Nuclear Operating Company
South Texas Project Electric Generating Station PO Box 289 Wadsworth, Texas 77483

April 18, 2003
NOC-AE-03001499
STI 31580649
10CFR50.73

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

South Texas Project
Unit 2
Docket No. STN 50-499
Licensee Event Report 03-001
Inoperable Residual Heat Removal Train

Pursuant to 10CFR50.73, South Texas Project submits the attached Unit 2 Licensee Event Report 03-001 regarding Train C Residual Heat Removal (RHR) operations not permitted by Technical Specifications 3.0.4 and 3.4.5.6. This event did not have an adverse effect on the health and safety of the public.

If there are any questions on this submittal, please contact S. M. Head at (361) 972-7136 or me at (361) 972-7849.

E. D. Halpin
Plant General Manager

awh

Attachment: LER 03-001 (South Texas, Unit 2)

IE22

cc:
(paper copy)

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NRC FORM 366 (7-2001) | U.S. NUCLEAR REGULATORY COMMISSION | APPROVED BY OMB NO. 3150-0104 | EXPIRES 7-31-2004

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)

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

4. TITLE
Inoperable Residual Heat Removal Train

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER 05000
01	25	2003	2003	- 01	- 00	04		2003	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	5
10. POWER LEVEL	0

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

	20 2201(b)		20 2203(a)(3)(ii)	50 73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
	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)	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)	X	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)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Albon W. Harrison	361-972-7298

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

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

On January 25, 2003 with Unit 2 in MODE 5, 2-RH-MOV-0060C, Loop C RHR pump suction valve, failed to open. 2-RH-MOV-0060C failed when the motor stalled and overheated causing the breaker to trip. This motor failure was caused by the motor pinion gear sliding down the motor shaft and contacting the de-clutching mechanism resulting in increased frictional loading. The motor pinion set-screw was not installed correctly in the drilled recess on the shaft. Consequently, when the motor was energized the pinion gear was thrust into the declutching mechanism. Coincident with this condition, the pinion key was also observed to be partially disengaged from the motor shaft keyway; however, this discrepancy was determined not to have contributed to the failure.

Corrective actions include rework of MOV-0060C, inspection and repair as required of all potentially affected Unit 1 and Unit 2 motor operated valves (MOVs), and confirmation that the maintenance procedures for MOVs is adequate to assure proper installation of the setscrews.

This event resulted in no personnel injuries, offsite radiological releases or damage to safety related equipment other than MOV-0060C.

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South Texas Unit 2	05000 499	2003	01	00	2 OF 4

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

DESCRIPTION OF EVENT

On January 25, 2003, 2-RH-MOV-0060C, Loop C RHR pump suction valve, failed to open. 2-RH-MOV-0060C failed when the motor stalled and overheated causing the breaker to trip. This motor failure was caused by the motor pinion gear sliding down the motor shaft and contacting the de-clutching mechanism resulting in increased frictional loading. The motor pinion set-screw was not installed correctly in the drilled recess on the shaft. Consequently, when the motor was energized the pinion gear was thrust into the declutching mechanism.

Coincident with this condition, the pinion key was also observed to be partially disengaged from the motor shaft keyway. The cause of the movement was inadequate staking of the stem to capture the key. The extended key was determined not to be a contributor to the failure.

The most recent work activity which involved the motor pinion was performed in 1993 by the motor-operated valve contractor, MOVATS. The MOVATS procedures contained no specifics on motor pinion installation, however, this work activity did not indicate any motor pinion activity other than re-inserting the key. No discussion or evidence could be found that the MOVATS personnel checked the setscrew installation for any parameters such as alignment or tightness.

Previous motor pinion work occurred during STP construction phase under the Limitorque Motor Operator Construction Inspection in combination with a motor changeout in 1987. The instructions for this 1987 activity included specific instructions for spot-drilling the motor shaft and proper installation of the setscrew.

It is concluded that the 1987 installation, while having good documentation of the expectations, failed to sufficiently ensure that instructions were implemented.

From this sequence of work history events on MOV-0060C and examination of the physical evidence on the motor shaft, it is concluded that in spite of the work instructions to check placement of the drilled spot, improper pinion installation originated with this 1987 installation. As discussed above, the setscrew mark was found misaligned with the dimpled area. Installation personnel did not understand that the setscrew must completely align with the spot drill location.

