

EMERGENCY SHUTDOWN

1.0 SYMPTOMS

- 1.1 Reactor Plant First-out Trip Alarm.
- 1.2 Turbine Generator First-out Trip Alarm.
- 1.3 Plant Electrical Protection Trip Alarm.
- 1.4 Manual Reactor and/or Turbine trip.

2.0 AUTOMATIC ACTION

- 2.1 Reactor trip.
- 2.2 Turbine trip.
- 2.3 Automatic Steam Dump actuation (if trip occurs above 30% Reactor power).
- 2.4 Turbine Stop Valves and Control Valves close.
- 2.5 Unit 1, CB-4012 and CB-6012 open one (1) minute after Turbine Stop Valves close).
- 2.6 At 40% nominal generator terminal voltage (7200 volts) on generator coastdown, which takes ~ four (4) minutes following the trip, the following occurs:
  - 2.6.1 Reactor Coolant Pumps A, B and C trip.
  - 2.6.2 Exciter motor breaker opens.
  - 2.6.3 Exciter field breaker opens.
- 2.7 If the Voltage Regulator is on manual control at the time of the trip:
  - 2.7.1 Field breaker trips open.
  - 2.7.2 18 KV voltage decays.
  - 2.7.3 Generator inertia coastdown is not effective.

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2.0 AUTOMATIC ACTION (Continued)

- 2.8 If the trip is from electrical protection or from Remote Turbine Trip Push Button, there is no generator coastdown. The following occurs:
- 2.8.1 Unit 1 CB-4012 and CB-6012 open immediately.
  - 2.8.2 Exciter field breaker opens immediately.
  - 2.8.3 Auxiliary Transformer A feeder ACB 11A04 opens.
  - 2.8.4 Auxiliary Transformer B feeder ACB 11B04 opens.
  - 2.8.5 Reactor Coolant Pumps A, B and C trip.
- 2.9 Automatic emergency auxiliary feedwater system initiation on low steam generator level (5%) in two-out-of-three (2/3) steam generator.
- 2.10 When  $T_{avg} < 545^{\circ}\text{F}$ , Steam Generator Main Feedwater Valves position to pass 5% of full load flow.
- 2.11 When turbine lube oil pressure  $< 10$  psig, Auxiliary Lube Oil Pump starts automatically.
- 2.12 When Turbine speed reaches "0", Turbine is automatically placed on the turning gear.

3.0 IMMEDIATE OPERATOR ACTION

- 3.1 Verify reactor trip breakers open.
- 3.2 Verify control rods fully inserted into the Core.
- 3.3 Observe that the Steam Dump System is lowering  $T_{avg}$  to its no-load value of  $535^{\circ}\text{F}$ .
- 3.4 Verify feedwater flow to the steam generators from the main and emergency auxiliary feedwater systems.
- 3.5 Verify Turbine Stop and Turbine Control Valves closed.
- 3.6 Verify Unit 1 CB-4012 and CB-6012 opened.



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4.0 SUBSEQUENT OPERATOR ACTION

NOTE: List pre-trip and first-out alarms before resetting annunciators.

- 4.1 If shutdown is due to loss of offsite power refer to subsequent actions of Emergency Operating Instruction S01-1.7-1, "Loss Of Offsite Power".
- 4.2 Transfer NIS Recorder to Intermediate Range Channels.
- 4.3 When Tave is  $<545^{\circ}\text{F}$  and the main feedwater regulators have closed to allow 5% flow, perform the following:
  - 4.3.1 Verify or establish  $\leq 150$  gpm auxiliary feedwater flow to each steam generator through the emergency auxiliary feedwater header (normal auxiliary feedwater regulators if Auto Auxiliary Feedwater System not initiated).

NOTE: Flow shall be maintained  $\leq 150$  gpm whenever the feeding is uncovered ( $<26\%$  on narrow range recorders) and feedwater temperature is less than  $300^{\circ}\text{F}$ .
  - 4.3.2 Place FCV-456, FCV-457, and FCV-458 on manual and close the valves.
  - 4.3.3 Close MOV-20, MOV-21, and MOV-22.
  - 4.3.4 Increase steam generator level to  $\sim 50\%$  on the narrow range recorders.
- 4.4 Transfer Steam Dump System operation to, "Pressure Control Atmos. Condenser" when Tavg approaches  $535^{\circ}\text{F}$ .
- 4.5 Verify termination of generator coastdown at 40% of nominal terminal voltage (7200 volts).
- 4.6 Restore power to 4KV Buses 1A and 1B (from Auxiliary Transformer C).
  - 4.6.1 Verify open ACB 11A04, Auxiliary Transformer A Feeder.
  - 4.6.2 Verify open ACB 11B04, Auxiliary Transformer B Feeder.
  - 4.6.3 Close ACB 11C01, 1A-1C Bus Tie.
  - 4.6.4 Close ACB 12C01, 1B-2C Bus Tie.

