

LICENSEE EVENT REPORT (LER)

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
South Texas Unit 2	05000 499	1 of 6

TITLE (4) Technical Specification Violation due to Train A Cold Leg Injection Motor Operated Valve Being Inoperable for Greater Than 72 Hours

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
02	17	93	93	-- 006 --	01	06		94	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	0	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER
		20.405(a)(1)(iii)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)	
NAME Jairo Pinzon - Senior Engineer	TELEPHONE NUMBER (Include Area Code) (512) 972-8027

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

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 17, 1993, Unit 2 was in Mode 4 at 0% power. After a recent Motor Operated Valve failure, review of completed work packages on a Low Head Safety Injection/Residual Heat Removal cold leg injection valve (MOV-0031A) was conducted. It was determined that on April 9, 1989, MOV-0031A could not be operated from the control room handswitch and was not repaired until November 8, 1990 (a period of 19 months). This valve is required to be capable of being closed hours after a Loss of Coolant Accident to establish hot leg recirculation. The cause for this Technical Specification violation was a misinterpretation of the requirement for hot leg recirculation capability. Corrective actions include discussing this event in Licensed Operator Requalification Training and performing a review of work packages on key systems to identify any additional cases of improper operability determinations. Additionally, Houston Lighting & Power evaluated the adequacy of the programmatic controls regarding operability determinations and made enhancements.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)			PAGE (3)
South Texas, Unit 2		05000 499		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 6
				93	-- 006 --	01	

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

DESCRIPTION OF EVENT:

On February 17, 1993, Unit 2 was in Mode 4 at 0% power. After a recent Motor Operated Valve failure, a review of completed work packages on the Low Head Safety Injection/Residual Heat Removal cold leg injection valve (MOV-0031A) was conducted. It was determined that the valve had been inoperable during previous Mode 1 through 4 operation. On April 9, 1989, MOV-0031A could not be operated from the control room handswitch and was not repaired until November 8, 1990 (a period of 19 months). The operation of Unit 2 while MOV-0031A was inoperable constituted a Technical Specification violation.

On April 9, 1989, Unit 2 was in Mode 4 with a Reactor Coolant System heatup in progress. After cooling down the 2A Residual Heat Removal pump and securing it, the operators attempted unsuccessfully to open MOV-0031A with the control room handswitch. After determining that the valve would not open electrically, it was deenergized and manually opened. Electrical Maintenance personnel tested the motor insulation resistance and reported it as satisfactory although the motor and motor overloads were hot to the touch. A work package to troubleshoot this problem was initiated and Reactor Coolant System heatup and eventual plant startup to full power operation was continued. The normal condition for this valve in Mode 1 through 3 is to be open with power removed from the actuator. Since this condition was met it was therefore deemed to be in compliance with the station procedures and Technical Specifications. However, it disabled the A Train Low Head Safety Injection hot leg recirculation capability.

On November 20, 1989, Unit 2 was shut down for a planned outage to inspect Bottom Mounted Instrumentation. MOV-0031A was placed in the Operability Tracking Log and work to troubleshoot the motor for MOV-0031A was commenced in accordance with the previously initiated work package. This work was considered not to be a mode ascension restraint. Electrical Maintenance personnel determined that the motor was shorted. The work document described the condition of the motor on MOV-0031A as shorted and that it required replacement. It could not be ascertained whether the electricians reported this condition directly to the Shift Supervisor.

On November 27, 1989, Train A Safety Injection components were declared operable after all preventive and corrective maintenance were thought to be complete. However, the work package and a preventative maintenance activity, (both activities were for maintenance on MOV-0031A) were listed as "work not started" on the Operability Tracking Log. On January 12, 1990, Unit 2 completed all outage activities and commenced reactor heatup and startup to full power operation. MOV-0031A condition was again considered to be in compliance with Technical Specifications (the valve was open with power removed from the actuator).

