

EMERGENCY INSTRUCTION

I-4.3

REACTOR TRIP

1.0 PURPOSE

- 1.1 A REACTOR TRIP IS INITIATED AUTOMATICALLY BY THE REACTOR PROTECTION SYSTEM IF UNSAFE OPERATING CONDITIONS ARE APPROACHED. IT MAY ALSO BE INITIATED MANUALLY FROM THE CONTROL CONSOLE. THIS INSTRUCTION PROVIDES THE ACTIONS REQUIRED TO ENSURE THE REACTOR IS IN A SAFE SHUTDOWN CONDITION.
- 1.2 IN ADDITION TO DE-ENERGIZING THE SHUTDOWN AND CONTROL ROD DRIVE MECHANISMS, A REACTOR TRIP SIGNAL WILL INITIATE A TURBINE TRIP AND, IN CONJUNCTION WITH A LOW T_{AVG} (554°F) INITIATE A FEEDWATER ISOLATION SIGNAL. THIS INSTRUCTION DELINEATES THE ACTION REQUIRED TO ENSURE BOTH OF THESE HAVE OCCURRED.
- 1.3 IN THE EVENT A REACTOR TRIP IS REQUIRED AND HAS NOT BEEN AUTOMATICALLY INITIATED OR THE REACTOR FAILS TO TRIP WHEN INITIATED, THIS IS IDENTIFIED AS AN "ANTICIPATED TRANSIENT WITHOUT A TRIP" EVENT (ATWT EVENT). THIS INSTRUCTION PROVIDES THE NECESSARY ACTIONS TO ENSURE THE REACTOR IS PLACED IN A SAFE SHUTDOWN CONDITION FOR THIS EVENT.

2.0 INITIAL CONDITIONS

- 2.1 ANY OF THE FOLLOWING CONDITIONS WILL LEAD TO A REACTOR TRIP AND TO AN AUTOMATIC PLANT SHUTDOWN. THE CONDITION CAUSING THE TRIP WILL BE BACK LIGHTED IN RED ON THE FIRST OUT OVERHEAD ANNUNCIATOR PANEL (SECTION F).

REACTOR TRIP	SETPOINT	COINCIDENCE	INTERLOCK
1. MANUAL	NONE	1/2	NONE
2. PWR. RANGE, HIGH NEUTRON FLUX	LOW SETPOINT - 25% OF RATED THERMAL PWR.	2/4	P-10
	HIGH SETPOINT - 109% OF RATED THERMAL PWR.	2/4	NONE
3. PWR. RANGE, HIGH FLUX RATE TRIP	± 5% OF RATED THERMAL PWR. IN 2 SEC.	2/4	NONE
4. INTERMEDIATE RANGE, HIGH NEUTRON FLUX	CURRENT EQUIVALENT TO 25% OF FULL PWR.	1/2	P-10
5. SOURCE RANGE, HIGH NEUTRON FLUX	10 ⁵ COUNTS PER SEC.	1/2	P-6 INTERLOCKED WITH P-10.
6. OVERTEMPERATURE ΔT	VARIABLE SETPOINT	2/4	NONE
7. OVERPOWER ΔT	VARIABLE SETPOINT	2/4	NONE

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3.3 IF CONTAINMENT PHASE "B" ISOLATION IS ACTUATED, TRIP ALL REACTOR COOLANT PUMPS WITHIN FIVE MINUTES.

4.0 SUBSEQUENT ACTIONS - PART I - COLD LEG INJECTION

COMMENTS

4.0 THE SUBSEQUENT ACTIONS IN THIS INSTRUCTION WILL ADDRESS BOTH THE SMALL LOCA AND THE DBA.

4.1 CHECK THE FOLLOWING INDICATORS ON THE CONTROL CONSOLE TO ENSURE BORATED WATER IS BEING INJECTED INTO THE REACTOR COOLANT SYSTEM.

4.1.1 BORON INJECTION TANK PRESSURE INDICATING RCS PRESSURE.

4.1.2 CHARGING PUMPS DISCHARGE FLOW

4.1.3 No. 11(21) SAFETY INJECTION PUMP DISCHARGE FLOW WHEN RCS PRESSURE IS $< \sim 1500$ PSIG.

4.1.4 No. 12(22) SAFETY INJECTION PUMP DISCHARGE FLOW WHEN RCS PRESSURE IS $< \sim 1500$ PSIG.

4.1.5 No. 11(21) RHR INJECTION FLOW WHEN RCS PRESSURE IS $< \sim 170$ PSIG.

4.1.6 No. 12(22) RHR INJECTION FLOW WHEN RCS PRESSURE IS $< \sim 170$ PSIG.

4.2 IF CONTAINMENT PRESSURE HAS NOT INCREASED TO THE HI-HI SETPOINT OF 23.5 PSIG, PROCEED TO STEP 4.5.

4.2 CONTINUE TO MONITOR CONTAINMENT PRESSURE.

A RELATIVELY SLOW BUILDUP IN CONTAINMENT PRESSURE IS INDICATIVE OF A SMALL LOCA.

4.3 IF CONTAINMENT PRESSURE HAS INCREASED TO THE HI-HI SETPOINT OF 23.5 PSIG, VERIFY THE FOLLOWING BY OBSERVING THE STATUS PANEL ON RP-4 AND/OR THE CONSOLE INDICATIONS.

4.3.1 CONTAINMENT SPRAY HAS INITIATED

1. CHECK THAT THE FOLLOWING PUMPS HAVE STARTED. IF A PUMP FAILS TO START, ATTEMPT TO START MANUALLY FROM THE CONTROL CONSOLE.

No. 11(21) CONTAINMENT SPRAY PUMP
 No. 12(22) CONTAINMENT SPRAY PUMP

2. CHECK THAT THE FOLLOWING VALVES HAVE OPENED. IF A VALVE FAILS TO OPEN, ATTEMPT TO OPEN MANUALLY FROM THE CONTROL CONSOLE.

11(21)CS2 DISCHARGE VALVE
 12(22)CS2 DISCHARGE VALVE
 1(2)CS16 SPRAY ADD TANK DISCH VALVE
 1(2)CS17 SPRAY ADD TANK DISCH VALVE

3. CHECK THE ADDITIVE TANK LEVEL INDICATOR AND OUTLET FLOW INDICATOR ON THE CONTROL CONSOLE TO ENSURE THAT THE SODIUM HYDROXIDE (NaOH) SOLUTION IS BEING INJECTED INTO THE CONTAINMENT SPRAY SYSTEM. IF THE LEVEL IS NOT DECREASING AND NO FLOW IS INDICATED, DISPATCH AN OPERATOR TO VERIFY THE LEVEL LOCALLY AND TO ENSURE THE FOLLOWING MECHANICAL VALVES ARE OPEN.

11(21)CS20 EDUCTOR SUPPLY VALVE
 12(22)CS20 EDUCTOR SUPPLY VALVE

4.3.2 ISOLATION PHASE "B" HAS TAKEN PLACE

1. CHECK TO SEE THAT THE FOLLOWING VALVES HAVE CLOSED BY OBSERVING THE STATUS PANEL ON RP-4 AND ACKNOWLEDGE ON THE APPROPRIATE CONTROL CONSOLE BEZEL.
 - A. IF ANY VALVE HAS FAILED TO CLOSE, ATTEMPT TO CLOSE IT FROM THE CONTROL CONSOLE BEZEL.

COMPONENT COOLING

1(2)CC117 RCP COOLING WATER INLET
 1(2)CC118 RCP COOLING WATER INLET
 1(2)CC136 RCP BEARING OUTLET
 1(2)CC131 RCP THRM BAR DISCH FLOW
 1(2)CC190 RCP THERMAL BAR DISCH
 1(2)CC187 RCP BEARING OUTLET

- B. IF ANY REACTOR COOLANT PUMPS
 ARE RUNNING, THEY MUST BE
 TRIPPED AT THIS TIME.

4.3.3 MAIN STEAM ISOLATION HAS TAKEN PLACE

1. CHECK THAT THE FOLLOWING VALVES HAVE
 CLOSED BY OBSERVING THE STATUS PANEL
 AND ACKNOWLEDGE ON THE APPROPRIATE
 CONTROL CONSOLE BEZEL. IF ANY
 VALVE HAS FAILED TO CLOSE, ATTEMPT
 TO CLOSE IT FROM THE CONTROL
 CONSOLE BEZEL.

11(21)MS167 No. 11(21) STEAM GEN
 STOP VALVE
 12(22)MS167 No. 12(22) STEAM GEN
 STOP VALVE
 13(23)MS167 No. 13(23) STEAM GEN
 STOP VALVE
 14(24)MS167 No. 14(24) STEAM GEN
 STOP VALVE
 11(21)MS18 No. 11(21) STEAM GEN
 STOP WARMUP VALVE
 12(22)MS18 No. 12(22) STEAM GEN
 STOP WARMUP VALVE
 13(23)MS18 No. 13(23) STEAM GEN
 STOP WARMUP VALVE
 14(24)MS18 No. 14(24) STEAM GEN
 STOP WARMUP VALVE
 11(21)MS7 No. 11(21) STEAM GEN
 DRAIN VALVE
 12(22)MS7 No. 12(22) STEAM GEN
 DRAIN VALVE
 13(23)MS7 No. 13(23) STEAM GEN
 DRAIN VALVE
 14(24)MS7 No. 14(24) STEAM GEN
 DRAIN VALVE

4.4 IF THE RWST LEVEL IS DROPPING RAPIDLY (> ~ 2 FEET PER MINUTE) PROCEED TO STEP 4.12.

4.5 CHECK CLOSED THE POWER OPERATED RELIEF VALVES, 1(2)PR1 & 2.

4.6 IF THE PRODAC 250 IS AVAILABLE:

4.6.1 INITIATE CRT TEST 41. IF THE CORE EXIT THERMOCOUPLE IS <1200°F, PROCEED TO STEP 4.8. IF THE HIGHEST CORE EXIT THERMOCOUPLE READS ≥1200°F, PROCEED WITH STEP 4.6.2.

4.6.2 INITIATE A SHORT FORM THERMOCOUPLE MAP TO PRINT ON THE TREND TYPEWRITER.

4.6.3 IF FIVE OR MORE CORE EXIT THERMOCOUPLES READ ≥1200°F A CONDITION OF INADEQUATE CORE COOLING IS DEVELOPING. PROCEED AS FOLLOWS UNTIL CORE COOLING IS RE-ESTABLISHED:

A. ESTABLISH MAXIMUM AUXILIARY FEEDWATER FLOW TO ALL INTACT STEAM GENERATORS.

AND

DUMP STEAM AT THE MAXIMUM RATE AVAILABLE FROM ALL STEAM GENERATORS TO WHICH AUXILIARY FEEDWATER FLOW HAS BEEN ESTABLISHED.

B. ESTABLISH MAXIMUM SAFETY INJECTION FLOW VIA THE BORON INJECTION TANK.

C. IF NEITHER THE CENTRIFUGAL CHARGING PUMPS NOR SAFETY INJECTION PUMPS ARE DELIVERING WATER TO THE RCS, AND STEAM DUMP FROM THE STEAM GENERATORS IS NOT AVAILABLE, AND AUXILIARY FEEDWATER IS NOT AVAILABLE TO ANY STEAM GENERATOR,

4.4 IF RWST LEVEL IS DROPPING RAPIDLY, IT IS EVIDENT A LARGE LOCA IS IN PROGRESS AND UNLIKELY THAT RCS PRESSURE WILL STABILIZE AT AN ELEVATED PRESSURE.

