

COMMON SENSOR FAILURE EVALUATION REPORT

OCTOBER 1984

PREPARED

FOR

GULF STATES UTILITIES COMPANY
RIVER BEND STATION

PREPARED
BY

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FOR GULF STATES UTILITIES COMPANY
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1.0

PURPOSE

The purpose of this evaluation report is to address the following NRC concerns:

- Perform an analysis to confirm that Final Safety Analysis Report Chapter 15 analyses bound any occurrence that could result from the failure of a single common instrument line.

A. DEFINITION

1. A common instrument line is defined as a line having two or more sensors, each of which belongs to a different system or a line having one or more sensors, one of which sends signals to two different control systems. For instance, one sensor could belong to the Feedwater Control System, another to the Nuclear Boiler Process Instrumentation System.
2. A line is also analyzed when it is not directly covered by Definition 1.A.1 but still serves as a variable or reference leg for a differential pressure or level transmitter(s) when the other leg is a common instrument line.

2.0

CONCLUSIONS

This report, which supplements existing FSAR Chapter 15 transient analyses, documents an evaluation of the River Bend Station for common sensor failures. No new transients have been identified as a result of this study. All the analyzed consequences of common instrument failures are bounded by the River Bend FSAR Chapter 15 analyses.

3.0

ANALYSIS METHODOLOGY

A comprehensive approach was developed by General Electric Company (GE) to analyze control systems that may affect reactor pressure vessel (RPV) water level, pressure or power. This report is a part of the total effort to answer River Bend FSAR Question 421.005 and utilizes the list of applicable control systems in Section 3.1 determined by the Control Systems Failures Evaluation Report.

The common sensors failure analysis was conducted in the following manner by GE* and Stone and Webster Engineering Corporation (SWEC):

*Additional GE technical contributors: R. K. Schroeder and L. K. Stapleton

ACTIVITY	ASSIGNED TO	SECTION
• Identify Common Sensors	GE & SWEC	3.1
• Determine Failure Modes	GE & SWEC	3.2
• Tabulate Common Sensor Failures	GE & SWEC	3.3 & 4.1
• Analyze Combined Effects Per Common Instrument Lines	GE & SWEC	3.4 & 4.0
• Compare Results to Chapter 15	GE	3.5 & 4.0
• Analyze Additional Transients	GE	3.6
• Modify/Augment Chapter 15 if Necessary	GE	3.7

3.1

IDENTIFY COMMON SENSORS

The scope of systems to be analyzed was established by first compiling a complete list of River Bend plant systems and subsystems. The list was reviewed to confine the analysis to only those systems with the potential to affect reactor pressure, water level, or power.

In order to ensure that all necessary systems were considered, specific elimination criteria were established as a basis for not analyzing systems further (see Appendix B). If there was any uncertainty as to whether or not a system met the criteria, it was retained for further analysis. Those systems that met the criteria for elimination were removed from the complete system list to produce the final list of systems for analysis. A further elimination of systems was obtained by analyzing only those systems with instrument lines containing sensors associated with two or more systems. This final list of systems to be reviewed by GE and SWEC follows:

<u>System Designators</u>	<u>Systems</u>
B21	Nuclear Boiler Process Instrumentation
B33	Reactor Recirculation/Jet Pump Instrumentation
C11	Control Rod Drive/Reactor Manual Control
C33	Feedwater Control
C51	Neutron Monitoring
C85	Steam Bypass and Pressure Regulation
D17	Process Radiation Monitoring
E31	Leak Detection and Isolation
G33	Reactor Water Cleanup
N64	Offgas Control
ARC	Condenser Air Removal
CCP	Reactor Plant Component Cooling Water
CCS	Turbine Plant Component Cooling Water
CNM	Condensate
BCS	Bearing Cooling Water
CRS	Cold Reheat
HRS	Hot Reheat
CWS	Circulating Water
DET	Turbine Building Equipment Drains
DER	Reactor Building Equipment Drains
DSM	Moisture Separator Vents and Drains
DSR	Moisture Separator RHTR Vents and Drains
DTM	Turbine Building Miscellaneous Drains
ESS	Extraction Steam
FWL	FDW Pump 4 Drive Lube Oil
FWR	FDW Pump Recirculation
FWS	Feedwater
GML	Generator Leads Cooling
GMC	Generator Stator Cooling Water
GMH	Generator H ₂ and CO ₂ Purge
H0H	High-Pressure FDW Heater Drain
HDL	Low-Pressure FDW Heater Drain
SAS	Service Air
IAS	Instrument Air
GMO	Generator Seal Oil
MSS	Main Steam
SVH	FDW Heater Relief Drains and Vents
SWP	Service Water
TMA	Turbine Trips
TMB	Turbine Generator E.H. Fluid System
TME	Turbine Generator Gland Seal and Exhaust
TML	Turbine Generator Lube Oil
TMR	Turbine Unit Runback
TMS	Turbine Generator Exhaust Hood Spray

NOTE: All non-numeric, letter designated systems are Stone & Webster designations.

The control systems which can affect reactor parameters, as determined by the Control Systems Failures Evaluation Report, were analyzed for multiple system sensors or multiple system contacts from

a common instrument line. Instrument lines which serve only one sensor of one control system were eliminated because their failure effects are bounded by the current FSAR Chapter 15 analysis.

DETERMINE FAILURE MODES

The bounding failures for an instrument line were designated as an instantaneous break or plug in a line during normal, full power operating conditions.

A broken line to a pressure transducer results in a sensed low pressure reading (close to atmospheric). A broken reference line to a differential pressure transducer used as a water level sensor results in an indicated high water level (reduced differential pressure). A broken "variable leg" line results in an indicated low water level (increased differential pressure).

Plugged lines are conservatively considered to be 100% plugged or pinched, causing sensors to be inaccurate under changing pressure conditions. In the case of differential pressure transmitters, used to sense water level changes, a plugged reference or variable line results in a more complex response than that resulting from a broken line, as described in the following paragraph.

Pressure fluctuations of about 9 psi have been measured in operating reactors under normal, full power operation. These pressure variations are sensed on both the variable and reference sides of the differential pressure instruments which sense water level, and do not affect the water level reading. In the event of a plugged line, the change in pressure is sensed on only one side of the differential pressure diaphragm. The response of the instrument will depend upon when the line is assumed to have been plugged in the pressure fluctuation cycle, since the response will be different if the plug occurs at the maximum or minimum point on the pressure fluctuation curve. A pressure variation of 9 psi translates into a sensed water level change of about 21 feet. In analyzing possible instrument responses, the plugging of the instrument line was postulated at the maximum and minimum points on the pressure variation curve. Assuming the extreme conditions, a plugged reference leg could result in the instrument indicating a low water level and actuating all low water level trips when the level has in fact remained constant. A plugged variable leg could result in the instrument indicating a high water level and actuating all high water level trips when the level has remained constant. The instrument responses are listed in Table 4.1 under the column labeled SECONDARY EFFECT.

