COMMON SENSOR FAILURE EVALUATION REPORT

AUGUST 1984

PUBLIC SERVICE ELECTRIC AND GAS COMPANY
HOPE CREEK GENERATING STATION

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1.0 PURPOSE

The purpose of this report is to provide an analysis to confirm the consequences of the Chapter 15 events analyses of the Hope Creek Generating Station (HCGS) Final Safety Analysis Report (FSAR) bound any occurrence that could result from the failure of a single common instrument line. This report addresses that part of FSAR Question 421.51 that deals with common sensing line failures.

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. Instrument lines which serve only one control system and did not qualify under this criterion or that which follows were eliminated because their failure effects are bounded by the current FSAR Chapter 15 analysis.

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 the existing HCGS FSAR Chapter 15 transient analyses, documents an evaluation of the HCGS for common sensor failures. No new transients have been identified as a result of this study and all the analyzed consequences of common instrument line failures are bounded by the existing HCGS FSAR Chapter 15 analyses.

3.0 ANALYSIS METHODOLOGY

A comprehensive approach was developed to analyze control systems that may affect the reactor pressure vessel (RPV) parameters of water level, pressure or power. This report is a part of the total effort to resolve Question 421.51 and has analyzed the list of applicable control systems listed in Section 3.1 and identified all instrument sensing lines and sensors as defined in the definition above.

The common sensors failure analysis was conducted in the following manner:

ACTIVITY	SECTION
• Identify Common Sensors	3.1
• Determine Failure Modes	3.2
• Tabulate Common Sensor Failures	3.3 & Appendix A,B
• Analyze Combined Effects	3.4 & 4.0
• Compare Results to Chapter 15	3.5 & 4.0
• Analyze Additional Transients	3.6
• Evaluate an Additional Single Failure in a Mitigating Safety System	3.7
• Modify/Augment Chapter 15, if Necessary	3.8

3.1 IDENTIFY COMMON SENSORS

The elimination criteria (Appendix C) were applied to a complete list of systems as elaborated in Appendix D.

The following systems were then examined to determine whether they contained common sensor lines and sensors:

System Designation	System
--	Generator System
--	Generator Excitation System
--	Generator Gas Control System
--	Main Turbine System
B21	Jet Pump Instrumentation System
B21/M25	Plant Leak Detection System
B21/M42	Nuclear Boiler Vessel Instrumentation System
B31/M43	Reactor Recirculation System
C11	CRD Hydraulic System
C11	Reactor Manual Control System
C32	Feedwater Control System
C51	Neutron Monitoring Systems
G33	Reactor Water Cleanup System
M1	Main Steam System
M2	Extraction Steam System
M3/M4	Heater, Vent and Drains System
M5	Condensate System
M6	Feedwater System
M8	Condensate Refueling Water Storage and Transfer System

System Designation	System
M9	Circulating Water System
M10	Service Water System
M11	Safety Auxiliaries Cooling, Reactor Building
M12	Safety Auxiliaries Colling, Auxiliary Building
M13	Reactor Auxiliaries Cooling System
M14	Auxiliaries Turbine Cooling Systems
M15	Compressed Air System
M16	Condensate Demineralizer System
M19	Lube Oil System
M24	Circulation and Service Water Hypochlorination and CW Acid Injection
M26	Radiological Monitoring System
M28	Generator Gas Control System
M29	Turbine Sealing Steam System
M31	Reactor Feed Pump Turbine Steam System
M57	Containment Atmosphere Control System
M59	Primary Containment Instrument Gas System
M69/70	Gaseous Radwaste System
M71	Liquid Nitrogen for Purge and Containment Inerting
M82	Turbine Bldg. Supply and Exhaust Vent System
M83/M84	Reactor Bldg. Supply and Exhaust Vent System
M86	Drywell Vent Control System
M87	Chilled Water System
M89	Auxiliary Bldg. - Control Area Vent Control System
M90	Auxiliary Bldg - Control Area Chilled Water System

3.2 DETERMINE FAILURE MODES

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

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

would results in a more complex response than that which would result from a broken line, as described in the following paragraph.

Pressure fluctuations of about 9 psi (±4.5psi) 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 that 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 applicable 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 Appendix A under the column labeled SECONDARY EFFECT.

The PRIMARY EFFECT is 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 thecase of a broken line. In the case of plugged lines, a range of responses is possible.

The SECONDARY EFFECT is the effect of 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.

The last column of Appendix A and Appendix B lists the effect of the incorrectly sensed pressure or water level upon RPV water level, pressure or power.

The combined effect of the interaction of all of the sensors on one line if that line were broken or plugged is listed in Section 4.0.

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 instrument.

3.4 ANALYZE COMBINED EFFECTS

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; the combined effect consequences, if any, were determined. The results are described for each line in Section 4.0, "Common Sensor Summary 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 consequences of existing FSAR Chapter 15 analyses to determine if any new transient was possible with consequences not bounded by those of the existing analyses.

3.6 ANALYZE ADDITIONAL TRANSIENTS

No additional transients were identified.

3.7 EVALUATE AN ADDITIONAL SINGLE FAILURE IN A MITIGATING SAFETY SYSTEM

The consequences of the postulated common instrument line plug or break events, detailed in Section 4, are all bounded by the consequences of FSAR Chapter 15 transients. For each bounded instrument line plug or break event the mitigating safety systems were identified according to the FSAR Chapter 15 event description. One additional worst case single failure in a mitigating safety system was then postulated for each event taking into consideration the effects of the instrument line plug or break. No event was identified wherein an additional single failure in a mitigating safety system would cause the failure of that system to perform its intended safety function.

As an example of this process, consider a break in instrument line #1 from Section 4.0.

The Chapter 15 bounding event is the Loss of Feedwater Flow, described in HCGS FSAR 15.2.7. The event scenario includes a vessel low water level (L3) scram trip from the Reactor Protection System (RPS), which performs a mitigating function. The break in instrument line #1 together with an additional single failure in the RPS was postulated. The RPS would not be prohibited from inserting the control rods and thereby mitigating the effects of the transient. This process was followed for each mitigating safety system identified for the Loss of Feedwater Flow event. Each mitigating safety system in the Loss of Feedwater Flow event scenario was able to perform its intended safety function, even considering an additional single failure.

The above process was repeated for each identified bounding FSAR Chapter 15 event.

3.8 MODIFY/AUGMENT CHAPTER 15 IF NECESSARY

This step was not necessary in the Hope Creek Generating Station analysis.

4.0 COMMON SENSOR SUMMARY RESULTS AND CHAPTER 15 COMPARISONS

INSTRUMENT LINE (Refer to Appendix A)	LINE FAILURE CONSEQUENCES
#1	A break in this line would cause a reduction in feedwater flow, lowered reactor vessel water level and possible reactor scram. At worst, this will be bounded by the Loss of Feedwater Flow event, (FSAR 15.2.7). A plugged line could possibly cause a level 2 RRCS Division 2 initiation, resulting in reactor scram (recirc pump trip, initiation of ARI, actuation of the time delay for SLCS). This transient is accounted for in the reactor duty cycles estimation.
#2	None
#3	A break in this line would cause an increase in feedwater flow resulting in a high water level in the reactor vessel, resulting in reactor scram. At worst, this will be bounded by a Feedwater Control Failure Maximum Demand event (FSAR 15.1.2). There would be no combined effects on RPV level, pressure or power due to a plugged line.
#4&5	None
#5	A break in this line would cause a level 2 RRCS Division 2 initiation, resulting in reactor scram, (recirc pump trip, initiate ARI, actuate time delay for SLCS). This transient is accounted for in the reactor duty cycles estimation. There would be no combined effects on RPV water level, pressure or power due to a plugged line.
#7	None
#8	Eliminated, since none of the instruments on this line perform any control function.