4.5 ELIMINATE PRV'S AS THE SOURCE OF LEAKAGE.

4.6.1 IF CORE EXIT TEMPERATURE IS <1200°F, CORE COOLING IS ADEQUATE.

4.6.2 REQUIRES ~2-3 MINUTES TO PRINT OUT. CRT TEST 13.

4.6.3 CORE COOLING IS RE-ESTABLISHED WHEN CORE EXIT TEMPERATURES ARE DECREASING.

A. CONDENSER DUMP IS PREFERRED.

ATMOSPHERIC DUMP IS ACCEPTABLE.

PUMPS SHOULD BE RUNNING.

ATMOSPHERIC OR CONDENSER

THEN, OPEN BOTH PRESSURIZER POWER OPERATED RELIEF VALVES, 1(2)PRI & 2, TO REDUCE RCS PRESSURE TO THE POINT AT WHICH SAFETY INJECTION FLOW IS BEING DELIVERED TO THE CORE. MAINTAIN 1(2) PRI & 2 OPEN UNTIL AUXILIARY FEED IS ESTABLISHED TO ALL STEAM GENERATORS.

INSURE 1(2)PR6 & 7 ARE OPEN.
SAFETY INJECTION PUMP SHUTOFF
~1520 PSIG.
RHR PUMP SHUTOFF ~170 PSIG.

- D. IF NONE OF THE ABOVE ACTIONS RESULT IN A REDUCTION IN CORE EXIT THERMOCOUPLES, AND, IF COMPONENT COOLING WATER IS AVAILABLE TO THE REACTOR COOLANT PUMP MOTOR COOLERS, THEN, START ONE REACTOR COOLANT PUMP

- D. THE CRITERIA FOR TRIPPING RCP'S AT 1500 PSIG DOES NOT APPLY.

THE REQUIREMENTS FOR SEAL INJECTION FLOW, SEAL LEAKOFF FLOW, THERMAL BARRIER CCW FLOW AND NO. 1 SEAL 4P DO NOT APPLY.

4.7 IF THE PRODAC 250 IS NOT AVAILABLE:

- 4.7.1 MONITOR THE WIDE RANGE RCS HOT LEG TEMPERATURES.

- 4.7.1 ON RECORDERS ON 1(2)RP4.

- 4.7.2 IF THREE HOT LEG TEMPERATURES INDICATE $\geq 700^{\circ}\text{F}$ A CONDITION OF INADEQUATE CORE COOLING MAY BE DEVELOPING. PROCEED AS FOLLOWS UNTIL CORE COOLING IS RE-ESTABLISHED:

- 4.7.2 CORE COOLING IS RE-ESTABLISHED WHEN CORE EXIT TEMPERATURES ARE DECREASING.

- A. ESTABLISH MAXIMUM AUXILIARY FEEDWATER FLOW TO ALL INTACT STEAM GENERATORS.

AND

DUMP STEAM AT THE MAXIMUM RATE AVAILABLE FROM ALL STEAM GENERATORS TO WHICH AUXILIARY FEEDWATER FLOW HAS BEEN ESTABLISHED.

- A. CONDENSER DUMP IS PREFERRED
ATMOSPHERIC DUMP IS ACCEPTABLE.

- B. ESTABLISH MAXIMUM SAFETY INJECTION FLOW VIA THE BORON INJECTION TANK.

- C. IF NEITHER THE CENTRIFUGAL CHARGING PUMPS NOR SAFETY INJECTION PUMPS ARE DELIVERING WATER TO THE RCS, AND,

PUMPS SHOULD BE RUNNING.

STEAM DUMP FROM THE STEAM GENERATORS IS NOT AVAILABLE. AND, AUXILIARY FEEDWATER IS NOT AVAILABLE TO ANY STEAM GENERATOR,

ATMOSPHERIC OR CONDENSER

THEN, OPEN BOTH PRESSURIZER POWER OPERATED RELIEF VALVES, 1(2)PRI & 2, TO REDUCE RCS PRESSURE TO THE POINT AT WHICH SAFETY INJECTION FLOW IS BEING DELIVERED TO THE CORE. MAINTAIN 1(2) PRI & 2 OPEN UNTIL AUXILIARY FEED IS ESTABLISHED TO ALL STEAM GENERATORS.

INSURE 1(2)PR6 & 7 ARE OPEN.
SAFETY INJECTION PUMP SHUTOFF ~1520 PSIG.
RHR PUMP SHUTOFF ~170 PSIG.

- D. IF NONE OF THE ABOVE ACTIONS RESULT IN A REDUCTION IN CORE EXIT THERMOCOUPLES, AND, IF COMPONENT COOLING WATER IS AVAILABLE TO THE REACTOR COOLANT PUMP MOTOR COOLERS, THEN, START ONE REACTOR COOLANT PUMP.

- D. THE CRITERIA FOR TRIPPING RCP'S AT 1500 PSIG DOES NOT APPLY.

THE REQUIREMENTS FOR SEAL INJECTION FLOW, SEAL LEAKOFF FLOW, THERMAL BARRIER CCW FLOW AND NO. 1 SEAL ΔP DO NOT APPLY

4.8 SAFETY INJECTION MAY BE TERMINATED IF ALL OF THE FOLLOWING EXIST.

4.8 MONITOR FOR THESE CONDITIONS THROUGHOUT THIS INSTRUCTION.

1. RCS PRESSURE IS >2000 PSIG AS INDICATED ON 2/3 PRESSURIZER PRESSURE INDICATORS, AND,
2. ACTUAL PRESSURIZER LEVEL IS >20% AND,
3. TOTAL AUXILIARY FEEDWATER FLOW TO ALL STEAM GENERATORS >42x10³ LB/HR OR ACTUAL LEVEL IN AT LEAST ONE STEAM GENERATOR ≥5% AS INDICATED ON 2/3 NARROW RANGE INDICATORS, AND THE INCORE THERMOCOUPLES AND WIDE RANGE T_H ARE STABLE OR DECREASING, AND,
4. RCS TEMPERATURE IS MORE THAN 50°F SUBCOOLED AS INDICATED BY EITHER THE WIDE RANGE T_H INDICATOR OR THE INCORE THERMOCOUPLES.

VERIFY RCS PRESSURE BY COMPARING IT TO BIT PRESSURE. BIT PRESSURE SHOULD BE SLIGHTLY HIGHER.

2. CORRECT PRESSURIZER LEVEL FOR REFERENCE LEG HEATUP IAW APPENDIX 2,
3. CORRECT STEAM GENERATOR LEVELS FOR REFERENCE LEG HEATUP IAW APPENDIX 2.

4. IF TEMPERATURE REMAINS BELOW THE T_{SAT} -50°F CURVE ON THE PRESSURE-TEMPERATURE CURVE, 50°F SUBCOOLING IS ASSURED.

4.8.1 IF ALL OF THE ABOVE ARE MET, PROCEED TO EI I-4.2, "RECOVERY FROM SAFETY INJECTION".

4.8.1 EI I-4.2 HAS ALL THE STEPS REQUIRED TO TERMINATE SAFETY INJECTION AND THE CRITERIA FOR RE-INITIATION.

4.8.2 IF RE-INITIATION OF SAFETY INJECTION WAS REQUIRED IAW THE CRITERIA IN EI I-4.2, PROCEED WITH THIS INSTRUCTION FROM THIS POINT.

4.8.2 DO NOT ATTEMPT TO TERMINATE SAFETY INJECTION AGAIN. FOR CERTAIN SMALL BREAKS MAXIMUM CHARGING FLOW MAY NOT KEEP RCS PRESSURE >2000 PSIG.

4.9 IF REACTOR COOLANT PRESSURE STABILIZES ABOVE THE SHUTOFF HEAD (~170 PSIG) OF THE RESIDUAL HEAT REMOVAL PUMPS, PROCEED AS FOLLOWS:

4.9.1 RESET SAFETY INJECTION BY DEPRESSING BOTH TRAIN "A" AND TRAIN "B" SI RESET PUSHBUTTONS ON THE SAFEGUARDS ACTUATION BEZELS ON THE CONTROL CONSOLE.

4.9.1 IF AT ANY TIME AFTER THE SAFETY INJECTION AND CONTAINMENT SPRAY SIGNALS ARE RESET, A BLACKOUT SIGNAL IS RECEIVED, THE VITAL BUSES WOULD BE STRIPPED AND THE BLACKOUT LOADS WOULD BE SEQUENCED ON BY THE SEC THE RHR, SAFETY INJECTION, AND CONTAINMENT SPRAY PUMPS AND THE CONTAINMENT FAN COIL UNITS WILL NOT BE RESTARTED. THESE MUST BE MANUALLY RESTARTED ONCE THE LOADING SEQUENCE IS COMPLETE AS INDICATED BY "LOADING COMPLETE"

LIGHTS ON THE 1A, 1B, 1C(2A, 2B 2C) DIESEL BEZELS ON THE CONTROL CONSOLE.

THIS IS TO BE ACCOMPLISHED IN SUCH A MANNER AS TO PREVENT OVERLOADING THE DIESELS. THE LOADS SHOULD BE APPLIED AT ~ 10 SEC. INTERVALS.

DO NOT RESTART THE EQUIPMENT BY MANUALLY INITIATING SAFETY INJECTION OR CONTAINMENT SPRAY AS THIS MAY RESULT IN UNDESIRABLE VALVE OPERATIONS.

4.9.2 RESET THE SAFEGUARDS LOADING SEQUENCE BY DEPRESSING THE EMERGENCY LOADING RESET PUSHBUTTON ON THE CONTROL CONSOLE FOR 1A, 1B, AND 1C(2A, 2B AND 2C) DIESEL GENERATORS.

4.9.2 THE STATUS LIGHTS ON RP-4 ASSOCIATED WITH SEC LOADING SHOULD GO OUT.

4.9.3 STOP No. 11 & 12(21 & 22) RESIDUAL HEAT REMOVAL PUMPS.

4.9.3 THE RHR PUMPS SHOULD NOT BE ALLOWED TO RUN ON RECIRC FOR MORE THAN ~30 MINUTES SINCE THERE IS NO COMPONENT COOLING TO THE HEAT EXCHANGER.

CAUTION: IF REACTOR COOLANT PRESSURE DECREASES TO BELOW THE SHUT-OFF HEAD (~170 PSIG) FOR THE RESIDUAL HEAT REMOVAL PUMPS, RESTART THE PUMPS.

4.9.4 OPERATE THE SAFETY INJECTION PUMPS AS REQUIRED TO MAINTAIN PRESSURIZER LEVEL BETWEEN 50% AND 90%.

4.9.4 DO NOT ATTEMPT TO THROTTLE THE DISCHARGE FLOW.

4.10 COMMENCE TAKING THE PLANT TO COLD SHUTDOWN CONDITIONS BY COOLING DOWN AS FOLLOWS:

4.10.1 MANUALLY CONTROL THE AUXILIARY FEEDWATER CONTROL VALVES (AF21) TO MAINTAIN ACTUAL STEAM GENERATOR LEVELS AT APPROXIMATELY 33%.

4.10.1 CORRECT STEAM GENERATOR LEVELS FOR REFERENCE LEG HEATUP IAW APPENDIX 2.

NOTE IF No. 13(23) AFW PUMP IS RUNNING IT WILL BE NECESSARY TO CONTROL THE AF11 VALVES.

4.10.2 PLACE THE STEAM DUMP IN MAIN STEAM PRESSURE CONTROL MODE AND PERIODICALLY, REDUCE THE PRESSURE SETPOINT OF THE MAIN STEAM PRESSURE CONTROLLER BY DEPRESSING THE SETPOINT DECREASE PUSHBUTTON.

4.10.2 DECREASING THE SETPOINT INCREASES STEAM FLOW.

IF THE CONDENSER IS NOT AVAILABLE, USE THE MS-10's.