On September 29, 1990, Unit 2 was shutdown for its first refueling outage. The motor replacement for MOV-0031A was completed on November 8, 1990, and the valve was returned to an operable status.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS.  
FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)		DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
South Texas, Unit 2		05000 499	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 OF 6
			93	-- 006 --	01	

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

CAUSE OF EVENT:

The cause of this event was use of a far too narrow interpretation of the operability requirements for the capability to establish hot leg recirculation with the Low Head Safety Injection subsystem following a Loss of Coolant Accident. A contributing cause was inadequate programmatic controls for operability determinations. The Technical Specifications do not mention the requirement for hot leg recirculation; however, this information is documented in the Updated Final Safety Analysis Report and the Licensed Operator Training Program.

MOV-0031A has suffered several failures during the life of both units. A failure that occurred in January 1988, in Unit 1 during startup, was attributed to frequent cycling of the motor. A failure that occurred in July 1988, in Unit 2 during Hot Functional Testing, had no apparent cause. A second failure in Unit 2 occurred in August 1988 and was attributed to motor bearing failure. A root cause of the 1989 failure (the subject of this LER) was not identified. No failures occurred in 1990, 1991, or 1992. A motor failure that occurred in February 1993 in Unit 2 was originally attributed to grease lock in the spring pack. Testing due to a motor failure on the "A" train Unit 1 valve, in August of 1993, identified thermal binding as the probable cause of the February 1993, Unit 2 failure to open, and the likely cause of the previous valve motor failures.

ANALYSIS OF EVENT:

The Emergency Core Cooling System is designed to meet the acceptance criteria as stated in 10CFR50.46 for breaks up to and including the double ended severance of a reactor coolant pipe. The Safety Injection System is based on a three train design with each train being able to supply 100 percent of minimum Emergency Core Cooling System flow. Each train consists of a High Head Safety Injection and Low Head Safety Injection pump, each capable of providing sufficient flow to prevent boron precipitation. Therefore, the South Texas Project Emergency Core Cooling System has six flow paths available for hot leg recirculation.

During the cold leg injection and recirculation phase following a Loss of Coolant Accident, the flow path from the Train A Low Head Safety Injection pump would be through the normally open MOV-0031A to the Reactor Coolant System loop A cold leg. Approximately 6.5 hours after a Loss of Coolant Accident, the operator aligns at least one, but no more than two Safety Injection Systems to pump borated water to the Reactor Coolant System hot legs using both the High Head Safety Injection and Low Head Safety Injection pumps. This may be accomplished by closing MOV-0008 and opening MOV-0006 to align the High Head Safety Injection pump and closing MOV-0031 and opening MOV-0019 to align the Low Head Safety Injection pump in the respective train. This arrangement ensures long term core cooling using subcooled water to terminate any potential boil-off and to provide a flushing flow through the core to preclude potential boron precipitation.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)			PAGE (3)
South Texas, Unit 2		05000 499		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 6
				93	-- 006 --	01	

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

ANALYSIS OF EVENT: (Con't)

The basis for the three Emergency Core Cooling System trains is that flow from one safety injection train is assumed lost through the break. The second safety injection train is not available due to a single failure. This leaves the third train of Safety Injection to successfully inject to the core. Assuming that Train A is the only train providing flow, hot leg recirculation flow would normally be provided by both the Low Head Safety Injection and High Head Safety Injection pumps.

With MOV-0031A inoperable, flow to the hot leg would be provided by only the High Head Safety Injection pump in Train A. However, analyses performed by Westinghouse has shown that flow for the High Head Safety Injection is sufficient to prevent boil-off and boron precipitation. Therefore, sufficient hot leg recirculation flow would be maintained and the hot leg recirculation function satisfied. Since the safety function is satisfied, no adverse consequences would occur as a result of this condition.

During the time period that MOV-0031A was inoperable, a limited number of train outages (72-hour action statements) occurred that removed the B or C train of Emergency Core Cooling System from service. During these time periods, the ability to mitigate a design basis accident was lost due to single failure considerations. However, implicit in the existence of a Technical Specification action statement is the fact that the single failure criterion is not satisfied for the limited period of time specified. Therefore, there was no additional risk imposed by the MOV-0031 inoperability than already experienced while the plant was in an action statement.