#9,10&11	None
#12	A break in this line would cause a reduction in feedwater flow, lowered reactor vessel water level and possible reactor scram. At worst this will be bounded by the Loss of Feedwater Flow event (FSAR 15.2.7). A plugged line could possibly cause a Level 2 RRCS Division 1 initiation, would result in reactor scram (recirc pump trip, initiate ARI actuation of time delay for SLCS). This transient is accounted for in the reactor duty cycles estimation.
#13	None
#14	A break in this line would cause an increase in feedwater flow resulting in a high water level in the reactor vessel, causing a reactor scram. At worst, this will be bounded by the Feedwater Controller Failure Maximum Demand event (FSAR 15.1.2.). A plugged line would have no effect on RPV.
#15&16	None
#17	A break in this line would cause a level 2 RRCS Division 1 initiation, resulting in reactor scram, (recirc pump trip, ARI, actuation time delay for SLCS). This transient is accounted for in the reactor duty cycles estimation. A plugged line has no effect upon RPV level, pressure or power.
#18&19	None
#20	Line 20 was deleted since none of the instruments on it perform a control function.
#21,22&23	None
#24,25,26&27	A break or a plug in any one of these lines would result in minor fluctuations in the reactor vessel water level. These would be corrected by the feedwater controller, when in automatic control, or by the operator, when in manual control.

#28,29,30&31	A break in any one of these lines would cause an MSIV closure, as defined in FSAR 15.2.4. A plugged line would have no effect on RPV water level, pressure or power.
#32,33	None
#34	A break in this line would cause turbine and generator trip discussed in Chapters 15.2.2 and 15.2.3 of the FSAR. A plugged line would have no effect on RPV water level, pressure or power.
#35	None
#36	A plugged or broken line has no effect on RPV water level, pressure or power.
#37	A broken line would cause the reactor feed pumps to be tripped, resulting in a Loss of Feedwater Flow. This event is bounded by the Loss of Feedwater Flow event (FSAR 15.2.7). A plugged line would have no effect on RPV water level, pressure or power.
#38	None
#39	A broken line would result in a slight increase in reactor water level or pressure. A plugged line would have no effect on RPV water level, pressure or power.

APPENDIX A

HOPE CREEK 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-N090B AND B21-N090F	BROKEN	MINIMUM PRESSURE SIGNAL	LOW VESSEL PRESSURE PERMISSIVE SIGNAL FOR CS (B) PRESSURE INTERLOCK VALVE TO OPEN DIVISION 2.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	LOW VESSEL PRESSURE PERMISSIVE SIGNAL FOR CS (B) PRESSURE INTERLOCK VALVE TO OPEN DIVISION 2 INOPERATIVE.	NONE
NUCLEAR BOILER	B21-N090K AND B21-N090P	BROKEN	MINIMUM PRESSURE SIGNAL	LOW VESSEL PRESSURE PERMISSIVE SIGNAL FOR CS (B) PRESSURE INTERLOCK VALVE TO OPEN DIVISION 2.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	LOW VESSEL PRESSURE PERMISSIVE SIGNAL FOR CS (B) PRESSURE INTERLOCK VALVE TO OPEN DIVISION 2 INOPERATIVE.	NONE
NUCLEAR BOILER	B21-N403B AND B21-N403F	BROKEN	MINIMUM PRESSURE SIGNAL	RRCS DIVISION 2 PRESSURE INITIATION INOPERATIVE (RECIRC PUMP TRIP, ARI, FEEDWATER RUNBACK, ACTUATE TIME DELAY FOR SLCS, AND RWCS ISOLATION). DIVISION 1 AVAILABLE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL		
NUCLEAR BOILER	B21-N085B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	RECORDER R610 INDICATES HIGH WATER LEVEL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL	RECORDER R610 INDICATES INACCURATE WATER LEVEL.	NONE
NUCLEAR BOILER	B21-N402B AND B21-N402F	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE (HIGH WATER LEVEL)	RRCS DIVISION 2 LEVEL INITIATION INOPERATIVE (RECIRC PUMP TRIP, ARI, ACTUATE TIME DELAY FOR SLCS, RWCS ISOLATE). DIVISION 1 AVAILABLE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 2 RRCS DIVISION 2 INITIATION (RECIRC PUMP TRIP, INITIATE ARI, ACTUATE TIME DELAY FOR SLCS AND RWCS ISOLATION).	REACTOR SCRAM.

INSTRUMENT LINE 1
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LINE 1 (N12, 160°) REFERENCE LINE

APPENDIX A

HOPE CREEK 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-N080B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	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 AND ISOLATION SIGNAL CHANNEL B.	NONE
NUCLEAR BOILER	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 WATER LEVEL 1 MSIV ISOLATION AND WATER LEVEL 2 ISOLATION CHANNEL B.	NONE
NUCLEAR BOILER	B21-N091B AND B21-N091F	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	RHR B, CS B, AND PARTIAL ADS INITIATION 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, CS B, AND PARTIAL ADS INITIATION. DIVISION 2 RCIC INITIATION. POSSIBLE START OF EMERGENCY DIESEL GENERATORS.	NONE
NUCLEAR BOILER	B21-N095B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	PARTIAL* ADS WATER LEVEL 3 INITIATION SIGNAL DIVISION 2 INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	PARTIAL ADS WATER LEVEL 3 INITIATION SIGNAL DIVISION 2.	NONE

*A PARTIAL INITIATION MEANS THAT SOME OF THE INPUTS NEEDED TO ACTUATE A PARTICULAR SYSTEM ARE PRESENT, BUT FURTHER INPUTS ARE STILL NECESSARY BEFORE THE SYSTEM FUNCTION IS INITIATED. A SYSTEM BEING PARTIALLY INOPERATIVE REFERS TO A CONDITION WHEREIN CERTAIN INPUTS TO A PARTICULAR DIVISION WILL NOT BE AVAILABLE TO INITIATE THAT DIVISION, BUT ANOTHER FULLY OPERATIONAL DIVISION IS STILL AVAILABLE TO INITIATE THE SYSTEM.

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HOPE CREEK 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
FEEDWATER CONTROL	C32-N004B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	C32-R606B WATER LEVEL INDICATOR HIGH READING. DECREASED FEEDWATER FLOW. HALF MAIN TURBINE TRIP AND RFPT TRIP ON HIGH WATER LEVEL. ANNUNCIATOR ALARM IN CONTROL ROOM.	CONTINUED CONTROL ON CHANNEL B WOULD RESULT IN LOWERED VESSEL WATER LEVEL, POSSIBLE SCRAM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	C32-R606B WATER LEVEL RECORDER AT INACCURATE READING. ANNUNCIATOR WILL ALARM IN CONTROL ROOM.	FLUCTUATION IN REACTOR WATER LEVEL.
NUCLEAR BOILER	B21-N078B	BROKEN	MINIMUM PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED.	NONE

LINE 1 (N12, 160°) REFERENCE LINE

APPENDIX A

HOPE CREEK 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-N097D AND B21-N097H	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	DIVISION 4 RCIC TURBINE TRIP SIGNAL. DIVISION 4 RCIC INITIATION INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE LEVEL 2 RCIC INITIATION DIVISION 4, RCIC TURBINE TRIP INOPERATIVE.	NONE
NUCLEAR BOILER	B21-N095D	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	PARTIAL ADS WATER LEVEL 3 INITIATION SIGNAL DIVISION 4 INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL)	POSSIBLE PARTIAL ADS WATER LEVEL 3 INITIATION, DIVISION 4.	NONE
NUCLEAR BOILER	B21-N080D	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	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
NUCLEAR BOILER	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 WATER LEVEL 1 MSIV ISOLATION AND WATER LEVEL 2 ISOLATION CHANNEL D.	NONE
NUCLEAR BOILER	B21-N078D	BROKEN	MINIMUM PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED.	NONE

INSTRUMENT LINE 2
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LINE 2 (N12, 10°) REFERENCE LINE

12-1975[24] (A-4)

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HOPE CREEK 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-N091D AND B21-N091H	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	RHR D, CS D, AND PARTIAL ADS INITIATION INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE RHR D, CS D, AND PARTIAL ADS INITIATION.	NONE