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4.0 SUBSEQUENT OPERATOR ACTION (Cont'd)

- 4.7 Within one (1) minute following the RCPs tripping, start RC Pump A and after two (2) minutes, start RC Pump C; or start RC Pump B for recirculation and pressurizer sprays.

CAUTION: If all three pumps are tripped for more than one (1) minute, no pump may be restarted until thirty (30) minutes after reactor coolant temperature has stabilized and all feedwater flow has been secured.

CAUTION: Allow two (2) minutes between the start of each pump.

- 4.8 Open Turbine Drain Valves, CV-83, CV-84, CV-85, CV-86 and CV-88.

- 4.9 Close Reheater Steam Supply MOV's 14, 15, 16, and 17.

- 4.10 Establish steam generator level control through the normal auxiliary feedwater regulators, CV-142, CV-143, and CV-144 concurrent with Steps 4.11 through 4.14.

4.10.1 Verify emergency auxiliary feedwater flow to A, B, and C steam generator.

4.10.2 Establish flow through CV-142, CV-143, and CV-144.

4.10.3 Reduce flow through FCV-3300, FCV-3301, FCV-2301, and FCV-2300, emergency auxiliary feedwater flow control valves, to zero while increasing flow on CV-142, CV-143, and CV-144.

4.10.4 Reset Auto Auxiliary Feedwater initiation and if the main feedwater pumps are in operation perform the following, if not go to Step 4.10.6.

1 Close MOV-1202, electric auxiliary feedwater pump emergency discharge valve.

2 Stop the electric auxiliary feedwater pump.

3 Reset and stop the steam driven auxiliary feedwater pump.



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4.0 SUBSEQUENT OPERATOR ACTION (Cont'd)

- 4.10.5.4 Close CV-3202, steam auxiliary feedwater pump emergency discharge valve.
- .5 Establish or maintain ~50% steam generator water level with CV-142, CV-143, and CV-144.
- 4.10.6 If the main feedwater pumps are unavailable perform the following:
  - .1 Reset Auto Auxiliary Feedwater initiation and open MOV-1204.
  - .2 Establish flow through CV-142, CV-143, and CV-144.
  - .3 Reduce flow through FCV-3300, FCV-3301, FCV-2301, and FCV-2300 to zero while increasing flow through CV-142, CV-143, and CV-144.
  - .4 Close MOV-1202 and CV-3203.
  - .5 Either shutdown the steam driven auxiliary feedwater pump or open its discharge valve to the west feedwater line as desired.

4.11 Verify start of Turbine Auxiliary Oil Pump

4.12 Upon a Unit trip, the Watch Engineer shall do the following:

- 4.12.1 Determine if this event is classified as an emergency under Initiating Conditions (IC) in Emergency Procedure S01-VIII-1.1, "Recognition and Classification of Emergencies."
- 4.12.2 Notify the "duty" Station Administrator and Shift Technical Advisor and discuss the situation. If unable to contact any Station Administrator in the normal reporting within fifteen (15) to twenty (20) minutes following the trip, notify the NRC via the Red Phone within one (1) hour.

4.13 Align Backup Station Power (220KV/18KV System).

- 4.13.1 Open Generator Motor Operated Disconnect Switch.

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4.0 SUBSEQUENT OPERATOR ACTION (Cont'd)

- 4.13.2 If trip was not from transformer protection:
- .1 Reset Lockup Bus.
  - .2 Close Unit 1 CB-4012 and CB-6012 energizing the main transformer and auxiliary transformers A and B.
  - .3 Notify Mira Loma Switching Center as soon as practical.
- 4.14 Verify automatic turbine turning gear engagement.
- 4.15 Determine cause of the emergency shutdown and initiate the necessary corrective actions.
- 4.16 As soon as possible following a Unit trip and prior to return to criticality, conduct a containment inspection to check for any fluid system leakage including RCP oil leakage.
- 4.17 Establish plant status as conditions warrant using applicable Operating Instructions:
- 4.17.1 S01-3-4, "Plant Shutdown from Full Power to Hot Standby."
  - 4.17.2 S01-3-5, "Plant Shutdown from Hot Standby to Cold Shutdown."
- 4.18 Isotopic analysis for iodine in the reactor coolant must be made between 2 and 6 hours following a thermal power change exceeding 15% within a one hour period.