4.10.3 AS APPLICABLE, TAKE THE PLANT TO COLD SHUTDOWN CONDITIONS IAW 01 I-3.6, "HOT STANDBY TO COLD SHUTDOWN".

4.10.3 DUE TO ABNORMAL PLANT CONDITIONS SOME STEPS MAY NOT BE APPROPRIATE AND SOME EQUIPMENT NOT AVAILABLE.

IT MAY BE NECESSARY TO MAINTAIN FLOW THROUGH THE BIT SINCE MAXIMUM CHARGING FLOW MAY NOT MAINTAIN RCS INVENTORY UNTIL PRESSURE IS SIGNIFICANTLY REDUCED.

4.10.4 IF THE PRODAC 250 COMPUTER IS AVAILABLE, INITIATE CRT TEST No. 41, "CORE TEMPERATURE/PRESSURE MONITOR PROGRAM".

4.10.4 THIS PROVIDES A READILY AVAILABLE DISPLAY OF SUB-COOLING.

IF THE COMPUTER IS NOT AVAILABLE OR THE INDICATIONS ARE CONSIDERED NOT RELIABLE DUE TO ADVERSE CONTAINMENT CONDITIONS, SUBCOOLING CAN BE DETERMINED FROM EITHER THE PRESSURE-TEMPERATURE CURVE OR FROM THE STEAM TABLES.

4.10.5 MAINTAIN SUBCOOLING $>50^{\circ}\text{F}$ BY INCREASING STEAM FLOW AS REQUIRED AS DESCRIBED IN STEP 4.10.2 ABOVE

4.11 WHEN CONDITIONS PERMIT, RETURN THE 4KV VITAL BUSES TO NORMAL BY:

4.11.1 STOPPING THE EMERGENCY DIESEL GENERATORS IAW OI IV-16.3.1, EMERGENCY POWER - DIESEL OPERATION.

4.11.2 START OR STOP VITAL BUS LOADS, AS REQUIRED.

4.12 CLOSELY MONITOR RWST LEVEL. AS IT APPROACHES THE LOW LEVEL ALARM, PREPARE TO CHANGE FROM THE INJECTION PHASE TO THE COLD LEG RECIRCULATION PHASE. PROCEED AS FOLLOWS:

4.12.1 RESET SAFETY INJECTION BY DEPRESSING BOTH TRAIN "A" AND TRAIN "B" SI RESET PUSHBUTTONS ON THE SAFEGUARDS ACTUATION BEZELS ON THE CONTROL CONSOLE.

4.12.1 IF AT ANY TIME AFTER THE SAFETY INJECTION AND CONTAINMENT SPRAY SIGNALS ARE RESET, A BLACKOUT SIGNAL IS RECEIVED, THE VITAL BUSES WOULD BE STRIPPED AND THE BLACKOUT LOADS WOULD BE SEQUENCED ON BY THE SEC.

THE RHR, SAFETY INJECTION, AND CONTAINMENT SPRAY PUMPS AND THE CONTAINMENT FAN COIL UNITS WILL NOT BE RESTARTED. THESE MUST BE MANUALLY RESTARTED ONCE THE LOADING SEQUENCE IS COMPLETE AS INDICATED BY THE "LOADING COMPLETE" LIGHTS ON THE 1A, 1B, 1C(2A, 2B, 2C) DIESEL BEZELS ON THE CONTROL CONSOLE.

THIS IS TO BE ACCOMPLISHED IN SUCH A MANNER AS TO PREVENT OVERLOADING THE DIESELS. THE LOADS SHOULD BE APPLIED AT ~ 10 SEC. INTERVALS.

DO NOT RESTART THE EQUIPMENT BY MANUALLY INITIATING SAFETY INJECTION OR CONTAINMENT SPRAY AS THIS MAY RESULT IN UNDESIRABLE VALVE OPERATIONS WHICH MAY RESULT IN EQUIPMENT DAMAGE.

4.12.2 RESET THE SAFEGUARDS LOADING SEQUENCE BY DEPRESSING THE EMERGENCY LOADING RESET PUSH-BUTTONS ON THE CONTROL CONSOLE FOR 1A, 1B, 1C(2A, 2B, 2C) DIESEL GENERATORS.

4.12.2 THE STATUS LIGHTS ON RP-4 ASSOCIATED WITH SEC LOADING SHOULD GO OUT.

4.12.3 RESET CONTAINMENT SPRAY, IF CONTAINMENT PRESSURE IS LESS THAN 23.5 PSIG ON 3/4 CHANNELS, BY DEPRESSING TRAIN "A" AND TRAIN "B" SPRAY ACT RESET PUSHBUTTONS ON THE SAFEGUARDS ACTUATION BEZELS ON THE CONTROL CONSOLE.

4.12.4 WHEN CONDITIONS PERMIT, RETURN THE 4KV VITAL BUSES TO NORMAL BY:

- A. STOPPING THE EMERGENCY DIESEL GENERATORS IAW OI IV-16.3.1, "EMERGENCY POWER - DIESEL OPERATION".
- B. START OR STOP VITAL BUS LOADS, AS REQUIRED.

NOTE: IF A LOSS OF OFFSITE POWER HAS OCCURRED IN COINCIDENCE WITH THE LOCA, ALIGN THE ELECTRICAL SYSTEM IN ACCORDANCE WITH APPENDIX 1, PRIOR PROCEEDING WITH PARTS II OR III OF THIS PROCEDURE.

4.13 PROCEED TO SECTION 5.0, PART II - COLD LEG RECIRCULATION.

5.0 SUBSEQUENT ACTIONS - PART II - COLD LEG RECIRCULATIONCOMMENTS

CAUTION THE CHANGEOVER FROM THE SAFETY INJECTION PHASE TO COLD LEG RECIRCULATION MUST BE DONE QUICKLY TO PRECLUDE EMPTYING THE RWST. IF ANY VALVES FAIL TO RESPOND OR COMPLETE THE REQUIRED MOVEMENT, CONTINUE WITH THE SEQUENCE AND INITIATE ANY CORRECTIVE ACTIONS WHEN THE CHANGEOVER IS COMPLETED.

5.1 VERIFY THAT THE FOLLOWING NORMALLY CLOSED VALVES ARE CLOSED:

11(21)SJ40 11(21) DISCH VALVE TO HOT LEG
 12(22)SJ40 12(22) DISCH VALVE TO HOT LEG
 11(21)SJ113 SI CHG PUMPS X-OVER VALVE
 12(22)SJ113 SI CHG PUMPS X-OVER VALVE
 11(21)SJ45 RECIRC ISOL VALVE TO SI PUMPS
 11(21)CS36 FROM 11(21) RHX VALVE
 12(22)CS36 FROM 12(22) RHX VALVE
 1(2)RH2 RHR COMMON SUCTION VALVE
 1(2)RH1 RHR COMMON SUCTION VALVE
 11(21)SJ44 SIS SUMP VALVE
 12(22)SJ44 SIS SUMP VALVE
 1(2)RH20 RHX BYPASS VALVE
 1(2)RH26 HOT LEG ISOLATION VALVE
 11(21)RH29 11(21) RHR PUMP BYPASS
 12(22)RH29 12(22) RHR PUMP BYPASS
 12(22)SJ45 SUCTION FROM RHY (TO CHARGING PUMP)

5.2 OPEN 11(21)CC16 AND 12(22)CC16 RHR HEAT EXHCANGER OUTLET VALVES.

5.3 VERIFY THAT THERE IS AN ADEQUATE WATER LEVEL IN THE CONTAINMENT SUMP AS INDICATED BY AN ENERGIZED AVAILABLE NPSH LIGHT ON THE CONTROL CONSOLE.

5.4 WHEN RWST LOW LEVEL ALARM ACTUATES STOP THE FOLLOWING PUMPS IF THEY ARE RUNNING.

No. 11(21) RHR PUMP
 No. 12(22) RHR PUMP
 No. 11(21) CS PUMP OR No. 12(22) CS PUMP,
 IF CONTAINMENT SPRAY ACTUATION HAS OCCURRED.

5.1 THE RH-29'S WILL BE CLOSED ONLY IF RHR FLOW IS >1000 GPM PER PUMP.

IF CONTAINMENT SPRAY HAS NOT BEEN ACTIVATED THE RHR PUMP NEED NOT BE ALIGNED TO THE SPRAY HEADER.

5.4 ANNUNCIATOR D-36 ON UNIT 1 (D-35 ON UNIT 2). RECEIPT OF THE RWST LOW LEVEL ALARM INSURES SUFFICIENT NPSH FOR THE RHR PUMP

ONE CS PUMP SHOULD CONTINUE TO OPERATE UNTIL THE RWST LOW-LOW LEVEL ALARM IS RECEIVED OR THE SPRAY ADDITIVE TANK EMPTIES. IF CONTAINMENT PRESSURE IS >23.5

PSIG IT WILL NOT BE POSSIBLE TO STOP EITHER CONTAINMENT SPRAY PUMP.

NOTE: ALIGNING THE RHR PUMPS AS DESCRIBED IN THE FOLLOWING STEPS WILL PROVIDE FLOW TO THE CHARGING AND SAFETY INJECTION PUMPS AND THE CONTAINMENT SPRAY HEADER. IF ONE RHR PUMP IS NOT AVAILABLE TO PROVIDE FLOW THE OTHER PUMP WILL SUPPLY THE CHARGING AND SAFETY INJECTION PUMPS AND THE CONTAINMENT SPRAY HEADER WITH NO ADDITIONAL VALVE OPERATION, HOWEVER, THE COLD LEG INJECTION FROM THE OPERATING RHR PUMP WILL HAVE TO BE ISOLATED BY CLOSING THE APPROPRIATE SJ-49. IF LOSS OF OFFSITE POWER HAS OCCURRED CONCURRENTLY WITH LOCA, SEE APPENDIX 1 FOR INSTRUCTIONS ON SECURING CONTAINMENT SPRAY PUMP.

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| 5.5 CLOSE 11(21)RH4 RHR PUMP SUCTION VALVE, IF No. 11(21) RHR PUMP IS AVAILABLE. | 5.5 11(21)RH4 MUST BE CLOSED IN ORDER TO OPEN 11(21)SJ44. |
| 5.6 CLOSE 12(22)RH4 RHR PUMP SUCTION VALVE, IF No. 12(22) RHR PUMP IS AVAILABLE. | 5.6 12(22)RH4 MUST BE CLOSED IN ORDER TO OPEN 12(22)SJ44. |
| 5.7 CLOSE THE BREAKER FOR 1(2)SJ69 AND CLOSE THE VALVE, AS SOON AS POSSIBLE. | 5.7 1(2)C WEST 230V VITAL VALVE CONTROL CENTER. THIS CAN BE COMPLETED IN CONJUNCTION WITH THE REMAINING STEPS. |
| 5.8 REMOVE THE LOCKOUT ON RP4 AND OPEN 11(21) SJ44 SIS SUMP VALVE, IF No. 11(21) RHR PUMP IS AVAILABLE. | |
| 5.9 REMOVE THE LOCKOUT ON RP4 AND OPEN 12(22)SJ44 SIS SUMP VALVE, IF No. 12(22) RHR PUMP IS AVAILABLE. | |
| 5.10 CLOSE 11(21)RH19 11(21) RHX CROSS DISCH VALVE. | |
| 5.11 CLOSE 12(22)RH19 12(22)RHX CROSS DISCH VALVE. | |
| 5.12 START No. 11 & 12(21 & 22) RHR PUMP. | |
| 5.13 REMOVE THE LOCKOUT ON RP4 AND CLOSE 1(2) SJ67, 12(22) MINI FLOW ISOLATION VALVE, AND 1(2)SJ68 11(21) MINI FLOW ISOLATION VALVE. | 5.13 THERE ARE REDUNDANT SWITCHES ON 1(2)RP4 TO OPERATE 1(2)SJ67 AND 68. EITHER THE PUSHBUTTON ON THE CONTROL CONSOLE OR THESE SWITCHES WILL ALLOW FULL |

OPERATION OF THE VALVES ONCE
THE LOCKOUT IS REMOVED.

