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July 9, 1985
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File No. G9.5,
G9.8.6.2

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Denton:

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

Enclosed for your review is the Gulf States Utilities Company response to the request for additonal information identified by the Nuclear Regulatory Commission's Power Systems Branch reguarding the Division III compliance to Branch Technical Position PSB-1 and updating Final Safety Anaylsis Report (FSAR) Figure 8.3.3 for second level undervoltage for the Division III 4.16 kV bus. Attachment 1 provides revisions to the FSAR which will be included in a future amendment. Attachment 2 provides revisions to the River Bend Station Technical Specifications which are necessary to ensure consistancy with the FSAR.

Sincerely,

J. E. Booker

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

JEB/WJR/JEP/kt

Enclosure (1)

B001
1/40

ATTACHMENT 1

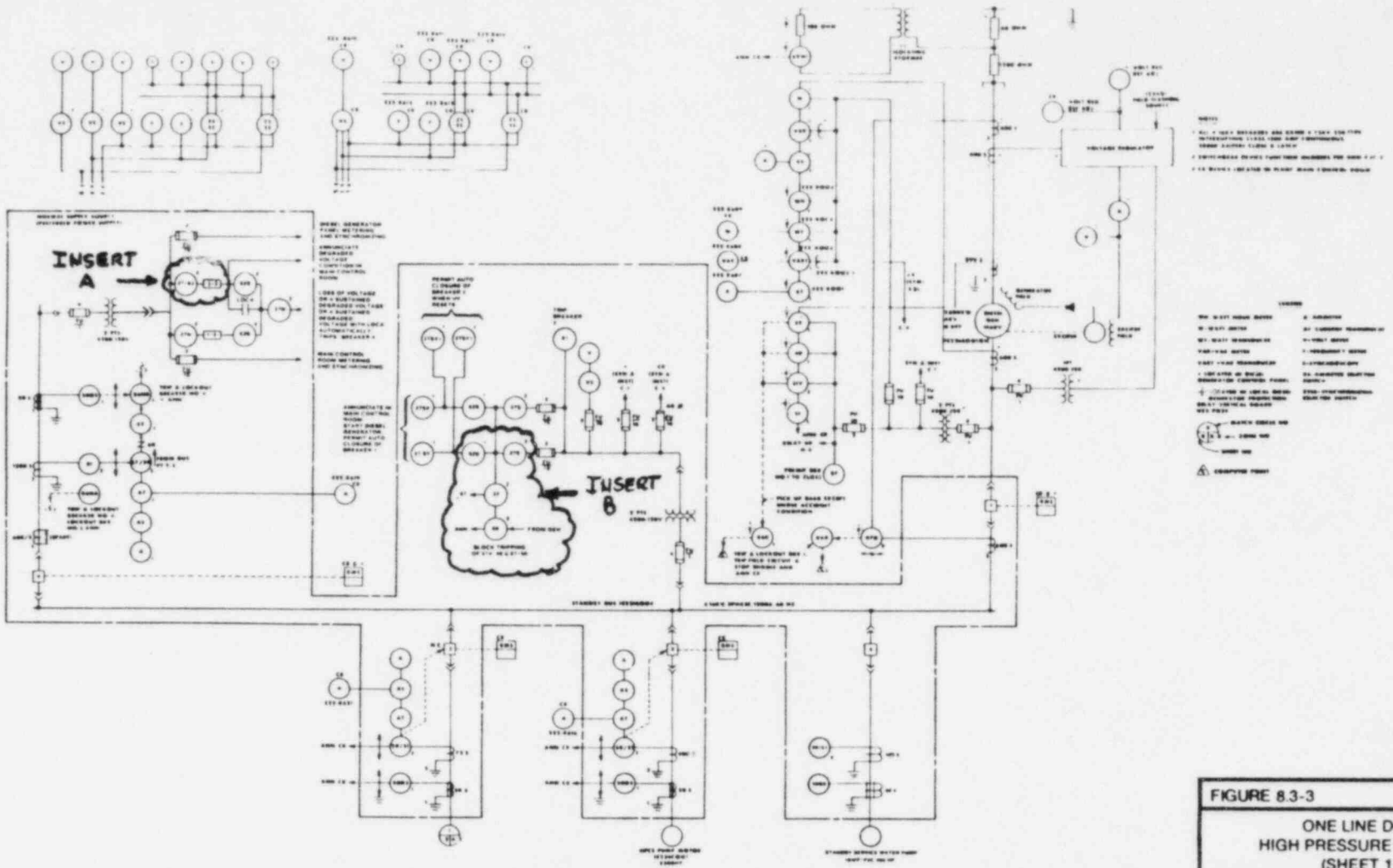


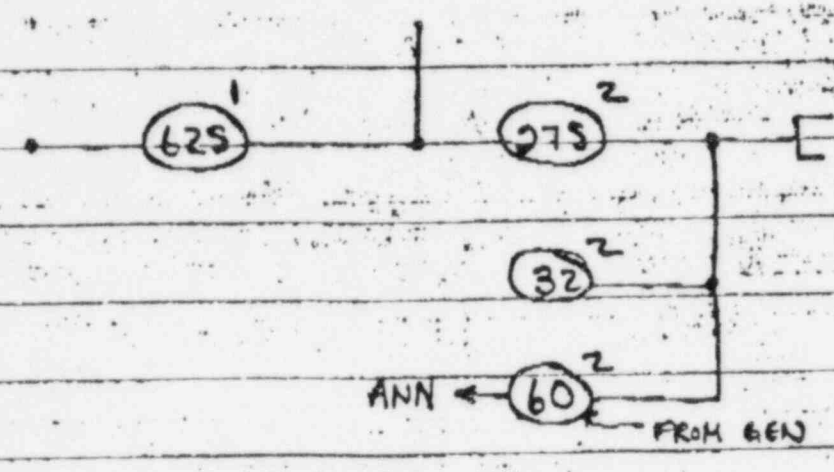
FIGURE 8.3-3

ONE LINE DIAGRAM
HIGH PRESSURE CORE SPRAY
(SHEET 1 OF 3)

RIVER BEND STATION
FINAL SAFETY ANALYSIS REPORT

INSERT A

INSERT B



BLOCK TRIPPING

OF 51V, 46 & 67/51

of the analyses is also established. In general the test results should not be more than 3% lower than the analytical results; however, the difference between the two when subtracted from the voltage levels determined in the original analysis should never be less than the Class 1E equipment rated voltages.

RESPONSE

21 A. Division I and II

21 1. Two completely separate schemes of undervoltage protection are provided on the Division I and II Class 1E buses at the 4.16-kV level. The selection of undervoltage and time delay setpoints have been determined from an analysis of the voltage requirements of the Class 1E loads. These setpoints will be verified during the actual system testing.

a. The first undervoltage scheme detects loss of power at the Class 1E buses. This undervoltage setpoint is set below any anticipated transient voltage condition, with a time delay of approximately 3 seconds.

b. The second level of undervoltage protection is set at approximately 90 percent and utilizes two 13 separate time delays based on the following conditions:

(1) The first time delay is approximately 3 seconds which establishes a sustained degraded voltage condition (i.e., something longer than a motor starting transient). Following this delay, an alarm in the main control room alerts the operator to the degraded condition. The subsequent occurrence of a LOCA signal immediately separates the Class 1E distribution system from the offsite power system, starts load shed logic and load sequence timers, starts the diesel generator, and permits auto-close of the diesel generator breaker.

