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

May 22, 2020
NOC-AE-20003737
10 CFR 50.73

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

South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
Licensee Event Report 2020-001-00
Automatic Actuation of Emergency Diesel Generators due to Lockout of Switchyard Electrical Bus

Pursuant to reporting requirements of 10 CFR 50.73(a)(2)(iv)(A), STP Nuclear Operating Company hereby submits the attached South Texas Project Licensee Event Report (LER) 2020-001-00.

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

There are no commitments in this submittal.

If there are any questions, please contact Wendy Brost at 361-972-8516 or me at 361-972-7888.

Michael A. Schaefer
Site Vice President

Attachment: LER 2020-001-00, Automatic Actuation of Emergency Diesel Generators due to Lockout of Switchyard Electrical Bus

cc:

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
1600 E. Lamar Boulevard
Arlington, TX 76011-4511

STI: 35022728

Attachment

LER 2020-001-00

Automatic Actuation of Emergency Diesel Generators due to
Lockout of Switchyard Electrical Bus

NRC FORM 366
(04-2020)

U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 04/30/2020

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 Information Services Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street NW, Washington, DC 20503; e-mail: oira_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

1. Facility Name	2. Docket Number	3. Page
South Texas Unit 1	05000498	1 OF 5

4. Title

Automatic Actuation of Emergency Diesel Generators due to Lockout of Switchyard Electrical Bus

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
									South Texas Unit 2	05000499
03	24	2020	2020	- 001	- 00	05	22	2020	Facility Name N/A	Docket Number 05000

9. Operating Mode	11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: *(Check all that apply)*			
Defueled	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. Power Level	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
000	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(ii)
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(iii)
		☐ 50.73(a)(2)(i)(C)	☐ Other (Specify in Abstract below or in NRC Form 366A	

12. Licensee Contact for this LER

Licensee Contact	Telephone Number (Include Area Code)
Wendy Brost, Licensing Engineer	(361) 972-8516

13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable to ICES	Cause	System	Component	Manufacturer	Reportable to ICES
A	FK	BKR	Mitsubishi	Y	N/A	N/A	N/A	N/A	N/A

14. Supplemental Report Expected	15. Expected Submission Date	Month	Day	Year
☐ Yes (If yes, complete 15. Expected Submission Date) ☒ No				

Abstract (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

On March 24, 2020 with Unit 1 defueled and Unit 2 at 100% power, the South Texas Project 345 kV south switchyard electrical bus unexpectedly de-energized. The de-energization of the south bus resulted in a loss of power to Standby Transformer 2 which was supplying power to the Engineered Safety Features (ESF) 4160V busses for the Unit 1 A- and C-Trains and Unit 2 B-Train. Emergency Diesel Generators 11, 13, and 22 automatically started in response to the undervoltage condition, as designed.

The cause of this event was a human performance error made by a Transmission and Distribution Service Provider employee during planned relay testing in the switchyard. This event is reportable as an event that resulted in the automatic actuation of the Unit 1 and Unit 2 emergency AC electrical power systems and reactor containment fan coolers, as well as the Unit 2 Auxiliary Feedwater Pump. Planned corrective actions include procedure changes intended to increase oversight of switchyard work activities and assignment of a dedicated Switchyard Coordinator.

The 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 safety-related equipment associated with this event. Additionally, all ESF equipment operated as designed. Therefore, there was no adverse effect on the health and safety of the public.

NARRATIVE

I. Description of Reportable Event

A. Reportable event classification

This event is reportable pursuant to 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in the automatic actuation of emergency AC electrical power systems (10 CFR 50.73(a)(2)(iv)(B)(8)), Reactor Containment Fan Coolers (10 CFR 50.73(a)(2)(iv)(B)(7)), and Auxiliary Feedwater Pump (10 CFR 50.73(a)(2)(iv)(B)(6)).

B. Plant operating conditions prior to event

Prior to the event on March 24, 2020, Unit 1 was defueled for a refueling outage and Unit 2 was in Mode 1.

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 this event that contributed to this event.

D. Background information

The Offsite Electrical System consists of two standby transformers, the 138 kV emergency transformer, two main generators, two main power transformers, 345 kV lines connecting the main power transformers and the standby transformers to the switchyard, the 345 kV switchyard, nine 345 kV transmission circuits from the South Texas Project Electric Generating Station (STPEGS) 345 kV switchyard to the interconnecting grids, and the 138 kV radial line connected to the 138 kV emergency transformer. The transmission system provides reliable sources of offsite power for supplying plant auxiliary power systems for plant startup, shutdown or at any time that power is unavailable from the unit's main generator.