- 5.14 OPEN 12(22)SJ45 SUCTION FROM RHX, IF NO. 12(22) RHR PUMP IS AVAILABLE.
- 5.14 TO OPEN 12(22)SJ45, THE FOLLOWING VALVES MUST BE POSITIONED AS LISTED BELOW:
1(2)RH1 OR 1(2)RH2 - CLOSED
1(2)SJ67 OR 1(2)SJ68 - CLOSED
12(22)SJ44 - OPEN
- 5.15 OPEN 11(21)SJ45 RECIRC ISOLATION VALVE TO SI PUMP, IF NO. 11(21) RHR PUMP IS AVAILABLE.
- 5.15 TO OPEN 11(21)SJ45, THE FOLLOWING VALVES MUST BE POSITIONED AS LISTED BELOW:
1(2)RH1 OR 1(2)RH2 - CLOSED
1(2)SJ67 OR 1(2)SJ68 - CLOSED
11(21)SJ44 - OPEN
- 5.16 CLOSE THE BREAKER FOR 1(2)S.30 AND CLOSE THE VALVE, AS SOON AS POSSIBLE.
- 5.16 1(2)C WEST 230V VITAL VALVE CONTROL CENTER. THIS CAN BE COMPLETED IN CONJUNCTION WITH THE REMAINING STEPS.
- 5.17 OPEN 11(21)SJ113 SI CHARGE PUMPS X-OVER VALVE.
- 5.18 OPEN 12(22)SJ113 SI CHARGE PUMPS X-OVER VALVE.
- 5.19 CLOSE 1(2)SJ1 RWST TO CHARGE PUMP.
- 5.20 CLOSE 1(2)SJ2 RWST TO CHARGE PUMP.
- 5.21 VERIFY THAT NO. 11(21) SI PUMP IS OPERATING PROPERLY BY OBSERVING NO. 11(21) SI PUMP DISCHARGE PRESSURE INDICATOR AND NO. 11(21) SI PUMP DISCHARGE FLOW INDICATOR.
- 5.21 PRESSURE: 175 - 1520 PSIG
FLOW: ~400 - 100 GPM
- 5.22 VERIFY THAT NO. 12(22) SI PUMP IS OPERATING PROPERLY BY OBSERVING NO. 12(22) SI PUMP DISCHARGE PRESSURE INDICATOR AND NO. 12(22) SI PUMP DISCHARGE FLOW INDICATOR.
- 5.22 PRESSURE: 175 - 1520 PSIG
FLOW: ~400 - 100 GPM
- 5.23 VERIFY THAT NO. 11(21) CENTRIFUGAL CHARGING PUMP IS OPERATING PROPERLY BY OBSERVING THE CHARGING PUMP DISCHARGE FLOW INDICATOR AND BORON INJECTION TANK DISCHARGE PRESSURE INDICATOR.
- 5.23 PRESSURE: 175 - 2500 PSIG
FLOW: ~500 - 100 GPM
- 5.24 VERIFY THAT NO. 12(22) CENTRIFUGAL CHARGING PUMP IS OPERATING PROPERLY BY OBSERVING THE CHARGING PUMP DISCHARGE FLOW INDICATOR AND BORON INJECTION TANK DISCHARGE PRESSURE INDICATOR.
- 5.24 PRESSURE: 175 - 2500 PSIG
FLOW: ~500 - 100 GPM

NOTE: IF CONTAINMENT SPRAY HAS NOT BEEN ACTUATED, DELETE STEPS 5.25 THROUGH 5.28.

5.25 WHEN THE RWST LOW-LOW LEVEL ALARM ACTUATES STOP THE FOLLOWING PUMP:
No. 11(21) CONTAINMENT SPRAY PUMP OR
No. 12(22) CONTAINMENT SPRAY PUMP, WHICHEVER PUMP IS STILL RUNNING.

5.25 ANNUNCIATOR D-44
BOTH CONTAINMENT SPRAY PUMPS SHOULD BE IDLE AT THIS TIME. IF CONTAINMENT PRESSURE HAD NOT DECREASED TO BELOW 23.5 PSIG, THE CONTAINMENT SPRAY PUMP CANNOT BE STOPPED FROM THE CONTROL CONSOLE. TO STOP THE PUMPS, IT WILL BE NECESSARY TO TRIP THE BREAKERS LOCALLY ON THE 1A AND 1C(2A AND 2C) 4kV VIT. BUSES BY TURNING OFF THE 125 VDC CONTROL POWER AND DEPRESSING THE MANUAL TRIP BUTTON INSIDE THE BREAKER CABINET.

5.26 REMOVE THE LOCKOUT AND CLOSE 12(22)SJ49 RHR PUMP DISCH ISOL VALVE. (11(21)SJ49 IF NO. 12(22) RHR PUMP IS NOT AVAILABLE).

5.27 OPEN THE FOLLOWING CONTAINMENT SPRAY VALVES:
12(22)CS36 (11(21)CS36 IF NO. 12(22) RHR PUMP IS NOT AVAILABLE).

5.28 CLOSE THE FOLLOWING CONTAINMENT SPRAY VALVES:
11(21)CS2
12(22)CS2

5.28.1 CONTINUE SPRAY OPERATION FOR A MINIMUM PERIOD OF 22.5 HOURS IN ORDER TO ASSURE CONTAINMENT INTEGRITY AND REMOVAL OF AIRBORNE FISSION PRODUCTS FROM THE CONTAINMENT ATMOSPHERE.

5.28.1 THE EMERGENCY CORE COOLING SYSTEM IS NOW ALIGNED FOR COLD LEG RECIRCULATION AS FOLLOWS:

RHR PUMP No. 11(21) IS SUPPLYING WATER FROM THE CONTAINMENT SUMP DIRECTLY TO RCS LOOP 11(21) AND 13(21) COLD LEGS VIA VALVE 11(21)SJ49 AND TO THE SUCTION OF THE SAFETY INJECTION PUMPS THROUGH VALVE 11(21) SJ45.

RHR Pump No. 12(22) IS SUPPLYING WATER FROM THE CONTAINMENT SUMP DIRECTLY TO THE CONTAINMENT SPRAY HEADER AND TO THE SUCTION OF THE CHARGING PUMPS THROUGH VALVE 12(22)SJ45.

5.29 CLOSELY MONITOR THE CONTAINMENT H_2 CONCENTRATION ON RP-5. WHEN THE CONCENTRATION EXCEEDS $\sim 2\%$, PLACE THE HYDROGEN RECOMBINERS IN SERVICE IAW OI 11-15.3.1 "HYDROGEN RECOMBINERS - NORMAL OPERATION".

5.30 VERIFY CORE COOLING IS MAINTAINED BY OBSERVING THAT THE CORE EXIT THERMOCOUPLES ARE STABLE OR SLOWLY DECREASING.

PART III6.0 SUBSEQUENT ACTION - PART III - HOT LEG RECIRCULATION

AFTER APPROXIMATELY 22.5 HOURS OF COLD LEG RECIRCULATION, REALIGN THE SAFETY INJECTION SYSTEM FOR HOT LEG RECIRCULATION. THE SEQUENCE FOR THE CHANGEOVER FROM COLD LEG RECIRCULATION TO HOT LEG RECIRCULATION IS AS FOLLOWS:

NOTE

IF A LOSS OF OFFSITE POWER HAS OCCURRED IN COINCIDENCE WITH THE LOCA AND ONE OF THE DIESEL GENERATORS HAS FAILED TO START, REFER TO SECTION 4.0 OF PART II, III OR IV OF APPENDIX 1, AS APPLICABLE.

- 6.1 CLOSE 12(22)CS36 FROM 12(22) RHX VALVE.
- 6.2 OPEN 12(22)RH19 RHX CROSS DISCH VALVE.
- 6.3 CLOSE THE BREAKER ON 1(2)C EAST 230V VITAL VALVE CONTROL CENTER AND OPEN 1(2)RH26 HOT LEG ISOLATION VALVE.
- 6.4 REMOVE THE LOCKOUTS ON RP-4 AND CLOSE 11 & 12(21 & 22)SJ49 RHR PUMP DISCH ISOL VALVES.
- 6.5 STOP NO. 11(21) SAFETY INJECTION PUMP.
- 6.6 CLOSE 11(21)SJ134 11(21) SI PUMP DISCHARGE TO COLD LEG.
- 6.7 CLOSE THE BREAKER ON 1(2) A EAST 230V VITAL VALVE CONTROL CENTER AND OPEN 11(21)SJ40 DISCHARGE VALVE TO HOT LEG.
- 6.8 START NO. 11(21) SAFETY INJECTION PUMP.
- 6.9 VERIFY THAT NO. 11(21) SAFETY INJECTION PUMP IS OPERATING PROPERLY BY OBSERVING NO. 11(21) SI PUMP DISCHARGE PRESSURE AND FLOW INDICATORS (A PRESSURE OF 175 TO 1520 PSIG AND A FLOW OF ~ 400 TO 100 GPM SHOULD BE INDICATED).
- 6.10 STOP NO. 12(22) SAFETY INJECTION PUMP.
- 6.11 CLOSE 12(22)SJ134 12(22) SI PUMP DISCH TO COLD LEG
- 6.12 CLOSE THE BREAKER ON 1(2)C WEST 230V VITAL VALVE CONTROL CENTER AND OPEN 12(22)SJ40 DISCH VALVE TO HOT LEG.
- 6.13 START NO. 12(22) SAFETY INJECTION PUMP.
- 6.14 VERIFY THAT NO. 12(22) SAFETY INJECTION PUMP IS OPERATING PROPERLY BY OBSERVING NO. 12(22) SI PUMP DISCHARGE PRESSURE AND FLOW INDICATORS (A PRESSURE OF 175 TO 1520 PSIG AND A FLOW OF ~ 400 TO 100 GPM SHOULD BE INDICATED).
- 6.15 VERIFY CORE COOLING IS MAINTAINED BY OBSERVING THAT THE CORE EXIT THERMOCOUPLES ARE STABLE OR DECREASING.

NOTE

THE RESIDUAL HEAT REMOVAL PUMPS AND SAFETY INJECTION PUMPS ARE NOW ALIGNED FOR HOT LEG RECIRCULATION AS FOLLOWS:

- 1) No. 11(21) RHR PUMP IS SUPPLYING WATER FROM THE CONTAINMENT SUMP TO THE SUCTION HEADER OF THE SAFETY INJECTION PUMPS.
- 2) No. 12(22) RHR PUMP IS SUPPLYING WATER FROM THE CONTAINMENT SUMP TO THE REACTOR COOLANT SYSTEM THROUGH RCS LOOPS 13(23) AND 14(24) HOT LEGS AND TO THE SUCTION OF THE CENTRIFUGAL CHARGING PUMPS.
- 3) No. 11(21) SAFETY INJECTION PUMP IS SUPPLYING COOLING WATER TO THE REACTOR COOLANT SYSTEM THROUGH RCS LOOPS 13(23) AND 14(24) HOT LEGS.
- 4) No. 12(22) SAFETY INJECTION PUMP IS SUPPLYING COOLING WATER TO THE REACTOR COOLANT SYSTEM THROUGH RCS LOOPS 11(21) AND 12(22) HOT LEGS.
- 5) No. 11(21) AND 12(22) CHARGING PUMPS ARE SUPPLYING COOLING WATER TO THE REACTOR COOLANT SYSTEM THROUGH THE BIT VIA THE COLD LEGS.

