GULF STATES UTILITIES COMPANY

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

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June 30, 1989
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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 a supplement to Licensee Event Report 89-011, Revision 2 for River Bend Station - Unit 1. This report is being submitted pursuant to 10CFR50.73. This revision is to incorporate further investigation and corrective actions.

Sincerely,

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

DRD DRD
JEB/TFP/RGW/BMB/JGM/ch

cc: U.S. Nuclear Regulatory Commission
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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)

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TITLE (4)

Local Leak Rate Test Failure due to Service Water System Corrosion

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 3	2 1	8 9	8 9	—	0 1 1	—	0 2	0 6	3 0	8 9		0 5 0 0 0
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OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10) 0 1 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)	50.73(a)(2)(v)	73.71(c)
	20.405(a)(1)(ii)	50.36(c)(2)	X 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
L A England, Director-Nuclear Licencing	AREA CODE 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	
X	B I I	I I S I V	V 0 8 5	yes		X	B I I	I I S I V	V 0 8 5	yes	
X	B I I	I I S I V	V 0 8 5	yes		X	B I I	I I S I V	V 0 8 5	yes	

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)

At approximately 0100 on March 21, 1989 with the unit in Operational Condition 5 (refueling), leak rate test, STP-256-3821, was performed on penetration 1KJB*Z52B and penetration 1KJB*Z52A was tested at 0200 hours on April 4, 1989. The leak rate test results for each penetration was in excess of 2.4 standard cubic feet per minute (scfm) which exceeds the integrated leak rate as identified in Technical Specification 3.6.1.3, approximately 4.0 scfm. On April 8, 1989 at 1030 the Division III diesel water cooler was found with corrosion in the service water side. This report is being submitted pursuant to 10CFR50.73(a)(2)(vii)(c).

Investigations determined the cause to be corrosion products preventing full closure of the valves and corrosion has reduced the wall thickness of the cooler below ASME code requirements. An ongoing program will implement the necessary corrective actions.

Due to the inherent design of the service water system a water seal limits the actual leakage from the penetrations and the diesel continued to perform as required during this period; therefore, there was no adverse impact on the safe operation of the plant or to the health and safety of the public as a result of this event.

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

REPORTED CONDITION

At approximately 0100 on March 21, 1989 with the unit in Operational Condition 5 (refueling), local leak rate test, STP-256-3821, was performed on service water (*BI*) penetration 1KJB*Z52B (*NH*) for isolation valves 1SWP*MOV507B and 1SWP*V175 (*ISV*). Leak rate test results for both valves were in excess of 2.4 standard cubic feet per minute (scfm) which is the limit of the instrumentation used. Also penetration 1KJB*Z52A, valve numbers 1SWP*MOV507A and 1SWP*V174 were tested at 0200 hours on April 4, 1989. Both of these valves exhibited a leak rate in excess of 2.4 scfm. The leak rate of these two penetrations exceeds the integrated leak rate of 0.26 percent containment free volume air mass per day as identified in Technical Specification 3.6.1.3. This is approximately equivalent to 4.0 scfm.

On April 8, 1989 at 1030 with the unit in Operational Condition 5 (refueling) and reactor level greater than 23 feet above the vessel flange, while completing routine maintenance on the Division III diesel and associated components, it was discovered that the diesel jacket water cooler (*HX*), service water side, had undergone corrosion. Since the plant was already shut down and the diesel was undergoing maintenance, no operator action was required. No automatic or manually initiated safety system responses occurred or were required. This event is reportable due to the channel heads failing to meet the ASME minimum wall requirements of 1.3125 inches. The minimum measured thickness was 1.175 inches. This is less than the ASME minimum wall requirements by 0.1375 inches.

This report is being submitted pursuant to 10CFR50.73(a)(2)(vii)(c). Maintenance work orders were issued to investigate and rework as necessary.

INVESTIGATION

The cause of the valve failures was a build up of corrosion products on the inner valve bodies and disc surfaces which did not allow the valves to fully close. The corrosion products were diagnosed as general service water system corrosion products.

The Division III high pressure core spray (HPCS) diesel generator (*EK*) jacket water cooler has a closed loop that cools the HPCS diesel generator (shell side) and plant service water (SWP) on the other side (tube side). The results of an analysis confirmed that all of the requirements for ASME minimum wall were met except the channel heads. The heat exchanger channel heads are made from forged steel (SA-285-C).

An inspection of Division I and II jacket coolers revealed these designs continue to meet ASME code requirements. Minor repairs and cleaning were concluded and the coolers were restored to service.

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This problem has been recognized previously at River Bend Station (RBS) and a program has been in place since mid-1987 to address continuing service water system (SWP) issues. The condition of the SWP was discussed with the Resident Inspectors on March 27 at the Region IV offices on April 7, 1989 and on May 11, 1989 at RBS. GSU has extensively investigated the extent of service water corrosion and its determination of equipment operability throughout the upcoming operating cycle.

In preparation for the second refueling outage, a program was developed to investigate the condition of the service water system to establish data for future considerations. This program included inspection of heat exchangers and other components such as piping, valves, pumps, and instrumentation.

Primary corrosion mechanisms in the service water system are galvanic couples and concentration cell attack. Although conditions at the plant in many areas were believed to be conducive for microbiologically induced corrosion (MIC) attack, actual occurrences appeared to be infrequent. Further, current chemical addition (e.g., chlorine) practices should keep MIC at a low level.