LINE 2 (N12, 10°) REFERENCE LINE

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HOPE CREEK 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-N080B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL, CHANNEL B.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	LEVEL 3 SCRAM AND ISOLATION SIGNAL ON CHANNEL B INOPERATIVE.	NONE
NUCLEAR BOILER	B21-N095B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	PARTIAL ADS WATER LEVEL 3 INITIATION, DIVISION 2.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	PARTIAL ADS WATER LEVEL 3 INITIATION SIGNAL DIVISION 2 INOPERATIVE.	NONE
FEEDWATER	C32-N004B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	C32-R606B WATER LEVEL INDICATOR FALSE LOW READING. INCREASED FEEDWATER FLOW. ANNUNCIATOR ALARM IN CONTROL ROOM.	CONTINUED CONTROL ON CHANNEL B WOULD RESULT IN HIGH WATER LEVEL IN VESSEL POSSIBLE TURBINE TRIP.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER	C32-R606B WATER LEVEL INDICATOR AT INACCURATE READING. REACTOR FEEDWATER ERROR IN LEVEL) LEVEL FOLLOWING.	NONE

INSTRUMENT LINE 3
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LINE 3 (N11, 160°) VARIABLE LINE

12-1975[24] (A-6)

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HOPE CREEK 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.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	LEVEL 3 SCRAM AND ISOLATION SIGNAL ON CHANNEL D INOPERATIVE.	NONE
NUCLEAR BOILER	B21-N095D	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	PARTIAL ADS WATER LEVEL 3 INITIATION, DIVISION 4.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	ADS WATER LEVEL 3 INITIATION SIGNAL INOPERATIVE, DIVISION 4.	NONE

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HOPE CREEK 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-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
NUCLEAR BOILER	B21-N091D AND B21-N091H	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	RHR D, CS D, AND PARTIAL ADS INITIATION.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	RHR D, CS D, AND PARTIAL ADS INITIATION INOPERATIVE.	NONE
NUCLEAR BOILER	B21-N097D AND B21-N097H	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	LEVEL 2 RCIC INITIATION DIVISION 4, RCIC TURBINE TRIP INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	POSSIBLE DIVISION 4 RCIC TURBINE TRIP SIGNAL, DIVISION 4 RCIC INITIAITON INOPERATIVE.	NONE

INSTRUMENT LINE 5
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LINE 5 (N16, 10°) VARIABLE LINE

12-1975[24] (A-8)

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HOPE CREEK 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-N402B AND B21-N402F	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	WATER LEVEL 2 RRCS DIVISION 2 INITIATION (RECIRC PUMP TRIP, INITIATE ARI, ACTUATE TIME DELAY FOR SLCS, AND RWCS ISOLATION).	REACTOR SCRAM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	RRCS DIVISION 2 LEVEL TRIP INOPERATIVE (RECIRC PUMP TRIP, ARI, SLCS, AND RWCS ISOLATE). DIVISION 1 AVAILABLE.	NONE
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
NUCLEAR BOILER	B21-N091B AND B21-N091F	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	RHR (B) CS/(B) INITIATION, DIVISION 2 RCIC LOW WATER LEVEL INITIATION. DIVISION 2 RCIC HIGH WATER LEVEL TURBINE TRIP INOPERATIVE. PARTIAL ADS INITIATION.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	RHR (B) CS/(B) HALF RCIC, AND PARTIAL ADS INITIATION INOPERATIVE. HALF RCIC HIGH WATER LEVEL TURBINE TRIP.	NONE

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LINE 6 (N16, 160°) VARIABLE LINE

APPENDIX A

HOPE CREEK 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
JET PUMP INSTRUMENTATION	B21-N034B	BROKEN	NO EFFECT; USE FOR INDICATION ONLY	NONE	NONE
		PLUGGED	NO EFFECT UPON CONTROL SYSTEMS; USE FOR INDICATION ONLY	NONE	NONE
NUCLEAR BOILER	B21-N085B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	RECORDER R610 INDICATES INACCURATE WATER LEVEL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL	RECORDER R610 INDICATES INACCURATE WATER LEVEL.	NONE

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LINE 7 (N8, 105°) VARIABLE LINE

12-1975[24] (A-10)

APPENDIX A

HOPE CREEK 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
REACTOR PROTECTION	C71-N050B	BROKEN	MINIMUM PRESSURE SIGNAL	ONE CHANNEL FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE. HIGH DRYWELL PRESSURE ISOLATION CLOSURE OF BALANCE OF PLANT ISOLATION VALVES INOPERATIVE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	ONE CHANNEL FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE. HIGH DRYWELL PRESSURE ISOLATION CLOSURE OF BALANCE OF PLANT ISOLATION VALVES INOPERATIVE.	NONE
NUCLEAR BOILER	B21-N094B AND B21-N094F	BROKEN	MINIMUM PRESSURE SIGNAL	HALF HIGH DRYWELL PRESSURE SIGNAL INOPERATIVE. CORE SPRAY PUMP B AUTO INITIATION INOPERATIVE. "B" TRIP TO ADS SAFETY RELIEF VALVES B21-F013A THROUGH -F013E INOPERATIVE. CLOSURE OF E51-F062 TURBINE EXHAUST LINE ISOLATION OUTBOARD VALVE ON HIGH DRYWELL PRESSURE LOW STEAM LINE PRESSURE INOPERATIVE. RHR B INITIATION ON HIGH DRYWELL PRESSURE INOPERATIVE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	RHR B INITIATION ON HIGH DRYWELL PRESSURE INOPERATIVE.	NONE

APPENDIX A

HOPE CREEK 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-N094D AND B21-N094H	BROKEN	MINIMUM PRESSURE SIGNAL	HALF HIGH DRYWELL PRESSURE SIGNAL INOPERATIVE. CORE SPRAY PUMP D AUTO INITIATION INOPERATIVE. "D" TRIP TO ADS SAFETY RELIEF VALVES B21-F013A THROUGH -F013E INOPERATIVE. CLOSURE OF E51-F084 TURBINE EXHAUST LINE ISOLATION INBOARD VALVE ON HIGH DRYWELL PRESSURE LOW STEAM LINE PRESSURE INOPERATIVE. RHR D INITIATION ON HIGH DRYWELL PRESSURE INOPERATIVE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	HALF HIGH DRYWELL PRESSURE SIGNAL INOPERATIVE. CORE SPRAY PUMP D AUTO INITIATION INOPERATIVE. "D" TRIP TO ADS SAFETY RELIEF VALVES B21-F013A THROUGH -F013E INOPERATIVE. CLOSURE OF E51-F084 TURBINE EXHAUST LINE ISOLATION INBOARD VALVE ON HIGH DRYWELL PRESSURE LOW STEAM LINE PRESSURE INOPERATIVE. RHR D INITIATION ON HIGH DRYWELL PRESSURE INOPERATIVE.	NONE
REACTOR PROTECTION	C71-N050B	BROKEN	MINIMUM PRESSURE SIGNAL	ONE CHANNEL FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE. HIGH DRYWELL PRESSURE CLOSURE OF E11-F040 RHR DISH TO RADWASTE OUTBOARD ISOLATION VALVE AND E11-F080A&B RHR SAMPLE LINE ISOLATION VALVES INOPERATIVE. HIGH DRYWELL PRESSURE CLOSURE TO BALANCE OF PLANT ISOLATION VALVES INOPERATIVE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	ONE CHANNEL FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE. HIGH DRYWELL PRESSURE CLOSURE TO BALANCE OF PLANT ISOLATION VALVES INOPERATIVE.	NONE
CONTAINMENT ATMOSPHERE CONTROL (M57)	PT-4960B2	BROKEN	MINIMUM PRESSURE SIGNAL	NONE, USED FOR INDICATION ONLY.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	NONE, USED FOR INDICATION ONLY.	NONE
CONTAINMENT ATMOSPHERE CONTROL (M57)	PT-4960B1,B3	BROKEN	LOW PRESSURE SIGNAL	NONE, USED FOR INDICATION ONLY.	NONE
		PLUGGED	INACCURATE PRESSURE SIGNAL	NONE, USED FOR INDICATION ONLY.	NONE