PREPARED BY J. Bailey

M. J. Williams
MANAGER - SALEM GENERATING STATION

REVIEWED BY G. Connor

SORC MEETING No. 74-80

DATE 9/19/80

APPENDIX I

DISCUSSION

IF A LOSS OF OFFSITE POWER HAS OCCURRED IN COINCIDENCE WITH THE LOCA, THE DIESEL GENERATORS WILL BE SUPPLYING POWER TO THE VITAL BUSES. DURING THE RECIRCULATION PHASE, IT IS NECESSARY TO RUN THE COMPONENT COOLING PUMPS AND THE HYDROGEN RECOMBINERS. IN ORDER TO ACCOMMODATE THIS ADDITIONAL LOAD, OTHER EQUIPMENT MUST BE STOPPED BEFORE THE COMPONENT COOLING PUMPS AND HYDROGEN RECOMBINERS ARE STARTED TO PREVENT OVERLOADING THE DIESEL GENERATORS.

AFTER THE SAFETY INJECTION AND SEC ARE RESET, PROCEED WITH THE APPROPRIATE SECTION.

1 - ALL DIESEL GENERATORS OPERATING

1.0 STOP THE FOLLOWING EQUIPMENT:

NOTE

DO NOT STOP BOTH NO. 11(21) AND 12(22) CONTAINMENT SPRAY PUMPS UNTIL THE RWST LOW-LOW LEVEL ALARM ACTUATES. WHEN ENTERING COLD LEG RECIRC., STOP ONLY ONE CONTAINMENT SPRAY PUMP, EITHER 11(21) OR 12(22).

1.1 EQUIPMENT ON 1A(2A) VITAL BUS (POWERED BY 1A(2A) DIESEL/GENERATOR)

1. No. 11(21) CONTAINMENT SPRAY PUMP
2. No. 11(21) AUXILIARY BUILDING EXHAUST FAN
- 3) No. 11(21) SWITCHGEAR ROOM SUPPLY FAN
4. No. 11(21) CHILLER

1.2 EQUIPMENT ON 1B(2B) VITAL BUS (POWERED BY 1B(2B) DIESEL/GENERATOR)

1. No. 12(22) CONTAINMENT FAN COIL UNIT
2. No. 14(24) CONTAINMENT FAN COIL UNIT

1.3 EQUIPMENT ON 1C(2C) VITAL BUS (POWERED BY 1C(2C) DIESEL/GENERATOR)

1. No. 12(22) CONTAINMENT SPRAY PUMP
2. No. 11(21) AUXILIARY BUILDING SUPPLY FAN

2.0 START THE FOLLOWING EQUIPMENT:

CAUTION

WHEN ENTERING COLD LEG RECIRC. START ONLY ONE COMPONENT COOLING PUMP. ENSURE THE COMPONENT COOLING PUMP TO BE STARTED IS ENERGIZED FROM THE SAME VITAL BUS AS WAS THE CONTAINMENT SPRAY PUMP SECURED IN THE ABOVE STEP.

2.1 EQUIPMENT ON 1A(2A) VITAL BUS (POWERED BY 1A(2A) DIESEL/GENERATOR)

1. No. 11 COMPONENT COOLING PUMP, OR

2.2 EQUIPMENT ON 1C(2C) VITAL BUS (POWERED BY 1C(2C) DIESEL/GENERATOR)

1. No. 13(23) COMPONENT COOLING PUMP

NOTE

IF IRRADIATED FUEL IS STORED IN THE FUEL HANDLING BUILDING, START NO. 11 & 12(21 & 22) FHB EXHAUST FAN.

3.0 OPEN 11(21)SW122 AND 12(22)SW133 TO SUPPLY SERVICE WATER TO COMPONENT COOLING.

4.0 RETURN TO SUBSEQUENT ACTIONS PART II, STEP 5.1, OF THIS INSTRUCTION.

II - FAILURE OF 1A(2A) DIESEL GENERATOR

1.0 STOP THE FOLLOWING EQUIPMENT:

1.1 EQUIPMENT ON 1B(2B) VITAL BUS (POWERED BY 1B(2B) DIESEL/GENERATOR)

1. No. 11(21) CHARGING PUMP
2. No. 12(22) OR No. 14(24) CONTAINMENT FAN COIL UNIT
3. No. 12(22) AUXILIARY BUILDING SUPPLY FAN

1.2 EQUIPMENT ON 1C(2C) VITAL BUS (POWERED BY 1C(2C) DIESEL/GENERATOR)

1. No. 12(22) CONTAINMENT SPRAY PUMP WHEN RWST LOW-LOW LEVEL ALARM ACTUATES.

2.0 START NO. 12(22) COMPONENT COOLING PUMP AND OPEN 12(22)SW122 TO PROVIDE SERVICE WATER TO COMPONENT COOLING.

NOTE

IF IRRADIATED FUEL IS STORED IN THE FUEL HANDLING BUILDING, START NO. 12(22) FHB EXHAUST FAN.

3.0 THE FOLLOWING SHOULD BE THE ALIGNMENT FOR COLD LEG RECIRCULATION.

3.1 THE FOLLOWING PUMPS SHOULD BE RUNNING:

1. No. 12(22) RHR PUMP
2. No. 12(22) CHARGING PUMP
3. No. 12(22) SAFETY INJECTION PUMP
4. No. 12(22) CONTAINMENT SPRAY PUMP, UNTIL RWST LOW-LOW LEVEL ALARM ACTUATES.

3.2 CLOSE VALVES 12(22)RH19 AND 12(22)SJ49 TO PREVENT FLOW TO THE COLD LEGS AND TO INSURE ADEQUATE FLOW TO No. 12(22) CHARGING PUMP AND No. 12(22) SAFETY INJECTION PUMP SUCTIONS AND TO INSURE FLOW TO THE CONTAINMENT SPRAY HEADER THROUGH 12(22)CS36 WHEN IT IS OPENED.

3.3 THE COLD LEG RECIRCULATION FLOW PATH WOULD BE AS FOLLOWS:

1. No. 12(22) RHR PUMP TAKING SUCTION ON THE CONTAINMENT SUMP AND DISCHARGING TO THE SUCTIONS OF No. 12(22) CHARGING PUMP AND No. 12(22) SAFETY INJECTION PUMP THROUGH 12(22)SJ45, 12(22)SJ113, 11(21)SJ33, AND 12(22)SJ33.
2. No. 12(22) CHARGING PUMP DISCHARGE THROUGH THE BORON INJECTION TANK TO ALL FOUR COLD LEGS.
3. No. 12(22) SAFETY INJECTION PUMP DISCHARGE THROUGH 12(22)SJ134 AND 1(2)SJ135 TO ALL FOUR COLD LEGS.
4. 12(22) CONTAINMENT SPRAY PUMP TAKING SUCTION FROM THE RWST AND DISCHARGE TO THE SPRAY HEADER.

4.0 RETURN TO SUBSEQUENT ACTIONS PART II, STEP 5.1, OF THIS INSTRUCTION.

5.0 PROCEED AS FOLLOWS FOR HOT LEG RECIRCULATION:

5.1 CLOSE 12(22)CS36 TO STOP CONTAINMENT SPRAY.

5.2 STOP No. 12(22) SAFETY INJECTION PUMP AND No. 12(22) CHARGING PUMP.

5.3 CLOSE 12(22)SJ134 TO ISOLATE COLD LEG RECIRCULATION.

5.4 CLOSE THE BREAKER ON 1(2)C WEST 230V VITAL VALVE CONTROL CENTER AND OPEN 12(22)SJ40 TO SUPPLY HOT LEG RECIRCULATION.

5.5 START No. 12(22) SAFETY INJECTION PUMP.

5.6 THE HOT LEG RECIRCULATION FLOW PATH WOULD BE AS FOLLOWS:

1. No. 12(22) RHR PUMP TAKING SUCTION ON THE CONTAINMENT SUMP AND DISCHARGING TO THE SUCTIONS OF No. 12(22) CHARGING PUMP AND No. 12(22) SAFETY INJECTION PUMP THROUGH 12(22)SJ45, 12(22)SJ113, 11(21)SJ33, AND 12(22)SJ33.
2. No. 12(22) SAFETY INJECTION PUMP DISCHARGING THROUGH 12(22)SJ40 TO No. 11 & 12 (21 & 22) HOT LEGS.

6.0 RETURN TO SUBSEQUENT ACTIONS PART III, STEP 6.1, OF THIS INSTRUCTION.

III - FAILURE OF 1B(2B) DIESEL GENERATOR

2.0 STOP THE FOLLOWING EQUIPMENT:

NOTE

DO NOT STOP BOTH 11(21) AND 12(22) CONTAINMENT SPRAY PUMPS UNTIL THE RWST LOW-LOW LEVEL ALARM ACTUATES. WHEN ENTERING COLD LEG RECIRC., STOP ONLY NO. 12(22) CONTAINMENT SPRAY PUMP.

1.1 EQUIPMENT ON 1A(2A) VITAL BUS (POWERED BY 1A(2A) DIESEL/GENERATOR)

1. No. 11(21) CONTAINMENT SPRAY PUMP WHEN RWST LOW-LOW LEVEL ALARM ACTUATES.

1.2 EQUIPMENT ON 1C(2C) VITAL BUS (POWERED BY 1C(2C) DIESEL/GENERATOR)

1. No. 12(22) CONTAINMENT SPRAY PUMP
2. No. 12(22) SAFETY INJECTION PUMP

2.0 START NO. 13(23) COMPONENT COOLING PUMP AND OPEN 11(21)SW122 TO PROVIDE SERVICE WATER TO COMPONENT COOLING.

NOTE

IF IRRADIATED FUEL IS STORED IN THE FUEL HANDLING BUILDING, START NO. 12(22) FHB EXHAUST FAN.

3.0 THE FOLLOWING SHOULD BE THE ALIGNMENT FOR COLD LEG RECIRCULATION:

3.1 THE FOLLOWING PUMPS SHOULD BE RUNNING:

1. No. 11(21) RHR PUMP
2. No. 12(22) CHARGING PUMP
3. No. 11(21) SAFETY INJECTION PUMP
4. No. 11(21) CONTAINMENT SPRAY PUMP, UNTIL RWST LOW-LOW LEVEL ALARM ACTUATES.

3.2 CLOSE VALVE 11(21)RH19 AND 11(21)SJ49 TO PREVENT FLOW TO THE COLD LEGS AND TO INSURE ADEQUATE FLOW TO NO. 12(22) CHARGING PUMP AND NO. 11(21) SAFETY INJECTION PUMP SUCTIONS AND TO INSURE FLOW TO THE CONTAINMENT SPRAY HEAD THROUGH 11(21)CS36 WHEN IT IS OPENED.

3.3 - THE COLD LEG RECIRCULATION FLOW PATH WOULD BE AS FOLLOWS:

1. No. 11(21) RHR PUMP TAKING SUCTION ON THE CONTAINMENT SUMP AND DISCHARGING TO THE SUCTIONS OF NO. 12(22) CHARGING PUMP AND NO. 11(21) SAFETY INJECTION PUMP THROUGH 11(21)SJ45, 11(21)SJ113, 11(21)SJ33, AND 12(22)SJ33.
2. No. 12(22) CHARGING PUMP DISCHARGING THROUGH THE BORON INJECTION TANK TO ALL FOUR COLD LEGS.