The PRIMARY EFFECT is defined as the effect a broken or plugged line has on the specific sensor being analyzed. The sensed pressure or differential pressure signal goes to a maximum or minimum value or remains at a constant (inaccurate) reading in the case of a broken line. A range of responses is possible in the case of a plugged line.

The SECONDARY EFFECT is the effect due to sensing an incorrect pressure or water level on trips, permissives, interlocks and scram

signals. These may be inappropriately actuated or rendered inoperative/inhibited for the particular instrument being evaluated.

Combined effects (See Section 4.0) are those combined interactions of the various failed instruments on a given line which could impact RPV water level, pressure, or power.

3.3 TABULATE COMMON SENSOR FAILURES

Common Sensor Failures for given instrument lines are described in Appendix A tables. Described in the tables are: (1) system identification, (2) the common sensors, (3) failure type, (4) the primary effect of either a broken or plugged line upon that sensor, (5) the secondary effect on systems' instrumentation and logic, and (6) the effect on RPV water level, pressure, or power due to an erroneous signal from an affected instrument.

3.4 ANALYZE COMBINED EFFECTS PER COMMON INSTRUMENT LINE

This step combined all of the individual effects for each instrument on a given line. The interaction of each effect relative to the other was evaluated and the combined effect consequences, if any, were determined. The results are described for each line in Section 4.0, "Common Sensors Results and Chapter 15 Comparison."

3.5 COMPARE RESULTS TO CHAPTER 15

The combined effects, as discussed in Section 4.0, were compared to the existing FSAR Chapter 15 analyses to determine if any new transient was possible which is not bounded by the existing analyses.

3.6 ANALYZE ADDITIONAL TRANSIENTS

No additional transients were identified.

3.7 MODIFY/AUGMENT CHAPTER 15 IF NECESSARY

This step was not necessary in the River Bend Station analysis.

4.0 COMMON SENSOR SUMMARY RESULTS AND CHAPTER 15 COMPARISONS

INSTRUMENT LINE

LINE FAILURE CONSEQUENCES

#1*

A break in this line will cause a reduction in reactor water recirculation flow to about 25% of full rated speed for recirculation pump A and trip of pump B. Reactor power will be reduced. The consequences of a break in this line are bounded by the consequences of the two Reactor Recirculation Pump Trip event considered in the Chapter 15 analysis.

*See Appendix A for line number designations.

A broken water level sensor line on feedwater control channel "A" would result in an alarm in the control room. If feedwater is being controlled on channel "A" and the operator ignores the alarm, continued control on channel "A" could possibly lead to a low water level scram. The consequences of this transient are bounded by the consequences of the Loss of Feedwater Flow event considered in the Chapter 15 analysis.

A plugged sensor line could result in the water level sensor on feedwater control channel "A" indicating levels beyond the range of the associated recorder. This will result in an alarm in the control room. Continued control on channel "A" could possibly lead to a water level actuated scram (either high or low). The consequences of this transient are bounded by the consequences of the Loss of Feedwater Flow event considered in the Chapter 15 analysis.

#2 Similar to instrument line #1.

#3 A break in this line would have no effect on RPV water level, pressure, or power.

A plugged sensor line could possibly result in an inadvertant HPCS startup, as analyzed in the Chapter 15 analysis.

#4 Similar to instrument line #3.

#5 None

#6 A break in this line would cause increased feedwater flow if feedwater control is on channel "A". An alarm in control room will be actuated. Continued control on channel A could possibly lead to a high water level turbine trip and subsequent reactor scram. The consequences of this transient are bounded by the consequences of the Feedwater Controller Failure-Maximum Demand event in the Chapter 15 analysis.

A plugged line would result in consequences similar to that described for instrument line #1.

#7 None

#8 Similar to instrument line #6.

#9 None

#10 None

#11	Similar to instrument line #3.
#12	None
#13	Similar to instrument line #3.
#14	None
#15	None
#16	None
#17	None
#18	None
#19	None
#20	A break or a plug in this line could result in a slight loss of feedwater heating. The consequences of this event are bounded by the consequences of the Loss of Feedwater Heating event in the Chapter 15 analysis.
#21	Similar to instrument line #20.
#22	Similar to instrument line #20.
#23	Similar to instrument line #20.
#24	Similar to instrument line #20.
#25	Similar to instrument line #20.
#26	Similar to instrument line #20.
#27	Similar to instrument line #20.
#28	A break or a plug in this line could result in the isolation of one string of feedwater heaters. This would cause a reduction in feedwater inlet temperature, a turbine runback, and recirculation pump runback. The consequences of this event are bounded by the consequences of the Loss of Feedwater Heating event in the Chapter 15 analysis.
#29	Similar to instrument line #28.
#30	Similar to instrument line #20.
#31	Similar to instrument line #20.

APPENDIX A

RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N080A	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	WATER LEVEL 8 SCRAM SIGNAL CHANNEL A. WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL A INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL A.	NONE
	B21-N081A	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	HALF OF WATER LEVEL 1 MSIV ISOLATION INOPERATIVE, HALF OF WATER LEVEL 2 ISOLATION SIGNAL INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 1 MSIV ISOLATION (DIVISION 1) AND WATER LEVEL 2 ISOLATION CHANNEL A.	NONE
	B21-N091A AND B21-N091E	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	RHR A, LPCS AND PARTIAL ADS INITIA- TION INOPERATIVE. DIVISION 1 RCIC INITIATION INOPERATIVE. HALF RCIC HIGH WATER LEVEL TURBINE TRIP.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE RHR A, LPCS, AND PARTIAL ADS INITIATION. DIVISION 1 RCIC INITIATION.	NONE
	B21-N095A	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	PARTIAL ADS A WATER LEVEL 3 INITIA- TION SIGNAL INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE PARTIAL ADS A WATER LEVEL 3 INITIATION SIGNAL.	NONE
	B21-N099A AND B21-N099E	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	TWO OUT OF FOUR RECIRC A AND B LEVEL 2 PUMP TRIPS INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE INITIATION OF TWO OUT OF FOUR RECIRC A AND B LEVEL 2 PUMP TRIPS.	NONE

