Nuclear Operating Company

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

April 3, 2001
NOC-AE-01001072
File No.: G26
10CFR50.73
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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

South Texas Project
Unit 2
Docket No. STN 50-499
Licensee Event Report 01-001
Manual Reactor Trip

Pursuant to 10CFR50.73, South Texas Project submits the attached Unit 2 Licensee Event Report 01-001 regarding a manual reactor trip. This event did not have an adverse effect on the health and safety of the public.

Licensee commitments are listed in the Corrective Action section of the attachment. If there are any questions on this submittal, please contact either Mr. W. E. Mookhoek at (361) 972-7274 or me at (361) 972-7800.

G. L. Parkey
Plant General Manager

Attachment: LER 01-001 (South Texas, Unit 2)

IE22

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NRC FORM 366 (1-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2001

Estimated burden per response to comply with this mandatory information 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 Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
South Texas Unit 2	05000 499	1 OF 4

TITLE (4) Manual Reactor Trip and Engineered Safety Features Actuation

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
02	07	2001	2001	– 001	– 00	04	09	2001	FACILITY NAME	DOCKET NUMBER 05000

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

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
W. E. Mookhoek	361-972-7274

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE									

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

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) **(16)**

On February 7, 2001, at 1828, Unit 2 was operating at 10% power, escalating to 12-14% power, in preparation for closing the Main Generator Breaker when a Reactor Operator performing electrical plant bus transfer operations inadvertently de-energized the 2F Auxiliary and Standby 13.8 kV busses. As a result Reactor Coolant Pump 2A was de-energized, requiring the operating crew to initiate a manual reactor trip in accordance with plant procedures. All control rods fully inserted. All actuated safety equipment operated as required. The root causes identified for this event include time pressure imposed by electrical alarms and interlocks that lead to a deviation from fundamental work practices, and less than adequate procedural direction. Corrective actions include revising procedural guidance for this activity, training Plant Operations personnel on the pitfalls for time pressure driven evolutions, and revisiting the time limit setpoints for parallel operations of 13.8 kV busses.

This event was reviewed for risk impact and found to be risk insignificant since the conditional core damage probability is less than 2×10^{-7}.

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

DESCRIPTION OF EVENT:

On February 5, 2001, the operations dayshift crew attended "Just in Time Training" (JIT) to practice bringing the Main Generator online following a forced outage. The JIT included transferring the 13.8 kV Auxiliary and Standby busses to the Standby Transformers (STBY XFMR). This evolution is performed to prevent a loss of power to these busses in the event that a Main Generator Lockout were to occur while closing the Main Generator Breaker, in turn causing the loss of the Unit Auxiliary Transformer (AUX XFMR). A Reactor Operator and his Unit Supervisor performed the JIT for this evolution.

On February 7, 2001 a breaker transfer sheet ("Transferring 13.8 KV Bus Power Supply Checklist"), was developed for transferring the 13.8 kV busses to the STBY XFMR in accordance with plant procedures (0POP02-AE-0002). The transfer sheet was reviewed and approved by the Unit Supervisor and included the sequence and description of all breakers to be manipulated (the synchronizing interlock switches were not listed nor required per procedure). A pre-job brief was held to discuss the 13.8 kV bus transfer procedure. The scope of the briefing included:

- The evolution sequence and expected alarms.
- The methodology of breaker manipulations was covered. The Reactor Operator was to watch breaker handswitch indications while the Unit Supervisor watched current indications. The Reactor Operator would close the STBY XFMR supply breaker and reopen it if it failed to close. If the AUX XFMR supply breaker failed to open, then the Reactor Operator was to re-close it.
- Verbal cues for this evolution were covered. When the STBY XFMR supply breaker was closed, the Unit Supervisor was to say "have current" if a current surge was seen, indicating that the breaker had closed. The Reactor Operator would then open the AUX XFMR supply breaker. If a current surge was not observed when closing the STBY XMFR supply breaker the Unit Supervisor was to say "no change" at which point the Reactor Operator was to take the STBY XFMR supply breaker handswitch to open.

Once the 13.8 kV sources are paralleled, the South Texas design has a bus parallel alarm, "13KV BUS PARRALLELED", occur at four (4) seconds indicating that half the time is gone to successfully complete the evolution. Following this alarm an automatic action can de-energize the Auxiliary and Standby busses under certain circumstances. This automatic action occurs after 8.5 seconds of parallel operation. As a result, Operators have 8.5 seconds to perform two breaker operations.

After all preparations and briefings were concluded the Unit Supervisor directed the Reactor Operator to close the STBY XFMR supply breaker and open the AUX XFMR supply breaker to the 2F Auxiliary and Standby busses.