3. No. 11(21) SAFETY INJECTION PUMP DISCHARGING THROUGH 11(21)SJ134 AND 1(2)SJ135 TO ALL FOUR COLD LEGS.

4. No. 11(21) CONTAINMENT SPRAY PUMP DISCHARGING TO THE SPRAY HEADER, UNTIL RWST LOW-LOW LEVEL ALARM ACTUATES.

4.0 RETURN TO SUBSEQUENT ACTIONS PART II, STEP 5.1, OF THIS INSTRUCTION.

5.0 PROCEED AS FOLLOWS FOR HOT LEG RECIRCULATION:

5.1 CLOSE 11(21)CS36 TO STOP CONTAINMENT SPRAY.

5.2 STOP No. 11(21) SAFETY INJECTION PUMP.

5.3 CLOSE 11(21)SJ134 TO ISOLATE COLD LEG RECIRCULATION.

5.4 CLOSE THE BREAKER ON 1(2)A EAST 230V VITAL VALVE CONTROL CENTER AND OPEN 11(21)SJ40 TO SUPPLY HOT LEG RECIRCULATION.

5.5 START No. 11(21) SAFETY INJECTION PUMP.

5.6 THE HOT LEG RECIRCULATION FLOW PATH WOULD BE AS FOLLOWS:

1. No. 11(21) RHR PUMP TAKING SUCTION ON THE CONTAINMENT SUMP AND DISCHARGING TO THE SUCTION OF No. 11(21) SAFETY INJECTION PUMP THROUGH 11(21)SJ45, 11(21)SJ113, 11(21)SJ33, AND 12(22)SJ33.

2. No. 11(21) SAFETY INJECTION PUMP DISCHARGING THROUGH 11(21)SJ40 TO No. 13 & 14 (23 & 24) HOT LEGS.

3. No. 12(22) CHARGING PUMP DISCHARGING TO ALL RCS COLD LEGS.

6.0 RETURN TO SUBSEQUENT ACTIONS PART III, STEP 6.1, OF THIS INSTRUCTION.

IV - FAILURE OF 1C(2C) DIESEL GENERATOR

1.0 STOP THE FOLLOWING EQUIPMENT:

1.1 EQUIPMENT ON 1A(2A) VITAL BUS (POWERED BY 1A(2A) DIESEL/GENERATOR)

1. No. 11(21) CONTAINMENT SPRAY PUMP, WHEN RWST LOW-LOW LEVEL ALARM ACTUATES.
2. No. 11(21) AUXILIARY FEEDWATER PUMP

1.2 EQUIPMENT ON 1B(2B) VITAL BUS (POWERED BY 1B(2B) DIESEL/GENERATOR)

1. No. 12(22) RHR PUMP

1.0 START No. 12(22) COMPONENT COOLING PUMP AND OPEN 11(21)SW122 TO PROVIDE SERVICE WATER TO COMPONENT COOLING.

NOTE

IF IRRADIATED FUEL IS STORED IN THE FUEL HANDLING BUILDING, START NO. 11 & 12(21 & 22) FHB EXHAUST FAN.

3.0 THE FOLLOWING SHOULD BE THE ALIGNMENT FOR COLD LEG RECIRCULATION:

3.1 THE FOLLOWING PUMPS SHOULD BE RUNNING:

1. No. 11(21) RHR PUMP
2. No. 11(21) CHARGING PUMP
3. No. 11(21) SAFETY INJECTION PUMP
4. No. 11(21) CONTAINMENT SPRAY PUMP, UNTIL RWST LOW-LOW LEVEL ALARM ACTUATES.

3.2 CLOSE VALVES 11(21)RH19 AND 11(21)SJ49 TO PREVENT FLOW TO THE COLD LEGS AND TO INSURE ADEQUATE FLOW TO NO. 11(21) CHARGING PUMP AND NO. 12(22) SAFETY INJECTION PUMP SUCTIONS AND TO INSURE FLOW TO THE CONTAINMENT SPRAY HEADER THROUGH 11(21)CS36 WHEN IT IS OPENED.

3.3 THE COLD LEG RECIRCULATION FLOW PATH WOULD BE AS FOLLOWS:

1. No. 11(21) RHR PUMP TAKING SUCTION ON THE CONTAINMENT SUMP AND DISCHARGING TO THE SUCTIONS OF NO. 11(21) CHARGING PUMP AND NO. 11(21) SAFETY INJECTION PUMP THROUGH 11(21)SJ45, 11(21)SJ113, 12(22)SJ113, 11(21)SJ33 AND 12(22)SJ33.
2. No. 11(21) CHARGING PUMP DISCHARGING THROUGH THE BORON INJECTION TANK TO ALL FOUR COLD LEGS.
3. No. 12(22) SAFETY INJECTION PUMP DISCHARGING THROUGH 12(22)SJ134 AND 1(2)SJ135 TO ALL FOUR COLD LEGS.
4. No. 11(21) CONTAINMENT SPRAY PUMP DISCHARGING TO SPRAY HEADER, UNTIL RWST LOW-LOW LEVEL ALARM ACTUATES.

4.0 RETURN TO SUBSEQUENT ACTIONS PART II, STEP 5.1, OF THIS INSTRUCTION

5.0 PROCEED AS FOLLOWS FOR HOT LEG RECIRCULATION:

5.1 CLOSE 11(21)CS36 TO STOP CONTAINMENT SPRAY.

5.2 STOP NO. 11(21) SAFETY INJECTION PUMP.

5.3 CLOSE 11(21)SJ134 TO ISOLATE COLD LEG RECIRCULATION.

5.4 CLOSE THE BREAKER ON 1(2)A EAST 230V VITAL VALVE CONTROL CENTER AND OPEN 11(21)SJ40 TO SUPPLY HOT LEG RECIRCULATION.

5.5 START NO. 11(21) SAFETY INJECTION PUMP.

5.6 THE HOT LEG RECIRCULATION FLOW PATH WOULD BE AS FOLLOWS:

1. No. 11(21) RHR PUMP TAKING SUCTION ON THE CONTAINMENT SUMP AND DISCHARGING TO THE SUCTIONS OF No. 11(21) CHARGING PUMP AND No. 11(21) SAFETY INJECTION PUMP THROUGH 11(21)SJ45, 11(21)SJ113, 12(22)SJ113, 11(21)SJ33, AND 12(22)SJ33.
2. No. 11(21) SAFETY INJECTION PUMP DISCHARGING THROUGH 11(21)SJ40 TO No. 13 & 14 (23 & 24) HOT LEGS.
3. No. 11(21) CHARGING PUMP DISCHARGING TO ALL RCS COLD LEGS.

6.0 TRANSFER THE SECURITY SYSTEM TO THE EMERGENCY POWER SUPPLY ON 1A 230V VITAL BUS.

7.0 RETURN TO SUBSEQUENT ACTIONS PART III, STEP 6.1, OF THIS INSTRUCTION.

APPENDIX 2
DETERMINATION OF ACTUAL PRESSURIZER AND STEAM GENERATOR LEVELS

TO DETERMINE ACTUAL PRESSURIZER OR STEAM GENERATOR LEVELS, UTILIZE THE ATTACHED TABLES AS DESCRIBED BELOW:

TABLES 1-5 ARE TO BE USED FOR THE STEAM GENERATORS
TABLES 6-11 ARE TO BE USED FOR THE PRESSURIZER

1. OBTAIN THE AVERAGE CONTAINMENT TEMPERATURE FROM COMPUTER POINT U1304
2. REFER TO THE APPROPRIATE TABLE FOR THE PRESSURE IN THE STEAM GENERATOR AND PRESSURIZER.
3. LOCATE THE DESIRED ACTUAL LEVEL UNDER THE COLUMN FOR THE AVERAGE CONTAINMENT TEMPERATURE.
4. FROM THE COLUMN HEADED "INDICATED LEVEL (%)" DETERMINE THE INDICATED LEVEL WHICH SHOULD BE MAINTAINED TO ENSURE THE ACTUAL LEVEL IS MAINTAINED AT OR ABOVE THE DESIRED VALUE.

NOTE

IF THE COMPUTER IS UNAVAILABLE, MAINTAIN INDICATED
LEVEL ~35% ABOVE THE DESIRED ACTUAL LEVEL.

INDICATED STEAM GENERATOR LEVEL (%) VS. ACTUAL LEVEL (%) AT 200psia

INDICATED LEVEL (%)	ACTUAL S/G LEVEL (%) AT TEMPERATURE									
	125	150	175	200	225	250	275	300	325	350
0.00	-17.89	-18.74	-19.68	-20.73	-21.88	-23.14	-24.50	-25.96	-27.51	-29.14
5.00	-13.61	-14.46	-15.41	-16.46	-17.61	-18.87	-20.22	-21.68	-23.23	-24.87
10.00	-9.34	-10.19	-11.13	-12.18	-13.33	-14.59	-15.95	-17.41	-18.96	-20.59
15.00	-5.07	-5.91	-6.86	-7.91	-9.06	-10.32	-11.68	-13.13	-14.68	-16.32
20.00	-0.79	-1.64	-2.58	-3.63	-4.79	-6.04	-7.40	-8.86	-10.41	-12.05
25.00	3.48	2.64	1.69	0.64	-0.51	-1.77	-3.13	-4.58	-6.14	-7.77
30.00	7.76	6.91	5.96	4.92	3.76	2.51	1.15	-0.31	-1.86	-3.50
35.00	12.03	11.18	10.24	9.19	8.04	6.78	5.42	3.96	2.41	0.78
40.00	16.31	15.46	14.51	13.46	12.31	11.05	9.70	8.24	6.67	5.05
45.00	20.58	19.73	18.79	17.74	16.59	15.33	13.97	12.51	10.96	9.33
50.00	24.85	24.01	23.06	22.01	20.86	19.60	18.24	16.79	15.24	13.60
55.00	29.13	28.28	27.34	26.29	25.13	23.88	22.52	21.06	19.51	17.87
60.00	33.40	32.56	31.61	30.56	29.41	28.15	26.79	25.33	23.78	22.15
65.00	37.68	36.83	35.88	34.84	33.68	32.43	31.07	29.61	28.06	26.42
70.00	41.95	41.10	40.16	39.11	37.96	36.70	35.34	33.88	32.33	30.70
75.00	46.23	45.38	44.43	43.38	42.23	40.97	39.61	38.16	36.61	34.97
80.00	50.50	49.65	48.71	47.66	46.51	45.25	43.89	42.43	40.88	39.25
85.00	54.77	53.93	52.98	51.93	50.78	49.52	48.16	46.71	45.16	43.52
90.00	59.05	58.20	57.26	56.21	55.05	53.80	52.44	50.98	49.43	47.79
95.00	63.32	62.48	61.53	60.48	59.33	58.07	56.71	55.25	53.70	52.07
100.00	67.60	66.75	65.80	64.76	63.60	62.35	60.99	59.53	57.98	56.34