The standby transformers are individually supplied by separate and independent overhead 345 kV ties from the 345 kV switchyard. These 345 kV ties to the standby transformers are connected by two separate 345 kV busses (north and south) in the switchyard. Each standby transformer has the capacity to supply all Engineered Safety Features (ESF) busses in both Units and two 13.8 kV auxiliary busses. These transformers can be shared between Units 1 and 2 and can supply the two preferred power sources (the north and south 345 kV busses).

Per STP Technical Specification 3.8.1.1.a, two physically independent circuits between the offsite transmission network and the onsite Class 1E Distribution System are required to be operable in Modes 1, 2, 3, and 4. Unit 2 entered Technical Specification (TS) Actions 3.8.1.1.a and 3.8.1.1.e in response to this event. TS 3.8.1.1 was not applicable to Unit 1 at the time of the event because Unit 1 was in the defueled Mode.

E. Narrative summary of the event

On March 24, 2020 at 1046 hours, the 345 kV south bus was unexpectedly de-energized when a switchyard breaker failure trip signal was initiated in the south bus differential relay. The failure trip signal was initiated when a test signal was injected into an incorrect non-isolated transmission line relay instead of the intended electrically-isolated transmission line relay during a maintenance activity that is routinely performed during refueling outages. The maintenance activities in the switchyard were being performed by the Transmission and Distribution Service Provider (TDSP) personnel.

The following is a summary timeline of relevant events (note: all times are Central Daylight Time):

March 13, 2020 [2300]:	Unit 1 Main Output Breaker opened and refueling outage 1RE22 began
March 22, 2020 [2315]:	Unit 1 defueled and core alterations suspended
March 23, 2020 [0717]:	TDSP personnel (TDSP) began performing work in the switchyard

March 24, 2020 [1046]:	345 kV south bus unexpectedly de-energized Unit 1 experienced a loss of power to Engineered Safety Features (ESF) busses E1A and E1C. Emergency Diesel Generators (EDGs) 11 and 13 automatically started and restored power to the de-energized ESF busses. Spent Fuel Pool (SFP) Cooling Pump 1B lost power, but SFP Cooling Pump 1A remained running. A- and C-Train safety equipment started automatically including the Reactor Containment Fan Coolers (RCFCs). Unit 2 experienced a loss of power to ESF bus E2B. EDG 22 automatically started and restored power to lost bus. SFP Cooling Pump 2A lost power and forced circulation was lost in the Unit 2 SFP. B-Train safety equipment started automatically including Auxiliary Feedwater Pump (AFW) Pump 22 and RCFCs.
March 24, 2020 [1054]:	Secured SFP Cooling Pump 1A in preparation for restarting both SFP Cooling Pumps 1A and 1B
March 24, 2020 [1056]:	Started SFP Cooling Pumps 1A and 1B
March 24, 2020 [1208]:	Paralleled EDG 11 with offsite power and re-energized ESF Bus E1A from offsite power
March 24, 2020 [1215]:	Paralleled EDG 22 with offsite power and re-energized ESF Bus E2B from offsite power
March 24, 2020 [1229]:	Secured AFW Pump 22
March 24, 2020 [1231]:	Started SFP Cooling Pump 2A, forced circulation restored in Unit 2 SFP
March 24, 2020 [1257]:	Paralleled EDG 13 with offsite power and re-energized ESF Bus E1C from offsite power
March 24, 2020 [1615]:	NRC notification due to automatic actuation of systems listed in 10 CFR 50.73(a)(2)(iv)(B)
March 24, 2020 [2142]:	Required offsite circuits declared operable following restoration of switchyard south bus and Standby Transformer 2

F. Method of discovery

This event was self-revealed when the switchyard south bus de-energized, resulting in a loss of power to Standby Transformer 2 which was supplying power to the ESF busses for the Unit 1 A- and C-Trains and the Unit 2 B-Train. EDGs 11, 13, and 23 automatically started in response to the undervoltage condition.

