CAROLINA POWER & LIGHT COMPANY

SHEARON HARRIS NUCLEAR POWER PLANT

PLANT OPERATING MANUAL

VOLUME 3

PART 4

PROCEDURE TYPE: EMERGENCY OPERATING PROCEDURE (EOP)
END PATH PROCEDURE (EPP)

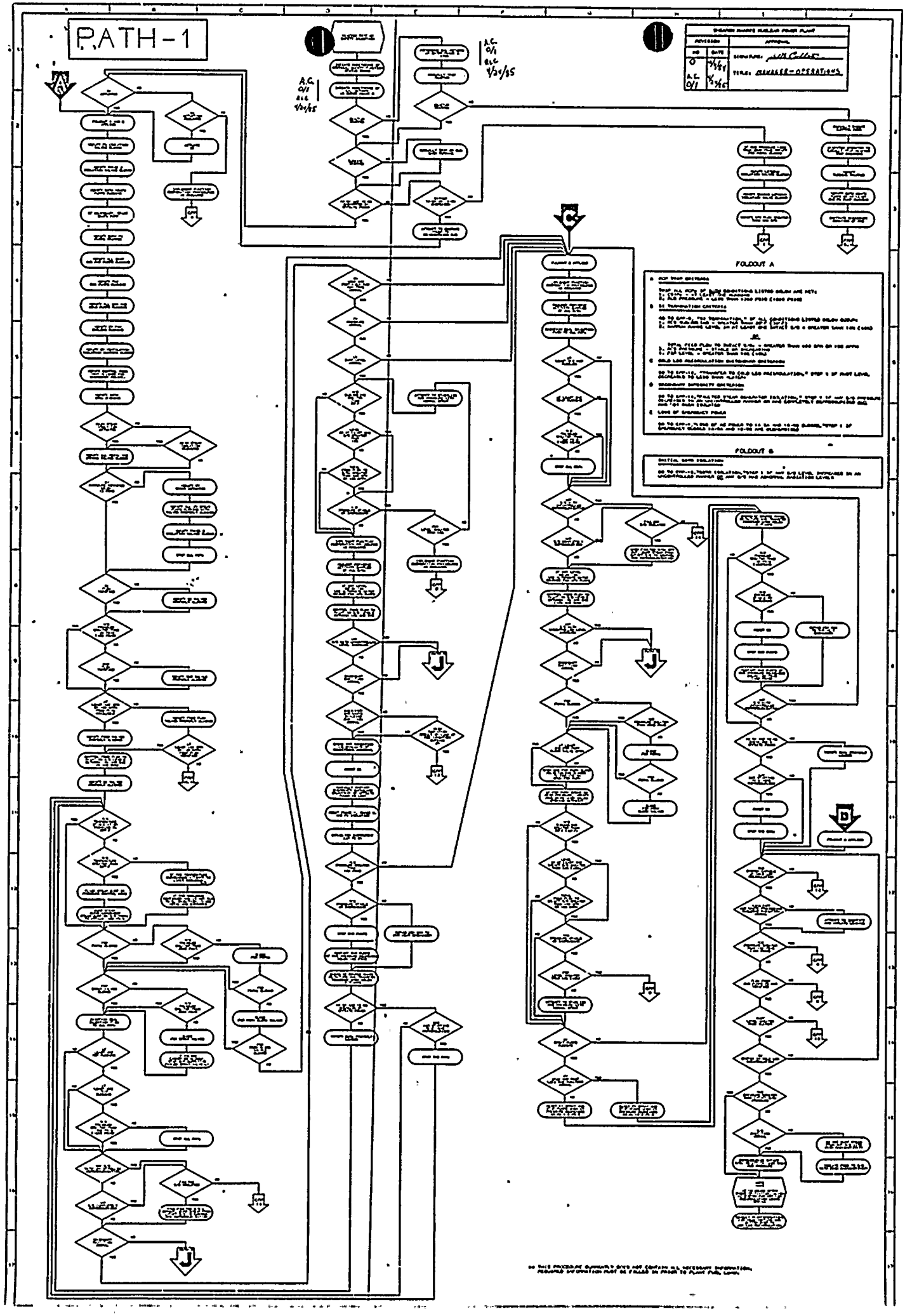
NUMBER: EOP-EPP-004

TITLE: REACTOR TRIP RESPONSE

REVISION 0

APPROVED: _____ 12-4-84
SIGNATURE DATE

TITLE: MANAGER-OPERATIONS


PATH-1
FOLDOUT A
FOLDOUT B

LIST OF EFFECTIVE PAGES

Page	Revision No.
1 through 13	0

1.0 PURPOSE

This procedure provides the necessary instructions to stabilize and control the plant following a reactor trip without a safety injection..

2.0 OPERATOR ACTIONS

CAUTION

If SI actuation occurs at any time, immediately go to PATH-1, entry point A.

NOTE: Foldout D should be open.

Instructions	Response Not Obtained
1. Check RCS Temperature - STABLE AT OR TRENDING TO 557°F	IF temperature less than 557°F and decreasing, THEN: a. Stop dumping steam. b. IF cooldown continues, THEN control total feed flow. Maintain total feed flow greater than 400 GPM or 192 KPPH until level greater than 10% in at least one S/G. c. IF cooldown continues, THEN close MSIVs and bypass valves. IF temperature greater than 557°F and increasing, THEN: o Dump steam to condenser. OR o Dump steam using S/G PORVs.

2.	Verify At Least One RCP - RUNNING	Perform the following: o Place steam dump in pressure control mode. o Dump steam to establish natural circulation.
3.	Check Feed System Status:	
a.	Check RCS temperature - LESS THAN 564°F	a. Continue with step 4. WHEN RCS temperature less than 564°F, THEN do steps 3b and c.
b.	Verify feed regulator valves - CLOSED	