(2) The second time delay is approximately 50 seconds, which ensures that permanently connected Class 1E loads will not be damaged. Following this time delay, if the operator has failed to restore adequate voltages, the Class 1E system is automatically separated

from the offsite power system, the load shed logic and load sequence timers start, and the diesel generator starts and permits auto-close of the diesel generator breaker.

c. Undervoltage protection is afforded to the ac distribution system down to and including the 480 V motor control centers (MCCs) level. The tripping of the 4.16 kV air circuit breakers (ACBs) discussed above also results in no voltage at the 480 V load centers and MCCs which, in turn, will cause motor feeder ACBs and contacts to open circuit. Subsequent energization of the 4.16 kV buses by the diesel generator results in the re-energization of MCC motor loads with the closing of their contacts at approximately 70 percent voltage.

d. The voltage sensors are designed to satisfy the following applicable requirements:

(1) Class 1E equipment is utilized and is physically located at and electrically connected to the Class 1E switchgear.

(2) An independent scheme is provided for Division I and II of the Class 1E power system. 21

(3) The undervoltage protection includes coincidence logic (2 out of 3) on a per-bus basis to preclude spurious trips of the offsite power source. 19

(4) The voltage sensors automatically initiate the disconnection of offsite power sources whenever the voltage setpoint and time delay limits have been exceeded.

(5) Capability for test and calibration during power operation is provided. Undervoltage relay settings on the Class 1E 4.16 kV buses can be checked during plant operation by testing one single-phase undervoltage relay at a time. Disconnecting one phase of the three-phase system does not impair the operation of the switchgear. Normally a two-out-of-three logic, the removal of one relay results in an effective one-out-of-two logic, i.e., an undervoltage detected by any one of the two remaining relays still in the circuit would

initiate an undervoltage tripping sequence. The removed relay can then be checked against a variable voltage test input to verify its intended setpoint.

(6) Annunciation is provided in the control room by any bypasses incorporated in the design.

2. The Class 1E bus load shedding scheme automatically prevents shedding during sequencing of the emergency loads to the bus. The load shedding feature is reinstated upon completion of the load sequencing action.

