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

May 13, 2013
NOC-AE-13003002
10 CFR 50.73

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

South Texas Project
Unit 2
Docket No. STN 50-499
Revision 1 to Licensee Event Report 2-2013-003
Operational Mode Change Prohibited by Limiting Condition for Operation 3.0.4
with Limiting Conditions for Operation Unknowingly Not Met
for Inoperable Essential Cooling Water Pump

Pursuant to 10 CFR 50.73(a)(2)(i)(B), STP Nuclear Operating Company (STPNOC) submits the attached revision to the South Texas Project (STP) Unit 2 Licensee Event Report (LER) 2-2013-003 regarding a Mode change prohibited by Limiting Condition for Operation (LCO) 3.0.4. The mode change occurred with Limiting Conditions for Operation unknowingly not met as a result of the plant staff being unaware of a degraded Essential Cooling Water (ECW) Pump 2B motor bearing condition that later resulted in the ECW train and the supported systems being declared inoperable.

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

The attached LER provides a revision to correct the number of components affected by this event.

There are no commitments in this letter. Corrective actions will be implemented in accordance with the STP Corrective Action Program.

If there are any questions, please contact Ken Taplett at (361) 972-8416, or me at (361) 972-7566.

G. T. Powell
Site Vice President

kjt

Attachment: Revision 1 to LER 2-2013-003

IE22
NRR

STI 33692258

cc:
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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 information 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

Operational Mode Change Prohibited by Limiting Condition for Operation 3.0.4 with Limiting Conditions for Operation Unknowingly Not Met for Inoperable Essential Cooling Water Pump

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
									N/A	N/A
01	07	2013	2013	- 003 -	01	05	13	2013	FACILITY NAME	DOCKET NUMBER
									N/A	N/A

9. OPERATING MODE

1

10. POWER LEVEL

005

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)	☒ 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*)
Ken Taplett, Licensing Engineer	361-972-8416

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
D	BI	MO	R165	Y					

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*)

With Essential Cooling Water (ECW) Pump 2B unknowingly inoperable, the plant staff was unaware that the associated Limiting Conditions of Operation (LCO) were not met when Unit 2 reached greater than 5% rated thermal power and entered Mode 1 on 01/07/2013 at 0053, in violation of LCO 3.0.4. This event is considered reportable under 10 CFR 50.73(a)(2)(i)(B).

On 01/06/2013 at 2100, just prior to the mode change, a temperature excursion began on the ECW Pump 2B lower motor bearing, which peaked below the alarm setpoint before returning to normal by 01/07/2013 at 0125. This excursion was identified on 01/14/2013. Analysis of subsequent vibration data indicated a bearing defect with a step increase in vibration data. Without reasonable assurance that the pump would meet its mission time, ECW Pump 2B was declared inoperable on 01/15/2013 at 1200. Due to lack of any other abnormal temperature or vibration data available for the degraded condition, the pump is considered to have been inoperable since the start of the temperature excursion.

The bearing degradation was due to insufficient tolerance in the motor shaft endplay, as set during refurbishment. Corrective actions are planned to specify this design parameter for subsequent refurbishments, and to increase endplay adjustment shim thickness in the affected ECW pump motors to reduce bearing wear.

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NARRATIVE

I. DESCRIPTION OF EVENT

A. REPORTABLE EVENT CLASSIFICATION

This event is reportable pursuant to 10 CFR 50.73(a)(2)(i)(B), any operation or condition which was prohibited by the plant's Technical Specifications.

B. PLANT OPERATING CONDITIONS PRIOR TO EVENT

Unit 2 entered Mode 2 Startup on 1/06/2013 at 2031. Unit 2 entered Mode 1 Power Operation when reactor power reached greater than 5% on 1/07/2013 at 0053 when the event occurred.

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

The event resulted from the ECW Pump 2B [EIIS: BI, P] that was inoperable due to a degraded lower bearing on the pump motor [EIIS: MO]. There were no other structures, systems, or components that were inoperable at the start of the event and that contributed to the event.