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FEEDWATER	C33-N004A	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	C33-R606A WATER LEVEL INDICATOR FALSE HIGH READING. DECREASED FEEDWATER FLOW. HALF MAIN TURBINE AND RFP MOTOR TRIP ON HIGH WATER LEVEL. ANNUNCIATOR ALARM IN CONTROL ROOM.	CONTINUED CONTROL ON CHANNEL A WOULD RESULT IN LOWERED VESSEL WATER LEVEL, POSSIBLE SCRAM. OPERATOR WOULD HAVE TO IGNORE ANNUNCIATOR ALARM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	C33-R606A WATER LEVEL INDICATOR AT INACCURATE READING. REACTOR FEED- WATER ERROR IN LEVEL FOLLOWING.	WATER LEVEL COULD FLUCTUATE BEYOND RANGE OF RECORDER. ANNUNCIATOR WILL ALARM IN CONTROL ROOM.
NUCLEAR BOILER	B21-N058A AND B21-N058E	BROKEN	MINIMUM PRESSURE SIGNAL	TWO OUT OF FOUR HIGH PRESSURE TRIPS FOR RECIRC PUMPS A AND B DISABLED.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	TWO OUT OF FOUR HIGH PRESSURE TRIPS FOR RECIRC PUMPS A AND B DISABLED.	NONE
	B21-N062A	BROKEN	MINIMUM PRESSURE SIGNAL	PRESSURE RECORDER R623A INDICATES MINIMUM PRESSURE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	PRESSURE RECORDER R623A INDICATES CONSTANT PRESSURE.	NONE
	B21-N068A AND B21-N068E	BROKEN	MINIMUM PRESSURE SIGNAL	PRESSURE TRANSMITTERS PART OF LOW-LOW SET RELIEF FUNCTION OF SAFETY/RELIEF VALVES. SYSTEM IS SAFETY GRADE AND SINGLE FAILURE PROOF, BACKED UP BY REDUNDANT SENSORS.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL		
	B21-N078A	BROKEN	MINIMUM PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED. HALF LOW PRESSURE PERMISSIVE FOR MANUAL OPENING OF RHR VALVES.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED. HALF LOW PRESSURE PERMISSIVE FOR MANUAL OPENING OF RHR VALVES INOPERATIVE.	NONE

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FEEDWATER	C33-N005	BROKEN	MINIMUM PRESSURE SIGNAL	HIGH PRESSURE ALARM (K636) INOPERATIVE, PRESSURE INDICATOR (R605) AT MINIMUM PRESSURE. THERMAL LIMIT INTERLOCK WILL TRIP RECIRC PUMP B.	REDUCED RECIRC PUMP FLOW, REACTOR POWER REDUCED. WATER LEVEL INCREASES.
		PLUGGED	CONSTANT PRESSURE SIGNAL	HIGH PRESSURE ALARM (K636) INOPERATIVE, PRESSURE INDICATOR (R605) AT CONSTANT PRESSURE. THERMAL LIMIT INTERLOCK FOR RECIRC PUMP B INOPERATIVE.	NONE
	C33-N008A	BROKEN	MINIMUM PRESSURE SIGNAL	PRESSURE RECORDER (R609) WILL INDICATE 850 PSIG REACTOR PRESSURE. SIGNAL SENT TO REACTOR RECIRC. SYSTEM CAVITATION INTERLOCK. RECIRC PUMP A RUNBACK TO LFMC SET OPERATION.	RECIRC PUMP A OPERATION REDUCED TO 25% OF FULL RATED SPEED. REACTOR POWER IS REDUCED, WATER LEVEL INCREASES.
		PLUGGED	CONSTANT PRESSURE SIGNAL	PRESSURE RECORDER (R609) WILL INDICATE CONSTANT REACTOR PRESSURE. SIGNAL TO REACTOR RECIRC SYSTEM CAVITATION INTERLOCK INOPERATIVE. BACKED BY C33-N008B.	NONE

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NUCLEAR BOILER	B21-N080B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	WATER LEVEL 8 SCRAM SIGNAL CHANNEL B WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL B INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 3 SCRAM (DIVISION 2) AND ISOLATION SIGNAL CHANNEL B.	NONE
	B21-N081B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	HALF OF WATER LEVEL 1 MSIV ISOLATION INOPERATIVE. HALF OF WATER LEVEL 2 ISOLATION SIGNAL INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE HALF OF WATER LEVEL 1 MSIV ISOLATION (DIVISION 2), WATER LEVEL 2 ISOLATION CHANNEL B.	NONE
	B21-N091B AND B21-N091F	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	RHR B, RHR C, AND PARTIAL ADS INITIA- TION INOPERATIVE. DIVISION 2 RCIC INITIATION INOPERATIVE. HALF RCIC HIGH WATER LEVEL TURBINE TRIP.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE RHR B, RHR C, AND PARTIAL ADS INITIATION. DIVISION 2 RCIC INITIATION.	NONE
	B21-N095B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	PARTIAL ADS B WATER LEVEL 3 INITIA- TION SIGNAL INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE PARTIAL ADS B WATER LEVEL 3 INITIATION.	NONE
	B21-N099B AND B21-N099F	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	TWO OUT OF FOUR RECIRC A AND B LEVEL 2 PUMP TRIPS INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE INITIATION OF TWO OUT OF FOUR RECIRC A AND B LEVEL 2 PUMP TRIPS.	NONE

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FEEDWATER	C33-N004B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	C33-R606B WATER LEVEL INDICATOR FALSE HIGH READING. DECREASED FEEDWATER FLOW. HALF MAIN TURBINE AND RFP MOTOR TRIP ON HIGH WATER LEVEL. ANNUNCIATOR ALARM IN CONTROL ROOM.	CONTINUE CONTROL ON CHANNEL B WOULD RESULT IN LOWERED VESSEL WATER LEVEL, POSSIBLE SCRAM. OPERATOR WOULD HAVE TO IGNORE ANNUNCIATOR ALARM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	C33-R606B WATER LEVEL INDICATOR AT INACCURATE READING. REACTOR FEED- WATER ERROR IN LEVEL FOLLOWING.	WATER LEVEL COULD FLUCTUATE BEYOND RANGE OF RECORDER. ANNUNCIATOR WILL ALARM IN CONTROL ROOM.
NUCLEAR BOILER	B21-N058B AND B21-N058F	BROKEN	MINIMUM PRESSURE SIGNAL	TWO OUT OF FOUR HIGH PRESSURE TRIPS FOR RECIRC PUMPS A AND B DISABLED.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	TWO OUT OF FOUR HIGH PRESSURE TRIPS FOR RECIRC PUMPS A AND B DISABLED.	NONE
	B21-N062B	BROKEN	MINIMUM PRESSURE SIGNAL	PRESSURE RECORDER R623B INDICATES MINIMUM PRESSURE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	PRESSURE RECORDER R623B INDICATES CONSTANT PRESSURE.	NONE
	B21-N068B AND B21-N068F	BROKEN	MINIMUM PRESSURE SIGNAL	PRESSURE TRANSMITTERS PART OF LOW-LOW SET RELIEF FUNCTION OF SAFETY/RELIEF VALVES. SYSTEM IS SAFETY GRADE AND SINGLE FAILURE PROOF, BACKED UP BY REDUNDANT SENSORS.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL		
	B21-N078B	BROKEN	MINIMUM PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED. HALF LOW PRESSURE PERMISSIVE FOR MANUAL OPENING OF RHR VALVES.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED. HALF LOW PRESSURE PERMISSIVE FOR MANUAL OPENING OF RHR VALVES INOPERATIVE.	NONE

