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

November 9, 2006
NOC-AE-06002082
10CFR50.73

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

South Texas Project
Unit 1
Docket No. STN 50-498
Licensee Event Report 1-06-003
Control Room Envelope HVAC Makeup Fan 11B Failure to Start

Pursuant to 10 CFR 50.73(a)(2)(i)(B), the South Texas Project (STP) submits the attached Unit 1 Licensee Event Report 1-06-003 as a result of failure of Control Room Envelope (CRE) HVAC Makeup Fan 11B to start when actuated from the Control Room pushbutton.

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 James R. Morris at (361) 972-8652 or me at (361) 972-7849.

E. D. Halpin
Site Vice President/
Plant General Manager

jrm
Attachment: LER 1-06-003, Control Room Envelope HVAC Makeup Fan 11B Failure to Start

IE22

cc:
(paper copy)

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

Richard A. Ratliff
Bureau of Radiation Control
Texas Department of State Health Services
1100 West 49th Street
Austin, TX 78756-3189

Senior Resident Inspector
U. S. Nuclear Regulatory Commission
P. O. Box 289, Mail Code: MN116
Wadsworth, TX 77483

C. M. Canady
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

(electronic copy)

A. H. Gutterman, Esquire
Morgan, Lewis & Bockius LLP

Mohan C. Thadani
U. S. Nuclear Regulatory Commission

Steve Winn
Christine Jacobs
Eddy Daniels
NRG South Texas LP

C. Kirksey
City of Austin

Jon C. Wood
Cox Smith Matthews

J. J. Nesrsta
R. K. Temple
E. Alarcon
City Public Service

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 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)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
South Texas, Unit 1	05000498	1 OF 6

4. TITLE

Control Room Envelope HVAC Makeup Fan 11B Failure to Start

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
09	11	2006	2006	- 003 -	00	11	09	2006	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE

1

10. POWER LEVEL

095

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

NAME	TELEPHONE NUMBER (Include Area Code)
James Morris (Licensing Engineer)	(361) 972-8652

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

☐ 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)*

On 9/11/2006, at 1210 hours, with Unit 1 in coast down operations, Control Room Envelope Makeup Fan 11B was manually actuated from the Control Room in support of maintenance activities and failed to start. The failure was due to the magnetic circuit breaker (short circuit trip protection) for Fan 11B tripping on instantaneous (starting) over current. As a result, Control Room Envelope HVAC Train B was declared inoperable.

Investigation determined that during implementation of the Motor Control Center Upgrade Modification in 2000, the instantaneous trip setting of the magnetic breaker for the fan load was set based on code letter "G" motors rather than the required "J" setting. As a result, the magnetic breaker setting was set too low causing a vulnerability to spurious tripping during certain plant conditions.

The locked rotor current setting was adjusted for the 11B Control Room Envelope Makeup Fan breaker, and the 11B Fan was declared operable on 09/12/2006 at 0240 hours. Walkdowns were performed on all Unit 1 and Unit 2 safety related 480 Volt motors affected by the Motor Control Center Upgrade Modification to verify the correct magnetic trip settings for the breakers. No other motors were found with incorrect magnetic breaker settings.

Probabilistic risk assessment determined that there was no adverse impact to Core Damage Frequency or to the Large Early Release Frequency as a result of this event. This event resulted in no personnel injuries, no offsite radiological releases, and no damage to other safety-related equipment.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
South Texas, Unit 1	05000498	2006	003	00	2 OF 6

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). The South Texas Project (STP) determined that Control Room Envelope (CRE) Makeup Fan 11B was inoperable and actions had not been taken as required by Technical Specifications. The requirements of Technical Specifications (TS) were not met in that one of the three CRE HVAC trains was not operable, and TS 3.7.7 Action a. was not implemented within the required allowed outage time. Consequently, STP Unit 1 was in a condition prohibited by Technical Specifications.

B. PLANT OPERATING CONDITIONS PRIOR TO EVENT

STP Unit 1 was in Mode 1 at approximately 95% power, in coast-down operations.

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

No other inoperable structures, systems, or components contributed to the event.

D. NARRATIVE SUMMARY OF THE EVENT

On 9/11/2006, at 1210 hours, with Unit 1 in coast down operations, CRE Make-up Fan 11B was manually actuated from the Control Room in support of maintenance activities and failed to start. The failure was due to the magnetic circuit breaker (short circuit trip protection) for Fan 11B tripping on instantaneous (starting) over current. As a result, CRE HVAC Train B was declared inoperable.