During this event, MOV-0031A was inoperable for greater than the 72 hours allowed by Technical Specification 3.5.2. Therefore, this event is reportable pursuant to 10CFR50.73(a)(2)(i)(B).

CORRECTIVE ACTIONS:

1. A revision to Operations Procedure (OPGP02-RH-001) was completed to provide enhanced direction to prevent future thermal binding/pressure locking of the SI-MOV-0031 valves. A special test (1TEP07-RH-001) was performed to confirm the adequacy of the procedure changes. Test results were satisfactory.
2. MOV-0031A in Unit 2 has been changed from torqued closed to limit closed. This will prevent hard seating of the valve and reduce the possibility for thermal binding, and wedging of the valve stem bearing block. Additionally, this change eliminates the control function of the spring pack. The same modification was made on the MOV-0031B and MOV-0031C during the current Unit 2 refueling outage. The Unit 1 valves were previously modified to be limit closed.
3. This event was included in Licensed Operators Requalification Training.



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)		DOCKET NUMBER (2)		LER NUMBER (6)			PAGE (3)
South Texas, Unit 2		05000 499		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 6
				93	-- 006 --	01	

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

ADDITIONAL ACTIONS AND PROGRAM ENHANCEMENTS:

1. A thermal binding/pressure locking checklist has been included in the design basis reviews, which were part of the Generic Letter 89-10 effort at the South Texas Project (Procedure EI 4.06).
2. The Unit 2 spring pack on MOV-0031A was cleaned and reassembled. The spring pack on MOV-0031A, MOV-0031B, and MOV-0031C were replaced with spring packs which have grease relief paths during the most recent refueling outage. These grease relief paths were installed or verified installed for Unit 1.
3. Houston Lighting & Power performed a review of prior Operability Tracking Logs and a sample of key safety related service requests to determine if any additional cases of improper operability determinations existed for either Unit. This review was completed on June 9, 1993, with follow-on efforts completed on September 14, 1994. In addition, the System Certification Process for Restart of each Unit provided additional confidence that equipment will perform satisfactorily and that no unevaluated equipment deficiencies exist for systems included in the process.
4. Houston Lighting & Power evaluated enhancements for the current programmatic controls regarding operability determinations. Revisions to the operability determination process were made and incorporated into OPGP03-ZX-0002 "Corrective Action Program", Rev. 4.
6. Houston Lighting & Power upgraded the program used to analyze and trend equipment history to assure that repetitive component failures are identified and appropriate corrective actions are taken to prevent recurrence. This program change was initially implemented on October 15, 1993.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)		DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
South Texas, Unit 2		05000 499	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 OF 6
			93	-- 006 --	01	

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

ADDITIONAL INFORMATION:

The transition from April 9, 1989, to present includes many significant changes in the overall station programs for work identification, work management, operability review, problem identification, and corrective action determination. The most significant changes are:

- In the area of operability review, proceduralized criteria and structure has been added to the process.
- In the area of out-of-service equipment, the current process has a more definite criteria for when an Operability Tracking Log entry is required and criteria for when an entry can be removed and explicit approval requirements.

Overall, as addressed above, the programs in place currently provide the Shift Supervisor with structure, requirements, and guidance that was not available to the Shift Supervisors on April 9, 1989. In addition, the unit was in initial startup in April 1989, since that time, operations personnel have gained significant experience in performing their evaluations as evidenced by the fact that the February 1993 failure of MOV-0031A resulted in a declaration of inoperability of MOV-0031A.

The issue of frequent valve cycles was unique to hot functional and startup testing. These valves are not subject to frequent cycles during normal operations or accident conditions.

The MOV-0031 series valves in each unit are in the Motor Operated Valve Test program which will prevent improper set up of the actuator.

The motor operated valve model number is SB-1-60 and is manufactured by Limitorque.

There have been no similar events reported to the NRC regarding a Technical Specification violation due to Low Head Safety Injection cold leg injection motor operated valve being inoperable for greater than 72 hours.