c.	Establish FW bypass flow to S/Gs.	c. Establish AFW flow to S/Gs.

4. Verify All Control Rods Fully Inserted.

IF two or more control rods NOT fully inserted, THEN emergency borate as follows:

a. Start a boric acid pump.

b. Align boric acid to CSIP suction (listed in order of preference).

- o Open 8104 (Emergency Boration)

  OR

- o Open FCV-113A (Boric Acid to Blender) and open FCV-113B (Blender Outlet to CSIP suction)

  OR

- o Open FCV-113A (Boric Acid to Blender) and open FCV-114A (Blender Outlet to VCT)

c. Verify boric acid flow to CSIP suction.

d. Verify CSIP flow to RCS.

5. Check PZR Level Control:		
	a. Level - GREATER THAN 17%	a. Perform the following: 1) Verify letdown isolation. 2) Verify PZR heaters secured. 3) Control charging to restore PZR level greater than 17%.
	b. Verify charging and letdown - IN SERVICE	
	c. Level - STABLE AT OR TRENDING TO 25%	c. Control charging and letdown to maintain PZR level at 25%.
6. Check PZR Pressure Control:		
	a. Pressure - GREATER THAN 1881 PSIG	a. Verify SI actuation AND go to PATH-1, entry point A.

b. Pressure - STABLE AT OR TRENDING TO 2235 PSIG	b. IF pressure LESS THAN 2235 PSIG and decreasing, THEN: 1) Verify PZR PORVs closed. IF any PZR PORV can NOT be closed, THEN close its block valve. 2) Verify PZR spray valves closed. IF valve(s) can NOT be closed, THEN stop RCP(s) supplying failed spray valve(s). 3) Verify PZR heaters energized. IF pressure greater than 2235 PSIG and increasing, THEN: 1) Verify PZR heaters off. 2) Control pressure using normal PZR spray. IF NOT available AND letdown in service, THEN use auxiliary spray. IF NOT, THEN use one PZR PORV.