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LINE 10 (CONTAINMENT PENETRATION J10D)

12-1975[24] (A-12)

APPENDIX A

HOPE CREEK 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)	INACCURATE READING.	NONE
FEEDWATER CONTROL	C32-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)	INACCURATE READING.	NONE

APPENDIX A

HOPE CREEK 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 3 SCRAM AND ISOLATION SIGNAL CHANNEL A INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL)	POSSIBLE WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL A.	NONE
NUCLEAR BOILER	B21-N081A	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	HALF OF WATER LEVEL 1 MSIV ISOLATION INOPERATIVE. HALF OF WATER LEVEL 2 ISOLATION INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 1 MSIV ISOLATION AND WATER LEVEL 2 ISOLATION CHANNEL A.	NONE
NUCLEAR BOILER	B21-N091A AND B21-N091E	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	RHR A, CS A INITIATION INOPERATIVE. DIVISION 1 HPCI TURBINE TRIP ON HIGH WATER LEVEL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	DIVISION 1 HPCI INITIATION INOPERATIVE. POSSIBLE RHR A AND CS A INITIATION, DIVISION 1 HPCI INITIATION.	NONE

APPENDIX A

HOPE CREEK 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-N090A AND B21-N090E	BROKEN	MINIMUM PRESSURE SIGNAL	LOW VESSEL PRESSURE PERMISSIVE SIGNAL FOR CS (A) AND RHR (A) INITIATION ON DIVISION 1.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	LOW VESSEL PRESSURE PERMISSIVE SIGNAL FOR CS (A) AND RHR (A) INITIATION ON DIVISION 1 INOPERATIVE.	NONE
NUCLEAR BOILER	B21-N090J AND B21-N090N	BROKEN	MINIMUM PRESSURE SIGNAL	LOW VESSEL PRESSURE PERMISSIVE SIGNAL FOR CS (A) PRESSURE INTERLOCK VALVE TO OPEN DIVISION 1.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	LOW VESSEL PRESSURE PERMISSIVE SIGNAL FOR CS (A) INOPERATIVE.	NONE

APPENDIX A

HOPE CREEK 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-N402A AND B21-N402E	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	RRCS DIVISION 1 INOPERATIVE (RECIRC PUMP TRIP, ARI, SLCS, RWCS ISOLATE). DIVISION 2 AVAILABLE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 2 RRCS DIVISION 1 INITIATION (RECIRC PUMP TRIP, INITIATE ARI, ACTIVATE TIME DELAY FOR SLCS AND RWCS ISOLATION).	POSSIBLE REACTOR SCRAM.
NUCLEAR BOILER	B21-N403A AND B21-N403E	BROKEN	MINIMUM PRESSURE SIGNAL	RRCS DIVISION 1 PRESSURE INITIATION TRIP INOPERATIVE (REIRC PUMP TRIP, ARI FEEDWATER RUNBACK, SLCS, RWCS ISOLATE). DIVISION 2 AVAILABLE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL		
NUCLEAR BOILER	B21-N085A	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	RECORDER R615 INDICATES HIGH WATER LEVEL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL	RECORDER R615 INDICATES INACCURATE WATER LEVEL.	NONE

LINE 12 (N12, 190°) REFERENCE LINE

APPENDIX A

HOPE CREEK 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
FEEDWATER CONTROL	C32-N004A	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	C32-R606A WATER LEVEL INDICATOR FALSE HIGH READING. DECREASED FEEDWATER FLOW. HALF MAIN TURBINE AND RFPT TRIP ON HIGH WATER LEVEL. ANNUNCIATOR ALARM IN CONTROL ROOM. OPERATOR WOULD HAVE TO IGNORE ANNUNCIATOR ALARM.	CONTROL ON CHANNEL A WOULD RESULT IN LOWERED VESSEL WATER LEVEL, POSSIBLE SCRAM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	C32-R606A WATER LEVEL INDICATOR AT INACCURATE READING. REACTOR FEEDWATER ERROR IN LEVEL FOLLOWING.	CONTINUED CONTROL ON CHANNEL A COULD RESULT IN RPV WATER LEVEL FLUCTUATION.
NUCLEAR BOILER	B21-N078A	BROKEN	MINIMUM PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED.	NONE

LINE 12 (N12, 190°) REFERENCE LINE

APPENDIX A

HOPE CREEK 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
FEEDWATER CONTROL	C32-N008	BROKEN	MINIMUM PRESSURE SIGNAL	PRESSURE RECORDER R609 WILL INDICATE LOW REACTOR PRESSURE.	NONE
			CONSTANT PRESSURE SIGNAL	PRESSURE RECORDER R609 WILL INDICATE INCORRECT REACTOR VESSEL PRESSURE.	NONE
FEEDWATER CONTROL	C32-N005	BROKEN	MINIMUM PRESSURE SIGNAL	HIGH PRESSURE ALARM (K636) INOPERATIVE, PRESSURE RECORDER (R605) AT MINIMUM PRESSURE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	HIGH PRESSURE ALARM (K636) INOPERATIVE, PRESSURE RECORDER (R605) AT CONSTANT PRESSURE.	NONE

LINE 12 (N12, 190°) REFERENCE LINE

APPENDIX A

HOPE CREEK 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-N081C	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	POSSIBLE WATER LEVEL 1 MSIV ISOLATION INOPERATIVE, HALF OF WATER LEVEL 2 ISOLATION INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 1 MSIV ISOLATION AND WATER LEVEL 2 ISOLATION CHANNEL C.	NONE
	B21-N091C AND B21-N091G	BROKEN	MAXIMUM DIFFERNENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	RHR C AND CS C INITIATION INOPERATIVE. DIVISION 3 HPCI HIGH WATER LEVEL TURBINE TRIP. DIVISION 3 HPCI INITIATION INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE RHR C AND CS C INITIATION. DIVISION 3 HPCI INITIATION.	NONE
FEEDWATER CONTROL	C32-N004C	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	C32-R606C WATER LEVEL INDICATOR FALSE HIGH READING. HALF MAIN TURBINE AND RFPT TRIP ON HIGH WATER LEVEL. ANNUNCIATOR ALARM IN CONTROL ROOM.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	C33-R606C WATER LEVEL INDICATOR AT INACCURATE READING.	NONE
NUCLEAR BOILER	B21-N080C	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH WATER LEVEL)	WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL C INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE LOW WATER LEVEL SIGNAL)	POSSIBLE WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL C.	NONE
NUCLEAR BOILER	B21-N078C	BROKEN	MINIMUM PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON ONE CHANNEL DISABLED.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	HIGH RPV PRESSURE SCRAM SIGNAL ON THE CHANNEL DISABLED.	