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FEEDWATER	C33-N008B	BROKEN	MINIMUM PRESSURE SIGNAL	SIGNAL SENT TO REACTOR RECIRC SYSTEM CAVITATION INTERLOCK. RECIRC PUMP B RUN BACK TO LFMG SET OPERATION.	RECIRC PUMP B OPERATION REDUCED TO 25% OF FULL RATED SPEED. REACTOR POWER REDUCED, WATER LEVEL INCREASES.
		PLUGGED	CONSTANT PRESSURE SIGNAL	SIGNAL TO REACTOR RECIRC SYSTEM CAVI- TATION INTERLOCK INOPERATIVE. BACKED UP BY C33-N008A.	NONE
RECIRC SYSTEM	B33-N040	BROKEN	MINIMUM PRESSURE SIGNAL	THERMAL LIMIT INTERLOCK WILL TRIP RECIRC PUMP A.	RECIRC PUMP FLOW REDUCED, REACTOR POWER REDUCED, WATER LEVEL INCREASES.
		PLUGGED	CONSTANT PRESSURE SIGNAL	THERMAL LIMIT INTERLOCK FOR RECIRC PUMP A INOPERATIVE.	NONE

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NUCLEAR BOILER	B21-N044C	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	LEVEL RECORDER R615 INDICATES HIGH WATER LEVEL (INSTRUMENT USED DURING SHUTDOWN TO RECORD WATER LEVEL).	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	LEVEL RECORDER R615 WILL RECORD INACCURATE WATER LEVEL DURING SHUT- DOWN.	NONE
	B21-N073C AND B21-N073G	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	HALF OF SIGNAL TO CLOSE HPCS INJEC- TION VALVES. LEVEL 2 INITIATION SIGNAL FOR HPCS INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	POSSIBLE INITIATION OF HPCS ON LOW WATER LEVEL.	FEEDWATER CONTROL WILL ADJUST FOR HPCS FLOW. MINOR PERTURBATION IN WATER TEMP. MILD DEPRESSURIZATION.
	B21-N080C	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	WATER LEVEL 8 SCRAM SIGNAL CHANNEL C. WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL C INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE INITIATION OF WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL C.	NONE
NUCLEAR BOILER	B21-N081C	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	HALF OF WATER LEVEL 1 MSIV ISOLATION INOPERATIVE, HALF OF WATER LEVEL 2 ISOLATION SIGNAL INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE INITIATION OF HALF WATER LEVEL 1 MSIV ISOLATION, AND HALF WATER LEVEL 2 ISOLATION.	NONE
FEEDWATER	C33-N004C	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	C33-R606C WATER LEVEL INDICATOR FALSE HIGH READING. HALF MAIN TURBINE AND RFP MOTOR TRIP ON HIGH WATER LEVEL. ANNUNCIATOR ALARM IN CONTROL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	C33-R606C WATER LEVEL INDICATOR AT INACCURATE READING.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N078C	BROKEN	MINIMUM PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED. HALF LOW PRESSURE PERMISSIVE FOR MANUAL OPENING OF RHR VALVES.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED. HALF LOW PRESSURE PERMISSIVE FOR MANUAL OPENING OF RHR VALVES INOPERATIVE.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N044D	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	LEVEL INDICATOR R610 INDICATES HIGH WATER LEVEL (INSTRUMENT USED DURING SHUTDOWN TO INDICATE WATER LEVEL).	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	LEVEL INDICATOR R610 WILL INDICATE INACCURATE WATER LEVEL DURING SHUTDOWN.	NONE
	B21-N073L AND B21-N073R	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	HALF OF SIGNAL TO CLOSE HPCS INJEC- TION VALVES. LEVEL 2 INITIATION SIGNAL FOR HPCS INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE INITIATION OF HPCS ON LOW WATER LEVEL.	FEEDWATER CONTROL WILL ADJUST FOR HPCS FLOW. MINOR PERTURBATION IN WATER TEMP. MILD DEPRESSURIZATION.
	B21-N080D	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	WATER LEVEL 3 SCRAM SIGNAL CHANNEL D. WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL D INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE INITIATION OF WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL D.	NONE
	B21-N081D	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	HALF OF WATER LEVEL 1 MSIV ISOLATION INOPERATIVE. HALF OF WATER LEVEL 2 ISOLATION SIGNAL INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE INITIATION OF HALF WATER LEVEL 1 MSIV ISOLATION AND HALF OF WATER LEVEL 2 ISOLATION.	NONE
	B21-N078D	BROKEN	MINIMUM PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED. HALF LOW PRESSURE PERMISSIVE FOR MANUAL OPENING OF RHR VALVES.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED. HALF LOW PRESSURE PERMISSIVE FOR MANUAL OPENING OF RHR VALVES INOPERATIVE.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N027	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	R605 SHUTDOWN WATER LEVEL INDICATOR AT MAXIMUM WATER LEVEL INDICATION.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	R605 SHUTDOWN WATER LEVEL INDICATOR AT INACCURATE READING.	NONE
FEEDWATER	C33-N017	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	R608 WIDE RANGE LEVEL RECORDER WILL INDICATE MAXIMUM WATER LEVEL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	R608 WIDE RANGE LEVEL RECORDER WILL INDICATE INACCURATE WATER LEVEL.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N080A	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	WATER LEVEL 8 SCRAM SIGNAL CHANNEL A, WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL ON CHANNEL A INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 8 SCRAM SIGNAL CHANNEL A. LEVEL 3 SCRAM AND ISOLA- TION SIGNAL ON CHANNEL A INOPERATIVE.	NONE
	B21-N095A	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	PARTIAL ADS A WATER LEVEL 3 INITIA- TION SIGNAL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	PARTIAL ADS A WATER LEVEL 3 INITIA- TION SIGNAL INOPERATIVE.	NONE
FEEDWATER	C33-N004A	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	C33-R606A WATER LEVEL INDICATOR FALSE LOW READING. INCREASED FEEDWATER FLOW. ANNUNCIATOR ALARM IN CONTROL ROOM. RECIRC PUMPS RUNBACK TO LFNG SET OPERATION.	CONTINUED CONTROL ON CHANNEL A WOULD RESULT IN HIGH WATER LEVEL IN VESSEL, POSSIBLE SCRAM. OPERATOR WOULD HAVE TO IGNORE ANNUNCIATOR ALARM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	C33-R606A WATER LEVEL INDICATOR AT INACCURATE READING. REACTOR FEED- WATER ERROR IN LEVEL FOLLOWING.	WATER LEVEL COULD FLUCTUATE BEYOND RANGE OF RECORDER. ANNUNCIATOR WILL ALARM IN CONTROL ROOM.