TABLE 1

07 OF 37

INDICATED STEAM GENERATOR LEVEL (%) VS. ACTUAL LEVEL (%) AT 400 psia

INDICATED LEVEL (%)	ACTUAL S/G LEVEL (%) AT TEMPERATURE									
	125	150	175	200	225	250	275	300	325	350
0.00	-18.52	-19.41	-20.42	-21.54	-22.77	-24.10	-25.53	-27.06	-28.70	-30.46
5.00	-13.98	-14.88	-15.89	-17.01	-18.23	-19.56	-20.99	-22.53	-24.17	-25.93
10.00	-9.45	-10.34	-11.35	-12.47	-13.70	-15.03	-16.46	-17.99	-19.64	-21.40
15.00	-4.91	-5.81	-6.82	-7.94	-9.17	-10.49	-11.92	-13.46	-15.10	-16.86
20.00	-0.38	-1.27	-2.29	-3.41	-4.63	-5.96	-7.39	-8.92	-10.57	-12.33
25.00	4.15	3.26	2.25	1.13	-0.10	-1.42	-2.85	-4.39	-6.03	-7.79
30.00	8.69	7.79	6.78	5.66	4.44	3.11	1.68	0.15	-1.50	-3.26
35.00	13.22	12.33	11.32	10.20	8.97	7.65	6.22	4.68	3.04	1.28
40.00	17.76	16.86	15.85	14.73	13.51	12.18	10.75	9.21	7.57	5.81
45.00	22.29	21.40	20.39	19.27	18.04	16.71	15.28	13.75	12.10	10.34
50.00	26.83	25.93	24.92	23.80	22.58	21.25	19.82	18.28	16.64	14.88
55.00	31.36	30.47	29.46	28.33	27.11	25.78	24.35	22.82	21.17	19.41
60.00	35.89	35.00	33.99	32.87	31.64	30.32	28.89	27.35	25.71	23.95
65.00	40.43	39.54	38.52	37.40	36.18	34.85	33.42	31.89	30.24	28.48
70.00	44.96	44.07	43.06	41.94	40.71	39.39	37.96	36.42	34.78	33.02
75.00	49.50	48.60	47.59	46.47	45.25	43.92	42.49	40.96	39.31	37.55
80.00	54.03	53.14	52.13	51.01	49.78	48.45	47.03	45.49	43.85	42.09
85.00	58.57	57.67	56.66	55.54	54.32	52.99	51.56	50.02	48.38	46.62
90.00	63.10	62.21	61.20	60.08	58.85	57.52	56.09	54.56	52.91	51.15
95.00	67.64	66.74	65.73	64.61	63.38	62.06	60.63	59.09	57.45	55.69
100.00	72.17	71.28	70.26	69.14	67.92	66.59	65.16	63.63	61.98	60.22

TABLE 2

INDICATED STEAM GENERATOR LEVEL (%) VS. ACTUAL LEVEL (%) AT 600psia

INDICATED LEVEL (%)	ACTUAL S/G LEVEL (%) AT TEMPERATURE									
	125	150	175	200	225	250	275	300	325	350
0.00	-19.27	-20.19	-21.25	-22.44	-23.73	-25.12	-26.61	-28.21	-29.92	-31.77
5.00	-14.50	-15.42	-16.49	-17.67	-18.96	-20.36	-21.85	-23.44	-25.16	-27.00
10.00	-9.74	-10.66	-11.72	-12.91	-14.20	-15.59	-17.08	-18.68	-20.39	-22.24
15.00	-4.97	-5.89	-6.96	-8.14	-9.43	-10.82	-12.32	-13.91	-15.63	-17.47
20.00	-0.21	-1.13	-2.19	-3.38	-4.67	-6.06	-7.55	-9.15	-10.86	-12.71
25.00	4.56	3.64	2.57	1.39	0.10	-1.29	-2.78	-4.38	-6.10	-7.94
30.00	9.32	8.40	7.34	6.15	4.86	3.47	1.78	0.38	-1.33	-3.18
35.00	14.09	13.17	12.11	10.92	9.63	8.24	6.75	5.15	3.44	1.59
40.00	18.86	17.94	16.87	15.69	14.40	13.00	11.51	9.92	8.20	6.36
45.00	23.62	22.70	21.64	20.45	19.16	17.77	16.28	14.68	12.97	11.12
50.00	28.39	27.47	26.40	25.22	23.93	22.53	21.04	19.45	17.73	15.89
55.00	33.15	32.23	31.17	29.98	28.69	27.30	25.81	24.21	22.50	20.65
60.00	37.92	37.00	35.93	34.75	33.46	32.07	30.58	28.98	27.26	25.42
65.00	42.68	41.76	40.70	39.52	38.22	36.83	35.34	33.74	32.03	30.18
70.00	47.45	46.53	45.47	44.28	42.99	41.60	40.11	38.51	36.80	34.95
75.00	52.22	51.30	50.23	49.05	47.75	46.36	44.87	43.28	41.56	39.72
80.00	56.98	56.06	55.00	53.81	52.52	51.13	49.64	48.04	46.33	44.48
85.00	61.75	60.83	59.76	58.58	57.29	55.89	54.40	52.81	51.09	49.25
90.00	66.51	65.59	64.53	63.34	62.05	60.66	59.17	57.57	55.86	54.01
95.00	71.28	70.36	69.29	68.11	66.82	65.43	63.93	62.34	60.62	58.78
100.00	76.04	75.12	74.06	72.88	71.58	70.19	68.70	67.10	65.39	63.54

TABLE 3

201.04 201.04

INDICATED STEAM GENERATOR LEVEL (%) VS. ACTUAL LEVEL (%) AT 800psia

INDICATED LEVEL (%)	ACTUAL S/G LEVEL (%) AT TEMPERATURE									
	125	150	175	200	225	250	275	300	325	350
0.00	-20.20	-21.11	-22.13	-23.39	-24.72	-26.16	-27.71	-29.36	-31.12	-33.00
5.00	-15.20	-16.11	-17.18	-18.39	-19.72	-21.16	-22.71	-24.36	-26.12	-28.00
10.00	-10.20	-11.11	-12.18	-13.39	-14.72	-16.16	-17.71	-19.36	-21.12	-23.00
15.00	-5.20	-6.11	-7.18	-8.39	-9.72	-11.16	-12.71	-14.36	-16.12	-18.00
20.00	-0.20	-1.11	-2.18	-3.39	-4.72	-6.16	-7.71	-9.36	-11.12	-13.00
25.00	4.80	3.89	2.82	1.61	0.28	-1.16	-2.71	-4.36	-6.12	-8.00
30.00	7.80	8.37	7.82	6.61	5.28	3.84	2.27	0.64	-1.12	-3.00
35.00	14.80	13.89	12.82	11.61	10.28	8.84	7.29	5.64	3.88	2.00
40.00	19.80	18.89	17.82	16.61	15.28	13.84	12.29	10.64	8.88	7.00
45.00	24.80	23.89	22.82	21.61	20.28	18.84	17.29	15.64	13.88	12.00
50.00	29.80	28.89	27.82	26.61	25.28	23.84	22.29	20.64	18.88	17.00
55.00	34.80	33.89	32.82	31.61	30.28	28.84	27.29	25.64	23.88	22.00
60.00	39.80	38.89	37.82	36.61	35.28	33.84	32.29	30.64	28.88	27.00
65.00	44.80	43.89	42.82	41.61	40.28	38.84	37.29	35.64	33.88	32.00
70.00	49.80	48.89	47.82	46.61	45.28	43.84	42.29	40.64	38.88	37.00
75.00	54.80	53.89	52.82	51.61	50.28	48.84	47.29	45.64	43.88	42.00
80.00	59.80	58.89	57.82	56.61	55.28	53.84	52.29	50.64	48.88	47.00
85.00	64.80	63.89	62.82	61.61	60.28	58.84	57.29	55.64	53.88	52.00
90.00	69.80	68.89	67.82	66.61	65.28	63.84	62.29	60.64	58.88	57.00
95.00	74.80	73.89	72.82	71.61	70.28	68.84	67.29	65.64	63.88	62.00
100.00	79.80	78.89	77.82	76.61	75.28	73.84	72.29	70.64	68.88	67.00

TABLE 4

INDICATED STEAM GENERATOR LEVEL (%) VS. ACTUAL LEVEL (%) AT 1000psia

INDICATED LEVEL (%)	ACTUAL S/G LEVEL (%) AT TEMPERATURE									
	125	150	175	200	225	250	275	300	325	350
0.00	-21.23	-22.20	-23.35	-24.63	-26.04	-27.56	-29.18	-30.92	-32.79	-34.79
5.00	-16.00	-16.97	-18.12	-19.40	-20.81	-22.33	-23.95	-25.69	-27.55	-29.55
10.00	-10.77	-11.74	-12.88	-14.17	-15.58	-17.09	-18.72	-20.46	-22.32	-24.32
15.00	-5.54	-6.51	-7.65	-8.94	-10.35	-11.86	-13.49	-15.23	-17.09	-19.09
20.00	-0.31	-1.28	-2.42	-3.71	-5.11	-6.63	-8.26	-10.00	-11.86	-13.86
25.00	4.92	3.95	2.81	1.52	0.12	-1.40	-3.03	-4.77	-6.63	-8.63
30.00	10.15	9.18	8.04	6.75	5.35	3.83	2.20	0.46	-1.40	-3.40
35.00	15.38	14.41	13.27	11.99	10.58	9.06	7.43	5.69	3.83	1.83
40.00	20.62	19.64	18.50	17.22	15.81	14.29	12.66	10.92	9.06	7.06
45.00	25.85	24.87	23.73	22.45	21.04	19.52	17.90	16.16	14.29	12.29
50.00	31.08	30.11	28.96	27.68	26.27	24.75	23.13	21.39	19.52	17.52
55.00	36.31	35.34	34.19	32.91	31.50	29.98	28.36	26.62	24.75	22.76
60.00	41.54	40.57	39.43	38.14	36.73	35.22	33.59	31.85	29.99	27.99
65.00	46.77	45.80	44.66	43.37	41.96	40.45	38.82	37.08	35.22	33.22
70.00	52.00	51.03	49.89	48.60	47.20	45.68	44.05	42.31	40.45	38.45
75.00	57.23	56.26	55.12	53.83	52.43	50.91	49.28	47.54	45.68	43.68
80.00	62.46	61.49	60.35	59.06	57.66	56.14	54.51	52.77	50.91	48.91
85.00	67.69	66.72	65.58	64.30	62.89	61.37	59.74	58.00	56.14	54.14
90.00	72.93	71.95	70.81	69.53	68.12	66.60	64.97	63.23	61.37	59.37
95.00	78.16	77.18	76.04	74.76	73.35	71.83	70.21	68.47	66.60	64.60
100.00	83.39	82.42	81.27	79.99	78.58	77.06	75.44	73.70	71.83	69.83

TABLE 5

INDICATED PRESSURIZER LEVEL (%) VS. ACTUAL LEVEL (%) AT 500 psia

INDICATED LEVEL (%)	ACTUAL PRZ LEVEL (%) AT CONTAINMENT TEMPERATURE (Deg F)									
	125	150	175	200	225	250	275	300	325	350
0.00	-10.25	-11.16	-12.20	-13.35	-14.61	-15.97	-17.43	-19.00	-20.69	-22.52
5.00	-7.15	-8.06	-9.10	-10.25	-11.51	-12.87	-14.33	-15.90	-17.59	-19.42
10.00	-4.05	-4.96	-6.00	-7.15	-8.41	-9.77	-11.23	-12.81	-14.50	-16.32
15.00	-0.95	-1.86	-2.90	-4.06	-5.31	-6.67	-8.14	-9.71	-11.40	-13.22
20.00	2.15	1.24	0.20	-0.96	-2.21	-3.57	-5.04	-6.61	-8.30	-10.12
25.00	5.25	4.34	3.30	2.14	0.88	-0.48	-1.94	-3.51	-5.20	-7.02
30.00	8.35	7.43	6.40	5.24	3.98	2.62	1.16	-0.41	-2.10	-3.92
35.00	11.44	10.53	9.49	8.34	7.08	5.72	4.26	2.69	1.00	-0.82
40.00	14.54	13.63	12.59	11.44	10.18	8.82	7.36	5.79	4.10	2.27
45.00	17.64	16.73	15.69	14.54	13.28	11.92	10.46	8.89	7.20	5.37
50.00	20.74	19.83	18.79	17.64	16.38	15.02	13.56	11.99	10.30	8.47
55.00	23.84	22.93	21.89	20.74	19.48	18.12	16.66	15.08	13.39	11.57
60.00	26.94	26.03	24.79	23.83	22.58	21.22	19.75	18.18	16.49	14.67
65.00	30.04	29.13	28.09	26.93	25.68	24.32	22.85	21.28	19.59	17.77
70.00	33.14	32.23	31.19	30.03	28.77	27.41	25.95	24.38	22.69	20.87
75.00	36.24	35.33	34.29	33.13	31.87	30.51	29.05	27.48	25.79	23.97
80.00	39.33	38.42	37.38	36.23	34.97	33.61	32.15	30.58	28.89	27.07
85.00	42.43	41.52	40.48	39.33	38.07	36.71	35.25	33.68	31.99	30.16
90.00	45.53	44.62	43.58	42.43	41.17	39.81	38.35	36.78	35.09	33.26
95.00	48.63	47.72	46.68	45.53	44.27	42.91	41.45	39.88	38.19	36.36
100.00	51.73	50.82	49.78	48.63	47.37	46.01	44.55	42.97	41.28	39.46