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LINE 13, (N12, 340°) REFERENCE LINE

12-1975[24] (A-19)

APPENDIX A

HOPE CREEK 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
FEEDWATER CONTROL	C32-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
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
NUCLEAR BOILER	B21-N080A	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL ON CHANNEL A.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	LEVEL 3 SCRAM AND ISOLATION SIGNAL ON CHANNEL A INOPERATIVE.	NONE
FEEDWATER	C32-N004A	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	C32-R606A WATER LEVEL INDICATOR FALSE LOW READING. INCREASED FEEDWATER FLOW. ANNUNCIATOR ALARM IN CONTROL ROOM.	CONTINUED CONTROL ON CHANNEL A WOULD RESULT IN HIGH WATER LEVEL IN VESSEL, POSSIBLE TURBINE TRIP.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	C32-R606A WATER LEVEL INDICATOR AT INACCURATE READING. REACTOR FEEDWATER ERROR IN LEVEL FOLLOWING.	NONE

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LINE 14, (N11, 190°) VARIABLE LINE

12-1975[24] (A-20)

APPENDIX A

HOPE CREEK 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
FEEDWATER CONTROL	C32-N004C	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	C32-R606C WATER LEVEL INDICATOR FALSE LOW READING. LEVEL SIGNAL FAILURE ANNUNCIATOR ALARM IN CONTROL ROOM.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (WATER LEVEL)	C32-R606C WATER LEVEL INDICATOR AT INACCURATE READING.	NONE
NUCLEAR BOILER	B21-N080C	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	WATER LEVEL 3 SCRAM AND ISOLATION SIGNAL CHANNEL C.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	LEVEL 3 SCRAM AND ISOLATION SIGNAL ON CHANNEL C INOPERATIVE.	NONE

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LINE 15 (N11, 340°) VARIABLE LINE

12-1975[24] (A-21)

APPENDIX A

HOPE CREEK 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-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)	HALF WATER LEVEL 1 MSIV ISOLATION AND HALF WATER LEVEL 2 ISOLATION SIGNAL INOPERATIVE.	NONE
	B21-N091C AND B21-N091G	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	RHR C AND CS C INITIATION. DIVISION 3 HPCI INITIATION. DIVISION 3 HIGH WATER LEVEL HPCI TURBINE TRIP INOPERATIVE.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	RHR C AND CS C INITIATION INOPERATIVE. DIVISION 3 HPCI INITIATION INOPERATIVE. DIVISION 3 HIGH WATER LEVEL HPCI TURBINE TRIP.	NONE

LINE 16 (N16, 340°) VARIABLE LINE

APPENDIX A

HOPE CREEK 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-N402A AND B21-N402E	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	WATER LEVEL 2 RRCS DIVISION 1 INITIATION (RECIRC PUMP TRIP, INITIATE ARI, ACTIVATE TIME DELAY FOR SLCS, AND RWCS ISOLATION).	REACTOR SCRAM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	RRCS DIVISION 1 INOPERATIVE (RECIRC PUMP TRIP, ARI, SLCS AND RWCS ISOLATION). DIVISION 2 AVAILABLE.	NONE
NUCLEAR BOILER	B21-N081A	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
NUCLEAR BOILER	B21-N091A AND B21-N091E	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	RHR A AND CS A INITIATION. DIVISION 1 HPCI INITIATION.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (POSSIBLE HIGH WATER LEVEL SIGNAL)	RHR A, CS A INITIATION INOPERATIVE. DIVISION 1 HIGH WATER LEVEL HPCI TURBINE TRIP.	NONE

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LINE 17 (N16, 190°) VARIABLE LINE

12-1975[24] (A-23)

APPENDIX A

HOPE CREEK 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
JET PUMP INSTRUMENTATION	B21-N033A	BROKEN	FLOW TRANSMITTER READING WILL BE INACCURATE	NONE. USED FOR JET PUMP CALIBRATION ONLY.	NONE
		PLUGGED	FLOW TRANSMITTER READING WILL BE INACCURATE	NONE. USED FOR JET PUMP CALIBRATION ONLY.	NONE
JET PUMP INSTRUMENTATION	B21-N034J	BROKEN	FLOW TRANSMITTER WILL BE INACCURATE	NONE. USED FOR JET PUMP CALIBRATION.	NONE
		PLUGGED	FLOW TRANSMITTER WILL BE INACCURATE	NONE. USED FOR JET PUMP CALIBRATION.	NONE

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LINE 18 (N8, 285°) VARIABLE LINE

APPENDIX A

HOPE CREEK 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-N085A	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW WATER LEVEL)	LEVEL RECORDER B21-R615 INDICATES LOW WATER LEVEL.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL	LEVEL RECORDER B21-R615 INACCURATE.	NONE

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LINE 19 (HIGH PRESSURE CONNECTOR)

12-1975[24] (A-25)

APPENDIX A

HOPE CREEK 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-N032	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL	DIFFERENTIAL PRESSURE/FLOW RECORDER R613 INDICATES MINIMUM PRESSURE/FLOW.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL	DIFFERENTIAL PRESSURE/FLOW RECORDER R613 INDICATES INACCURATE PRESSURE/ FLOW.	NONE
REACTOR WATER CLEANUP	G33-N037	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL	INSTRUMENT USED TO MEASURE FLOW THROUGH DRAIN LINE, DRAIN NOT USED DURING NORMAL OPERATION.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL	SEE ABOVE FOR BROKEN LINE.	NONE
NUCLEAR BOILER	B21-N034J	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL	NONE. USED FOR INDICATION ONLY.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL	NONE. USED FOR INDICATION ONLY.	NONE

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LINE 21 (PRESSURE BELOW CORE PLATE)

12-1975[24] (A-26)

APPENDIX A

HOPE CREEK COMMON SENSOR FAILURE

SYSTEM ID	COMMON TAP SENSOR NO.	FAILURE TYPE (BROKEN OR PLUGGED)	PRIMARY EFFECT	SECONDARY EFFECT	EFFECT ON RPV WATER LEVEL, PRESSURE OR POWER
REACTOR PROTECTION	C71-N050A	BROKEN	MINIMUM PRESSURE SIGNAL	ONE CHANNEL FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE. HIGH DRYWELL PRESSURE ISOLATION CLOSURE OF E11-F049 RHR DISH TO RADWASTE INBD ISOL VALVE AND E11-F079A&B. RHR SAMPLE LINE ISOLATION VALVES INOPERATIVE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	ONE CHANNEL FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE.	NONE
NUCLEAR BOILER	B21-N094A AND B21-N094E	BROKEN	MINIMUM PRESSURE SIGNAL	HALF HIGH DRYWELL PRESSURE SIGNAL INOPERATIVE. CORE SPRAY PUMP A AUTO INITIATION INOPERATIVE. RHR A INITIATION ON HIGH DRYWELL PRESSURE INOPERATIVE. HIGH DRYWELL PRESSURE HPCI INITIATION OPERATIVE (CHANNEL A LOST, BUT CHANNEL C AVAILABLE - B21-N094C&G). AUTO OPEN E11-F021A AND E11-F016A CONTAINMENT SPRAY OUTBOARD AND INBOARD VALVES INOPERATIVE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	AUTO OPEN E11-F021A AND E11-F016A CONTAINMENT SPRAY OUTBOARD AND INBOARD VALVES INOPERATIVE.	NONE
CONTAINMENT ATMOSPHERIC CONTROL (M57)	PT-4960A1	BROKEN	LOW PRESSURE SIGNAL	USED FOR INDICATION ONLY; NO EFFECT.	NONE
		PLUGGED	INACCURATE PRESSURE SIGNAL	USED FOR INDICATION ONLY; NO EFFECT.	NONE
	PT-4960A2	BROKEN	LOW PRESSURE SIGNAL	USED FOR INDICATION ONLY; NO EFFECT.	NONE
		PLUGGED	INACURRATE PRESSURE SIGNAL	USED FOR INDICATION ONLY; NO EFFECT.	NONE
	PT-4960A3	BROKEN	NO EFFECT.	USED FOR INDICATION ONLY; NO EFFECT.	NONE
		PLUGGED	NO EFFECT.	USED FOR INDICATION ONLY; NO EFFECT.	NONE

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LINE 22 (CONTAINMENT PENETRATION J6A)

12-1975[24] (A-27)

APPENDIX A

HOPE CREEK 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-N094C AND B21-N094G	BROKEN	CONSTANT PRESSURE SIGNAL	HIGH DRYWELL PRESSURE CORE SPRAY PUMP C AUTO INITIATION INOPERATIVE. RHR C INITIATION ON HIGH DRYWELL PRESSURE INOPERATIVE. HIGH DRYWELL PRESSURE HPCI INITIATION OPERATIVE (CHANNEL C LOST, BUT CHANNEL A AVAILABLE - P?1-N094A&E).	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	(CHANNEL C LOST, BUT CHANNEL A AVAILABLE - B21-N094A&E).	NONE
REACTOR PROTECTION	C71-N050C	BROKEN	MINIMUM PRESSURE SIGNAL	ONE CHANNEL FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE. HIGH DRYWELL PRESSURE CLOSURE OF BALANCE OF PLANT ISOLATION VALVES INOPERATIVE.	NONE
		PLUGGED	CONSTANT PRESSURE SIGNAL	ONE CHANNEL FOR SCRAM ON HIGH DRYWELL PRESSURE INOPERATIVE. HIGH DRYWELL PRESSURE CLOSURE OF BALANCE OF PLANT ISOLATION VALVES INOPERATIVE.	NONE

