GULF STATES UTILITIES COMPANY

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

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Gentlemen:

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

Gulf States Utilities Company (GSU) has investigated the effects of fire water flooding due to automatic fire suppression systems on Category I areas of River Bend Station (RBS) as discussed with your Messrs. W. Paulson and D. Nottley and is providing this analysis in accordance with their request. The areas investigated include the auxiliary, control, diesel generator, and fuel buildings, as well as the electrical and piping tunnels. Expected water depths due to fire suppression system actuation are shown in Table 10 of the Fire Hazards Analysis, criterion document 240.201. This analysis was conducted to verify that water migration between fire areas herein did not occur and that redundant trains of safe shutdown equipment were not affected. The assumptions used in the original flooding study for the Fire Hazards Analysis (FHA) were used in this investigation.

GSU concludes that depth of water due to fire suppression system flow is less than the base elevation of safe shutdown equipment and the only equipment potentially affected is limited to the area of sprinkler discharge. Where water can migrate through open floor penetrations, there is no effect on safe shutdown equipment. The results for each building are summarized below.

CONTROL BUILDING

Suppression systems in the control building are present in the cable chases, the HVAC rooms on the 98 foot elevation, and the entire 70 foot elevation. Water discharged in the cable chases will collect to the depth shown in the FHA on the 70 foot elevation due to the floor penetrations in the chases. The only suppression system water retained at a higher elevation is in the HVAC room at elevation 98. An addition to the fire suppression system was made late in construction to protect this area and the depth due to water discharge from this addition was not specifically discussed in the FHA.

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Calculations show the depth in the HVAC room at the 98 foot elevation to be 2.5 inches, which is less than the 2.8 inches reported for the cable chases. This water depth is insufficient to damage any floor mounted equipment. Floor penetration seals in this area installed for fire protection have pressure ratings in excess of the water head so all fire water discharge is contained in the area of discharge, and there is no adverse effects due to flooding.

FUEL BUILDING

Suppression systems in the fuel building are found on the 70, 95, and 113 foot elevations. These systems are pipe schedule designed wet pipe sprinkler systems and flows are derived by assuming that 10 heads are discharging simultaneously. With the exception of the cubicle containing the spent fuel pool cooling pump, 1SFC*P1A, with its associated heat exchanger, and the two iodine filter rooms, the fuel building is considered one fire area. These separate fire areas are unaffected by any sprinkler discharge or postulated flooding. However, the remainder of the building is relatively open to fire water migration. The depth of water due to fire water flow as presented in the FHA is insufficient to cause damage to Category 1 equipment. In an effort to consider the effect of water migration, the postulated flow was spread over the entire 95 and 113 foot elevations into areas not covered by sprinklers. As the entire 70 foot elevation is sprinkler protected, this further review was not required for that elevation. This investigation demonstrated that the only equipment potentially affected was 4160V electrical switchgear, 1ENS*SWG3A and 1ENS*SWG4A, on the 95 foot elevation. This equipment is not required for safe shutdown or to cool spent fuel, but supplies power to the recirculation pumps in the drywell. The new fuel vault and spent fuel pool on the 113 foot elevation were unaffected. In summary, the review shows no effect on equipment required for safe shutdown or for protection of spent fuel.

AUXILIARY BUILDING

The failure of a freeze plug during the second refueling outage prompted questions from the NRC concerning the effect of water curtain (WS-20) discharge on equipment in the auxiliary building. Calculations, using information from the FHA, the moderate energy line crack (MELC) analysis and a detailed walkdown, demonstrate that sprinkler waterflow results in a water depth of less than 0.75 inches, assuming a ten-minute sprinkler flow and no floor drains operating. This water is assumed to flow through floor openings on its way to the basement. Reviews of the above calculation and the results of the MELC analysis show no equipment is impacted by flooding from discharge of the water curtain. Suppression systems are also in service in the RCIC

room (PS-1), 70 foot elevation crescent area (WS-19), D tunnel (WS-8H), and 114 and 141 foot elevation cable trays (AS-12). Water from the RCIC room, D tunnel and the crescent area cannot migrate to other fire areas due to their relative elevations. System AS-12 is a wet pipe sprinkler system serving both east and west sides of the building. Since this system actuates individual heads from high temperatures, system flow is assumed to occur only in one fire area. Flow from this system, assuming that all heads are flowing, results in maximum water depth of 2 1/8" in each of the standby gas treatment rooms. This depth is less than the 4" typical equipment mounting height, so room equipment is unaffected. There is no safe shutdown equipment in these rooms. The depth resulting from the small amount of flow outside the standby gas treatment rooms is bounded by the water curtain discharge. Maximum water depth on the 114 foot elevation due to system discharge is 1 3/8". The worst case occurs on the east side of the 114 foot elevation because the large grated areas around the reactor plant component cooling water heat exchangers on the west side would rapidly drain any sprinkler runoff. The maximum depth is very close to the 1.5" mounting height of Category I MCC's in the area. However, only one side of the building and one shutdown division could be impacted by flooding, leaving one shutdown path unaffected. This follows the analogy of the MELC analysis. This fire water flooding analysis is also conservative because no contribution by the six area floor drains is considered.

PIPING AND ELECTRICAL TUNNELS

Due to the relative elevation of the piping and electrical tunnels, migration of suppression system water to Category I buildings is not able to occur. Depths of water collected in the tunnels is presented in table 10 of the FHA. The maximum depth of water is 9.5" in B tunnel east, on the west side of the control building. No safe shutdown equipment is affected by this water level. In addition to this flooding analysis, a study was performed to determine the time required to actually submerge valve operators in the tunnels due to fire water flow. This study demonstrates that under worst case conditions (i.e. lowest equipment mounting, smallest floor area, multiple suppression systems operating) over 43 minutes must elapse before valve operators are affected.

DIESEL GENERATOR BUILDING

Each of the three diesel generators is protected by a pre-action sprinkler system. Water migration to lower elevations was not considered because of the absence of open floor penetrations between the 98 and 70 foot elevations. Except for the fuel oil storage tanks, no equipment is located in the lower elevation of the building. Water migration between fire areas cannot occur and redundant trains will not be affected. The assumptions used

in the original flooding study for the FHA were used, with the following exceptions: 1) One-half of the floor drains are operable, 2) The area of the equipment foundations was subtracted from the total floor space.

Calculation G13.18.2.0*43 Rev. 0, based on the greatest water flow from pre-action sprinkler system PS-2A and the longest drainage line with only three of the possible six drains functioning, demonstrates that the water is adequately removed. The suppression water would not spread laterally to the diesel generator control area because a four inch curb installed at the intervening door prevents the flow.

GSU concludes that the depth of water due to suppression system flow in the diesel generator building is less than the base elevation of safe shutdown equipment and the only equipment potentially affected is limited to the area of sprinkler discharge.

Should you have any questions please contact Mr. L. L. Dietrich at (504) 381-4866.

Sincerely,

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

TFP/LAE/LLD/MSF/pg

cc: U. S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

Senior Resident Inspector
P. O. Box 1051
St. Francisville, LA 70775

Mr. W. A. Paulson
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852