ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION

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PROCEDURE NO. E-1.1 REV. NO. 13

IMMEDIATE ACTION AND DIAGNOSTICS FOR SPURIOUS ACTUATION OF SI, LOCA, LOSS OF SECONDARY COOLANT, AND STEAM GENERATOR TUBE RUPTURE

TECHNICAL REVIEW

PORC 12/3/79

J C Bodine
Q/C REVIEW

12-3-79
DATE

APPROVED FOR USE

for J C Moon
PLANT SUPERINTENDENT

12-3-79
DATE

QA X NON-QA CATEGORY 1.0 THIS PROCEDURE CONTAINS 12 PAGES

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E-1.1

IMMEDIATE ACTION AND DIAGNOSTICS FOR SPURIOUS ACTUATION OF SI, LOCA, LOSS OF SECONDARY COOLANT, AND STEAM GENERATOR TUBE RUPTURE

1.0 SYMPTOMS:

NOTE: The process variables referred to in this Instruction are typically monitored by more than one instrumentation channel. The redundant channels should be checked for consistency while performing the steps of this Instruction.

1.1 The following symptoms are typical of those which may arise in a plant which is undergoing a loss of reactor coolant, loss of secondary coolant or steam generator tube rupture (one or more symptoms may appear in any order):

1.1.1 Low Pressurizer Pressure

1.1.2 Low Pressurizer Water Level

1.1.3 High Pressurizer Water Level

1.1.4 High Containment Pressure

1.1.5 High Containment Radiation

1.1.6 High Air Ejector Radiation

1.1.7 High Steam Generator Blowdown Radiation

1.1.8 Steam Flow/Feedwater Flow Mismatch

1.1.9 Letdown Isolation/Pressurizer Heater Cutout

1.1.10 Reactor Coolant Low Tavg Loop A and/or Loop B

1.1.11 High Containment Recirculation Sump Water Level

1.1.12 Low Steamline Pressure (one or all Steamlines)

1.1.13 Low Steam Generator Water Level

1.1.14 Increasing Steam Generator Water Level

1.1.15 Rapidly Changing Reactor Coolant System Average Coolant Temperature

1.1.16 Increased Charging Flow

1.1.17 High Steam Flow (one or all Steam Lines)

1.1.18 Increased Dumping of CV Recirc fan collectors

1.1.19 High Containment Temperature

1.1.20 Low Feedwater Pump Discharge Pressure

NOTE: The pressurizer water level indication should always be used in conjunction with other specified reactor coolant system indication to evaluate system conditions and to initiate manual operator actions.

2.0 IMMEDIATE OPERATOR ACTIONS:

2.1 Conditions requiring reactor trip or safety injection may be characterized by a number of unusual situations and instrument indications.

2.1.1 If the plant is in a condition for which a reactor trip is warranted and an automatic reactor trip has not yet occurred, manually trip the reactor. Refer to Figure 1 attached.

2.1.2 If the plant is in a condition for which safety injection is warranted and an automatic safety injection has not yet occurred, manually initiate safety injection. Refer to Figure 1 attached.

2.2 Verify the following actions and system status. If any of the following automatic actions have not occurred and are required, they should be manually initiated.

2.2.1 Reactor trip (all rods on bottom) and turbine trip (turbine stop valves closed).

2.2.2 Busses 14, 16, 17, 18 are energized and at approximately 480 volts.

2.2.3 Main Feedwater Isolation has occurred.

2.2.4 Containment Isolation has occurred (Alarm - A26).

2.2.5 Auxiliary Feedwater Pumps have started and the Auxiliary Feedwater System valves are in their proper Emergency Alignment and are fully open or fully closed as appropriate.

2.2.6 SI & RHR Pumps have started and the monitor lights indicate that the Safety Injection System valves are in the proper safeguards position.

2.2.7 Service water pumps have started and indicate sufficient service water pressure.

2.2.8 Containment Ventilation isolation has occurred (Alarm - A25).

2.2.9 Containment recirc fans running & charcoal filters in service

2.2.10 SI pump suction swap-over if $\leq$ 10% BAST level, 825 A and/or B Open

2.3 Verify the following:

2.3.1 Safety Injection flow from at least one train is being delivered to the reactor coolant system when the Reactor Coolant System pressure is below the high head safety injection pump shutoff head. If not, attempt to operate

equipment manually or locally.