LINE 23 (CONTAINMENT PENETRATION J8D)

APPENDIX A

HOPE CREEK 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-N086A AND B21-N086B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW FLOW)	MSIV CLOSURE CHANNELS A AND B INOPERATIVE; BACKED UP BY CHANNELS C AND D.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	MSIV CLOSURE CHANNELS A AND B INOPERATIVE; BACKED UP BY CHANNELS C AND D.	NONE
FEEDWATER CONTROL	C32-N003A	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW FLOW)	LOW FLOW INDICATION ON ONE STEAM LINE TO FEEDWATER CONTROLLER WHICH TOTALS FLOW FROM ALL STEAM LINES AND DECREASES FEEDWATER ACCORDINGLY.	MINOR DECREASE IN WATER LEVEL, BUT RPV LEVEL SENSORS FEED BACK TO CONTROLLER, CAUSING INCREASED FEEDWATER FLOW WHICH READJUSTS RPV WATER LEVEL.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION IN ONE STEAMLINE; SUBSEQUENT SMALL ERROR IN FEEDWATER FLOW.	MINOR FLUCTUATIONS IN RPV WATER LEVEL

INSTRUMENT LINE 24
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LINE 24 (CONDENSING CHAMBER D008A ON STEAM LINE "A", HIGH PRESSURE SIDE)

APPENDIX A

HOPE CREEK 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-N087A AND B21-N087B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW FLOW)	MSIV CLOSURE CHANNELS A AND B INOPERATIVE; BACKED UP BY CHANNELS C AND D.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	MSIV CLOSURE CHANNELS A AND B INOPERATIVE; BACKED UP BY CHANNELS C AND D.	NONE
FEEDWATER CONTROL	C32-N003B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW FLOW)	LOW FLOW INDICATION ON ONE STEAM LINE TO FEEDWATER CONTROLLER WHICH TOTALS FLOW FROM ALL STEAM LINES AND DECREASES FEEDWATER ACCORDINGLY.	MINOR DECREASE IN WATER LEVEL, BUT RPV LEVEL SENSORS FEED BACK TO CONTROLLER, CAUSING INCREASED FEEDWATER FLOW WHICH READJUSTS RPV WATER LEVEL.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION IN ONE STEAMLINE; SUBSEQUENT SMALL ERROR IN FEEDWATER FLOW.	MINOR FLUCTUATIONS IN RPV WATER LEVEL, SEE NOTE ABOVE.

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LINE 25 (CONDENSING CHAMBER D008A ON STEAM LINE "B", HIGH PRESSURE SIDE)

12-1975[24] (A-30)

APPENDIX A

HOPE CREEK 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-N088A AND B21-N088B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW FLOW)	MSIV CLOSURE CHANNELS A AND B INOPERATIVE; BACKED UP BY CHANNELS C AND D.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	MSIV CLOSURE CHANNELS A AND B INOPERATIVE; BACKED UP BY CHANNELS C AND D.	NONE
FEEDWATER CONTROL	C32-N003C	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (LOW FLOW)	LOW FLOW INDICATION ON ONE STEAM LINE TO FEEDWATER CONTROLLER (WHICH TOTALS FLOW FROM ALL STEAM LINES AND DECREASES FEEDWATER ACCORDINGLY).	MINOR DECREASE IN WATER LEVEL, BUT RPV LEVEL SENSORS FEED BACK TO CONTROLLER, CAUSING INCREASED FEEDWATER FLOW WHICH READJUSTS RPV WATER LEVEL.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION IN ONE STEAMLINE; SUBSEQUENT SMALL ERROR IN FEEDWATER FLOW.	MINOR FLUCTUATIONS IN RPV WATER LEVEL, SEE NOTE ABOVE.

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LINE 26 (CONDENSING CHAMBER D008A ON STEAM LINE "C" "IGH PRESSURE SIDE)

APPENDIX A

HOPE CREEK 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-N089A AND B21-N089B	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL	MSIV CLOSURE CHANNELS A AND B INOPERATIVE; BACKED UP BY CHANNELS C AND D.	NONE
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	MSIV CLOSURE CHANNELS A AND B INOPERATIVE; BACKED UP BY CHANNELS C AND D.	NONE
FEEDWATER CONTROL	C32-N003D	BROKEN	MINIMUM DIFFERENTIAL PRESSURE SIGNAL (FLOW)	LOW FLOW INDICATION ON ONE STEAM LINE TO FEEDWATER CONTROLLER WHICH TOTALS FLOW FROM ALL STEAM LINES AND DECREASES FEEDWATER ACCORDINGLY.	MINOR DECREASE IN WATER LEVEL, BUT RPV LEVEL SENSORS FEED BACK TO CONTROLLER, CAUSING INCREASED FEEDWATER FLOW WHICH READJUSTS RPV WATER LEVEL.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION IN ONE STEAMLINE; SUBSEQUENT SMALL ERROR IN FEEDWATER FLOW.	MINOR FLUCTUATIONS IN RPV WATER LEVEL, SEE NOTE ABOVE.

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LINE 27 (CONDENSING CHAMBER D008A ON STEAM LINE "D", HIGH PRESSURE SIDE)

12-1975[24] (A-32)

APPENDIX A

HOPE CREEK 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-N086A AND B21-N086B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH FLOW)	SIGNAL TO ISOLATE MSIVs DUE TO HIGH STEAM FLOW.	REACTOR SCRAM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION FROM ONE OF THE MAIN STEAM LINES.	NONE
FEEDWATER CONTROL	C32-N003A	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH FLOW)	HIGH FLOW INDICATION ON ONE STEAM LINE TO FEEDWATER CONTROLLER (WHICH TOTALS FLOW FROM ALL STEAM LINES AND INCREASES FEEDWATER ACCORDINGLY).	MINOR INCREASE IN WATER LEVEL, BUT RPV LEVEL SENSORS FEED BACK TO CONTROLLER, CAUSING DECREASED FEEDWATER FLOW.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION FROM ONE STEAM LINE; SUBSEQUENT SMALL ERROR IN FEEDWATER FLOW.	MINOR FLUCTUATIONS IN RPV WATER LEVEL, SEE NOTE ABOVE.

INSTRUMENT LINE 28
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LINE 28 (CONDENSING CHAMBER D007A ON STEAM LINE "A", LOW PRESSURE SIDE)

APPENDIX A

HOPE CREEK 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-N087A AND B21-N087B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH FLOW)	SIGNAL TO ISOLATE MSIVs DUE TO HIGH STEAM FLOW.	REACTOR SCRAM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION FROM ONE OF THE MAIN STEAM LINES.	NONE
FEEDWATER CONTROL	C32-N003B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH FLOW)	HIGH FLOW INDICATION ON ONE STEAM LINE TO FEEDWATER CONTROLLER WHICH TOTALS FLOW FROM ALL STEAM LINES AND INCREASES FEEDWATER ACCORDINGLY.	MINOR INCREASE IN WATER LEVEL, BUT RPV LEVEL SENSORS FEED BACK TO CONTROLLER, CAUSING DECREASED FEEDWATER FLOW.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION FROM ONE STEAM LINE; SUBSEQUENT SMALL ERROR IN FEEDWATER FLOW.	MINOR FLUCTUATIONS IN RPV WATER LEVEL, SEE NOTE ABOVE.

