train C was found to be inoperable due to a crack in the Component Cooling Water (CCW) heat exchanger 2C ECW return line near a connection to a vent valve. Actual inoperability of the ECW train was determined to have occurred on December 14, 2009, but was not recognized at the time. Operability was restored on December 25, 2009, when the repair was complete.

Technical Specification 3.7.4.a requires that at least two ECW trains be operable while in Modes 1, 2, 3, and 4. If one ECW train is inoperable, power operation may continue provided that operability is restored within seven days, or the requirements of the Configuration Risk Management Program are met. Otherwise, the plant is to be in Hot Standby within the next six hours and in Cold Shutdown within the following thirty hours. Because Unit 2 ECW Train C was inoperable for eleven days without taking the appropriate action required by Technical Specifications, this event is reportable under 10 CFR 50.73(a)(2)(i)(B).

Definitive procedural guidance for applying Generic Letter 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping," had not been provided to condition reviewers. The cause of the crack initiation could not be determined. Propagation of the crack was due to vibration in the piping resulting from throttle flow cavitation. Procedure and design changes will be applied to prevent a repeat occurrence.

Only one ECW train was affected by this condition. There were no personnel injuries, no offsite radiological releases, and no damage to other safety-related equipment.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

I. DESCRIPTION OF EVENT

A. REPORTABLE EVENT CLASSIFICATION

This event is reportable pursuant to 10 CFR 50.73(a)(2)(i)(B). South Texas Project (STP) Technical Specification 3.7.4.a allows one Essential Cooling Water (ECW) loop to be inoperable for seven days while in Modes 1 through 4 before taking action to begin shutdown without extending the allowed outage time using the Configuration Risk Management Program. However, STP Unit 2 ECW Train C was determined to have been inoperable longer than the allowed outage time without taking the required action. Consequently, STP Unit 2 was in a condition prohibited by Technical Specifications.

B. PLANT OPERATING CONDITIONS PRIOR TO EVENT

STP Unit 2 was in Mode 1 at 100% power.

C. STATUS OF STRUCTURES, SYSTEMS, AND COMPONENTS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT

No other structures, systems, or components were inoperable at the start of the event and contributed to the event.

D. NARRATIVE SUMMARY OF THE EVENT

On October 27, 2009, a pinhole through-wall leak was discovered near the welded joint connecting a vent valve line to the Unit 2 Train C Component Cooling Water (CCW) heat exchanger ECW return line. The leak was initially characterized as 60 drops per minute. The leak was found to have grown to three pinhole leaks totaling 0.03 gpm on November 23, progressively growing to 0.26 gpm through ten pinhole leaks on December 21, at which point the train was shut down to prevent further degradation. A prompt operability review was requested although the train was still considered operable.

Non-destructive examination on December 22 found a through-wall crack approximately 3.25 inches long at the outside diameter and 3.75 inches long at the inside diameter. The crack was near the weld in the base metal of the ECW 30" diameter pipe. The critical crack length at this location is 6.1 inches. The crack propagation rate could not be defined, and it was uncertain that the ECW train could meet its 30-day mission time with this condition. Consequently, the Unit 2 ECW train C was declared inoperable at 13:11 hours on December 22, 2009. The leak was repaired, and the train was returned to service December 25, 2009.

A reportability review of the condition concluded that the increased crack length used to justify the declaration of inoperability had been present when photographs were taken on December 17. Because the ECW train was inoperable for eight days until return to service on December 25, and Technical Specification 3.7.4.a allows a single train of ECW to be inoperable for a seven-day period, the condition was reportable to the NRC under 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications. Subsequent review of photographs taken December 14, 2009, identified similar extent of condition. Consequently, December 14 was chosen to be the presumed initiating date of inoperability, and the ECW train was inoperable for eleven days until return to service on December 25. There is no change in the reportability criteria.

E. METHOD OF DISCOVERY

Leakage from the vent line connection was initially identified by a Performance Technician performing fire detection system testing in Unit 2 on October 27, 2009. At the time, the leakage rate did not constitute an operability issue.

II. EVENT-DRIVEN INFORMATION

A. SAFETY SYSTEMS THAT RESPONDED

No safety systems were required to respond during this event.