2.3.2 Auxiliary Feedwater flow from at least one train is being delivered to the steam generators. If not, attempt to operate equipment manually or locally. If these attempts fail, start standby aux. FW pumps per E-29.3.

NOTE: Only after steam generator water level is > 25% in the narrow range should the Auxiliary Feedwater System Flow be regulated to maintain required level.

2.3.3 Verify that heat is being removed from the reactor plant via the steam generators by noting the following:

2.3.3.1 Automatic steam dump to the condenser is occurring:

2.3.3.2 Reactor coolant average temperature is decreasing towards programmed no-load temprature.

NOTE: If condenser steam dump has been blocked due to a control malfunction or loss of the "Condenser Available" condition, decay heat removal will be effected by automatic actuation of the steam generator power-operated relief valves, or, if these prove ineffective, the steam generator code safety valves. In this event, steam pressure will be maintained at the set pressure of the controlling valve(s) and reactor coolant average temperature will stabilize at approximately the saturation temperature for the steam pressure being maintained.

2.4 Whenever the Containment 20 psig pressure setpoint is reached verify that the Main Steam Isolation Valves have closed. If not, manually close the Main Steam Isolation Valves from the Control Board.

2.5 Whenever the Containment 30 psig pressure setpoint is reached verify that containment spray is initiated. If not manually initiate containment spray.

2.6 Check if conditions exists for Site Radiation Emergency (1 Rem/hour on any area monitor plus either Plant Vent Alarm or Containment pressure 30 psig.)

2.7 If this condition exists refer to SC-1.3A

2.8 Notify appropriate personnel of the nature of the emergency.

3.0 SUBSEQUENT OPERATOR ACTION (ACCIDENT DIAGNOSTICS)
(Refer to Figure 2 Attached)

3.1 Evaluate reactor coolant pressure to determine if it is low or decreasing in an uncontrolled manner. If it is low or decreasing, verify that:

3.1.1 All pressurizer spray line valves are closed

3.1.2 All pressurizer PORV's and safety valves are closed

3.1.3 If not, manually close the valves from the Control Board if possible

3.1.4 If pressurizer PORV(s) are open and cannot be closed, close the respective(s) block valve(s)

3.1.5 If the RCS pressure is above the low pressure reactor trip setpoint (1865) and is stable or increasing, go to STEP 3.7

3.2 Stop ALL Reactor Coolant Pumps after the high head safety injection pump operation has been verified and when the narrow presurizer pressure is at ≤ 1715 psig

CAUTION: If the reactor coolant pumps are stopped, the seal injection flow should be maintained.

NOTE: The conditions given above for stopping reactor coolant pumps should be continuously monitored throughout this instruction.

NOTE: Notify the NRC within one hour of an actuation of the safety injection system, automatic or manual, to protect the reactor coolant system. A communication channel shall be left open for continuous communication with NRC.

3.3 IF the condenser air ejector radiation and/or generator blowdown radiation monitor exhibit abnormally high readings, AND containment pressure, containment radiation and containment recirculation sump level exhibit normal readings, THEN go to E-1.4 "Steam Generator Tube Rupture."

3.4 IF the steamline pressure is abnormally lower in one steam generator than in the other steam generator, THEN go the E-1.3 "Loss of Secondary Coolant."

3.5 IF containment pressure, OR containment radiation OR containment recirculation sump levels exhibit either abnormally high readings or increasing readings, THEN go to E-1.2, "Loss of Reactor Coolant".

NOTE: For very small breaks inside the containment building, the containment pressure increase will be very small and possibly not recognizable by the operator. For very small breaks the containment recirculation sump water level will increase very slowly and early in the transient may not indicate a level increase.

3.6 IF the containment pressure, containment radiation AND containment recirculation sump water level continue to exhibit stable readings in the normal pre-event range, with relatively low RCS pressure, THEN go to E-1.3 "Loss of Secondary Coolant".

3.7 In the event of a spurious safety injection signal, the sequence of reactor trip, turbine trip and safeguards actuation will occur.