INSTRUMENT LINE 29
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LINE 29 (CONDENSING CHAMBER D007A ON STEAM LINE "B", LOW PRESSURE SIDE)

APPENDIX A

HOPE CREEK 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-N088A AND B21-N088B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH FLOW)	SIGNAL TO ISOLATE MSIVs DUE TO HIGH STEAM FLOW.	REACTOR SCRAM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION FROM ONE OF THE MAIN STEAM LINES.	NONE
FEEDWATER CONTROL	C32-N003C	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH FLOW)	HIGH FLOW INDICATION ON ONE STEAM LINE TO FEEDWATER CONTROLLER WHICH TOTALS FLOW FROM ALL STEAM LINES AND INCREASES FEEDWATER ACCORDINGLY.	MINOR INCREASE IN WATER LEVEL, BUT RPV LEVEL SENSORS FEED BACK TO CONTROLLER, CAUSING DECREASED FEEDWATER FLOW.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION FROM ONE STEAM LINE; SUBSEQUENT SMALL ERROR IN FEEDWATER FLOW.	MINOR FLUCTUATIONS IN RPV WATER LEVEL, SEE NOTE ABOVE.

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LINE 30 (CONDENSING CHAMBER D007A ON STEAM LINE "C", LOW PRESSURE SIDE)

12-1975[24] (A-35)

APPENDIX A

HOPE CREEK 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-N089A AND B21-N089B	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH FLOW)	SIGNAL TO ISOLATE MSIVs DUE TO HIGH STEAM FLOW.	REACTOR SCRAM.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION FROM ONE OF THE MAIN STEAM LINES.	NONE
FEEDWATER CONTROL	C32-N003D	BROKEN	MAXIMUM DIFFERENTIAL PRESSURE SIGNAL (HIGH FLOW)	HIGH FLOW INDICATION ON ONE STEAM LINE TO FEEDWATER CONTROLLER (WHICH TOTALS FLOW FROM ALL STEAM LINES AND INCREASES FEEDWATER ACCORDINGLY).	MINOR INCREASE IN WATER LEVEL, BUT RPV LEVEL SENSORS FEED BACK TO CONTROLLER, CAUSING DECREASED FEEDWATER FLOW.
		PLUGGED	INACCURATE DIFFERENTIAL PRESSURE SIGNAL (FLOW)	INACCURATE FLOW INDICATION FROM ONE STEAM LINE; SUBSEQUENT SMALL ERROR IN FEEDWATER FLOW.	MINOR FLUCTUATIONS IN RPV WATER LEVEL, SEE NOTE ABOVE.

INSTRUMENT LINE 31
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LINE 31 (CONDENSING CHAMBER D007A ON STEAM LINE "D", LOW PRESSURE SIDE)

12-1975[24] (A-36)

APPENDIX A

HOPE CREEK 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
CONTROL ROD DRIVE	C11-N054A	BROKEN	MINIMUM PRESSURE SIGNAL	POWER INDICATION BELOW 20% ENFORCED ROD PATTERN CONTROL.	NONE
		PLUGGED	INACCURATE PRESSURE SIGNAL	NONE	NONE
REACTOR PROTECTION	C71-N052A AND C71-N052B	BROKEN	MINIMUM PRESSURE SIGNAL		NONE
		PLUGGED	INACCURATE PRESSURE SIGNAL	NONE	NONE

INSTRUMENT LINE 32
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LINE 32 (FIRST STAGE PRESSURE, HP TURBINE)

12-1975[24] (A-37)

APPENDIX A

HOPE CREEK 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
CONTROL ROD DRIVE	C11-N054B	BROKEN	MINIMUM PRESSURE SIGNAL	POWER INDICATION BELOW 20% ENFORCED ROD PATTERN CONTROL.	NONE
		PLUGGED	INACCURATE PRESSURE CONTROL	NONE	NONE
REACTOR PROTECTION	C71-N052C AND C71-N052D	BROKEN	MINIMUM PRESSURE SIGNAL	POWER INDICATION BELOW 30% REESTABLISH TURBINE STOP VALVE CLOSURE, CONTROL VALVE FAST CLOSURE SCRAM BYPASS.	NONE
		PLUGGED	INACCURATE PRESSURE SIGNAL	NONE	NONE

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LINE 33 (FIRST STAGE PRESSURE, HP TURBINE)

12-1975[24] (A-38)

APPENDIX B

HOPE CREEK 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
STATOR COOLING WATER SYSTEM (GEN SYS)	PSLL-3589A-C	BROKEN	SENSOR FAILS LOW	2/3 LOGIC WILL TRIP TURBINE, GENERATOR	REACTOR LOAD RUNBACK, SLIGHT INCREASE IN REACTOR WATER LEVEL, PRESSURE.
		PLUGGED	SENSOR FAILS LOW	LOSS OF STATOR COOLING TRIP SIGNAL	NONE

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LINE 34 VARIABLE LINE

38-0211 (B-1)

APPENDIX B

HOPE CREEK 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
STEAM SEAL SYSTEM (M29)	PT-1998, PSL-1997, PT-1996, PIC-2038	BROKEN	AUXILIARY STEAM SUPPLY VALVE OPENS	NONE	NONE
		PLUGGED	INACCURATE INDICATION OF SEALING STEAM PRESSURE	NONE	NONE

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PAGE 1 OF 1

LINE 35 VARIABLE LINE

38-0211 (B-2)

APPENDIX B

HOPE CREEK 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
CONDENSATE AND REFUELING WATER STORAGE AND TRANSFER (M8)	LT-2040A LT-2040B	BROKEN PLUGGED	SENSES LOW LEVEL	CONDENSATE TANK DEMINERALIZED WATER MAKEUP VALVE HV-2041 ENERGIZES TO FILL THE TANK. DOES NOT SHUT OFF THE MAKEUP WATER VALVE ON HIGH LEVEL.	NONE

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LINE 36 VARIABLE LINE

38-0211 (B-3)

APPENDIX B

HOPE CREEK 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
CONDENSATE SYSTEM (M5)	PSH-1056A,B,C PSH-1058A,B,C PSH-1060A,B,C	BROKEN	SENSES HIGH PRESSURE (ATMOSPHERE)	TRIPS TURBINE.	WILL TRIP THE REACTOR FEED PUMPS.
	PSH-1664A,B,C	PLUGGED	INACCURATE PRESSURE SIGNAL	DUE TO INCORRECT PRESSURE, MAY NOT TRIP THE TURBINE ON HIGH PRESSURE (LOW VACUUM).	NO EFFECT AT NORMAL OPERATION.

APPENDIX B

HOPE CREEK 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
FEEDWATER SYSTEM (M6)	PSHH-1788-1 PSHH-1788-2 PSHH-1788-3	BOTH	INACCURATE PRESSURE SIGNAL	WILL INHIBIT FEEDWATER LINE HIGH PRESSURE FEED PUMP TRIP.	NONE

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LINE 38 VARIABLE LINE

38-0211 (B-5)

APPENDIX B

HOPE CREEK 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
LUBE OIL SYSTEM PRESSURE (M19)	PSL-3118A-C	BROKEN	SENSOR READS LOW	2/3 LOGIC WILL TRIP THE TURBINE/GEN.	REACTOR LOAD RUNBACK, SLIGHT INCREASE IN REACTOR WATER LEVEL/PRESSURE.
		PLUGGED	LOSS OF LUBE OIL PRESSURE TRIP SIGNAL	NONE	NONE

INSTRUMENT LINE 39
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LINE 39 VARIABLE LINE

38-0211 (B-6)