Subsequent to the above, an expansion of the original program to investigate the condition of the service water system to establish a data base for future consideration would be required. An offsite laboratory analysis of various samples was also taken. In general, the areas or items in each category were decided upon on the basis of importance to safety and impact on plant operation. A summary of the results of the investigation, as well as recommendations for future actions, are outlined below.

General corrosion rates have been reduced from 30 mils per year to 5-10 mils per year by past improvements in the water treatment program. Further improvements are expected to result from optimization of the program. The extent and rate of pitting corrosion also appears to be greatly reduced. These observations will be confirmed by follow up testing during the next operating cycle. The results of the evaluation support continued safe operation of the plant with continued monitoring. Further discussions of GSU's efforts are included in its May 22, 1989 letter from J. E. Booker to the NRC (RBG-30927).

A review of previously submitted LERs from River Bend Station for service water system failures induced by corrosion revealed one LER (87-023) which resulted from service water system corrosion. The root cause was determined to be the previous operation of the system. Identified corrective actions included a program to improve the overall quality and control of the service water system chemistry. The action taken by GSU since that period has improved the system

★U.S.GPO 1986-0-624-538/455

water chemistry but did not reverse the effects which had already begun.

CORRECTIVE ACTION

Maintenance work orders were issued upon discovery of the failures to investigate and rework the valves as necessary. Valves 1SWP*MOV507B, motor operated gate, and 1SWP*V175, swing checks, were inspected and service water system corrosion products were found in valve cavities which prevented leak-tight closure of the containment isolation valves. The result was to keep the valves partially open and thereby allowing excessive leakage past the valve seats. The corrosion products were removed and the disc in 1SWP*V175 was replaced. The valves were reassembled and tested with acceptable results on March 26, 1989 for 1SWP*MOV507B and March 3, 1989 for 1SWP*V175. Valves 1SWP*MOV507A and 1SWP*V174 were also reworked and successfully tested prior to the integrated leak rate test (ILRT).

A modification to replace the channel covers with an upgraded material was completed and the waterboxes returned to service after it was determined that the existing covers were too thin on April 28, 1989. The HPCS jacket water cooler has had the channel covers replaced with SA516 GR70 which is a higher grade of steel (higher tensile and yield strength) than the original material, SA285 Grade C. A modification has replaced the channel covers. The partition plate has been replaced using SA516 GR70 and all components that do not meet the minimum wall thickness required by ASME Section III Code will be rebuilt to meet the requirements. All welds will be rebuilt by an approved ASME repair plan.

In addition to the repairs zinc anodes were installed in the waterboxes for the HPCS jacket water cooler. The zinc will become the anode to corrode and the carbon steel surface will be protected from corrosion, therefore, the carbon steel corrosion resistance will be greatly improved.

GSU plans further activities to address and correct these conditions. These plans will include the three areas and periods of effort: 1)continued monitoring and examinations to confirm present conclusions and provide additional data for future use, 2) development of the actions required for final resolution, and 3) final implementation requirements and schedules. In addition to the above, GSU will continue, upon discovery, to address any new conditions which are identified that threaten the operability of the system. To support these actions, a task force familiar with these issues will be established and will be supplemented by expert consultants.

For the period from startup from the current refueling outage until the mid-Cycle 3 outage, continued monitoring and evaluation will be the primary focus of the corrective action program.

From the mid-Cycle 3 outage until the beginning of the third refueling outage the final plan to address this issue will be developed. These efforts will be prioritized based on system or component conditions and plant configuration.

During the period from the beginning of the third refueling outage until the completion of the fourth refueling outage, all work identified by GSU will be implemented. Further information on the corrective action program can be found in the May 22, 1989 letter.

SAFETY ASSESSMENT

Penetrations 1KJB*Z52A (valves 1SWP*MOV507A and 1SWP*V174) and 1KJB*Z52B (valves 1SWP*MOV507B and 1SWP*V175) are the respective Division I and II service water supply lines to containment and also supply drywell functions. As described in USAR section 9.2.1, during normal operations the SWP system is supplied by pumps taking water from the circulating water system. During emergency operation, the standby service water system described in USAR section 9.2.7 isolates unnecessary functions and supplies essential equipment outside containment and the unit coolers inside the containment. Other functions can be manually initiated by the operator. Because the standby service water system is an engineered safety feature system and is required to supply water to the containment during an accident, the isolation valves do not receive automatic isolation signals.

As part of the original analysis of offsite dose consequences performed for RBS, the effect of these penetrations being open during an event was addressed. Both the normal and standby service water system supplies water at pressures above 100 psi which exceed the containment design (15 psi) and analyzed accident (7.6 psi) pressures. In addition, the elevation changes within the service water system piping provides a static water column pressure which exceed the design accident pressure. Because the static water seal exceeds the analyzed accident pressure, this path was not considered creditable in the offsite dose calculations. Therefore, there has been no adverse effect to the health and safety of the public as a result of these penetrations failing this leak test.

While the HPCS jacket water cooler channel covers were below the original ASME minimum wall specifications, this did not have an affect on the availability of the HPCS diesel because the diesel performed satisfactorily. At no time was an overheating condition identified or was there indications of a malfunction of the cooling system.

An additional review confirms that even with a thinner than required channel head the heat exchangers meet its seismic requirements and would have performed during a design basis event. Therefore, the

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safety consequences resulting from this condition were not significant. Therefore, there has been no adverse effect to the health and safety of the public as a result of this condition.

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