7. Check S/G Levels:

a. Narrow range level – GREATER THAN 10%	a. Maintain total feed flow greater than 400 GPM or 192 KPPH until narrow range level greater than 10% in at least one S/G.
b. Control feed flow to maintain narrow range level between 10% and 50%.	b. IF narrow range level in any S/G continues to increase, THEN stop feed flow to that S/G.

8. Verify All AC Busses - ENERGIZED BY OFFSITE POWER	Perform the following as necessary: a. Verify EDGs have started. b. Verify EDGs have assumed the proper loads. c. Verify turbine DC lube oil pump and air side seal oil backup pump are running. d. Verify adequate EDG capacity and load the following equipment on the EDGs: 1) One instrument air compressor 2) Battery chargers 3) PZR heaters, as needed. e. Determine the cause of the loss of offsite power. If due to a failure of the startup transformer, request assistance from maintenance crews to restore power from either the main or spare startup transformer. If the loss of power is the result of a loss of grid, obtain assistance from the Load Dispatcher.
9. Transfer Condenser Steam Dump to Pressure Control Mode.	IF condenser NOT available, THEN use S/G PORVs.

CAUTION

On natural circulation, RTD bypass temperatures and associated interlocks will be inaccurate.

NOTE: RCPs should be run in order of priority to provide normal PZR spray.

10.	Check RCP Status – AT LEAST ONE RUNNING	Try to start one RCP:
		a. Establish conditions for running RCP(s) using OP-100, "REACTOR COOLANT SYSTEM," while continuing with this procedure.
		b. Start RCP(s)
		IF at least one RCP can NOT be started, THEN verify natural circulation from trended values:
		o RCS subcooling – GREATER THAN 25°F.
		o Steam pressure – STABLE OR DECREASING.
		o RCS hot leg temperature – STABLE OR DECREASING.
		o Core exit T/Cs – STABLE OR DECREASING.
		o RCS cold leg temperatures – TRENDING TO OR AT SATURATION TEMPERATURE FOR STEAM PRESSURE.
		IF natural circulation NOT verified, THEN increase dumping steam.

11. Check If Source Range Detector Should Be Energized:	
a. Check intermediate range flux - LESS THAN 10^{-10} AMPS	a. Continue with step 12. WHEN flux less than 10^{-10} AMPS, THEN do steps 10b and c.
b. Verify source range detectors - ENERGIZED	
c. Transfer nuclear recorder to source range scale	
12. Shutdown ~~Unnecessary Plant~~ Equipment:	
o Stop both heater drain pumps.	
o Stop condensate pump, condensate booster pump, and EW pump as required.	
o Isolate BTRS.	
o Verify turbine generator goes on the turning gear one minute after zero speed alarm is received.	
o Secure the MSRs.	
o Stop DEH pumps.	

13. Maintain Stable Plant Conditions:

    a. PZR pressure - AT OR TRENDING TO 2235 PSIG

    b. PZR level - AT OR TRENDING TO 25%

    c. S/G narrow range levels - BETWEEN 10% AND 50%

    d. RCS average temperature - AT OR TRENDING TO 557°F

14. Go To Appropriate Plant Procedure As Determined Below:

    a. Perform OMM-004, "POST TRIP/SAFEGUARDS REVIEW"

    b. Check plant status - RCS COOLDOWN REQUIRED

    b. Go to GP-004, "RECOVERY FROM A REACTOR TRIP," and return to power operation.

    c. Check RCP status - AT LEAST ONE RCP AVAILABLE

    c. Go to EPP-5, "NATURAL CIRCULATION COOLDOWN," step 1.

    d. Start RCP(s) using OP-100 "REACTOR COOLANT SYSTEM."

    e. Go to GP 007, "NORMAL PLANT COOLDOWN."

