GULF STATES UTILITIES COMPANY

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U. S. Nuclear Regulatory Commission
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Gentlemen:

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

Please find enclosed Revision 1 to an Informational Report concerning multiple relay failures in the standby cooling tower fans at River Bend Station - Unit 1. This report is submitted to inform the NRC of these failures and document GSU's investigation and corrective actions.

Sincerely,

W. H. Odell
Manager-Oversight
River Bend Nuclear Group

LAE/PDG/GAB/DCH/HAK/JKH/AS/ch

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## INTRODUCTION

During a 12 hour time period from 10/05/90 to 10/06/90, with the unit in Operational Condition 5 (Refueling), two 42X relays (*RLY*) in Division I standby cooling tower fans (*FAN*) 1SWP*FN1U and 1SWP*FN1S experienced failures, rendering the fans inoperative. The 42X relays are used in the starting circuits of the fans. The results of these failures were that control room indication for each of the fans was lost due to blown control fuses. Shortly thereafter, two additional relays, a 62TX and a 62VX (*62*), in the timer circuits of the Division II fans (*FAN*) 1SWP*FN1T and 1SWP*FN1V were also found to be inoperative. The failures of the 62TX and 62VX relays disabled the remote operation of these fans from the control room. However, the fans remained operable locally from motor control center (MCC) (*MCC*) 1EHS*1MCC16B.

The 42X relays (*RLY*) and the 62TX and 62VX relays (*62*) are all Gould J10 relays. A failure analysis performed by Wyle Laboratories concluded that the environmental conditions to which the relays were subjected was the most likely cause of the relay failures.

## INVESTIGATION

An inspection of the failed relays revealed the following observations:

- The coils of the relays were cracked, and the coils had been swelled.
- The coils exhibited a burned odor.
- Three relays had low coil resistance.
- One relay open-circuited.

Low coil resistance is indicative of shorted windings. This and the other observations are evidence of overheating.

Following the event, resistance measurements were taken on all of the remaining J10 relays in the starting circuits of the standby cooling tower fans. The resistance values were all found to be within allowable limits.

The failure analysis by Wyle Laboratories concluded that the most likely cause of failure was the environmental conditions to which the relays were subjected. The standby cooling tower fans are installed in motor-control-centers (MCC's) located in the standby cooling tower pump room. The temperatures in this room typically drop below 40 degrees Fahrenheit during winter months when the outside ambient temperature is sufficiently low. Prior to this event, the environment was not properly controlled to maintain room temperatures consistent with the specified service conditions of the relays. Exposure of Gould J10 relays to low temperatures can result in damage to the coil encapsulant. This condition can prevent insertion of the relay armature into the coils, thus creating a binding condition. This binding condition can cause the coil to draw an inrush of current for a longer time period than normal for relay operation, resulting in shorted windings due to overheating of the coil.

Note that there are numerous Gould J10 relays in the plant where the temperature variance remains within the specified limits. A review of other plant areas where Gould J10 relays are used was performed to identify where similar temperature conditions might exist and none were identified. GSU concludes that Gould J10 relays do not represent a generic safety concern as the failure mode described above is limited to relays subjected to lower temperatures than specified by the vendor.

CORRECTION ACTION

The failed relays have been replaced with new J10 relays. As stated in the investigation section of this report, GSU inspected and took resistance readings on all of the failed relays and found evidence of overheating. Resistance measurements were also taken on the relays in the starting circuits that did not fail. There was no evidence of degeneration of the non-failed relays.

The daily log report, Operations Section Procedure (OSP)-0012 was revised to require temperature monitoring of the SBCT pump rooms and switchgear rooms. In the event that the temperature readings are below 40 degrees F, the procedure requires that Design Engineering be contacted. This would be followed by corrective measures to elevate the room temperatures.

The ultimate resolution of the ventilation problems in the SBCT pump room and electrical switchgear rooms includes the following:

- Redesign of the ventilation system to assure that temperatures can be maintained above 40 degrees F. This is to be completed by November 1, 1991.

- The use of infra-red temperature monitoring (thermographic) in the preventive maintenance program for the relays.

SAFETY ASSESSMENT

At the time of the fan failures, the plant was in Operational Condition 5 (Refueling), seven days following shutdown. The standby cooling tower (*BS*) was being utilized to remove decay heat as normal service water was not available. The fan failures resulted in Division I being inoperable, since Technical Specification 3.7.1.2 requires all fans to be in operation. However, since both inoperable fans (*FAN*) were in the same cell (2-50% capacity cells per division), a minimum of 50% cooling capacity from Division I was available. In addition, Division II was operational at the time with power being supplied from offsite. Adequate cooling was therefore available during the period the fans were inoperable to maintain the plant in a safe shutdown condition.

The relays in the starting circuits of the standby cooling tower fans are continuously energized while operating. The Division I fans operated for 21 days, prior to being secured, without additional failures of J10 relay Based on these factors and the corrective actions taken to date, w concludes that the non-failed J10 relays in the starting circuits are capable of continued service. In addition, there is no generic safety concern regarding the J10 relays. The failures described in this report were due to the temperature conditions to which the relays were subjected.