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N091A	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	HALF WATER LEVEL 1 MSIV ISOLATION, HALF WATER LEVEL 2 ISOLATION SIGNAL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	HALF WATER LEVEL 1 MSIV ISOLATION, AND HALF WATER LEVEL 2 ISOLATION SIGNAL INOPERATIVE.	NONE
	B21-N091A AND B21-N091E	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	RHR A AND LPCS INITIATION, HALF RCIC LOW WATER LEVEL INDICATION. DIVI- SION 1 RCIC HIGH WATER LEVEL TURBINE TRIP INOPERATIVE. PARTIAL ADS INITIATION.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	RHR A, LPCS, HALF RCIC, AND PARTIAL ADS INITIATION INOPERATIVE. HALF RCIC HIGH WATER LEVEL TURBINE TRIP.	NONE
	B21-N099A AND B21-N099E	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	TWO OUT OF FOUR RECIRC (A AND B) LEVEL 2 PUMP TRIPS.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	TWO OUT OF FOUR RECIRC (A AND B) LEVEL 2 PUMP TRIPS INOPERATIVE.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N027	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	R605 SHUTDOWN WATER LEVEL INDICATOR AT MINIMUM WATER LEVEL INDICATION.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	R605 SHUTDOWN WATER LEVEL INDICATOR MAY INDICATE HIGH WATER LEVEL.	NONE
	B21-N080B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL B. WATER LEVEL 8 SCRAM SIGNAL CHANNEL B INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 8 SCRAM SIGNAL CHANNEL B.	NONE
	B21-N095B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	PARTIAL ADS B WATER LEVEL 3 INITIATION.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	ADS B WATER LEVEL 3 INITIATION INOPERATIVE.	NONE
FEEDWATER	C33-N004B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	C33-R606B WATER LEVEL INDICATOR FALSE LOW READING. INCREASED FEEDWATER FLOW. ANNUNCIATOR ALARM IN CONTROL ROOM. RECIRC PUMPS RUNBACK TO LFNG SET OPERATION.	CONTINUED CONTROL ON CHANNEL B WOULD RESULT IN HIGH WATER LEVEL IN VESSEL, POSSIBLE SCRAM. OPERATOR WOULD HAVE TO IGNORE ANNUNCIATOR ALARM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	C33-R606B WATER LEVEL INDICATOR AT INACCURATE READING. REACTOR FEED- WATER ERROR IN LEVEL FOLLOWING.	WATER LEVEL COULD FLUCTUATE BEYOND RANGE OF RECORDER. ANNUNCIATOR W/'' ALARM IN CONTROL ROOM.
	C33-N017	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	R608 WIDE RANGE LEVEL RECORDER WILL INDICATE MINIMUM WATER LEVEL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	R608 WIDE RANGE LEVEL RECORDER WILL INDICATE INACCURATE WATER LEVEL.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N081B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	HALF WATER LEVEL 1 MSIV ISOLATION, HALF WATER LEVEL 2 ISOLATION SIGNAL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	HALF WATER LEVEL 1 MSIV ISOLATION, AND HALF WATER LEVEL 2 ISOLATION SIGNAL INOPERATIVE.	NONE
	B21-N091B AND B21-N091F	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	RHR (B AND C) INITIATION, HALF RCIC LOW WATER LEVEL INITIATION. DIVI- SION 2 RCIC HIGH WATER LEVEL TURBINE TRIP INOPERATIVE. PARTIAL ADS INITIATION.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	RHR (B AND C), HALF RCIC, AND PARTIAL ADS INITIATION INOPERATIVE. HALF RCIC HIGH WATER LEVEL TURBINE TRIP.	NONE
	B21-N099B AND B21-N099F	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	TWO OUT OF FOUR RECIRC (A AND B) LEVEL 2 PUMP TRIPS.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	TWO OUT OF FOUR RECIRC (A AND B) LEVEL 2 PUMP TRIPS INOPERATIVE.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N080C	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL C. WATER LEVEL 8 SCRAM SIGNAL CHANNEL C INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 8 SCRAM SIGNAL CHANNEL C.	NONE
FEEDWATER	C33-N004C	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	C33-R606C WATER LEVEL INDICATOR FALSE LOW READING. LEVEL SIGNAL FAILURE ANNUNCIATOR ALARM IN CONTROL ROOM.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	C33-R606C WATER LEVEL INDICATOR AT INACCURATE READING.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N073C AND B21-N073G	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	INITIATION OF HPCS ON LOW WATER LEVEL.	FEEDWATER CONTROL WILL ADJUST FOR HPCS FLOW. MINOR PERTURBATION IN WATER TEMP. MILD DEPRESSURIZATION.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	INITIATION SIGNAL FOR HPCS ON LOW WATER LEVEL INOPERATIVE. POSSIBLE HALF OF SIGNAL TO CLOSE HPCS INJEC- TION VALVES.	NONE
	B21-N081C	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	HALF WATER LEVEL 1 MSIV ISOLATION, HALF WATER LEVEL 2 ISOLATION SIGNAL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	POSSIBLE HALF WATER LEVEL 1 MSIV ISOLATION AND HALF WATER LEVEL 2 ISOLATION SIGNAL INOPERATIVE.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N044C	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	LEVEL RECORDER R615 INDICATES LOW WATER LEVEL (INSTRUMENT USED DURING SHUTDOWN TO RECORD WATER LEVEL).	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	LEVEL RECORDER R615 WILL RECORD INACCURATE WATER LEVEL DURING SHUTDOWN.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N073L AND B21-N073R	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	INITIATION OF HPCS ON LOW WATER LEVEL.	FEEDWATER CONTROL WILL ADJUST FOR HPCS FLOW. MINOR PERTURBATION IN WATER TEMP. MILD DEPRESSURIZATION.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	INITIATION SIGNAL FOR HPCS ON LOW WATER LEVEL INOPERATIVE. POSSIBLE HALF OF SIGNAL TO CLOSE HPCS INJEC- TION VALVES.	NONE
	B21-N081D	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	HALF WATER LEVEL 1 MSIV ISOLATION, AND HALF WATER LEVEL 2 ISOLATION SIGNAL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	HALF WATER LEVEL 1 MSIV ISOLATION AND HALF WATER LEVEL 2 ISOLATION SIGNAL INOPERATIVE.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N080D	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL D. WATER LEVEL 8 SCRAM SIGNAL CHANNEL D INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 8 SCRAM SIGNAL CHANNEL D.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MFL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N044D	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	LEVEL INDICATOR R610 INDICATES LOW WATER LEVEL (INDICATOR USED DURING SHUTDOWN).	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	LEVEL INDICATOR R610 WILL INDICATE INACCURATE WATER LEVEL DURING SHUTDOWN.	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N067C AND B21-N067G	BROKEN	MINIMUM PRESSURE SIGNAL	HALF DRYWELL PRESSURE SIGNAL INOPERATIVE; HPCS CAN BE INITIATED BY VESSEL LOW WATER LEVEL	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	SAME AS FOR BROKEN LINE	NONE
REACTOR PROTECTION	C71-N050C	BROKEN	MINIMUM PRESSURE SIGNAL	CHANNEL C FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	SAME AS FOR BROKEN LINE	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N094A AND B21-N094E	BROKEN	MINIMUM PRESSURE SIGNAL	HALF HIGH DRYWELL PRESSURE SIGNAL INOPERATIVE; RHR (A)/LPCS/RCIC/ADS (A) CAN BE INITIATED BY VESSEL LOW WATER LEVEL	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	SAME AS FOR BROKEN LINE	NONE
REACTOR PROTECTION	C71-N050A	BROKEN	MINIMUM PRESSURE SIGNAL	CHANNEL A FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	SAME AS FOR BROKEN LINE	NONE
RECIRC SYSTEM	B13-N050A	BROKEN	MINIMUM PRESSURE SIGNAL	HALF HIGH DRYWELL PRESSURE SIGNAL INOPERATIVE; LOSS OF ABILITY TO LOCK RECIRC FLOW CONTROL VALVES IN CONTROL POSITION	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	SAME AS FOR BROKEN LINE	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N067L	BROKEN	MINIMUM PRESSURE SIGNAL	HALF HIGH DRYWELL PRESSURE SIGNAL INOPERATIVE; HPCS CAN BE INITIATED BY VESSEL LOW WATER LEVEL	NONE
	AND B21-N067R	PLUGGED	CONSTANT PRESSURE SIGNAL	SAME AS FOR BROKEN LINE	NONE
REACTOR PROTECTION	C71-N050D	BROKEN	MINIMUM PRESSURE SIGNAL	CRANSTL D FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	SAME AS FOR BROKEN LINE	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NUCLEAR BOILER	B21-N094B AND B21-N094F	BROKEN	MINIMUM PRESSURE SIGNAL	HALF HIGH DRYWELL PRESSURE SIGNAL INOPERATIVE: RHR (B)/RHR (C)/RCIC/ADS (B) CAN BE INITIATED BY VESSEL LOW WATER LEVEL	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	SAME AS FOR BROKEN LINE	NONE
REACTOR PROTECTION	C71-N050B	BROKEN	MINIMUM PRESSURE SIGNAL	CHANNEL B FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	SAME AS FOR BROKEN LINE	NONE
RECIRC SYSTEM	B01-N050B	BROKEN	MINIMUM PRESSURE SIGNAL	HALF HIGH DRYWELL PRESSURE SIGNAL INOPERATIVE; LOSS OF ABILITY TO LOCK RECIRC FLOW CONTROL VALVES IN CONTROL POSITION	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	SAME AS FOR BROKEN LINE	NONE