Following the event, a walkdown of the Fan 11B motor determined the locked rotor code letter specified in the nameplate data to be "J," indicating a higher than normal locked rotor current motor. Energy efficient and high torque motors have inherently higher locked rotor currents than more common older motors with the same full load ampere ratings and, therefore, require a higher instantaneous trip setting for the magnetic breaker. Based on the revision of STP Design Criteria 4E510EQ1005, Class 1E AC Power Distribution that was in effect when the design change package was prepared, the instantaneous trip setting of the magnetic breaker was incorrectly selected based on code letter "G" motors. "G" motors have lower locked rotor current requirements than "J" motors. As a result, the magnetic breaker setting was set too low causing a vulnerability to spurious tripping.

During emergency conditions (Safety Injection (SI) or Safety Injection with a Loss of Offsite Power (LOOP)), lower voltages on the bus feeding the fan could have sufficiently decreased the starting current required to allow a successful Fan 11B motor start. However, a high radiation signal could require the motor to start without an SI signal. For a high radiation start, the bus voltages could be high and the motor windings could be at ambient temperature and this condition could also trip the breaker. Therefore, as evident by the Fan 11B breaker trip, the

conditions which could potentially trip the breaker have existed since its replacement in 2000.

Investigation determined that the nameplate locked rotor code letters for the Motor Control Center (MCC) fed motors were not documented when the Makeup Fan 11B breaker was replaced. Further, the investigation identified several missed opportunities in previous years to identify the deficiency in the Design Criteria. The causes of these missed opportunities include human performance issues, as well as programmatic issues. These issues are summarized below.

It was also observed that at the time of the 11B Makeup Fan start failure, the bus voltages were high (because of light grid loads due to overcast weather conditions) and the motor windings were at ambient temperature (the motor is typically in standby mode for weeks). Both conditions increase the motor starting current requirements for induction motors. With the 11B Fan breaker set at the incorrect tap setting, review of test data showed that the breaker would trip at the low end of the acceptable breaker setting tolerance. Breakers tripping on the high end of the setting "tolerance range" would have not been affected by the above conditions.

Background Information

The Control Room Envelope Make-up Fans are part of the CRE HVAC System. The CRE HVAC System is safety-related and consists of three 50 percent capacity redundant equipment trains. The subject fan is powered by 480 Volt Engineered Safety Features (ESF) MCC E1B1 cubicle M3.

The CRE Makeup Fans supply outside makeup air through the makeup filter units for CRE pressurization and to filter outside air for makeup during emergency mode. The makeup unit fans deliver filtered air to the Control Room Air Cleanup Filter Unit. The fans are not required to operate under normal operating conditions.

The fans are started automatically by the ESF load sequencer after an SI or SI coincident with LOOP signal actuation or by an outside air intake high radiation signal. Surveillance of airborne radioactivity levels of the outside makeup air to the supply system is provided by the Control Room ventilation inlet air radiation monitors. The fans can also be started manually by operator action.

The CRE Makeup Fan motors are provided with overload and short-circuit trip protection by 480 Volt Class 1E MCCs. The overloads provide long term protection and the short circuit protection is instantaneous for shorts (faults and abnormally high starting current). The 480 Volt ESF MCCs have combination motor starters provided with magnetic, multiple setting instantaneous trip circuit breakers for short-circuit protection. Control Room Make-up Fan 11B MCC breaker E1B1/M3 tripped on instantaneous current when manually actuated from the Control Room. The MCC breaker was reset and the motor started and ran successfully. The measured full load current was less than nameplate and the motor physically checked out satisfactorily.

The magnetic breaker in MCC E1B1/M3 was replaced as part of the Class 1 E MCC Upgrade Modification in the spring (March 4-May 20) of 2000 (Refueling Outage 1RE09). CRE Makeup Fan 11B had been successfully started and/or tested on multiple occasions up to the discovery date of this event.

E. METHOD OF DISCOVERY OF EACH COMPONENT FAILURE, SYSTEM FAILURE, OR PROCEDURAL ERROR

This condition, failure of the 11B CRE Makeup Fan to start when manually actuated from the Control Room pushbutton, was identified while Operations was starting Makeup fans in support of maintenance.

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

The instantaneous trip setting for the CRE Makeup Fan 11B breaker was set incorrectly when it was replaced as part of the MCC Upgrade Modification in 2000 (Refueling Outage 1RE09). As evident by the Fan 11B trip, the conditions which could potentially trip the breaker have been possible since its replacement. Therefore, the CRE Makeup Fan 11B was inoperable since the breaker replacement in 2000.