3. The voltage levels at the safety-related buses are optimized for the maximum and minimum load conditions that are expected throughout the anticipated range of voltage variations of the offsite power sources. The trip settings selected are based on an analysis of the voltage at the terminals of the Class 1E loads. The analyses performed to determine minimum operating voltages consider maximum unit steady state and transient loads for events such as a unit trip, loss of coolant accident, startup, or shutdown, with the offsite power supply (grid) at minimum anticipated voltage and only the offsite source being considered available. Maximum voltages are analyzed with the offsite power supply at maximum expected voltage concurrent with minimum unit loads. 13

4. The analytical techniques and assumptions used in the voltage analysis cited in Item 3 will be verified by actual measurement. The verification and test will be performed prior to initial full-power reactor operation on all sources of offsite power by:

a. Loading the station distribution buses, including all Class 1E buses down to the 120/240 V level, to at least 30 percent. 21

b. Recording the existing grid and Class 1E bus voltages and bus loading down to the 120/240 V level at steady state conditions and during the starting of both a large Class 1E and non-Class 1E motor (not concurrently). 21

c. Using the analytical techniques and assumptions of the previous voltage analysis cited in Item 3 above, and the measured existing grid voltage and bus losing conditions recorded during conduct of

the test, a new set of voltages for all the Class 1E buses down to the 120/240 V level will be calculated. 21

d. The analytically derived voltage values will be compared against the test results. 18

B. Division III

1. Two completely separate schemes of undervoltage protection are provided on the Division III Class 1E HPCS bus at the 4.16-kV level. The selection of undervoltage and time delay setpoints has been determined from an analysis of the voltage requirements of the Class 1E loads. These setpoints will be verified during the actual system testing. The first and second level undervoltage protection scheme senses voltage at the incoming side of the normal supply breaker.

   a. The first level undervoltage setpoint is set below any anticipated transient voltage condition, with a time delay of approximately 2 sec.

   b. The second level of undervoltage protection is set at approximately 90 percent of normal voltage and utilizes two separate time delays based on the following conditions:

      (1) The first time delay is approximately 10 sec and establishes a sustained degraded voltage condition (i.e., something longer than a motor starting transient). Following this delay, an alarm in the main control room alerts the operator to the degraded condition. The subsequent occurrence of a LOCA signal immediately separates the Division III HPCS bus from the offsite power system. The Division III HPCS bus will experience a loss of voltage and the primary undervoltage relays and control circuit will start load shed logic, start the diesel generator, and permit auto-close of the diesel generator breaker when the diesel generator attains its rated speed, voltage, and frequency. 21

      (2) The second time delay is approximately 60 sec and is set to ensure that permanently connected Class 1E loads will not be damaged. Following this time delay, if the operator has failed to restore adequate voltages, the

Division III HPCS bus is automatically separated from the offsite power system. The Division III HPCS bus will experience a loss of voltage and the primary undervoltage relays and control circuit will start the load shed logic, start the diesel generator, and permit auto-close of the diesel generator breaker when the diesel generator attains its rated speed, voltage, and frequency.

c. Undervoltage protection is afforded to the ac distribution system down to and including the 480-V motor control center (MCC) level. The tripping of the 4.16-kV offsite power supply circuit breaker discussed above also results in no voltage at the 480-V MCC bus which, in turn, will cause motor feeder contactors to dropout. Subsequent energization of the 4.16-kV HPCS bus by the diesel generator results in the reenergization of 480-V MCC bus. Auto-closer interlocks will operate the contactors at approximately 70 percent voltage to energize the motor loads.

21

d. The voltage sensors are designed to satisfy the following applicable requirements:

(1) Class 1E equipment is utilized and is physically located at and electrically connected to the Class 1E switchgear.

(2) An independent scheme is provided for the Division III Class 1E HPCS power system.

(3) The second level of undervoltage protection includes coincidence logic (2 out of 2) to preclude spurious trips of the offsite power source.

(4) The voltage sensors automatically initiate the disconnection of offsite power sources whenever the voltage setpoint and time delay limits have been exceeded.

(5) Capability for test and calibration during power operation is provided.

(6) Annunciation is provided in the control room by any bypasses incorporated in the design.

2. The Class 1E HPCS bus load shedding scheme automatically prevents shedding during sequencing of the emergency loads to the bus. The load shedding feature is reinstated upon completion of the load sequencing action.

3. The voltage levels at the HPCS bus are optimized for the maximum and minimum load conditions that are expected throughout the anticipated range or voltage variations of the offsite power sources. The trip settings selected are based on an analysis of the voltage at the terminals of the Class 1E loads. The analyses performed to determine minimum operating voltages consider maximum unit steady state and transient loads for events such as unit trip, loss of coolant accident, startup, or shutdown, with the offsite power supply (grid) at minimum anticipated voltage and only the offsite source being considered available. Maximum voltages are analyzed with the offsite power supply at maximum expected voltage concurrent with minimum unit loads.

