GULF STATES UTILITIES COMPANY

RIVER BEND STATION POST OFFICE BOX 220 ST. FRANCISVILLE, LOUISIANA 70775

AREA CODE 504 635-6094 346-8651

June 19 , 1989
RBG- 31106
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. 89-024 for River Bend Station - Unit 1. This report is being submitted pursuant to 10CFR50.73.

Sincerely,

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

JEB/TFP/RGW/DAS/AKB/ch

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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 7

TITLE (4) Inoperability of Safety-related Instrument Air System Accumulators Due to Leakage in Excess of Design Requirements

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 5 0 0 0
0 4	0 6	8 9	8 9	0 2 4	0 0	0 6	1 9	8 9		0 5 0 0 0

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)							
POWER LEVEL (10)	0 0 0		20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
			20.405(a)(1)(i)		50.36(c)(1)	X	50.73(a)(2)(v)		73.71(c)
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		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)		

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

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

On 4/10/89, it was observed that six solenoid operated valves (SOVs) were oriented to isolate normal air flow into the safety-related instrument air system (IAS) accumulator. Since these SOVs are directional, they may not have maintained air in the accumulators as required when in the closed position. Following reorientation of the SOVs, a test of the accumulator system leak rate on 5/19/89 showed air use/leakage in excess of the River Bend Station Updated Safety Analysis Report requirements. Because of the similarity of instrument air systems in the control building, auxiliary building and fuel building, GSU believed that a similar condition existed in these systems.

Modifications were implemented to add compressed air bottles to both safety-related IAS accumulators in the control building and auxiliary building. The fuel building dampers have had their failure position reversed, removing their dependance on a long-term air supply.

Loss of pressure in these IAS accumulators would have adversely affected the systems that require a long-term air supply to perform their safety function. However, this condition would have been alarmed and operator action could have been initiated to restore these systems and safely shut down the plant.

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(9-83)

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

REPORTED CONDITION

On 4/6/89 with the unit in Operational Condition 5 (refueling), a leak rate test of the safety-related Division II control building (*NA*) instrument air system (IAS) (*LE*) accumulator (*ACC*) was performed in response to NRC Generic Letter 88-14. The results of this test showed air use/leakage of approximately 218 standard cubic feet per hour (SCFH). This air use/leakage was in excess of that required to maintain compliance with River Bend Station (RBS) Updated Safety Analysis Report (USAR) Section 9.3.1 which states that the air header and receivers have sufficient capacity to safely shut down the plant following a loss of the non-safety related IAS supply (*LD*). The cause of the measured air use/leakage was initially thought to be due to leakage past the check valve (*V*) which forms the ASME boundary between the safety-related accumulator and the non-safety related IAS supply.

On 4/10/89, while in the process of performing operability testing of the control building check valves, the test engineer observed that the orientation of six solenoid operated valves (SOV) (*PDSV*) between their associated check valves and accumulators was such that they may not have maintained air in the accumulators when in the closed position. The valves affected were 1IAS*SOV36A and 36B, 1IAS*SOV41A and 41B, and 1IAS*SOV45A and 45B which isolate Divisions I and II, respectively, of the safety-related IAS accumulators which serve safety-related loads in the control building, auxiliary building (*NF*), and fuel building (*ND*), respectively.

On 5/19/89, following reorientation of the SOVs, a retest of the safety-related Division II control building IAS accumulator system leak rate was performed. Results of this retest showed approximately 63 SCFH air use/leakage, still in excess of the USAR requirements. Because of the similarity of IAS accumulator systems in the control building, auxiliary building, and fuel building, GSU believed that the same condition existed in these systems. This report is being submitted as a condition that alone could have prevented these systems from performing their safety functions pursuant to 10CFR50.73(a)(2)(v).

INVESTIGATION

Compressed air to the IAS is provided by three non-safety related oil free air compressors (*CMP*) arranged in parallel to discharge air to a common header. ASME Section III Safety Class 3 accumulator tanks 1IAS*TK5A and 5B are provided to ensure adequate air supply to dampers (*CDMP*) in the control building in the event of a loss of the non-safety related air compressors due to a loss of offsite power or a seismic event. ASME Section III Safety Class 3 accumulator tanks 1IAS*TK6A and 6B and 1IAS*TK7A and 7B perform similar functions in the auxiliary building and fuel building, respectively.

The original design calculation (PB-315, Revision 1) indicates that the compressed air stored in the safety-related IAS accumulators is sufficient to operate all safety-related dampers served by the accumulators once and determines the length of time the accumulators will be available prior to the need for recharging. This calculation demonstrated that adequate air would be available to safely shut down the plant following a loss of the non-safety related IAS supply.