NOTE: The operator must assume that the safety injection signal is non-spurious unless the following are exhibited:

3.7.1 Normal readings for containment temperature, pressure, radiation and recirculation sump level or reason for the difference known and acceptable AND

3.7.2 Normal readings for auxiliary building radiation and ventilation monitoring or reason for difference known and acceptable AND

3.7.3 Normal readings for steam generator blowdown and condenser air ejector radiation.

IF all of the symptoms 3.7.1 through 3.7.3 above are met and when the following 3.7.4 through 3.7.7 are exhibited:

3.7.4 Reactor coolant pressure is greater than 2000 psig and increasing AND

3.7.5 Pressurizer water level is greater 20% AND

3.7.6 The reactor coolant indicated subcooling is greater than 50°F per subcooling meters

NOTE: As a backup to the subcooling meters the average of thermocouple (points 11,15,18,19 & 20) may be used with pressurizer pressure and the attached saturation curve to verify 50°F subcooling.

AND

3.7.7 Water level in at least one steam generator is in the narrow range span. THEN

3.8 Reset safety injection

CAUTION: Subsequent to this Step, should loss of offsite power occur, manual safety injection initiation would be required to load the safeguards equipment onto the diesel powered emergency busses.

3.9 Following SI reset, stop all Safety Injection and RHR pumps and place them in standby mode and maintain operable safety injection flowpaths.

3.10 Place CV Sump A pumps in pull-stop position before resetting containment isolation.

3.11 Place all containment isolation (T signal) valve switches in the closed position and manually reset containment isolation by use of key switch. (Refer to automatic actions in section 4 of this procedure for containment isolation valve numbers)

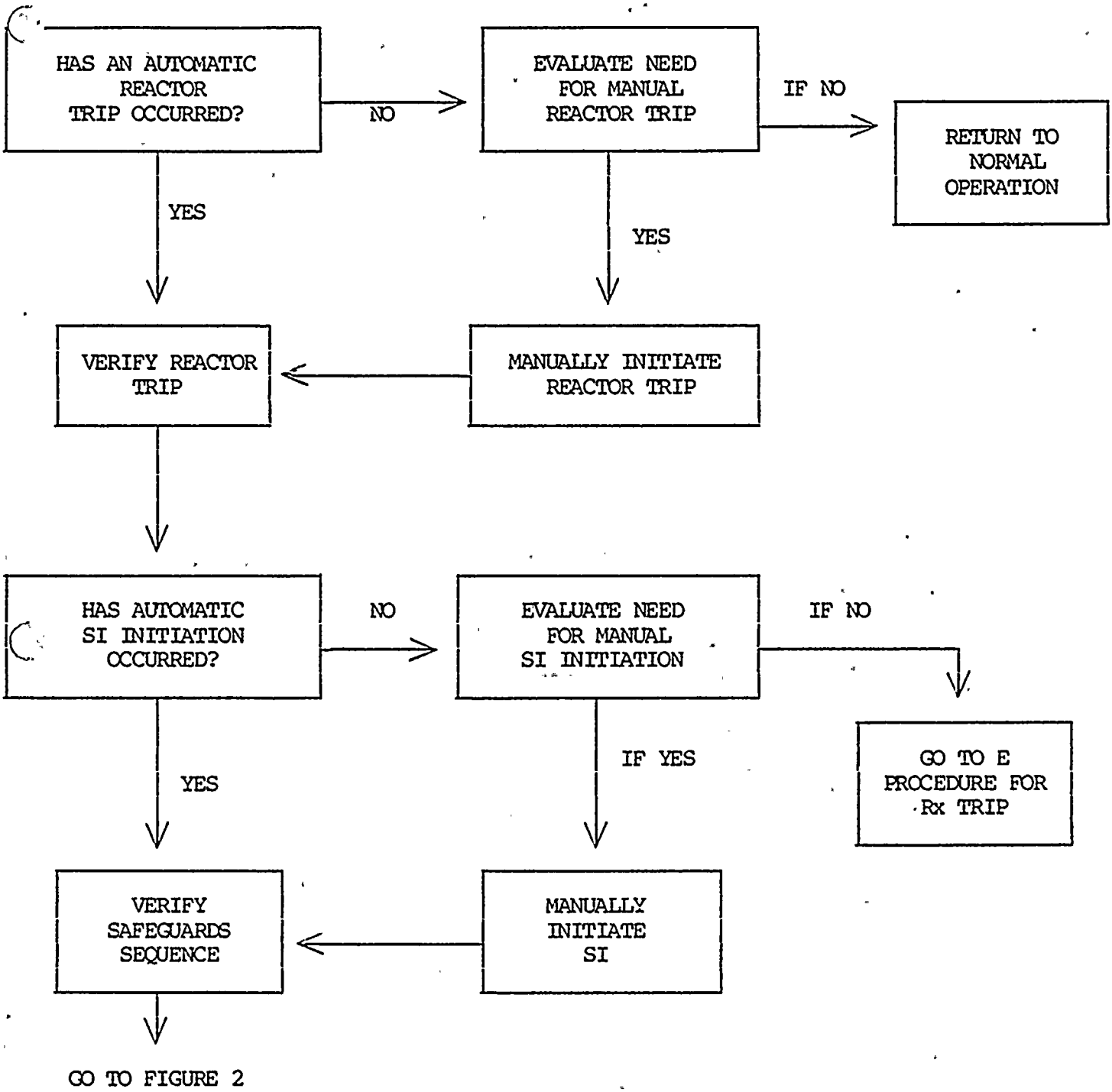
3.12 Reestablish normal makeup and letdown (if letdown is unaffected) to maintain pressurizer water level in the normal operating range and to maintain reactor coolant pressure at values reached when safety injection terminated. Ensure that water addition during this process does not result in dilution of the reactor coolant system boron concentration.