CRE Makeup Fan 11B had been successfully started and/or tested on multiple occasions up to the discovery date of this event.

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

A risk assessment performed by the STP PRA group determined that there was no adverse impact to Core Damage Frequency or to the Large Early Release Frequency as a result of this event. The CRE HVAC Makeup fan is used to support the control room operator habitability safety function. This function is not modeled in the plant probabilistic risk assessment (PRA) model; only the CRE HVAC room cooling function is modeled as a plant initiating event. Failure of the CRE HVAC Makeup fan 11B does not impact the room cooling function. Therefore, failure of CRE HVAC Makeup fan 11B does not cause a quantifiable increase in core damage or large early release frequency.

This event resulted in no personnel injuries, no offsite radiological releases, and no damage to other safety-related equipment.

III. CAUSE OF THE EVENT

The cause of the event was an incorrect instantaneous magnetic breaker setting. This incorrect setting was established as part of the Class 1 E MCC Upgrade Modification, which was implemented during the spring (March 4-May 20) of 2000 during Refueling Outage 1RE09.

It was not recognized at the time the design change was prepared that the magnetic setting criterion was incorrect and should have been revised. The incorrect breaker setting data was also contained in the STP Electrical Setpoint Index. The incorrect design criteria was corrected as part of the corrective actions for a 2002 Condition Report. Additionally, corrective actions associated with a 2000 Condition Report revised several sections of the Electrical Setpoint Index to reflect the correct breaker setting criteria. However, some guidance in the STP Electrical Setpoint Index still reflects the incorrect magnetic breaker setting criteria and will be revised.

A contributing cause is the fact that the Electrical Setpoint Index in some instances provides more than one value for the breaker magnetic setting with direction to set the breaker to the minimum value and increase if required due to spurious trips. This practice masks events where the breaker is adjusted in accordance with the setpoint index because these adjustments are not reviewed by engineering and the work order closure process does not review for these types of changes. The Setpoint Index will be revised to specify a single magnetic breaker setting for safety related SSCs.

Additional contributing programmatic/procedure/performance causes are as follows:

1. Causal evaluations performed for previous breaker setting events in 2000 and 2002 were too narrowly focused and did not adequately consider the extent of condition. Since these earlier events occurred, changes have been made to the corrective action program that improve the quality and depth of causal evaluations. Improvements include lowering the threshold for significant event determination; improvements to the apparent cause and root cause processes such as fault tree analysis and error precursor analysis; and a complete rewrite of the apparent cause and root cause investigation guidance manuals.

2. In some cases, for previous events, Engineering did not evaluate potential operability concerns during the design change process. Had these events been recognized as potential operability concerns, further investigation would likely have resulted in identifying the incorrect setting on CRE HVAC makeup Fan 11B. As detailed below, case study training will be presented and the design change procedure will be revised to address this issue.

3. An adverse trend in equipment reliability was not identified. It is an expectation that system engineers trend similar failures for common cause determination. The current System Engineering administrative guidelines are clear on this expectation. At the time of these past events, no programmatic tool existed to assist the system engineer in identification of repetitive issues. Now, all Condition Reports are reviewed to determine if a repeat failure exists and that information is provided to the system engineer.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
South Texas, Unit 1	05000498	2006	003	00	6 OF 6

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

IV. CORRECTIVE ACTIONS

1. The locked rotor current setting was adjusted for the 11B CRE Makeup Fan breaker, and the 11B Fan was declared operable on 09/12/2006 at 0240 hours.

2. Walkdowns were performed on all Unit 1 and Unit 2 safety related 480 Volt motors affected by the MCC Upgrade Modification to verify the correct magnetic trip settings for the breakers. No other motors were found with incorrect magnetic breaker settings.

3. The Electrical Setpoint Index guidance will be revised to apply the adjusted magnetic breaker setting criteria.

4. The Electrical Setpoint Index (Notes) will be revised to specify a single magnetic breaker setting for safety related SSCs.

5. Although no additional motors were found with incorrect magnetic breaker settings, optimization of Unit 1 and 2 motor breaker settings will be performed based on walkdown information.

6. Case study training on this event will be provided to design and maintenance engineers.

7. The design change procedure will be revised to include guidance on addressing potential operability and reportability issues when correcting conditions that support SSC operability (corrective design changes).

V. PREVIOUS SIMILAR EVENTS

No similar reportable events due to incorrect magnetic circuit breaker settings have occurred at STP within the past three years.

VI. ADDITIONAL INFORMATION

None