As stated above, the measured air use/leakage of the Division II control building IAS accumulator was believed to be due to leakage of the IAS accumulator check valve. In an effort to determine the cause of the air use/leakage, check valve operability test STP-122-3301, "Instrument Air Valve Operability Test", was performed on the Division II control building check valve. This test verified that the Division II check valve was not adequately closing. The Division I control building check valve was also tested and it passed the test. This operability test only demonstrates closure of the check valve and does not quantitatively determine check valve leak rate. While the operability test did not quantitatively measure the Division I check valve leak rate, GSU did not question the operability of the Division I control building IAS accumulator system at that time.

During the check valve operability testing, GSU discovered that the SOV between the check valve and accumulator was not properly oriented to provide isolation for maintaining air pressure in the accumulator. Investigation determined that the SOVs for both divisions of the safety-related IAS accumulators in the control building, auxiliary building, and fuel building were installed with the same orientation. Further investigation was begun to determine the impact of the SOV orientation on operability of these systems.

Because the ASME Code does not give guidelines for interface barriers between Safety Class 2 or Safety Class 3, and non-safety class piping, it is up to the designer to set a criteria for interface barriers. The RBS design criteria for acceptable interface barriers is contained in Stone & Webster's Power Division Technical Procedure (PTP-0.1.1.-0) which states the following.

(a) A "simple" check valve with an isolation valve, or

(b) A "positive closure" check valve only. (Motor operated, air operated, spring loaded, or weight loaded check valves are considered to be "positive closure" check valves)

The RBS design provides a single positive closure check valve (spring loaded) as the interface barrier on the standby diesel generator air start systems and main steam isolation valve air accumulators. However, in the case of the instrument air system, the isolation capability of the positive closure check valve was considered to be enhanced (i.e., not required) by the addition of a SOV to provide redundancy to ensure a positive isolation of the air accumulators in the event of IAS supply failure. These SOVs are angle type plug valves (Target Rock model 77KK-013), normally closed by spring action when de-energized with closure aided by the air pressure on top of the disc of the valve. For better sealing, the pressure on top of the disc should be equal to or greater than the pressure on the bottom of the disc. Therefore, these valves, if properly oriented, will provide positive isolation with or without a check valve installed in series.

The RBS design drawings do not show a preferred orientation of these angle type SOVs. The ASME control drawings do show a particular orientation and these SOVs were installed accordingly to stop forward air flow based on the vendor manual instructions. However, GSU believed that these valves were intended to provide additional isolation of the air accumulators and to prevent reverse air flow out of the air accumulators in the event of IAS supply failure. Because it was believed that the SOVs were not required, it was initially concluded that the orientation of the SOVs had no impact on the operability of the safety-related IAS accumulator systems. All six SOVs were subsequently reoriented. Further review of the design calculation for sizing of the safety-related IAS accumulators (PB-315, Revision 1) on 5/18/89 revealed that credit was taken for the SOVs in determining the design basis leakage rate. No credit was taken for closure of the check valves. Since these SOVs were oriented to isolate against normal air flow into the accumulators, there is no assurance that the SOVs would have satisfied the design basis maximum leakage rate. Within four hours of the discovery that the SOVs were required, notification was made to the NRC Operations Center pursuant to 10CFR50.72(b)(b)(iii). These systems were considered to be operable at the time of this determination since the SOVs had already been reoriented.

Following reorientation of the SOVs and rework of the control building accumulator check valves, the Division II control building IAS accumulator system leak rate test was re-performed on 5/19/89. The results of this retest showed air use/leakage of approximately 63 SCFH, still in excess of the amount required to maintain compliance with the RBS USAR. Because the usable capacity of each air accumulator in the safety-related IAS in the control building, auxiliary building, and fuel building is 13.5 SCFH (100 psig to 80 psig), GSU believed that a similar condition existed in these systems. The systems in the control building and auxiliary building were declared inoperable on 5/19/89. A design enhancement had previously been completed during the refueling outage that removed reliance on

the IAS accumulators for the safety-related dampers in the fuel building. Therefore, the safety-related IAS accumulator systems in the fuel building were operable at the time of this discovery. Within four hours of the decision to declare the control building and auxiliary building IAS accumulator systems inoperable, notification was made to the NRC Operations Center pursuant to 10CFR50.72(b)(2)(iii).

In an effort to determine the cause of the measured air use/leakage, the safety-related IAS users were reviewed. It was determined that the original design calculation (PB-315, Revision 1) did not identify control building chilled water bypass flow control valves (*PDCV*) 1HVK*PDCV25A and 25B as IAS users from the safety-related control building IAS accumulators. It was concluded that during these tests, flow control valve 1HVK*PDCV25B was modulating and air was being constantly vented through this valve. This condition contributed to the air use/leakage measured during these tests.