D. NARRATIVE SUMMARY OF THE EVENT

On 01/06/2013 at 2031, Unit 2 entered Mode 2 (Startup) while returning to power operation after a manual reactor trip due to two dropped control rods that occurred on 01/04/2013, as described in Docket Number 05000499 LER 2013-001-00 dated 02/28/2013.

On 01/06/2013 at 2100, the ECW Pump 2B motor lower bearing temperature began to increase from normal (approximately 100 degrees F), peaked at 163 degrees F at 2318, and then returned to normal by 01/07/2013 at 0125. The bearing temperature did not reach the alarm level set at 185 degrees F. ECW Pump 2B was started on 12/26/2012 and remained in service throughout this event.

On 01/07/2013 at 0053, Unit 2 reached greater than 5% rated thermal power and entered Mode 1. Power ascension in Mode 1 continued until 01/08/2013 at 1640 when an automatic reactor trip occurred following a Unit 2 main transformer fire, as described in Docket Number 05000499 LER 2013-002-00 dated 03/07/2013. Unit 2 was stabilized in Mode 3 (Hot Standby), then entered Mode 4 (Hot Shutdown) on 01/10/2013 at 0014, and Mode 5 (Cold Shutdown) on 01/10/2013 at 0412.

On 01/14/2013, a condition report was initiated on the ECW Pump 2B motor lower bearing temperature excursion. A walkdown of the pump was performed with no excessive noise or temperature condition observed. Vibration data was obtained which indicated a step increase in overall vibration magnitude with points at the alarm threshold. Spectral analysis indicated that the bearing was in Stage 3 of 4 for rolling element bearing failure. This was considered a rapid degradation from the most recent quarterly scheduled vibration data is limited to the sets of vibration data taken approximately one week before obtained on 12/31/2012 which had indicated the bearing was in good condition. Information on the rate of bearing degradation and one week after the temperature excursion. ECW Pump 2B continued to

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function; however, based on analysis of the vibration data a determination was made that there was no reasonable assurance its mission time would be met and ECW Pump 2B was declared inoperable on 01/15/2013 at 1200. The temperature excursion was considered the most likely indicator of the degraded bearing condition. Without any other abnormal temperature or vibration data available, a determination was made that the pump was inoperable at the start of the temperature excursion on 01/06/2013 at 2100, approximately four hours prior to Unit 2 entering Mode 1.

With ECW Pump 2B unknowingly inoperable when Unit 2 entered Mode 1 on 01/07/2013 at 0053, the plant staff was unaware that the Limiting Condition of Operation (LCO) requirements for an inoperable ECW train and for Technical Specification equipment supported by the inoperable ECW train were not met. The LCO actions do not permit continued operation in the applicable mode for an unlimited period of time. Therefore the mode change violated LCO 3.0.4 and this event is reportable under 10 CFR 50.73(a)(2)(i)(B) for an operation or condition prohibited by the plant's Technical Specifications.

The failed component was the ECW Pump 2B motor lower bearing. The pump (model 24VSN) was manufactured by Hayward Tyler Pump Company (Vermont), and the pump motor (frame V6840) was provided from Reliance Electric Limited (Ontario). The cause of the bearing degradation was determined to be insufficient minimum motor shaft endplay setting during the motor refurbishment. The insufficient motor shaft endplay resulted in excessive axial loading on the lower bearing which caused fatigue in the material at the bearing race surface and spalling of the bearing inner race.

The ECW Pump 2B motor was replaced with a refurbished motor in February 2011. Pump and motor maintenance was performed as scheduled. No issues related to bearing degradation were identified prior to the event. The STP procedure for ECW pump motor inspections provides a range of 5 to 10 mils for motor shaft endplay, consistent with general industry guidance. However, due to variations in design and thermal expansion characteristics, original equipment manufacturer (OEM) specification for motor endplay is preferred. The OEM has provided a written recommendation range for motor shaft endplay of 15 to 20 mils.

This condition affects all currently installed ECW pump motors. However, none of these motors are expected to have as severe a condition as ECW Pump 2B since none have experienced steady state lower motor bearing temperatures as high as ECW Pump 2B. Refer to the Corrective Actions section below for additional information.

