GULF STATES UTILITIES COMPANY

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

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June 10, 1985
RBG- 21279
File Nos. G9.5, G9.25.1.1

Mr. Robert D. Martin, Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 70611

Dear Mr. Martin:

River Bend Station - Unit 1
Docket No. 50-458
Final Report/DR-303

On June 7, 1985, GSU notified Region IV by telephone that it had determined DR-303 concerning damage to bellows expansion joints supplied by Pathway Bellows, Incorporated to be reportable under 10CFR50.55(e). The attachment to this letter is GSU's Final 30-day written report.

Sincerely,

J. E. Booker

J. E. Booker
Manager-Engineering,
Nuclear Fuels & Licensing
River Bend Nuclear Group

PJD
JEB/PJD/ebm

Attachment

cc: Director of Inspection & Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

NRC Resident Inspector-Site

INPO

ATTACHMENT

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DR-303/Bellows Expansion Joints

Background and Description of the Problem

The deficiency concerns the failure of bellows expansion joints supplied by Pathway Bellows, Incorporated as identified on Nonconformance and Disposition Report (N&D) Nos. 11,252, 11,367, and 11,531. On April 12, 1985, N&D No. 11,252 was written to document damage incurred by expansion joint 1SWP*EJ2D which was observed following a trip of pump 1SWP*P2D.

On April 16, 1985, damage to expansion joint 1SWP*EJ2B was observed following a trip of pump 1SWP*P2B. Slamming of pump discharge check valve 1SWP* V149 was also observed following the pump trip. N&D No. 11,367 was written to document the damage.

Similarly, expansion joints 1SWP*EJ2A and C incurred damage during LOP/LOCA testing, and N&D No. 11,531 was issued as documentation.

In all cases, the convolutions of the bellows-type joints deformed axially, as described in the referenced N&Ds.

We do not believe that check valve slam as referenced in N&D No. 11,367 would have generated a pressure spike sufficiently high to cause the observed damage.

Pathway Bellows, Inc., the manufacturer of the expansion joints, reviewed the damaged joints on April 16, 1985, and responded that the damage had greatly reduced the joints' allowable operating cycles, and hence, they were no longer suitable for use during emergency operation.

The expansion joints most likely failed as a result of a transient high-pressure condition occuring on a pump restart. When the pumps are tripped, the pump discharge check valve closes and the motor-operated discharge isolation valve begins closing. This traps a short column of water against the check valve, effectively sealing against air inleakage to the pump column.

If there is a low water level in the standby cooling tower basin, water remaining in the pump column slumps downward, back into the basin, and stops at a level approximately 30 ft above the basin water level. This separation of the water column forms a void in the upper pump column, discharge head, and expansion joint.

With tight pump seals and the discharge line sealed by a water leg, the void will remain for a substantial period of time.

When the pump is restarted, the impeller accelerates the water in the column to full discharge velocity within 1 sec; this collapses the void and impacts the closed check valve, causing a water hammer which could have sufficient energy to cause the expansion joint to deform axially.

Safety Implication

Since none of the joints experienced pressure boundary failure, it is considered unlikely that this condition, had it remained uncorrected, would have rendered the service water system incapable of delivering the required cooling water flow. Furthermore, since the damage is highly visible, it would have been detected during periodic surveillance tours/pump tests, further reducing the probability that the service water system would have been unable to satisfy its design bases during an accident scenario.

However, since it cannot be categorically demonstrated, without extensive analysis and/or testing, that the joint pressure boundary integrity would have remained intact during all possible scenarios, it can be conservatively assumed that had this condition remained uncorrected, joint pressure boundary integrity could have been breached. This in turn might have effectively disabled the associated standby service water pump. Since this condition exists in all four standby service water pumps, the potential exists for loss of all standby service water capacity. This would potentially cause a loss of cooling to the residual heat removal equipment, among other safety-related equipment, causing a loss of heat removal capacity for the reactor core.

Corrective Action

This condition will be corrected by installing safety-related vacuum release check valves in accordance with E&DCR No. P-13,269. This will provide automatic venting of the pump column during a pump trip. As a vacuum begins to form in the pump column, a 1-in. check valve piped into the pump discharge will allow outside air to enter the discharge piping. On pump restart, this will act to cushion the shock as the water column approaches the closed check valve. This transient is addressed in the current design. In addition, all four bellows expansion joints will be replaced prior to fuel load.