3.13 Reestablish operation of the pressurizer heaters (refer to O-8.1, "Restoration of Pressurizer Heaters to Maintain Circulation at HSD," if no RCP's are running). When reactor coolant pressure can be controlled by pressurizer heaters alone, return makeup and letdown to pressurizer water level control.

NOTE: IF after securing safety injection and attempting to transfer to normal pressurizer pressure and level control, reactor coolant pressure drops below the low pressurizer pressure setpoint for safety injection actuation OR if pressurizer water level drops

below 10% of span, OR the reactor coolant system is < 50°F subcooled THEN SAFETY INJECTION MUST BE MANUALLY REINITIATED. The operator must rediagnose plant conditions and proceed to the appropriate emergency instruction.

NOTE: IF after securing safety injection and transferring the plant to normal pressurizer pressure and level control, the reactor coolant pressure does not drop below the low pressurizer pressure setpoint for safety injection actuation AND the pressurizer water level remains above 10% span, AND the reactor coolant indicated subcooling is greater than 50°F then go to the normal operating instructions.



IMMEDIATE ACTIONS
FIGURE 1

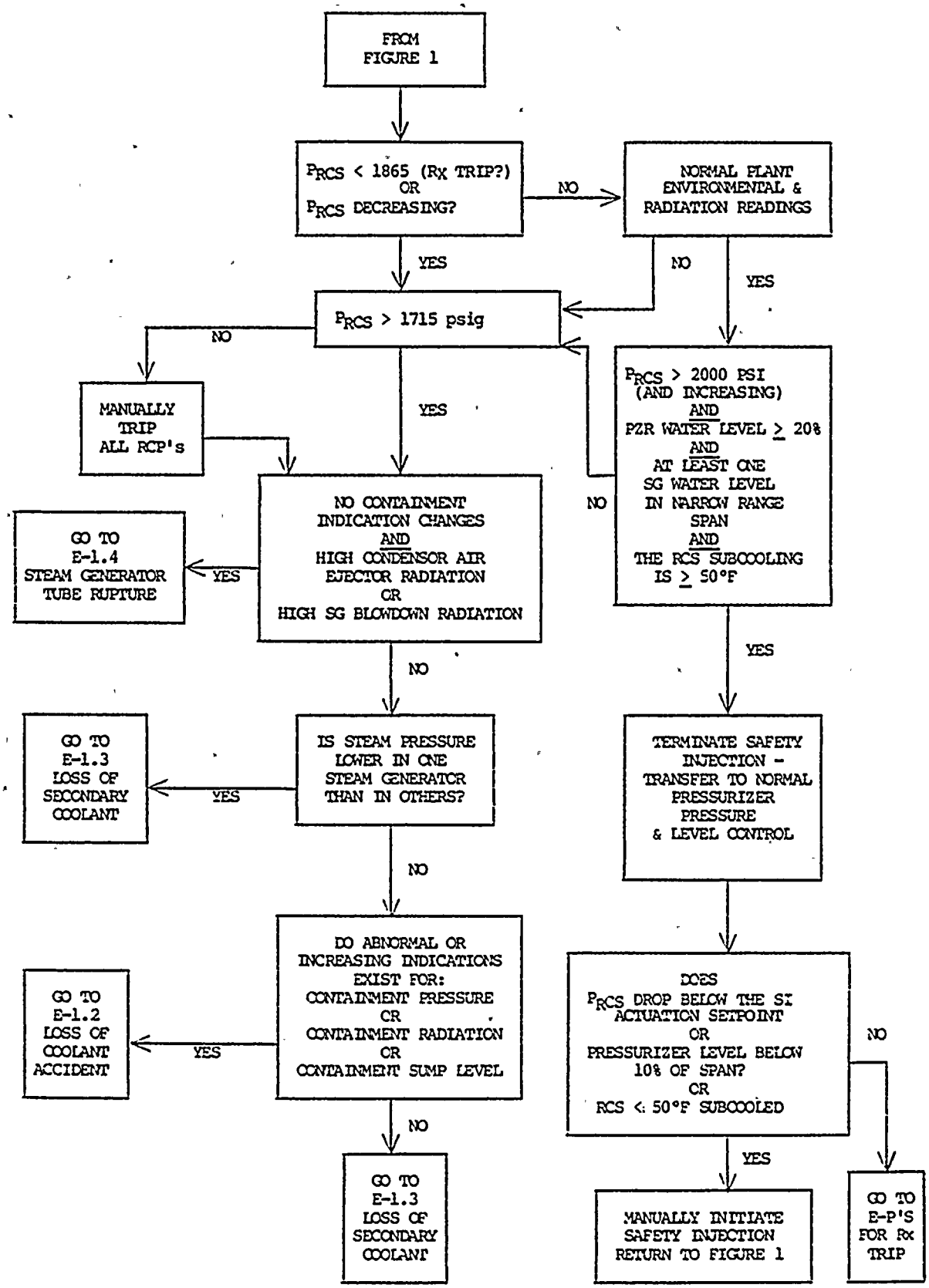

FROM FIGURE 1
P_{RCS} < 1865 (Rx TRIP?) OR P_{RCS} DECREASING?
NO
NORMAL PLANT ENVIRONMENTAL & RADIATION READINGS
YES
NO
YES
P_{RCS} > 1715 psig
NO
YES
MANUALLY TRIP ALL RCP's
P_{RCS} > 2000 PSI (AND INCREASING) AND PZR WATER LEVEL ≥ 20% AND AT LEAST ONE SG WATER LEVEL IN NARROW RANGE SPAN AND THE RCS SUBCOOLING IS ≥ 50°F
NO
NO CONTAINMENT INDICATION CHANGES AND HIGH CONDENSOR AIR EJECTOR RADIATION OR HIGH SG BLOWDOWN RADIATION
GO TO E-1.4 STEAM GENERATOR TUBE RUPTURE
YES
YES
NO
GO TO E-1.3 LOSS OF SECONDARY COOLANT
YES
IS STEAM PRESSURE LOWER IN ONE STEAM GENERATOR THAN IN OTHERS?
TERMINATE SAFETY INJECTION - TRANSFER TO NORMAL PRESSURIZER PRESSURE & LEVEL CONTROL
NO
DO ABNORMAL OR INCREASING INDICATIONS EXIST FOR: CONTAINMENT PRESSURE OR CONTAINMENT RADIATION OR CONTAINMENT SUMP LEVEL
GO TO E-1.2 LOSS OF COOLANT ACCIDENT
YES
DOES P_{RCS} DROP BELOW THE SI ACTUATION SETPOINT OR PRESSURIZER LEVEL BELOW 10% OF SPAN? OR RCS <: 50°F SUBCOOLED
NO
NO
YES
GO TO E-1.3 LOSS OF SECONDARY COOLANT
MANUALLY INITIATE SAFETY INJECTION RETURN TO FIGURE 1
GO TO E-P'S FOR Rx TRIP

FIGURE 2

4.0 AUTOMATIC ACTIONS:

* Bright white light indicates when valve is in safeguard position.