Other medium voltage vertical motors associated with medium or high risk systems were reviewed for vulnerability to insufficient endplay setting, and were determined to not be susceptible to similar bearing damage or the OEM recommended endplay setting has been incorporated into the design documents.

E. METHOD OF DISCOVERY

On 01/14/2013, after performing system trending, the ECW System Engineer initiated a condition report identifying the temperature excursion on ECW Pump 2B lower motor bearing. Vibration data obtained on 01/14/2013 led to the determination that ECW Pump 2B was inoperable. The pump was determined to have been inoperable since the temperature excursion began on 01/06/2013 at 2100, which was approximately four hours prior to Unit 2 entering Mode 1.

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II. EVENT-DRIVEN INFORMATION

A. SAFETY SYSTEMS THAT RESPONDED

No safety systems were required to respond to this event.

B. DURATION OF SAFETY SYSTEM INOPERABILITY

ECW Pump 2B is considered inoperable from the start of the lower motor bearing temperature excursion on 01/06/2013 at 2100, until Unit 2 entered Mode 5 on 01/10/2013 at 0412 and exited the modes of applicability for the LCO associated with an inoperable ECW train. ECW Pump 2B was inoperable while in an LCO mode of applicability for approximately 3 days and 7 hours. Technical Specification equipment supported by the inoperable ECW train was also considered to be inoperable and in a mode of applicability for an equivalent duration. Following motor replacement and testing, ECW Pump 2B was declared operable on 01/20/2013 at 1100.

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

The Unit 2 entry into Mode 1 prohibited by LCO 3.0.4 did not represent a significant additional risk. ECW Pump 2B was inoperable within a mode of applicability for approximately 3 days and 7 hours, which is approximately one-half of the minimum time allowed by Technical Specifications to restore affected equipment to operable (required completion times of 7 days or greater) in the modes of applicability.

ECW Pump 2B was considered functional throughout the event therefore the safety significance of the failure would not have been significantly changed by earlier identification of the temperature excursion and taking of vibration data. Train A and Train C safety systems, each supplied by their independent ECW trains, were fully capable of performing their safety function during this event.

This event did not result in any offsite release of radioactivity or increase of offsite dose rates, and there were no personnel injuries or damage to any other safety-related equipment associated with this event.

III. CAUSE OF THE EVENT

The cause of the event was failure of the ECW Pump 2B motor lower bearing due to an insufficient motor endplay allowance value used for motor refurbishment.

IV. CORRECTIVE ACTIONS

Investigation of the ECW Pump 2B motor lower bearing temperature excursion and collection of vibration data was performed as part of the Corrective Action Program. Following the determination that the pump was inoperable, the motor was replaced and ECW Pump 2B was returned to service and declared operable during the same work week.
Corrective action is planned to specify the OEM recommended range for motor shaft endplay in the STP

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design documentation and to update the procedure for maintenance and inspection of the ECW pump motors to implement the revised tolerance. Using the revised tolerance for motor shaft endplay for all subsequent ECW pump motor refurbishments will prevent recurrence of the condition. This action is estimated to be completed by 05/22/2013.

Corrective actions are planned to adjust the endplay for the affected ECW pump motors 1A, 1B, 1C, 2A, 2B, and 2C, by increasing the thickness of the endplay shims. These actions are estimated to be completed by 10/01/2013.

V. PREVIOUS SIMILAR EVENTS

There have been no similar component failures at STP, and there have been no reportable events at STP within the last three years that have occurred for the same reason as this event. There have been instances of operations or conditions prohibited by the plant's Technical Specifications that resulted from unidentified failures of components. These events include:

- Unit 1 LER 2012-001-01, Nuclear instrumentation channel was inoperable longer than allowed by the LCO, due to inadequate guidance for performing channel checks.
- Unit 2 LER 2010-006-00, Technical Specifications not met for Reactor Coolant System unidentified leakage, for an unrecognized condition caused by lack of procedural guidance.
- Unit 2 LER 2010-001-01, Essential Cooling Water System leak due to a crack in a heat exchanger return line near a vent valve connection that was not recognized.

VI. ADDITIONAL INFORMATION

None