4. The analytical techniques and assumptions used in the voltage analysis cited in Item 3 will be verified by actual measurement. The verification and test will be performed prior to initial full-power reactor operation on all sources of offsite power by: 21

a. Loading the station distribution buses, including all Class 1E buses down to the 120-V level, to at least 30 percent.

b. Recording the existing grid and Class 1E bus voltages and bus loading down to the 120-V level at steady-state conditions and during the starting of a large Class 1E HPCS pump motor.

c. Using the analytical techniques and assumptions of the previous voltage analysis cited in Item 3 above, and the measured existing grid voltage and bus loading conditions recorded during conduct of the test, a new set of voltages for the Class 1E

HPCS bus down to the 120-V level will be calculated. 21

d. The analytically derived voltage values will be compared against the test results.

ATTACHMENT 2

TABLE 3.3.3-1 (Continued)

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION

TRIP FUNCTION	MINIMUM OPERABLE CHANNELS PER TRIP FUNCTION[a]	APPLICABLE OPERATIONAL CONDITIONS	ACTION
C. DIVISION III TRIP SYSTEM			
1. HPCS SYSTEM			
a. Reactor Vessel Water Level - Low Low Level 2	4[b]	1, 2, 3, 4*, 5*	34[e]
b. Drywell Pressure - High	4[b]	1, 2, 3	34[e]
c. Reactor Vessel Water Level-High Level 8	2[c]	1, 2, 3, 4*, 5*	31
d. Condensate Storage Tank Level-Low	2[d]	1, 2, 3, 4*, 5*	35
e. Suppression Pool Water Level-High	2[d]	1, 2, 3, 4*, 5*	35
f. Pump Discharge Pressure-High (Bypass)	1	1, 2, 3, 4*, 5*	33
g. HPCS System Flow Rate-Low (Permissive)	1	1, 2, 3, 4*, 5*	33
h. Manual Initiation	1	1, 2, 3, 4*, 5*	33

	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM OPERABLE CHANNELS	APPLICABLE OPERATIONAL CONDITIONS	ACTION
D. LOSS OF POWER					
1. Divisions I and II					
a. 4.16 kv Standby Bus Undervoltage (Sustained Undervoltage)	3/bus	2/bus	3/bus	1, 2, 3, 4**, 5**	36
b. 4.16 kv Standby Bus Undervoltage (Degraded Voltage)	3/bus	2/bus	3/bus	1, 2, 3, 4**, 5**	36
2. Division III					
a. 4.16 kv Standby Bus Undervoltage (Sustained Undervoltage)	~~4~~ 2/bus	~~2~~ 1/bus	~~4~~ 2/bus	1, 2, 3, 4**, 5**	~~36~~ 37
b. 4.16 kv Standby Bus Undervoltage (Degraded Voltage)	2/bus	2/bus	2/bus	1, 2, 3, 4**, 5**	36

See footnotes on next page

TABLE 3.3.3-1 (Continued)

EMERGENCY CORE COOLING SYSTEM ACTUATION INSTRUMENTATION

ACTION

ACTION 30 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement:

a. With one channel inoperable, place the inoperable channel in the tripped condition within one hour* or declare the associated system inoperable.
b. With more than one channel inoperable, declare the associated system inoperable.

ACTION 31 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement, declare the associated ADS trip system or ECCS inoperable.

ACTION 32 - With the number of OPERABLE channels less than the Minimum OPERABLE Channels per Trip Function requirement, place the inoperable channel in the tripped condition within one hour.

ACTION 33 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement, restore the inoperable channel to OPERABLE status within 8 hours or declare the associated ADS valve or ECCS inoperable.

ACTION 34 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement:

a. For one trip system, place that trip system in the tripped condition within one hour* or declare the HPCS system inoperable.
b. For both trip systems, declare the HPCS system inoperable.

ACTION 35 - With the number of OPERABLE channels less than required by the Minimum OPERABLE Channels per Trip Function requirement, place at least one inoperable channel in the tripped condition within one hour* or declare the HPCS system inoperable.

ACTION 37 - With the number of OPERABLE channels less than the Total Number of Channels, declare the associated emergency diesel generator inoperable and take the ACTION required by Specification 3.8.1.1 or 3.8.1.2, as appropriate.

ACTION 36 - With the number of OPERABLE channels one less than the Total Number of Channels, place the inoperable channel in the tripped condition within one hour*; Operation may then continue until performance of the next required CHANNEL FUNCTIONAL TEST.

*The provisions of Specification 3.0.4 are not applicable.