APPENDIX C
CRITERIA FOR ELIMINATION OF SYSTEMS AND COMPONENTS OF SYSTEMS FROM THE CONTROL SYSTEMS FAILURE ANALYSIS

Elimination Criterion*	Basis
N1	Nonelectrical components (i.e., mechanical and structural components); however, associated functions that are electrically controlled or controlling (including signal inputs to electrical systems) may be relevant to the analysis. N1 examples are piping, tanks, turbines, etc.
N2	Instrumentation with no direct or indirect controlling function or passive input (such as a permissive signal) into control logic. Instrumentation and other dedicated inputs to the process computer, as well as the computer itself, are excluded. Operator actions as a result of indications are not considered control functions for the control systems failure analysis.
N3	Control systems and controlled components (i.e., pumps, valves) that have no direct or indirect interaction with reactor operation/parameters. Examples are communications, most unit heaters and controls, lighting controls, ventilation control systems for exterior building, machine shop equipment, refueling or maintenance equipment controls, etc.
N4	Control systems and controlled components (i.e., pumps, valves) that do interact or interface with reactor operating systems but cannot affect the reactor parameters (water level, pressure or reactivity) either directly or indirectly.
N5	Systems or components that cannot affect reactor parameters within 30 minutes of the loss of any power bus or combination thereof.
N6	Systems that are not used during normal power operation. For example, start-up, shutdown or refueling systems not used during normal operation may be eliminated.
N7	Electrical components involved in distribution, tranformation or interruption of power; however, controls for these components may need to be considered if loss of such control power may lead to failure of other electrical busses.
N8	Safety systems, except for their response to conditions brought about by control systems failures. Example: A level 3 scram will be assumed for a loss-of-feedwater event.

* In some cases, more than one of these criteria may apply.

APPENDIX D
HCGS COMMON SENSOR FAILURE ANALYSIS -
SYSTEM ELIMINATION PROCESS

RELATED P&ID	GE MPL NO.	ELIMINATION CRITERION	SYSTEM/SUBSYSTEMS
			I. REACTOR SYSTEMS
M42	B21	*	Nuclear Boiler Vessel Instrumentation
M43	B31	*	Reactor Recirculation System
M44/M45	G33	*	Reactor Water Cleanup System (RWCU)
M46/M47	C11	*	Control Rod Drive Hydraulics System
M48	C41	N8/N6	Standby Liquid Control System (SLC)
M49/M50	E51	N8/N6	Reactor Core Isolation Cooling (RCIC)
M51	E21	N8/N6	Residual Heat Removal System (RHR)
M52	E21	N8/N6	Core Spray System (CS)
M55/M56	E41	N8/N6	High Pressure Cooling Injection (HPCI)
M41	B21	N8	Automatic Depressurization System (ADS)
M42	B21	*	Jet Pump Instrumentation System
M41	B21	N8	Nuclear Steam Supply Shutoff System
Various		N8	Primary Containment Isolation System
	C22	N8	Redundant Reactivity Control System
M72		N8/N6	Main Steam Isolation Valve Sealing System
M53/M54		N3	Fuel Pool Cooling & Torus Water Cleanup
M57		*	Containment Atmosphere Control
M58		N8/N6	Containment Hydrogen Recombination System
M57		N1	Primary Containment Vacuum Relief System
	C51	*	Neutron Monitoring System
M41		N3	Safety Relief Valve Position Indication
	C11	*	Reactor Manual Control System

* To be included in analysis.

APPENDIX D
HCGS COMMON SENSOR FAILURE ANALYSIS -
SYSTEM ELIMINATION PROCESS

RELATED P&ID	GE MPL NO.	ELIMINATION CRITERION	SYSTEM/SUBSYSTEMS
M59		*	Primary Containment Instrument Gas System
Various		N6/N8	Remote Shutdown System
M38		N6	Post Accident Liquid & Gas Sampling

* To be included in analysis.

APPENDIX D
HCGS COMMON SENSOR FAILURE ANALYSIS -
SYSTEM ELIMINATION PROCESS

RELATED P&ID	GE MPL NO.	ELIMINATION CRITERION	SYSTEM/SUBSYSTEMS
			II. TURBINE/GENERATOR SYSTEM
M1		*	Main Steam System
		*	Main Turbine System
		*	Turbine Control System
M2		*	Extraction Steam System
M3/M4		*	Heater Vent & Drain System
M5		*	Condensate System
M6		*	Feedwater System
	C32	*	Feedwater Control System
M7		*	Condenser Air Removal System
M8		*	Condensate & Refueling Water Storage & Transfer
M16		*	Condensate Demineralizer
M19		*	Lube Oil System
M29		*	Turbine Sealing Steam
M31		*	Reactor Feed Pump Turbine Steam System
M9		*	Circulating Water System
		*	Generator System
		*	Generator Excitation System
M28		*	Generator Gas Control System

* To be included in analysis.

APPENDIX D
HCGS COMMON SENSOR FAILURE ANALYSIS -
SYSTEM ELIMINATION PROCESS

RELATED P&ID	GE MPL NO.	ELIMINATION CRITERION	SYSTEM/SUBSYSTEMS
			III. AUXILIARY SYSTEMS
		N8/N6	Diesel Generator System
M30		N8/N6	Diesel Engine Auxiliary System
M20		N3/N6	Auxiliary Boiler Fuel Oil System
M21		N3/N6	Auxiliary Steam System
M10		*	Service Water System
M11		*	Safety Aux Cooling (SAC), Reactor Building
M12		*	Safety Aux Cooling, Aux Building
M13		*	Reactor Auxiliary Cooling (RAC)
M14		*	Turbine Auxiliary Cooling
M24		*	Circulation & Service Water Hypochlorination & CW Acid Injection
M15		*	Compressed Air System
M18		N4	Demineralizer Water Makeup Storage & Transfer
M22		N3	Fire Protection
M23		N4	Process Sampling
M25	B21	*	Plant Leak Detection System
M26		*	Radiological Monitoring System
M33		N3	Low Volume & Oily Wastewater Treatment
M17		N3	Fresh Water Supply
M71		*	Liquid N_2 for Purge & Containment Inerting
M94/M97		N3	Building Drainage System
M99		N6	Building Sewage System
M60		N3	Primary Containment Leak Testing
		N3	Site Environs Radiation Monitoring
M98		N3	Domestic Water System

* To be included in analysis.

APPENDIX D
HCGS COMMON SENSOR FAILURE ANALYSIS -
SYSTEM ELIMINATION PROCESS

RELATED P&ID	GE MPL NO.	ELIMINATION CRITERION	SYSTEM/SUBSYSTEMS
			IV. HEATING, VENTILATION, AIR CONDITION AND COOLING (HVAC) SYSTEMS
M36/M37		N3	Guard House HVAC System
M73/M74		N3	Admin. Building & Warehouse HVAC System
M82		*	Turbine Building Supply & Exhaust Vent System
M83/M84		*	Reactor Building Supply & Exhaust Vent System (FRVS)
M86		*	Drywell Vent Control System
M88		N3	Auxiliary Bldg-Diesel Area Vent Control System
M89		*	Auxiliary Bldg-Control Area Vent Control System
M92		N3	Auxiliary Bldg - RW Area Vent Control System
M93		N3	Aux Bldg-Service Area & TSC Vent Control System
M87		*	Chilled Water System
M90		*	Aux Bldg - Control Area Chilled Water System
M95		N3	Misc Structure & Yard Bldgs Vent Control Systems
M96		N3	Plant Heating System

* To be included in analysis.

APPENDIX D
HCGS COMMON SENSOR FAILURE ANALYSIS -
SYSTEM ELIMINATION PROCESS

RELATED P&ID	GE MPL NO.	ELIMINATION CRITERION	SYSTEM/SUBSYSTEMS
			V. RADWASTE SYSTEM
M69/M70		*	Gaseous Radwaste System
M61/M62 M63/M64 M65		N3	Liquid Radwaste System
M66/M67 M68		N3	Solid Radwaste System

* To be included in analysis.

APPENDIX D
HCGS COMMON SENSOR FAILURE ANALYSIS -
SYSTEM ELIMINATION PROCESS

RELATED P&ID	GE MPL NO.	ELIMINATION CRITERION	SYSTEM/SUBSYSTEMS
			VI. ELECTRICAL SYSTEMS
		N3	Communication System
		N3	Lighting System

* To be included in analysis.