TABLE 6

7

INDICATED PRESSURIZER LEVEL (%) VS. ACTUAL LEVEL (%) AT 1000psia

INDICATED LEVEL (%)	ACTUAL PRZ LEVEL (%) AT CONTAINMENT TEMPERATURE (Deg F)									
	125	150	175	200	225	250	275	300	325	350
0.00	-11.48	-12.46	-13.61	-14.90	-16.32	-17.85	-19.48	-21.23	-23.11	-25.12
5.00	-8.00	-8.98	-10.13	-11.42	-12.83	-14.36	-16.00	-17.75	-19.62	-21.63
10.00	-4.51	-5.49	-6.64	-7.93	-9.35	-10.88	-12.51	-14.26	-16.14	-18.15
15.00	-1.03	-2.01	-3.16	-4.45	-5.87	-7.39	-9.03	-10.78	-12.65	-14.67
20.00	2.45	1.48	0.33	-0.97	-2.38	-3.91	-5.55	-7.30	-9.17	-11.18
25.00	5.94	4.96	3.81	2.52	1.10	-0.42	-2.06	-3.81	-5.69	-7.70
30.00	9.42	8.44	7.30	6.03	4.59	3.06	1.42	0.33	-2.20	-4.21
35.00	12.91	11.93	10.78	9.49	8.07	6.54	4.91	3.16	1.28	-0.73
40.00	16.39	15.41	14.26	12.97	11.56	10.03	8.39	6.64	4.77	2.75
45.00	19.87	18.90	17.75	16.46	15.04	13.51	11.87	10.12	8.25	6.24
50.00	23.36	22.38	21.23	19.94	18.52	17.00	15.36	13.61	11.73	9.72
55.00	26.84	25.87	24.72	23.42	22.01	20.48	18.84	17.09	15.22	13.21
60.00	30.33	29.35	28.20	26.91	25.49	23.96	22.33	20.58	18.70	16.69
65.00	33.81	32.83	31.68	30.39	28.98	27.45	25.81	24.06	22.19	20.18
70.00	37.30	36.32	35.17	33.88	32.46	30.93	29.30	27.55	25.67	23.66
75.00	40.78	39.80	38.65	37.36	35.94	34.42	32.78	31.03	29.16	27.14
80.00	44.26	43.29	42.14	40.84	39.43	37.90	36.26	34.51	32.64	30.63
85.00	47.75	46.77	45.62	44.33	42.91	41.38	39.75	38.00	36.12	34.11
90.00	51.23	50.25	49.10	47.81	46.40	44.87	43.23	41.48	39.61	37.60
95.00	54.72	53.74	52.59	51.30	49.88	48.35	46.72	44.97	43.09	41.08
100.00	58.20	57.22	56.07	54.78	53.36	51.84	50.20	48.45	46.58	44.56

TABLE 7

TABLE 8

INDICATED PRESSURIZED LEVEL (%) VS. ACTUAL LEVEL (%) AT 1500 PSI

INDICATED LEVEL (%)	ACTUAL PPZ LEVEL (%) AT CONTAINMENT TEMPERATURE (Deg F)									
	125	150	175	200	225	250	275	300	325	350
0.00	-13.61	-14.73	-16.03	-17.48	-19.07	-20.77	-22.64	-24.61	-26.71	-28.95
5.00	-9.67	-10.80	-12.09	-13.54	-15.13	-16.85	-18.70	-20.68	-22.78	-25.01
10.00	-5.74	-6.86	-8.16	-9.61	-11.20	-12.92	-14.77	-16.74	-18.84	-21.08
15.00	-1.80	-2.92	-4.22	-5.67	-7.26	-8.98	-10.83	-12.80	-14.91	-17.14
20.00	2.14	1.01	-0.28	-1.73	-3.32	-5.05	-6.89	-8.87	-10.97	-13.21
25.00	6.07	4.95	3.65	2.20	0.61	-1.11	-2.96	-4.93	-7.04	-9.27
30.00	10.01	8.83	7.57	6.14	4.55	2.83	0.98	1.00	3.10	5.33
35.00	13.94	12.82	11.52	10.07	8.48	6.76	4.91	2.94	0.84	-1.40
40.00	17.88	16.75	15.46	14.01	12.42	10.70	8.85	6.87	4.77	2.54
45.00	21.82	20.69	19.39	17.94	16.36	14.63	12.79	10.81	8.71	6.47
50.00	25.75	24.63	23.33	21.88	20.29	18.57	16.72	14.75	12.64	10.41
55.00	29.69	28.56	27.27	25.82	24.23	22.51	20.66	18.68	16.58	14.35
60.00	33.62	32.50	31.20	29.75	28.16	26.44	24.57	22.62	20.52	18.28
65.00	37.56	36.43	35.14	33.69	32.10	30.38	28.53	26.55	24.45	22.22
70.00	41.49	40.37	39.07	37.62	36.03	34.31	32.46	30.49	28.39	26.15
75.00	45.43	44.30	43.01	41.56	39.97	38.25	36.40	34.43	32.32	30.09
80.00	49.37	48.24	46.94	45.50	43.91	42.18	40.34	38.36	36.26	34.02
85.00	53.30	52.18	50.88	49.43	47.84	46.12	44.27	42.30	40.19	37.96
90.00	57.24	56.11	54.82	53.37	51.78	50.06	48.21	46.23	44.13	41.90
95.00	61.17	60.05	58.75	57.30	55.71	53.99	52.14	50.17	48.07	45.83
100.00	65.11	63.98	62.68	61.24	59.65	57.93	56.08	54.10	52.00	49.77

INDICATED PRESSURIZER LEVEL (%) VS. ACTUAL LEVEL (%) AT 2000psia

INDICATED LEVEL (%)	ACTUAL PRZ LEVEL (%) AT CONTAINMENT TEMPERATURE (Deg F)									
	125	150	175	200	225	250	275	300	325	350
0.00	-17.39	-18.69	-20.19	-21.85	-23.67	-25.64	-27.75	-30.00	-32.40	-34.97
5.00	-12.83	-14.13	-15.63	-17.29	-19.11	-21.08	-23.19	-25.44	-27.84	-30.41
10.00	-8.27	-9.57	-11.07	-12.73	-14.55	-16.52	-18.63	-20.88	-23.28	-25.85
15.00	-3.71	-5.01	-6.51	-8.17	-9.99	-11.96	-14.07	-16.32	-18.72	-21.29
20.00	0.85	-0.45	-1.95	-3.61	-5.43	-7.40	-9.51	-11.76	-14.16	-16.73
25.00	5.41	4.11	2.61	0.95	-0.87	-2.84	-4.95	-7.20	-9.60	-12.17
30.00	9.97	8.67	7.17	5.51	3.69	1.72	0.39	2.64	-5.04	-7.61
35.00	14.53	13.23	11.73	10.07	8.25	6.28	4.17	1.92	-0.48	-3.05
40.00	19.09	17.79	16.29	14.63	12.81	10.84	8.73	6.48	4.08	1.51
45.00	23.65	22.35	20.85	19.19	17.37	15.40	13.29	11.04	8.64	6.07
50.00	28.21	26.91	25.41	23.75	21.93	19.96	17.85	15.60	13.20	10.63
55.00	32.77	31.47	29.97	28.31	26.49	24.52	22.41	20.16	17.76	15.19
60.00	37.33	36.03	34.53	32.87	31.05	29.08	26.97	24.72	22.32	19.75
65.00	41.89	40.59	39.09	37.43	35.61	33.64	31.53	29.28	26.88	24.31
70.00	46.45	45.15	43.65	41.99	40.17	38.20	36.09	33.84	31.44	28.87
75.00	51.01	49.71	48.21	46.55	44.73	42.76	40.65	38.40	36.00	33.43
80.00	55.57	54.27	52.77	51.11	49.29	47.32	45.21	42.96	40.56	37.99
85.00	60.13	58.83	57.33	55.67	53.85	51.88	49.77	47.52	45.12	42.55
90.00	64.69	63.39	61.89	60.23	58.41	56.44	54.33	52.08	49.68	47.11
95.00	69.25	67.95	66.45	64.79	62.97	61.00	58.89	56.64	54.24	51.67
100.00	73.81	72.51	71.01	69.35	67.53	65.56	63.45	61.20	58.80	56.23

TABLE 9

TABLE 11

UNIONIZED PAPER MILLS AND PULP MILLS IN CANADA

PRODUCTIVITY	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030
0.00	24.97	26.52	23.54	40.46	32.57	35.12	37.74	40.54	43.47	46.55		
5.00	16.35	21.00	27.82	24.64	27.97	29.50	32.12	34.92	37.87	40.93		
10.00	14.74	15.32	17.20	19.22	21.52	24.33	26.50	29.30	32.25	35.51		
15.00	8.14	9.76	11.56	13.60	15.83	18.26	20.88	23.66	26.63	29.69		
20.00	2.62	4.14	5.96	7.93	10.11	12.64	15.26	18.06	21.01	24.07		
25.00	5.13	3.65	0.74	7.56	4.59	7.02	9.64	12.44	15.39	18.65		
30.00	1.75	1.29	0.23	1.35	1.01	1.40	1.92	2.39	2.77	3.33		
35.00	14.57	12.77	10.90	8.88	6.62	4.22	1.60	1.20	4.15	7.21		
40.00	19.99	13.44	16.32	14.50	12.27	9.35	7.22	4.42	1.47	1.59		
45.00	25.61	23.86	20.14	17.48	14.48	11.46	12.64	10.04	7.09	4.03		
50.00	31.24	29.53	24.76	21.51	17.51	13.03	10.46	15.56	12.71	9.65		
55.00	36.85	35.20	30.34	26.37	21.37	16.70	24.08	21.28	16.33	15.27		
60.00	42.47	40.32	39.09	36.73	31.73	25.42	29.70	26.90	23.75	20.37		
65.00	48.09	46.44	44.37	42.60	40.37	37.94	35.32	32.52	29.57	26.51		
70.00	53.71	51.92	49.31	48.22	45.97	42.96	40.24	37.14	33.19	32.14		
75.00	59.33	57.68	54.87	53.44	51.14	48.18	46.56	43.76	40.61	37.75		
80.00	64.95	63.50	61.50	59.66	57.34	54.30	52.13	49.43	46.42	43.47		
85.00	70.57	69.10	67.10	65.07	62.95	60.47	57.80	55.00	52.05	48.97		
90.00	76.19	74.74	72.74	70.70	68.57	65.96	63.42	59.62	57.67	54.61		
95.00	81.81	80.36	78.36	76.32	74.09	71.66	68.96	66.74	63.29	60.23		
100.00	87.43	85.98	83.98	81.94	79.71	77.28	74.66	71.36	68.21	65.35		