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
NDH	1NDH-LS7A 1NDH-LS26A 1NDH-LT6A 1NDH-LT26A	REFERENCE LINE BROKEN	A BREAK IN ANY REFERENCE LINE ON THE STANDPIPE WILL CAUSE THE PRESSURE TO DROP. ALL INSTRUMENTS SENSE A HIGHER LEVEL THAN ACTUAL HEATER LEVEL.	MOISTURE SEPARATOR REHEATER DRAIN SUPPLY TO FIRST POINT HEATER ISOLATED (1DSR-LV65A). EXTRACTION STEAM TO FIRST POINT HEATER ISOLATED (1ESS-MOV3A). OPENS FIRST POINT HEATER DRAIN LINE TO CONDENSER (1NDH-LV26A).	LOSS OF FIRST POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEEDWATER TEMPERA- TURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.
		REFERENCE LINE PLUGGED	INSTRUMENT SENSES CONSTANT PRESSURE AT REFERENCE LINE. INACCURATE SWITCH OPERATION MAY GENERATE A FALSE HIGH OR LOW LEVEL SIGNAL.	IF A FALSE LOW SIGNAL IS GENERATED, NO IMMEDIATE EFFECT. IF A FALSE HIGH SIGNAL IS GENERATED, SEE "REFERENCE LINE BROKEN," THIS INSTRUMENT LINE.	LOSS OF FIRST POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEEDWATER TEMPERA- TURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.

NOTE: "A" SIDE INSTRUMENTS LISTED, "B" SIDE SIMILAR

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
HDH	1HDH-LS7A	VARIABLE LINE BROKEN	IF LEVEL IS ABOVE BROKEN LINE, STANDPIPE AT A LOWER LEVEL THAN THE HEATER. ALL INSTRUMENTS ON STANDPIPE SENSE LOWER LEVEL THAN ACTUAL HEATER LEVEL.	NONE	NONE
	1HDH-LS26A		IF LEVEL IS BELOW BROKEN LINE, IT CAUSES STANDPIPE PRESSURE TO DROP. ALL INSTRUMENTS ON STANDPIPE SENSE HIGHER LEVEL THAN ACTUAL HEATER LEVEL.	MOISTURE SEPARATOR REHEATER DRAIN SUPPLY TO FIRST POINT HEATER ISOLATED (IDSR-LV63A). EXTRACTION STEAM TO FIRST POINT HEATER ISOLATED (1ESS-MOV3A). OPENS FIRST POINT HEATER DRAIN LINE TO CONDENSER (1HDH-LV26A).	LOSS OF FIRST POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEEDWATER TEMPERA- TURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.
	1HDH-LT6A	VARIABLE LINE PLUGGED	INSTRUMENT SENSES CONSTANT PRESSURE AT VARIABLE LINE. INACCURATE SWITCH OPERA- TION MAY GENERATE A FALSE HIGH OR LOW LEVEL SIGNAL.	IF A FALSE LOW SIGNAL IS GENERATED, NO IMMEDIATE EFFECT. IF A FALSE HIGH SIGNAL IS GENERATED, SEE "REFERENCE LINE BROKEN," LINE 20.	LOSS OF FIRST POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEEDWATER TEMPERA- TURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.

NOTE: "A" SIDE INSTRUMENTS LISTED, "B" SIDE SIMILAR

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RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
HDL	1HDL-LS11A 1HDL-LS25A 1HDL-LT5A 1HDL-LT25A	REFERENCE LINE BROKEN	A BREAK IN ANY REFERENCE LINE ON THE STANDPIPE WILL CAUSE THE PRESSURE TO DROP. ALL INSTRUMENTS SENSE A HIGHER LEVEL THAN ACTUAL LEVEL HEATER LEVEL.	FIRST POINT HEATER DRAIN SUPPLY TO SECOND POINT HEATER ISOLATED (1HDL- LV6A). EXTRACTION STEAM TO SECOND POINT HEATER ISOLATED (1ESS-MOV28A). OPENS SECOND POINT HEATER DRAIN LINE TO CONDENSER (1HDL-LV25A).	LOSS OF SECOND POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEED- WATER TEMPERATURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.
		REFERENCE LINE PLUGGED	INSTRUMENT SENSES CONSTANT PRESSURE AT REFERENCE LINE. INACCURATE SWITCH OPERATION MAY GENERATE A FALSE HIGH OR LOW LEVEL SIGNAL.	IF A FALSE LOW SIGNAL IS GENERATED, NO IMMEDIATE EFFECT. IF A FALSE HIGH SIGNAL IS GENERATED, SEE "REFERENCE LINE BROKEN," THIS INSTRUMENT LINE.	LOSS OF SECOND POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEED- WATER TEMPERATURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.