While a system leak rate test was not specifically required and testing to verify that the dampers would fail to the correct failure position was performed, the root cause of this event is the failure to perform a leak rate test on the safety-related portion of the system. The measured air use/leakage was in excess of the air use/leakage assumed in the original design calculation.

A review of LERs submitted by RBS identified one previous LER written as a result of Target Rock SOVs that required reorientation. LER 89-022 identified two Target Rock SOVs which serve to isolate a non-safety related air dryer (*DRY*) from the safety-related air supply to the main steam safety relief valve (*RV*) accumulators and suppression pool level indicators (*LI*). That LER also identified three other Target Rock SOVs used as containment isolation valves (*ISV*) that were discovered at RBS in October 1986. As a result of these events, an evaluation of the orientation of all safety-related Target Rock SOVs at RBS, regardless of function, was completed. Two SOVs in the standby service water system (*BI*) were identified and included in LER 89-022 as a result of that review. As a result of these investigations, a total of 13 Target Rock SOVs in safety-related service at RBS (including the six in the instrument air system) have been identified as requiring reorientation. The original design orientation for these valves was supplied by the RBS Architect/Engineer, Stone and Webster Corporation. No other previous LERs identified an improperly oriented valve or were written as a result of failure to have an initial test program to verify a system's capability to perform as assumed in the design calculations.

CORRECTIVE ACTION

As previously identified, the SOVs were installed to seal against normal air flow into the accumulator and not against air flow out of

the accumulator. To correct this condition, Modification Request (MR) 89-0090 was initiated to reorient the affected SOVs. Air flowing from the direction of the accumulator will have a tendency to reinforce seating of the plug. Additionally, the control building IAS accumulator check valves were reworked.

In order to meet the requirements of USAR Section 9.3.1, MR 89-0033 and MR 89-0121 were implemented to add compressed air bottles to both safety-related IAS accumulators in the control building and auxiliary building, respectively. Additionally, MR 89-0125 modified 1HVK*PDCV25A and 25B to make them manually operated. This modification removes their dependence on a safety-related air supply and reduces the air demand on the safety-related control building IAS accumulators. Based on the 5/19/89 and 6/1/89 test results for the control building and auxiliary building, respectively, the compressed air bottles connected to each air accumulator will provide a sufficient instrument air supply to achieve safe shutdown and allow operator action to maintain an adequate long-term air supply.

As previously stated, the fuel building dampers that required an air supply to perform their safety function have had their failure position reversed. These dampers no longer require a safety-related air supply to perform their safety function. This work was completed during the refueling outage in accordance with MR 89-0003.

As further corrective action, leak rate testing of the IAS accumulator systems required for safety-related damper operation will be performed each refueling outage.

SAFETY ASSESSMENT

In the fuel building, the fuel building exhaust filter train (*BH*) supply and exhaust dampers required a safety-related air supply in order to perform their safety function of opening to allow the filter train to process exhaust air and maintain the fuel building at a negative pressure. Loss of IAS accumulators would have prevented these filter train dampers from being held open to allow the filter trains to perform their safety functions.

In the auxiliary building, the standby gas treatment system (*BH*) decay heat removal dampers and area unit cooler (*CLR*) 1HVR*UC11A and 11B exhaust dampers require a safety-related air supply in order to perform their safety functions. Loss of IAS accumulators would not have affected the standby gas treatment system's ability to maintain the reactor building annulus and auxiliary building at a negative pressure or its ability to process exhaust air from these areas. The ability to remove decay heat from the filter train after both filter trains had been shut down following performance of their safety function would, however, have been affected. Fire protection systems (*KP*) provide redundancy to mitigate the consequences of overheating

of the charcoal. Loss of IAS accumulators also would have prevented the exhaust dampers for area unit coolers 1HVR*UC11A and 11B from being held open, affecting the unit coolers' ability to remove heat from the safety-related switchgear (*SWGR*) areas that they serve.

In the control building, various ventilation system damper alignments require a safety-related air supply in order to perform their safety functions. Loss of IAS accumulators would have adversely affected the ability of the ventilation system dampers and main control room filter trains (*VI*) to realign to perform their functions to remove heat from safety-related equipment and maintain the main control room habitable.

Results from the first test of the safety-related Division II control building IAS accumulator system demonstrated that the accumulator system would have supplied adequate air for approximately 3.7 minutes. This would not have allowed adequate time for operator action to prevent loss of the safety-related air supply to the components served by the safety-related IAS accumulator systems. Loss of pressure in the safety-related portions of the IAS would be alarmed in the main control room and operator actions could have been initiated to restore these systems and safely shut down the plant.

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