Current STPNOC procedures specify exact methods of installing the motor pinion setscrew and staking the motor pinion key.

EVENT SIGNIFICANCE

This event resulted in no personnel injuries, radiation exposure, offsite radiological releases or damage to safety related equipment other than MOV-0060C. The event is reportable pursuant to 10CFR50.73(a)(2)(i)(B) because it resulted in operation or condition which was prohibited by the plant's Technical Specifications.

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South Texas Unit 2	05000 499	2003	01	00	3 OF 4

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

Assuming the change in core damage probability can be approximated by determining the change in residual heat removal unavailability times the likelihood of failure of secondary heat removal, for the three day unavailability of train C of RHR in Unit 2, the change in core damage probability is 4.2E-07 which is below the 1E-06 change in core damage probability associated with risk significant changes to plant design in Regulatory Guide 1.174 and the 1E-06 limit in the NRC Significance Determination Process for risk significance.

The motor pinion set-screw must be securely engaged in the motor shaft for the valve to operate properly in the open direction. The safety function of MOV-0060C is to open so that Train C RHR can provide decay heat removal. MOV-0060C operated satisfactorily in 2RE09 and was last closed on January 2, 2003 at 11:27. Since the valve failed on its next open demand, and there were no intervening events that would have caused degradation of the valve operator, it can be concluded the valve had been inoperable since it was closed. With MOV-0060C inoperable, RHR Train C is also inoperable.

The operators were not aware of the inoperable condition of RHR Train C and startup of Unit 2 proceeded. TS 3.5.6 requires RHR to be operable in MODEs 1, 2, and 3. Unit 2 entered MODE 3 on January 2, 2003 at 1732 with MOV-0060C and the associated RHR train inoperable as described above. Technical Specification 3.0.4 prohibits changing MODE with Limiting Conditions for Operation not met that do not allow unlimited operation. Technical Specification 3.5.6 ACTION a. applies for an inoperable train of RHR and does not allow unlimited operation because it includes a shutdown requirement if the inoperable train cannot be restored within 7 days. Consequently, the requirements of TS 3.0.4 were violated when the plant changed MODE during the restart. In addition, the plant was in a MODE of applicability for TS 3.5.6 with Train C of RHR inoperable for approximately 23 days, which exceeds the 7 day allowed outage time in ACTION a. These conditions are both reportable in accordance with 10CFR50.73(a)(2)(i)(B), "...operation or condition which was prohibited by the plant's Technical Specifications..."

CAUSE OF EVENT

1. The root cause of the event is that personnel did not properly install the motor pinion setscrew during construction phase of the station (1987). The personnel did not follow the work instruction correctly.
2. A contributing cause was inadequate confirmation that a contractor's program (qualification levels and procedures) would ensure a quality installation.

CORRECTIVE ACTIONS

1. MOV-0060C was reworked with new motor and pinion installation in accordance with approved procedures.
2. STPNOC inspected and, if required, reworked motor pinions in potentially affected MOVs in Unit 1 and Unit 2. Other potentially affected attributes of the MOVs were also inspected and reworked as needed (e.g., pinion key insertion and staking). For both Units, this population of MOVs included the MOVs within the scope of GL 89-10 and 26 safety-related MOVs not included in the GL 89-10 program.
3. By start of the next refueling outage (2RE10), STPNOC will review and revise as needed procedures for MOV maintenance and training to assure proper installation of setscrews and other MOV attributes of a similar nature.

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

ADDITIONAL INFORMATION

Results of STPNOC inspections:

Of the 327 MOVs inspected (in addition to MOV-0060C), 24 MOVs had deficiencies that required an engineering evaluation. Any deficiencies found in the 327 MOVs were repaired and the MOV returned to service.

An operability/reportability review was conducted on the 24 MOVs that required an evaluation and documented in the Corrective Action Program. Except for Unit 2 RHR MOV-0060C (the subject of this LER), all the MOVs were determined to have been operable and capable of performing their design function.

The results of the inspections are consistent with the investigation and the causes described above.

Industry History:

There is a substantial amount of industry operating experience information spanning a number of years regarding Limitorque operators, including experience with motor pinions and key placement. As this information has become known, STP has incorporated it into station procedures and practices. Requirements for spot drilling for setscrew seating and staking for setscrews and keys were among those added to STP maintenance procedures.