4.1 Boric acid tank supply to safety injection pumps *MOV-826A,B,C and D Closed.

4.1.1 MOV 825 A&B SI pump suction from the RWST open

4.1.2 The two injection line valves to the reactor coolant cold legs *MOV-878B, and *MOV-878-D. Open.

4.1.3 Core deluge valves from the RHR pumps *MOV-852A and *MOV-852-B. Open

4.1.4 The containment fan coolers service water valves AOV-*4561 and AOV-*4562. Open (Status light only)

4.1.5 *MOV-841 and *MOV-865, Accumulator discharge valves, are open

4.1.6 MOV-1815A and MOV-1815B, Safety Injection Pump 1C Suction Open

4.2 Main feedwater pumps trip and discharge valves close.

4.2.1 Main and bypass feedwater control valves close.

4.3 Both diesel generators start.

4.4 Pressurizer control and backup heaters trip.

4.5 All charging pumps trip.

4.6 If outside power is lost the following breakers tripped.

4.6.1 Screenhouse motor control centers breakers 1G1 and 1G2.

4.6.2 Motor driven fire pump.

4.6.3 All circulating water intake heaters.

4.6.4 480V bus tie breakers 14-13, 16-14, 16-15, 17-18.

4.6.5 Instrument air compressors.

4.6.6 All plant lighting except emergency DC lighting and Emergency AC lighting supplied by the diesels.

4.6.7 Component cooling water pumps.

4.6.8 MCC 1C and MCC 1D load shedding as follows:

4.6.8.1 Boric Acid Transfer pumps A and B.

4.6.8.2 Reactor Coolant Drain Tank pumps A and B.

4.6.8.3 Reactor makeup water pumps A and B.

4.6.8.4 Refueling Water Purification pump.

4.6.8.5 Spent Fuel Pit pump.

4.6.8.6 Penetration cooling fans A and B.

4.6.8.7 Reactor compartment fans A and B.

4.6.8.8 Boric Acid Evap. Package.

4.7 Loss of normal feed to 480V bus 14 or bus 16 during safety injection will initiate service water isolation to non-safeguards equipment.

NOTE: Refer to RG&E Elementary 10905-118 for information to restore equipment to service.

4.8 Containment isolation (T signal) will be generated and perform the following actions.

4.8.1 Trip the containment sump pumps.

4.8.2 Close the following isolation valves: (if open)

*AOV-371	Letdown isolation.
*MOV-313	Seal water return line isolation.
*MOV-813	Reactor support cooling inlet.
*MOV-814	Reactor support cooling outlet.
*MOV-996 A,B&C	Sample line isolation (outside containment).
*AOV-1728	Containment sump pump discharge isolation.
*AOV-1723	Containment sump pump discharge isolation.
*AOV-5392	Instrument Air to containment isolation.
*AOV-5738	1A steam generator blowdown isolation.
*AOV-5737	1B steam generator blowdown isolation.
*AOV-5735	1A steam generator blowdown sample isolation.
*AOV-5736	1B steam generator blowdown sample isolation.
*AOV-508	(RMW to Containment Isolation).

4.9 Containment ventilation signal will be generated and perform the following actions:

4.9.1 Trip purge supply and exhaust fans.

4.9.2 Close the following isolation valves. (if open)

*AOV-5869	Purge supply outside containment.
*AOV-5870	Purge supply inside containment.
*AOV-5878	Purge exhaust inside containment.
*AOV-5879	purge exhaust outside containment.
*AOV-1597	Radiation monitor supply valve.
*AOV-1598	Radiation monitor exhaust valve.
*AOV-7970	Containment depressurization valve inside.
*AOV-7971	Containment depressurization valve outside.

4.10 Additional containment isolation and containment ventilation valves, normally closed.(T-signal)
Check closed :

*AOV-951	Sample line isolation (outside containment).
*AOV-953	Sample line isolation (pressurizer steam).
*AOV-955	Sample line isolation (pressurizer liquid).
*AOV-539	Gas analyzer line from PRT isolation.
*AOV-846	N_2 Supply line to accumulators.
*AOV-959	RHR loop sample line isolation.
*AOV-1789	R.C. drain tank gas analyzer isolation.
*AOV-1786	R.C. drain tank vent header isolation.
*AOV-1787	R.C. drain tank vent header isolation.
*AOV-1721	R.C. drain tank pumps suction line.
*AOV-1003A	R.C.D.T. pump 1A suction line.
*AOV-1003B	R.C.D.T. pump 1B suction line.
*AOV-8418	D.I. water to C.V. auto isolation valve.
*AOV-8418	Demin. Water to Containment Isolation.
*MOV-ATV1	Containment air test supply valve.
*MOV-ATV2	Containment air test vent valve.
*MOV-ATV3	Containment air test vent valve.