NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
RIVER BEND STATION	0 5 0 0 0 4 5 8	1 OF 0 5

TITLE (4)
Voluntary Report Due to Inoperable Isolation Valves

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 NAMES	DOCKET NUMBER(S)
0 9	3 0	8 8	8 8	0 2 3	0 0	1 0	3 1	8 8		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9): 1

POWER LEVEL (10): 0 7 5

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
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)	X OTHER (Specify in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
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)	Voluntary

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (AREA CODE)
L. A. England-Director, Nuclear Licensing	5 0 4 3 8 1 - 4 1 4 5

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)

YES (If yes, complete EXPECTED SUBMISSION DATE) X NO

EXPECTED SUBMISSION DATE (15): MONTH DAY YEAR

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

At 1455 on 9/30/88, with the unit at 75 percent power, a reactor shutdown was initiated after inboard main steam isolation valves (MSIVs) 1B21*AOVF022B and 1B21*AOVF022C were found to be inoperable during testing in response to Information Notice 88-43, "Solenoid Valve Problems". All remaining MSIVs were tested and each remained in the full close position indicating proper operation of the fast-closure SOV and the capability of the MSIVs to close on a valid isolation signal.

In order to preclude recurrence of the failure of the SOVs, all eight MSIV fast-closure SOVs were replaced with new SOVs. Prior to installation, the Dow-Corning DC-550 lubricant was removed from the metallic portions of the new SOVs. Gelling of this lubricant has been determined to be the cause of failure for these MSIV fast-closure SOVs.

The testing demonstrated that of the four inboard MSIVs, only two failed to close. The remaining six MSIVs were functioning properly. Therefore, at least one MSIV in each main steam line was capable of automatic isolation if required. The proactive testing of the MSIVs performed by GSU and the immediate shutdown upon discovery of the two MSIV failures served to ensure that the health and safety of the public was adequately protected at all times.

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

REPORTED CONDITION

At 1455 on 9/30/88, with the unit at 75 percent power, a reactor shutdown was initiated. The reactor shutdown was commenced after main steam isolation valves (*ISV*) (MSIV's) 1B21*AOVF022B and 1B21*AOVF022C were found to be inoperable during testing. Reactor power was reduced to 22 percent prior to initiating a manual scram per approved shutdown procedures.

The River Bend Station Technical Specifications allow continued operation with one or more MSIVs inoperable provided the affected main steam line is isolated by use of a deactivated MSIV within 8 hours. The SOVs that failed were both on inboard MSIVs, and therefore, would not have prevented isolation of the affected main steam lines. There is no conclusive evidence that this failure mode would have caused any of the outboard MSIVs to fail. However, GSU elected to shut down to perform prompt corrective actions. Therefore, it has been determined that this event does not specifically satisfy any of the reporting requirements of 10CFR50.73. This voluntary LER is being provided to inform the NRC and industry of the potential problem regarding this type of failures.

INVESTIGATION

On 6/23/88, the NRC issued Information Notice 88-43, "Solenoid Valve Problems", which described events at the Perry, LaSalle, and Bruinswick nuclear plants where Automatic Switch Company (ASCO) Solenoid Operated Valves (SOVs) (*V*) failed to properly shift to their de-energized state when electrical power was removed. After obtaining the NRC Reports referenced in the Information Notice and copies of the utilities' final reports on the events, an evaluation was performed by GSU engineering. It was determined that RBS used the same SOV model as Perry and LaSalle, and that the temperatures at the MSIVs at RBS equalled or exceeded those reported for Perry and LaSalle. The evaluation concluded that River Bend Station (RBS) was susceptible to the failure mode and mechanism described for the LaSalle event and it was recommended that testing of the MSIV fast-closure SOVs be performed.

At approximately 1400 on 9/30/88, after briefing of the control room crew and assignment of additional personnel to the control room, testing of the MSIVs was initiated. All eight (8) MSIVs were tested to demonstrate the capability of the ASCO fast-closure SOV to transfer to the de-energized position when electrical power was removed. The test was performed using an approved RBS procedure for closure of the MSIVs.

The testing consists of transferring the MSIV control switch (*HS*) from the "auto" position to the "open-test" position, and then depressing the test pushbutton. Depressing the test pushbutton

activates the slow-closure test SOV allowing the MSIV to close. When the indicating lamps (*IL*) show that the MSIV has reached the full closed position, the control switch is transferred to the "close" position, de-energizing both coils on the fast-closure SOV. If the MSIV remains in the closed position, the fast-closure SOV transferred properly. If the MSIV returns to the open position, the ammeters (*II*) and isolation indication lamps on a control room back panel are checked to verify that power has been removed from the SOV. If all indications are that the SOV is de-energized and the MSIV is still open, failure of the fast-closure SOV is indicated since all other components functioned to allow the MSIV to slow close. The testing is performed in this manner to minimize the potential for inducing a plant transient as a result of MSIV fast-closure, and to preclude unnecessary wear to the MSIV seating surfaces.

The MSIVs were tested in the following sequence: (inboard) 1B21*AOVF022A through 1B21*AOVF022D followed by (outboard) 1B21*AOVF028A through 1B21*AOVF028D. At 1408 on 9/30/88, inboard MSIV 1B21*AOVF022B was tested and the MSIV returned to the full open position with the control switch in the "Close" position. The valve was retested at 1409 with the same results and the MSIV was declared inoperable. At 1415, inboard MSIV 1B21*AOVF022C was tested and this MSIV also returned to the full open position with the control switch in "Close". The valve was retested at 1416 with the same results and this MSIV was also declared inoperable. All remaining MSIVs were tested, and when the control switch was placed in the "Close" position, each MSIV remained in the full close position indicating immediate transfer of the fast-closure SOV and the capability of the MSIVs to close on a valid isolation signal.