- END -

4. FOLDOUT D

a. SI ACTUATION CRITERIA

Actuate SI and go to PATH-1, entry point A if EITHER condition listed below occurs:

1) RCS Subcooling - LESS THAN 25°F [30°F]
2) PZR Level - CANNOT BE MAINTAINED GREATER THAN 10% [45%]

b. LOSS OF EMERGENCY POWER

Go to EPP-1, "LOSS OF AC POWER TO 1A-SA AND 1B-SB BUSSES," step 1 if emergency busses 1A-SA and 1B-SB are deenergzied.

PATH-1

SHEARON HARRIS NUCLEAR POWER PLANT	
REVISION NO	REVISION DATE
0	12/1/84
A.C. 0/1	4/24/85

APPROVAL
SIGNATURE: [signature]
TITLE: MANAGER-OPERATIONS

A.C. 0/1 RLC 4/24/85

A.C. 0/1 RLC 4/24/85

REACTOR TRIP OR SAFETY INJECTION
INITIATE MONITORING OF CRITICAL SAFETY FUNCTION STATUS TREES
INITIATE MONITORING OF EAL NETWORK AT ENTRY POINT X
REFERENCE EAL NETWORK AT ENTRY POINT X - ATWS
MANUALLY TRIP REACTOR
REACTOR TRIPPED
MANUALLY TRIP OR RUN BACK TURBINE
TURBINE TRIPPED
1A-SA AND 1B-SB ENERGIZED BY OFFSITE POWER
EITHER 1A-SA OR 1B-SB ENERGIZED
ATTEMPT TO RESTORE POWER TO DE-ENERGIZED BUS

SI ACTUATED
SI ACTUATION REQUIRED
ACTUATE SI
IMPLEMENT FUNCTION RESTORATION PROCEDURES AS REQUIRED
EPP 4

FOLDOUT A AND B APPLIES
VERIFY FW ISOLATION VALVES CLOSED
VERIFY PHASE A ISOLATION VALVES CLOSED
VERIFY BOTH MDAFW PUMPS RUNNING
IF NECESSARY, START MDAFW PUMP
VERIFY BOTH FW PUMPS TRIPPED
VERIFY ALL CSIP AND RHR PUMPS RUNNING
VERIFY TWO CCW PUMPS RUNNING
VERIFY ALL EDG AND ESW PUMPS RUNNING
VERIFY CV FAN COOLERS RUNNING
VERIFY CV VENTILATION ISOLATION DAMPERS CLOSED
VERIFY CONTROL ROOM VENT ALIGNED FOR EMERGENCY RECIRC.
VERIFY BOTH EDGs RUNNING

MAIN STEAM ISOLATION ACTUATED
MAIN STEAM ISOLATION REQUIRED
VERIFY ALL MSIVs AND BYPASS VALVES CLOSED
C/ PRESSURE MAINTAINED BELOW 12 PSIG
VERIFY CV SPRAY ACTUATED
VERIFY ALL CV SPRAY PUMPS RUNNING WITH VALVES PROPERLY ALIGNED
VERIFY PHASE B ISOLATION VALVES CLOSED
STOP ALL RCPs
SI FLOW VERIFIED
VERIFY SI VALVES PROPERLY ALIGNED
RCS PRESSURE GREATER THAN 180 PSIG (450 PSIG)
RHR FLOW VERIFIED
VERIFY RHR VALVES PROPERLY ALIGNED
AT LEAST 400 GPM OR 192 KPPH FEED FLOW AVAILABLE
VERIFY FEED FLOW VALVES PROPERLY ALIGNED
VERIFY FEED VALVES PROPERLY ALIGNED
AT LEAST 400 GPM OR 192 KPPH FEED FLOW VERIFIED
FRP H.1
CONTROL FEED FLOW TO MAINTAIN S/G LEVELS BETWEEN 10% AND 50% (40% AND 80%)
VERIFY SI VALVES PROPERLY ALIGNED
RCS TEMPERATURE STABLE AT OR TRENDING TO 557°F
RCS TEMPERATURE GREATER THAN 557°F
PLACE STEAM DUMP IN PRESSURE CONTROL MODE
DUMP STEAM USING CONDENSER STEAM DUMP OR S/G PORVs TO ATTAIN 1092 PSIG
IF RCS TEMPERATURE DECREASING ATTEMPT TO LIMIT COOLDOWN
IF RCS COOLDOWN CONTINUES AND IS NOT DUE TO SI INJECTION, CLOSE MSIVs AND BYPASSES
PZR PORVs CLOSED
RCS PRESSURE GREATER THAN 2338 PSIG
CLOSE PZR PORVs
PZR PORVs CLOSED
CLOSE PZR PORV BLOCK VALVES
PZR PORV BLOCK VALVES CLOSED
PZR SPRAY VALVES CLOSED
RCS PRESSURE GREATER THAN 2260 PSIG
CLOSE PZR SPRAY VALVES
IF VALVES CANNOT BE CLOSED, STOP RCP SUPPLYING FAILED SPRAY VALVE(s)
MAINTAIN SEAL INJECTION FLOW TO ALL RCPs
AT LEAST ONE RCP RUNNING
AT LEAST ONE CSIP RUNNING
RCS PRESSURE GREATER THAN 1360 PSIG (1600 PSIG)
STOP ALL RCPs
ANY S/G WITH UNCONTROLLED DEPRESSURIZATION
FAULTED S/G ISOLATED
EPP 14
ANY S/G COMPLETELY DEPRESSURIZED
WHEN FAULTED S/G(s) DRY OUT, DUMP STEAM FROM INTACT S/G TO CONTROL RCS REPRESSURIZATION
SECONDARY RADIATION NORMAL
PATH-2 J