NOTE: "A" SIDE INSTRUMENTS LISTED, "B" SIDE SIMILAR

APPENDIX A

RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
HDL	1HDL-LS11A 1HDL-LS25A 1HDL-LT5A 1HDL-LT25A	VARIABLE LINE BROKEN	IF LEVEL IS ABOVE BROKEN LINE, STANDPIPE AT A LOWER LEVEL THAN THE HEATER. ALL INSTRUMENTS ON STANDPIPE SENSE LOWER LEVEL THAN ACTUAL HEATER LEVEL.	NONE	NONE
			IF LEVEL IS BELOW BROKEN LINE, IT CAUSES STANDPIPE PRESSURE TO DROP. ALL INSTRUMENTS ON STANDPIPE SENSE A HIGHER LEVEL THAN ACTUAL HEATER LEVEL. (1HDL-LV25A)	FIRST POINT HEATER DRAIN SUPPLY TO SECOND POINT HEATER ISOLATED (1HDL-LV6A). EXTRACTION STEAM TO SECOND POINT HEATER ISOLATED (1ESS-MOV28A). OPENS SECOND POINT HEATER DRAIN LINE TO CONDENSER (1HDL-LV25A)	LOSS OF SECOND POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEED- WATER TEMPERATURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.
		VARIABLE LINE PLUGGED	INSTRUMENT SENSES CONSTANT PRESSURE AT VARIABLE LINE. INACCURATE SWITCH OPERATION MAY GENERATE A FALSE HIGH OR LOW LEVEL SIGNAL.	IF A FALSE LOW SIGNAL IS GENERATED, NO IMMEDIATE EFFECT. IF A FALSE HIGH SIGNAL IS GENERATED, SEE "REFERENCE LINE BROKEN," LINE 22.	LOSS OF SECOND POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEED- WATER TEMPERATURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.

NOTE: "A" SIDE INSTRUMENTS LISTED, "B" SIDE SIMILAR

APPENDIX A

RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
HDL	1HDL-LS10A 1HDL-LS24A 1HDL-LS6A 1HDL-LT4A 1HDL-LT24A	REFERENCE LINE BROKEN	A BREAK IN ANY REFERENCE LINE ON THE STANDPIPE WILL CAUSE THE PRESSURE TO DROP. ALL INSTRUMENTS SENSE A HIGHER LEVEL THAN ACTUAL HEATER LEVEL.	MOISTURE SEPARATOR DRAIN SUPPLY AND SECOND POINT HEATER DRAIN SUPPLY LINES TO THIRD POINT HEATER ISOLATED. EXTRACTION STEAM TO THIRD POINT HEATER ISOLATED (1DSM-LV75A, 1HDL-LV5A, 1ESS- MOV22A). OPENS THIRD POINT HEATER DRAIN LINE TO CONDENSER (1HDL-LV24A).	LOSS OF THIRD POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEED- WATER TEMPERATURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.
		REFERENCE LINE PLUGGED	INSTRUMENT SENSES CONSTANT PRESSURE AT REFERENCE LINE. INACCURATE SWITCH OPERATION MAY GENERATE A FALSE HIGH OR LOW LEVEL SIGNAL.	IF A FALSE LOW SIGNAL IS GENERATED, NO IMMEDIATE EFFECT. IF A FALSE HIGH SIGNAL IS GENERATED, SEE "REFERENCE LINE BROKEN," THIS INSTRUMENT LINE.	LOSS OF THIRD POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEEDWATER TEMPERA- TURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.

NOTE: "A" SIDE INSTRUMENTS LISTED, "B" SIDE SIMILAR

APPENDIX A

RIVER BEND COMMON SENSOR FAILURES

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
HDL	1HDL-LS10A 1HDL-LS24A 1HDL-LS6A 1HDL-LT4A 1HDL-LT24A	VARIABLE LINE BROKEN	IF LEVEL IS ABOVE BROKEN LINE, STANDPIPE AT A LOWER LEVEL THAN THE HEATER. ALL INSTRUMENTS ON STAND- PIPE SENSE LOWER LEVEL THAN ACTUAL HEATER LEVEL.	FEEDWATER SUCTION PRESSURE REDUCED. THIRD POINT HEATER DRAIN PUMP TRIPS. REDUNDANT DRAIN PUMP AVAILABLE.	SLIGHT DECREASE IN FEEDWATER FLOW, REESTABLISHED VIA FEEDWATER FLOW CONTROL VALVES.
			IF LEVEL IS BELOW BROKEN LINE, IT CAUSES STANDPIPE PRESSURE TO DROP. ALL INSTRUMENTS ON STANDPIPE SENSE HIGHER LEVEL THAN ACTUAL HEATER LEVEL.	MOISTURE SEPARATOR DRAIN SUPPLY TO AND SECOND POINT HEATER DRAIN SUPPLY TO THIRD POINT HEATER ISOLATED (1DSM-LV75A, 1HDL-LV5A). EXTRACTION STEAM TO SECOND POINT HEATER ISOLATED (1ESS-MOV22A). OPENS THIRD POINT HEATER DRAIN LINE TO CONDENSER (1HDL-LV24A).	LOSS OF THIRD POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEEDWATER TEMPERA- TURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.
		VARIABLE LINE PLUGGED	INSTRUMENT SENSES CONSTANT PRESSURE AT VARIABLE LINE. INACCURATE SWITCH OPERATION MAY GENERATE A FALSE HIGH OR LOW LEVEL SIGNAL.	FEEDWATER SUCTION PRESSURE REDUCED. IF A FALSE LOW LEVEL SIGNAL IS GENER- ATED, THIRD POINT HEATER DRAIN PUMP TRIPS. IF A FALSE HIGH LEVEL SIGNAL IS GENERATED, SEE "REFERENCE LINE BROKEN," LINE 24.	SLIGHT DECREASE IN FEEDWATER FLOW, REESTABLISHED VIA FEEDWATER FLOW CONTROL VALVES. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED ON FALSE HIGH SIGNAL (SEE "REFERENCE LINE BROKEN," LINE 24).

NOTE: "A" SIDE INSTRUMENTS LISTED, "B" SIDE SIMILAR

APPENDIX A
RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
HDL	1HDL-LS9A 1HDL-LS23A 1HDL-LT2A 1HDL-LT23A	REFERENCE LINE BROKEN	A BREAK IN ANY REFERENCE LINE ON THE STANDPIPE WILL CAUSE THE PRESSURE TO DROP. ALL INSTRUMENTS SENSE A HIGHER LEVEL THAN ACTUAL HEATER LEVEL.	RADWASTE REBOILER AND STEAM SEAL EVAPORATOR DRAIN SUPPLY LINES TO FOURTH POINT HEATER ISOLATED (1DTM-LVY187 AND 189). EXTRACTION STEAM TO FOURTH POINT HEATER ISOLATED (1ESS-MOV15A). OPENS FOURTH POINT HEATER DRAIN LINE TO CONDENSER (1HDL-LV23A).	LOSS OF FOURTH POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEED- WATER TEMPERATURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.
		REFERENCE LINE PLUGGED	INSTRUMENT SENSES CONSTANT PRESSURE AT REFERENCE LINE. INACCURATE SWITCH OPERATION MAY GENERATE A FALSE HIGH OR LOW LEVEL SIGNAL.	IF A FALSE LOW SIGNAL IS GENERATED, NO IMMEDIATE EFFECT. IF A FALSE HIGH SIGNAL IS GENERATED, SEE "REFERENCE LINE BROKEN," THIS INSTRUMENT LINE.	LOSS OF FOURTH POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEED- WATER TEMPERATURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.