After completion of testing of all MSIVs, an immediate and orderly shutdown was initiated at 1455.

The SOVs were removed from the MSIVs and taken to the Instrumentation and Controls maintenance facility for failure analysis. A controlled disassembly and internal inspection was performed on inboard 1B21*SOVF022D (which had functioned properly during testing) to provide baseline data for comparison with failed inboard SOV 1B21*SOVF022B.

The disassembly and internal inspection of 1B21*SOVF022D revealed evidence of amber-colored deposits on the "A" core assembly and the "A" solenoid base subassembly. Similar deposits were noted on the "B" core assembly and "B" plugnut assembly. Inspection of the disc holder subassembly (exhaust seat) revealed a compressive set, however, inspection of the exhaust pilot orifice did not provide any visual evidence of bonding between the disc holder subassembly and the exhaust pilot orifice. The disassembly and internal inspection indicated that the failure mechanism that occurred at LaSalle was occurring at RBS, however, for this SOV, it was in its early stages.

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

With the inspection of 1B21*SOVF022D completed, and the component parts available for comparison, inboard SOV 1B21*SOVF022B was disassembled and internally inspected. As with the previous SOV, degradation of static seals and O-rings was noted, however, no loose particulate matter was found in the SOV internals. Inspection of the critical components that would contribute to the observed failure mode revealed the following:

"A" Solenoid Base Subassembly: an amber colored deposit was found on the top of the solenoid base subassembly at the point that the "A" core rests when energized.

"A" core assembly: A significant deposit of an amber-colored material was found on the top of the "A" core assembly.

SOV Body: the body was inspected to identify any deposits of the elastomer material on the exhaust pilot orifice. Deposits of the seat material would indicate adherence of the seat to the body. This can also be indicated by discoloration of the seat. No deposits were found on the SOV body, nor was there any discoloration.

Disc holder Subassembly: The seating surface had taken a compressive set to the exhaust pilot orifice. No indications of tearing or missing pieces of the seat was evident.

Plugnut assembly: A deposit of amber-colored material was found on the surface that mates with the "B" core assembly.

"B" Core Assembly: A large deposit of amber-colored material was found on the top of the "B" core assembly.

In response to a verbal request by NRC personnel, one of the outboard MSIV SOVs was also disassembled and inspected. The internal inspection revealed minute deposits on the "B" core assembly of an amber-colored material. No other comments were noted during this inspection.

To quantify the amount of deposits found on the three MSIV SOVs, the following can be provided: If the deposits on the failed inboard SOV (1B21*SOVF022B) are considered 100 percent, the deposits on the unfailed inboard SOV (1B21*SOVF022D) would be described as 40-50 percent, and the (unfailed) outboard SOV as 5-10 percent.

The findings of the disassembly and internal inspection led to the following conclusions:

1) The amber-colored material is similar to that described for the LaSalle event.
2) The LaSalle failure analysis concluded that the amber-colored material was Dow-Corning DC-550 lubricant that had gelled.

3) No evidence of sticking or bonding of the seat materials was found and therefore, bonding of the seat did not induce the failures observed at RBS.
4) On the basis of the above, the failure observed at RBS is the result of gelling of the Dow-Corning DC-550 lubricant.

A review of previously submitted LERs by RBS has concluded that there have been no previous events describing a failure of a MSIV to close due to Dow-Corning DC-550 lubricant gelling.

CORRECTIVE ACTION

In order to preclude recurrence of the failure of the SOVs, all eight (8) MSIV fast-closure SOVs were replaced. Prior to installation, the Dow-Corning DC-550 lubricant was removed from the metallic portions of the new SOVs. GSU has concluded that removal of the lubricant does not impact the qualification of the SOVs for the following reasons:

1) During discussions with the SOV manufacturer (ASCO), it was learned that the lubricant is not used to enhance motion of the metallic core assemblies.

2) During discussions with ASCO, it was learned that the lubricant was used to preclude fretting of the metallic core assemblies due to 60Hz hum.

3) Vibration of the core assemblies would result in variations in the electric current drawn by the solenoid coil, and would be observable.

These completed corrective actions should preclude recurrence of the sticking problem discovered on 9/30/88 and ensure continued operability of the MSIVs.

SAFETY ASSESSMENT

The testing demonstrated that of the four inboard MSIVs, only two failed to close. The remaining six MSIVs (including all four outboard MSIVs) were functioning properly. Therefore, at least one MSIV in each main steam line was capable of automatic isolation if required. The proactive testing of the MSIVs performed by GSU and the immediate shutdown upon discovery of the two MSIV failures served to ensure that the health and safety of the public was adequately protected at all times.

Note: Energy Industry Identification System Codes are identified in the text as (*XX*).

GULF STATES UTILITIES COMPANY

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AREA CODE 504 635 6094 635 6601

October 31, 1988
RBG- 29151
File Nos. G9.5, G9.25.1.3

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Gentlemen:

River Bend Station - Unit 1
Docket No. 50-458

Please find enclosed Licensee Event Report No. 88-023 for River Bend Station - Unit 1. This report is being submitted to provide information regarding a condition discovered on September 30, 1988.

Sincerely,

J. E. Booker

J. E. Booker
Manager-River Bend Oversight
River Bend Nuclear Group

JEB/TFP/PDC/BMS/ch

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