CV AREA AND POST-LOCA RAD MONITORS NORMAL
CV PRESSURE NORMAL
LV SUMP LEVEL NORMAL
RCS SUBCOOLING GREATER THAN 25°F
ATTEMPT TO STABILIZE RCS PRESSURE WITH NORMAL SPRAY
LEVEL IN AT LEAST ONE S/G GREATER THAN 10%
TOTAL FEED FLOW TO S/Gs GREATER THAN 400 GPM OR 192 KPPH
RCS PRESSURE STABLE OR INCREASING
PZR LEVEL GREATER THAN 10%
IMPLEMENT FUNCTION RESTORATION PROCEDURES AS REQUIRED
EPP 8
IMPLEMENT FUNCTION RESTORATION PROCEDURES AS REQUIRED
REQUEST PERIODIC ACTIVITY SAMPLES OF ALL S/Gs
IF CST LEVEL BELOW 10% USE ALTERNATE WATER SOURCE FOR AFW PUMPS
CONTROL FEED FLOW TO MAINTAIN S/G LEVELS BETWEEN 10% AND 50%
ANY S/G WITH UNCONTROLLED LEVEL INCREASE
PATH-2 J
RADIATION NORMAL
AUXILIARY AND WASTE BUILDING RADIATION NORMAL
HIGH RADIATION/POSSIBLE LOSS OF RCS INVENTORY OUTSIDE CV
EPP 13
CHECK PRT CONDITION AND EVALUATE IF CONDITIONS ABNORMAL
RESET SI
MANUALLY RESTART EMERGENCY SAFEGUARD EQUIPMENT IF OFFSITE POWER IS LOST
RESET PHASE A, PHASE B, AND FW ISOLATION
ESTABLISH INSTRUMENT AIR TO CV
RCS PRESSURE GREATER THAN 180 PSIG
RCS PRESSURE STABLE OR INCREASING
PZR LEVEL GREATER THAN 10%
STOP RHR PUMPS
ESTABLISH CCW TO RHR HEAT EXCHANGER
RESTART RHR PUMPS IF RCS PRESSURE DECREASES BELOW 180 PSIG
ENERGIZE SOURCE RANGE DETECTORS AND TRANSFER RECORDER WHEN BELOW 10^{-10} AMPS
1A-SA AND 1B-SB ENERGIZED BY OFFSITE POWER
EDG AIR STARTING RECEIVERS REPRESSURIZED
VERIFY EDGs PROPERLY LOADED
STOP THE EDGs