NOTE: "A" SIDE INSTRUMENTS LISTED, "B" SIDE SIMILAR.

APPENDIX A

RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
HDL	1HDL-LS9A 1HDL-LS23A 1HDL-LT2A 1HDL-LT23A	VARIABLE LINE BROKEN	IF LEVEL IS ABOVE BROKEN LINE, STANDPIPE AT A LOWER LEVEL THAN THE HEATER. ALL INSTRUMENTS ON STAND- PIPE SENSE LOWER LEVEL THAN ACTUAL HEATER LEVEL	NONE	NONE
			IF LEVEL IS BELOW BROKEN LINE, IT CAUSES STANDPIPE PRESSURE TO DROP. ALL INSTRUMENTS ON STANDPIPE SENSE HIGHER LEVEL THAN ACTUAL HEATER LEVEL.	RADWASTE REBOILER AND STEAM SEAL EVAPORATOR DRAIN SUPPLY LINES TO FOURTH POINT HEATER ISOLATED (1DTH-LVY187 AND 189). EXTRACTION STEAM TO FOURTH POINT HEATER ISOLATED (1ESS-MOV15A). OPENS FOURTH POINT HEATER DRAIN LINE TO CONDENSER (1HD2-LV23A).	LOSS OF FOURTH POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEED- WATER TEMPERATURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.
		VARIABLE LINE PLUGGED	INSTRUMENT SENSES CONSTANT PRESSURE AT VARIABLE LINE. INACCURATE SWITCH OPERATION MAY GENERATE A FALSE HIGH OR LOW LEVEL SIGNAL.	IF A FALSE LOW SIGNAL IS GENERATED NO IMMEDIATE EFFECT. IF A FALSE HIGH SIGNAL IS GENERATED, SEE "REFERENCE LINE BROKEN," LINE 26.	LOSS OF FOURTH POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEED- WATER TEMPERATURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED.

NOTE: "A" SIDE INSTRUMENTS LISTED, "B" SIDE SIMILAR

APPENDIX A
RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
HDL	1HDL-LS1A 1HDL-LS7A	REFERENCE LINE BROKEN	A BREAK IN ANY REFERENCE LINE ON THE STANDPIPE WILL CAUSE THE PRESSURE TO DROP. ALL INSTRUMENTS SENSE A HIGHER LEVEL THAN ACTUAL HEATER LEVEL.	LOW PRESSURE HEATER STRING "A" ISOLATED, (1CNM-MOV32A,33A)HEATER BYPASS VALVE OPENED (1CNM-MOV136). TURBINE CONDENSER NECK RUNBACK CIRCUIT ACTUATED.	LOSS OF 1 STRING OF LOW PRESSURE FEEDWATER HEATERS. TURBINE RUNBACK TO 70% LOAD. RECIRC RUNBACK SIGNAL INITIATED.
		REFERENCE LINE PLUGGED	INSTRUMENT SENSES CONSTANT PRESSURE AT REFERENCE LINE. INACCURATE SWITCH OPERATION MAY GENERATE A FALSE HIGH OR LOW LEVEL SIGNAL.	IF A FALSE LOW SIGNAL IS GENERATED, NO IMMEDIATE EFFECT. IF A FALSE HIGH SIGNAL IS GENERATED, SEE "REFERENCE LINE BROKEN," THIS INSTRUMENT LINE.	LOSS OF SIXTH POINT FEEDWATER HEATING. SLIGHT REDUCTION IN FEEDWATER TEMPERA- TURE. REACTOR COOLANT TEMPERATURE SLIGHTLY REDUCED. TURBINE AND RECIRC RUNBACKS INITIATED (SEE "REFERENCE LINE BROKEN," THIS LINE).

NOTE: "A" SIDE INSTRUMENTS LISTED, "B" SIDE SIMILAR

APPENDIX A

RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
HDL	1HDL-LS1A 1HDL-LS7A	VARIABLE LINE BROKEN	IF LEVEL IS ABOVE BROKEN LINE, STANDPIPE AT A LOWER LEVEL THAN THE HEATER. ALL INSTRUMENTS ON STAND- PIPE SENSE LOWER LEVEL THAN ACTUAL HEATER LEVEL.	NONE	NONE
			IF LEVEL IS BELOW BROKEN LINE, IT CAUSES STANDPIPE PRESSURE TO DROP. ALL INSTRUMENTS ON STANDPIPE SENSE HIGHER LEVEL.	LOW PRESSURE HEATER STRING "A" ISOLATED (1CNM-MOV32A,33A), HEATER BYPASS VALVE OPENED (1CNM-MOV100). TURBINE CONDENSER NECK RUNBACK CIRCUIT ACTUATED.	LOSS OF 1 STRING OF LOW PRESSURE FEEDWATER HEATERS, TURBINE RUNBACK TO 70% LOAD, RECIRC RUNBACK SIGNAL INITIATED.
		VARIABLE LINE PLUGGED	INSTRUMENT SENSES CONSTANT PRESSURE AT VARIABLE LINE. INACCURATE SWITCH OPERATION MAY GENERATE A FALSE HIGH OR LOW LEVEL SIGNAL.	IF A FALSE LOW LEVEL SIGNAL IS GENER- ATED, NO IMMEDIATE EFFECT. IF A FALSE HIGH LEVEL SIGNAL IS GENERATED, SEE "REFERENCE LINE BROKEN," LINE 28.	SAME AS "REFERENCE LINE BROKEN," LINE 28.

NOTE: "A" SIDE INSTRUMENTS LISTED, "B" SIDE SIMILAR

APPENDIX A

RIVER BEND COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR MPL	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
DTM	1DTM-LS189 1DTM-LS192 1DTM-LT189 1DTM-LT190	REFERENCE LINE BROKEN	A BREAK IN ANY REFERENCE LINE ON STANDPIPE WILL CAUSE PRESSURE TO DROP. ALL INSTRUMENTS SENSE A HIGHER LEVEL THAN ACTUAL DRAIN RECEIVER LEVEL.	EXTRACTION STEAM SUPPLY (1MSS-MOV155) AND MAIN STEAM SUPPLY TO STEAM SEAL EVAPORATOR ISOLATED (1ESS-MOV112).	NEGLECTIBLE LOSS OF FEEDWATER HEATING AT FOURTH POINT HEATER.
		REFERENCE LINE PLUGGED	INSTRUMENT SENSES CONSTANT PRESSURE AT REFERENCE LINE. INACCURATE SWITCH OPERATION MAY GENERATE A FALSE HIGH OR LOW LEVEL SIGNAL.	IF A FALSE LOW SIGNAL IS GENERATED, NO IMMEDIATE EFFECT. IF A FALSE HIGH SIGNAL IS GENERATED, SEE "REFERENCE LINE BROKEN," THIS INSTRUMENT LINE.	NEGLECTIBLE LOSS OF FEEDWATER HEATING AT FOURTH POINT HEATER.