B. DURATION OF SAFETY SYSTEM INOPERABILITY

ECW Train C was first declared inoperable on December 22, 2009. However, photographs taken on December 14, 2009, show water spraying from multiple locations around the connecting weld. A declaration of inoperability would have been appropriate at that time. The degraded area was repaired and the ECW was returned to operability on December 25, 2009. The estimated duration of inoperability is eleven days.

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

Technical Specification Requirements:

Technical Specification 3.7.4.a requires each ECW train to be operable in Modes 1, 2, 3, and 4. With one ECW train inoperable, power operation may continue provided that the inoperable train is restored to operable status within seven days or the requirements of Configuration Risk Management Program are met. Otherwise, the plant is to be in Hot Standby within the next six hours and in Cold Shutdown within the following thirty hours.

Because Unit 2 ECW train C was inoperable longer than allowed under the Technical Specifications without entering the appropriate action statements, this event is reportable pursuant to 10 CFR 50.73(a)(2)(i)(B).

Design Description:

The ECW system has three trains designed to supply cooling water to various safety-related systems for normal plant operations as well as normal shutdown and after postulated design-basis accidents. The ECW system is designed to:

1. Remove heat from plant equipment required for safe shutdown or design-basis LOCA conditions. This equipment includes:
   a. Component cooling water (CCW) heat exchangers
   b. Diesel generator (DG) heat exchangers
   c. Essential chiller condensers
   d. CCW pump supplementary coolers
2. Remove heat from certain plant equipment during normal operation. This equipment includes:
   a. CCW heat exchangers
   b. Essential chiller condensers
   c. CCW pump supplementary coolers

Normal Operation Mode:

The normal operating mode is two independent ECW trains. The CCW heat exchanger, essential chiller condensers, and CCW pump supplementary cooler all reject heat to the ECW system during normal operation.

Operation Mode During and After a Design Basis Accident (DBA):

All three ECW loops are designed to operate initially to provide cooling for equipment required to mitigate the consequences of a DBA. There is sufficient Engineered Safety Feature equipment and cooling for mitigating the consequences of a DBA after a single failure in the ECW system.

The CCW heat exchanger 2C ECW return line is a 30-inch pipe made of aluminum bronze (seamed rolled plate). The ECW vent valve line is 1 inch in diameter and made from forged aluminum bronze. Repair included removing the ECW vent valve and applying a cap on the line connecting to the 30-inch line.

The cause of crack initiation could not be established because repair activities removed flaw site characteristics that could have provided confirmation. However, crack propagation was in response to high cycle fatigue due to vibration caused by throttle valve cavitation.

Extent of Condition:

As a proactive measure against similar occurrences, equivalent vent valves on remaining ECW trains in Units 1 and 2 will be removed and the lines capped.

Risk Assessment:

This condition contributed a very small change in core damage risk and large early release risk. The Incremental Core Damage Probability was 3.0E-7 per year, and the Incremental Large Early Release Probability was 2.2E-8 per year. Therefore, this event had very low safety significance.

III. CAUSE OF THE EVENT

A. Organizational Root Cause:

NRC Inspection Manual Part 9900 references Generic Letter 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping," which stipulates the actions to be taken in the event of a through-wall leak. The actions were not applied to the condition in a timely manner, which otherwise could have been addressed prior to the declaration of inoperability.

B. Technical Root Cause

The Technical Root Cause for crack initiation cannot be determined conclusively. The Technical Root Cause for propagation of the crack is vibration resulting from cavitation occurring as the flow is throttled.

IV. CORRECTIVE ACTIONS

A. Remedial Actions:

ECW Train C has been repaired.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

B. Corrective Actions:

Enhance procedures to incorporate specific definitive guidance for the evaluation of ASME Class 1, 2, and 3 leaks in accordance with Generic Letter 90-05.

Estimated completion date: 06/24/2010

C. Recurrence Control:

Design changes have been prepared to modify similar vent valve lines from the ECW piping in both Units 1 and 2 to prevent development of similar leaks.

V. PREVIOUS SIMILAR EVENTS

There have been no similar events associated with application of Generic Letter 90-05. While there have been previous instances of through-wall leaks in ECW aluminum-bronze piping due to dealloying, there has been no adverse impact on ECW operability, and deferral of repairs of such leaks have been addressed via relief requests under 10 CFR 50.55a.

VI. ADDITIONAL INFORMATION

None.