FOLDOUT A APPLIES
IMPLEMENT FUNCTION RESTORATION PROCEDURES AS REQUIRED
REQUEST PERIODIC ACTIVITY SAMPLES OF ALL S/Gs
MAINTAIN SEAL INJECTION FLOW TO ALL RCPs
AT LEAST ONE RCP RUNNING
AT LEAST ONE CSIP RUNNING
RCS PRESSURE GREATER THAN 1360 PSIG (1600 PSIG)
STOP ALL RCPs
ANY S/G WITH UNCONTROLLED DEPRESSURIZATION
ANY S/G COMPLETELY DEPRESSURIZED
FAULTED S/G ISOLATED
EPP 14
WHEN FAULTED S/Gs DRY OUT, DUMP STEAM FROM INTACT S/G TO CONTROL RCS REPRESSURIZATION
IF CST LEVEL BELOW 10% USE ALTERNATE WATER SOURCES FOR AFW PUMPS
CONTROL FEED FLOW TO MAINTAIN S/G LEVELS BETWEEN 10% AND 50% (40% AND 80%)
ANY S/G WITH UNCONTROLLED LEVEL INCREASE
PATH-2 J
SECONDARY RADIATION NORMAL
PZR PORVs CLOSED
RCS PRESSURE GREATER THAN 2338 PSIG
CLOSE PZR PORVs
PZR PORVs CLOSED
CLOSE PZR PORV BLOCK VALVES
AT LEAST ONE PZR PORV BLOCK VALVE OPEN
OPEN ONE PZR PORV BLOCK VALVE UNLESS CLOSED TO ISOLATE AN OPEN PZR PORV
IF PZR PORV OPENS ON HIGH PRESSURE, VERIFY RECLOSURE WHEN BELOW OPENING SETPOINT
RCS SUBCOOLING GREATER THAN 25°F (30°F)
LEVEL IN AT LEAST ONE INTACT S/G GREATER THAN 10% (40%)
TOTAL FEED FLOW TO INTACT S/G GREATER THAN 400 GPM OR 192 KPPH
RCS PRESSURE STABLE OR INCREASING
PZR LEVEL GREATER THAN 10% (40%)
EPP 8
ATTEMPT TO STABILIZE RCS PRESSURE WITH NORMAL SPRAY
CV SPRAY PUMPS RUNNING
CV AREA AND POST LOCA RAD MONITORS NORMAL
RESET CV SPRAY AND STOP PUMPS WHEN CV PRESSURE DECREASES BELOW 4.9 PSIG
RESET CV SPRAY AND STOP PUMPS WHEN CV PRESSURE INCREASES BELOW 12.0 PSIG

IF RCS PRESSURE LESS THAN 2338 PSIG VERIFY PZR PORVs CLOSED
VERIFY LETDOWN ISOLATION VALVES CLOSED
VERIFY EXCESS LETDOWN ISOLATION VALVE CLOSED
VERIFY AFW FLOW GREATER THAN 400 GPM
EPP 1

MANUALLY INSERT CONTROL RODS
DISPATCH OPERATOR TO LOCALLY TRIP REACTOR TRIP BREAKERS
VERIFY TURBINE TRIPPED
VERIFY BOTH MDAFW PUMPS OR AT LEAST ONE FW PUMP RUNNING
INITIATE EMERGENCY BORATION OF RCS
FRP S.1

FOLDOUT A

A RCP TRIP CRITERIA

TRIP ALL RCPs IF BOTH CONDITIONS LISTED BELOW ARE MET:
1. CSIPs - AT LEAST ONE RUNNING
2. RCS PRESSURE - LESS THAN 1360 PSIG (1600 PSIG)

B SI TERMINATION CRITERIA

GO TO EPP-8, "SI TERMINATION," IF ALL CONDITIONS LISTED BELOW OCCUR:
1. RCS SUBCOOLING - GREATER THAN 25°F (30°F)
2. NARROW RANGE LEVEL IN AT LEAST ONE INTACT S/G - GREATER THAN 10% (40%)