II. Component failures

A. Failure Mode, mechanism, and effects of failed component

The failed component in this event was the 345 kV Switchyard South Breaker Y550. A Y550 breaker failure trip signal was initiated to the south bus differential relay when a test signal was injected into an incorrect non-isolated transmission line relay (Y540/Y550) instead of the intended electrically-isolated transmission line relay (Y500/Y510) during a planned maintenance activity.

LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
South Texas Unit 1	05000- 498	2020	- 001	- 00

NARRATIVE (Continued)

B. Cause of component failure

The cause of this event was a human performance error by the TDSP personnel conducting relay testing in the switchyard. Specifically, a test signal was mistakenly injected into an energized transmission line relay instead of into the intended de-energized relay.

C. Systems or secondary functions that were affected by failure of components with multiple functions

During this partial Loss of Offsite Power event, Standby Transformer 2 was supplying power to Trains A and C on Unit 1 and Train B on Unit 2. All three of these trains lost normal power when the south bus was inadvertently isolated. No other electrical busses in the switchyard were affected by this event – the North Bus remained energized.

In response to the undervoltage condition, EDGs 11, 12, and 22 automatically started and provided power to their respective busses as designed.

The loss of busses E1A and E1C in Unit 1 resulted in a loss of power to SFP Cooling Pump 1B. All fuel had been offloaded to the Unit 1 SFP and the Residual Heat Removal (RHR) system was not in service. The loss of bus E2B in Unit 2 resulted in a loss of power to SFP Cooling Pump 2A and a loss of forced circulation to the Unit 2 SFP.

As a result of the transient, Integrated Computer System (ICS) displays, RM-11 radiation monitoring, and RT-8010B indications were lost in the Unit 1 Control Room. Compensatory measures for these indications were available and in place during the time-period this equipment was non-functional.

D. Failed component information

Switchyard System { FK }
Breaker { BKR }
Manufacturer: Mitsubishi { Mitsubishi }
Model: {300SFMT63B}

III. Analysis of the event

A. Safety system responses that occurred

EDGs 11, 13, and 22 automatically started in response to the undervoltage condition. Subsequently, the Unit 1 A- and C-Train RCFCs and Unit 2 B-Train RCFCs and AFW Pump actuated automatically.

B. Duration of safety system inoperability

When the south bus was de-energized, Unit 2 entered TS Action 3.8.1.1.e on March 24, 2020 at 1046 hours due to two independent offsite circuits being inoperable – the switchyard south bus and ESF bus E2B were not connected to their offsite source. Upon re-energization of ESF Bus E2B approximately 89 minutes later at 1215 hours, Unit 2 exited TS Action 3.8.1.1.e and entered TS Action 3.8.1.1.a due to one independent offsite circuit being inoperable. Unit 2 exited TS Action 3.8.1.1.a approximately 9 hours and 27 minutes later at 2142 hours when the offsite circuits were declared operable following the restoration of the switchyard south bus and Standby Transformer 2.

TS 3.8.1.1 was not applicable to Unit 1 at the time of the event because Unit 1 was in the defueled Mode.

C. Safety consequences and implications

This event resulted in the actuation of the emergency AC electrical power system. The initiating event was caused by human error and not by external events. 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. Therefore, there was no adverse effect on the health and safety of the public.

NARRATIVE (Continued)

IV. Cause of the event

The root cause for this event was determined to be:

TDSP personnel had less than adequate work practices during the performance of transmission line relay testing for Jones Creek Circuit 18 (Y500/Y510).

The contributing cause for this event was determined to be:

STP had less than adequate oversight of switchyard field activities when work was in progress.

V. Corrective actions

Planned corrective actions are as follows:

1. Assign a dedicated STP Switchyard Coordinator with primary duties for oversight and observation of switchyard work activities.
2. Revise site procedures to incorporate current industry best practices and to expand the scope of switchyard work activities that require oversight by the STP Switchyard Coordinator.

VI. Previous similar events

A review of internal operating experience identified a similar event in 2010 involving a TDSP human performance error and insufficient STP oversight that resulted in the loss of the north switchyard electrical bus. STP submitted Licensee Event Report 2010-004-00 in response to this event.

STP reviewed the corrective actions associated with the 2010 event and determined that STP needs to provide increased direct oversight and ownership of work performed in the switchyard. In addition, an effectiveness review will be performed on the corrective actions to be implemented for the 2020 event.