The Reactor Operator placed the STBY XFMR supply breaker to 2F Standby bus in the close position, but did not place the synchronizing interlock switch in the "ON" position first, which prevented the breaker from closing. The Reactor Operator observed that the breaker indication did not change (remained green), and became confused. He did not reposition the STBY XFMR breaker handswitch back to open, as specified by the Unit Supervisor in the pre-job briefing, nor did he alert the Unit Supervisor of his indications. Almost immediately an alarm sounded, which the Reactor Operator assumed was the expected "13KV BUS PARRALLELED" alarm and assumed that the breaker had closed. The Reactor Operator did not verify the alarm because he was directed in the pre-job brief to focus on breaker indications. Had he done so, he would have noted that an unexpected "BREAKER TRIP" alarm had been received, meaning that the breaker was open with a closed demand present. The Unit Supervisor did not hear the alarm due to his focus on the current indicator. Surprised that current had not increased as expected, the Unit Supervisor stated "no change in current" instead of the agreed upon verbiage. The Reactor Operator heard the word "...current" and took that as the verbal cue to open the AUX XFMR supply breaker to 2F Auxiliary bus. The Reactor Operator then opened the AUX XFMR supply breaker to 2F Auxiliary bus, de-energizing the 2F Auxiliary and Standby busses. The above sequence of events took place in less than four seconds.

At this point the Unit Supervisor noted that multiple alarms sounded and looked down at the switch panel. He observed that the synchronizing interlock switch for the STBY XFMR to the 2F Standby bus breaker was in the "OFF" position, and that both the AUX and STBY XFMR supply breakers were open. The Unit Supervisor then surveyed the Control Room, noted that the 2A Reactor Coolant Pump was not running, and ordered the reactor manually tripped.

CAUSE OF EVENT

The root causes identified for this event are:

1. Perceived and actual time pressure imposed by electrical alarms and interlocks lead to a deviation from fundamental work practices. The perceived time pressure manifested itself as follows:

   - The Unit Supervisor used inappropriate communication techniques that contributed to an incorrect breaker manipulation.
   - The Unit Supervisor focused on transformer current indications, compromising his ability to provide effective oversight of the evolution. Consequently, the operator's failures to operate the synchronizing interlock switch and verify the resulting annunciator alarm were not identified or corrected.
   - The Reactor Operator did not: stop, alert others, or otherwise seek assistance upon encountering abnormal indications; verify the alarm received; or seek clarification of the Unit Supervisor's unclear verbal communications prior to acting.

2. Operation of synchronizing interlock switches were not included in plant procedures (0POP02-AE-0002) since their operation was considered "skill of the craft". The omission of synchronizing interlock switches and lack of requirements to include them on "Transferring 13.8 kV Bus Power Supply Checklist" made 0POP02-AE-0002 less than optimum for the less practiced user.

CORRECTIVE ACTIONS

1. Procedure 0POP02-AE-0002 was revised to require "Transferring 13.8 kV Bus Power Supply Checklist" (Addendum 4) to include all breaker and synchronizing interlock switch manipulations. Addenda 5 through 8 were added to the procedure to facilitate transferring 13.8 kV Auxiliary Busses to the Standby Transformers when preparing to close the Main Generator Breaker and when returning the 13.8 kV Auxiliary Busses to the Unit Auxiliary Transformers after closing the Main Generator Breaker.

2. Lessons learned from this event will be covered with Licensed and Non-Licensed Operators during requalification training. The lessons learned training will include:
   - Discussion of perceived and actual time pressure, proper verbal communications, self-verification techniques, and responding to abnormal indications or conditions.
   - Training on the expectations to stop and gain assistance from peers or supervision when faced with unusual or unexpected conditions. This training will be practical in nature and reinforce station and department expectations.
   - For Licensed Operators, the training will reinforce the alarms and interlocks associated with paralleling 13.8 kV busses.

   This action will be completed by May 30,2001.

3. The setpoints for alarms and interlocks associated with paralleling 13.8 kV busses will be reviewed to determine if timing intervals can be increased or eliminated. This action will be completed by May 30, 2001.

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

ANALYSIS OF EVENT:

A notification was made to the Nuclear Regulatory Commission on February 7, 2001 at 2215 CST pursuant to 10CFR50.72(b)(2)(iv)(B) for an actuation of the Reactor Protective System and 10CFR50.72(b)(3)(iv)(A) for the actuation of specified systems.

The unplanned de-energization of the 2F Auxiliary and Standby busses resulted in de-energizing the 2A Reactor Coolant Pump. Plant procedures require the plant operators to manually trip the reactor with less than four Reactor Coolant Pumps in operation. There were no personnel injuries, radiation exposures, offsite radiological releases, or damage to safety equipment during this event. All safety systems, when actuated, operated as designed. Standby Diesel Generator 21 started on the loss of power to the 2F Standby bus and the load sequencer started the required loads, among these Auxiliary Feedwater.

The conditional core damage probability (CCDP) for a reactor trip is approximately $2x10^{-07}$. The PRA model assumes all trips occur from 100% power after some period of operation. When initial decay heat levels are significantly lower, as in this case, system success requirements are not as severe and CCDP's should be lower. The CCDP presented above is somewhat conservative for the trip that occurred.

ADDITIONAL INFORMATION:

Just in Time (JIT) training may not be fully effective in ensuring consistent, measurable performance of operating crews during planned evolutions. The scope, objectives, and duration of JIT are currently determined informally by the crew Shift Supervisor, as opposed to being based upon a pre-determined training plan. This practice results in varying degrees of training for crews assigned to perform identical evolutions in the plant, including the exposure of crews to potential failures that might complicate the planned evolution. Lesson plans for JIT will be developed to include the scenario type to be performed (e.g. reactor start-up, shutdown, turbine generator synchronization, etc.). The JIT lesson plans will also include discussion topics as well as any lessons learned from previous plant and industry experience.

No similar events have occurred within the last three years.