OR

TOTAL FEED FLOW TO INTACT S/Gs - GREATER THAN 400 GPM OR 192 KPPH
3. RCS PRESSURE - STABLE OR INCREASING
4. PZR LEVEL - GREATER THAN 10% (45%)

C COLD LEG RECIRCULATION SWITCHOVER CRITERION

GO TO EPP-10, "TRANSFER TO COLD LEG RECIRCULATION," STEP 1 IF RWST LEVEL DECREASES TO LESS THAN <LATER>

D SECONDARY INTEGRITY CRITERION

GO TO EPP-14, "FAULTED STEAM GENERATOR ISOLATION," STEP 1 IF ANY S/G PRESSURE DECREASES IN AN UNCONTROLLED MANNER OR HAS COMPLETELY DEPRESSURIZED AND HAS NOT BEEN ISOLATED

E LOSS OF EMERGENCY POWER

GO TO EPP-1, "LOSS OF AC POWER TO 1A-SA AND 1B-SB BUSSES," STEP 1 IF EMERGENCY BUSSES 1A-SA AND 1B-SB ARE DEENERGIZED

**

FOLDOUT B

INITIAL SGTR ISOLATION

GO TO EPP-16, "SGTR ISOLATION," STEP 1 IF ANY S/G LEVEL INCREASES IN AN UNCONTROLLED MANNER OR ANY S/G HAS ABNORMAL RADIATION LEVELS

ENERGIZE SOURCE RANGE DETECTORS AND TRANSFER RECORDER WHEN BELOW 10^{-10} AMPS
RCS PRESSURE GREATER THAN 180 PSIG (450 PSIG)
RCS PRESSURE STABLE OR INCREASING
RESET SI
STOP RHR PUMPS
RESTART RHR PUMPS IF RCS PRESSURE DECREASES BELOW 180 PSIG (450 PSIG)
ESTABLISH CCW TO RHR HEAT EXCHANGER
ANY S/G WITH UNCONTROLLED DEPRESSURIZATION
1A-SA AND 1B-SB ENERGIZED BY OFFSITE POWER
VERIFY EDGs PROPERLY LOADED
EDG AIR STARTING RECEIVERS REPRESSURIZED
RESET SI
STOP THE EDGs
D
FOLDOUT A APPLIES
RHR SYSTEM CAPABLE OF COLD LEG RECIRCULATION
EPP 12
AUXILIARY AND WASTE PROCESSING BUILDING RADIATION NORMAL
ATTEMPT TO IDENTIFY AND ISOLATE LEAKAGE
RCS PRESSURE GREATER THAN 180 PSIG (450 PSIG)
EPP 9
FLOW FROM RHR PUMPS TO RCS VERIFIED
EPP 9
RWST LEVEL GREATER THAN <LATER>
EPP 10
SI SYSTEM IN COLD LEG RECIRCULATION
RCS PRESSURE GREATER THAN INTACT S/Gs PRESSURE
S/G RADIATION NORMAL
DO NOT DUMP STEAM FROM ANY S/G WITH HIGH RADIOACTIVITY
DEPRESSURIZE INTACT S/Gs TO ATTAIN LESS THAN RCS PRESSURE
ISOLATE FEED TO S/G WITH HIGH RADIOACTIVITY
NOTE
AT 18 HOURS AFTER EVENT INITIATION, PLACE SYSTEM IN COLD LEG RECIRCULATION USING EPP-11
CONSULT PLANT OPERATIONS FOR HEAD VENTING AND SWITCH OVER TO HOT LEG RECIRCULATION

** THIS PROCEDURE CURRENTLY DOES NOT CONTAIN ALL NECESSARY INFORMATION. REQUIRED INFORMATION MUST BE FILLED IN PRIOR TO PLANT FUEL LOAD.

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