  
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SUPERINTENDENT, UNIT 1

APPROVED:

  
J. H. CURRAN  
PLANT MANAGER

NUS/ms

SHUTDOWN FROM OUTSIDE THE CONTROL ROOM

1.0 SYMPTOMS

1.1 Forced evacuation of the Control Room.

2.0 AUTOMATIC ACTION

2.1 Not Applicable

3.0 IMMEDIATE OPERATOR ACTION

3.1 Trip the Reactor Turbine.

3.2 Before exiting the Control Room, the Watch Engineer and the Control Operator will obtain Radio Transmitters from the Watch Engineer's Office.

4.0 SUBSEQUENT OPERATOR ACTION

NOTE: Refer to Emergency Procedure S01VIII.1, "Recognition and Classification of Emergencies" to determine if this event is classified as an emergency under the Initiating Conditions (IC) and for the notification requirements of offsite authorities.

4.1 If the Reactor could not be tripped before exiting the Control Room, trip the Reactor using any of the following means:

4.1.1 Trip Reactor Breakers locally in the 4KV Room.

4.1.2 Open the DC supply to the Control Rods ACB 72-141, located in the No. 1 DC Room.

4.1.3 Turbine may be tripped from the Front Standard.

4.2 Plant Equipment Operator will perform the following:

4.2.1 Close the Main Feedwater Isolation Valves (MOV-20, MOV-21, and MOV-22) at their respective breakers.

MOV-20 - Breaker 42-1197

MOV-21 - Breaker 42-1242

MOV-22 - Breaker 42-1387

4.2.2 Verify Unit CB-4012 and CB-6012 have opened. Relay 452 AX at South Auxiliary Panel in the 4KV Room is de-energized (Clapper not pulled in). RECEIVED

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4.0 SUBSEQUENT OPERATOR ACTION (Cont'd)

4.2.3 After completing the above steps, the Plant Equipment Operator will report to the Watch Engineer for further instructions.

4.3 Read Reactor Power Level on the Log Power Channel on the Auxiliary Control Panel to insure subcriticality.

4.4 The Watch Engineer will supervise the operating personnel from the vicinity of the Auxiliary Control Panel.

4.5 The Control Operator, utilizing the Auxiliary Control Panel, will establish Hot Standby Conditions.

4.5.1 Place the Steam Dump Control Transfer Switch to LOCAL and maintain RCS temperature at approximately 535°F with Steam Dump to Atmosphere.

4.5.2 Direct personnel to stop the East and West Feedwater Pumps, and verify that the Heater Drain Pumps trip.

4.5.3 Verify running or start the electric and/or steam driven auxiliary feedwater pumps.

4.5.4 If the normal auxiliary feedwater regulators are operable, complete Step 4.5.5. If they are not operable, or later become inoperable, complete Step 4.5.6 for operation of the emergency auxiliary feedwater system.

4.5.5 With the auxiliary feedwater regulators closed, operate "Feedwater Control Transfer" switch to LOCAL position and stabilize the steam generator level at approximately 200" (on the wide range indicator) through use of the auxiliary feedwater regulators. Attempt to maintain flow at <150 gpm to each steam generator until level reaches 200".

.1 Isolate the emergency auxiliary feedwater flow path by verifying CV-3203, steam driven auxiliary feedwater pump discharge valve, closed or by closing the three (3) loop FCV isolation valves from the steam driven auxiliary feedwater pump.

NOTE: CV-3203 and FCV-3300, FCV-3301, FCV-2301, and FCV-2300, emergency auxiliary feedwater flow control valves, all fail open on loss of air/N<sub>2</sub>.



SHUTDOWN FROM OUTSIDE THE CONTROL ROOM

4.0 SUBSEQUENT OPERATOR ACTION (Cont'd)

4.5.6 With the normal auxiliary feedwater system inoperable, utilize the emergency auxiliary feedwater system as follows:

- .1 Verify open or open CV-3203, steam driven auxiliary feedwater pump discharge valve, and operate by local manual control, FCV-3300, FCV-3301, FCV-2301, and FCV-2300 to establish auxiliary feedwater flow ( $\leq 150$  gpm per steam generator) and steam generator level (200").
- .2 Close the steam driven auxiliary feedwater pump discharge valve to the west 1st point heater.

NOTE: It may be necessary to open the flow control valves (FVC's) and CV-3203 by disconnecting the air/N<sub>2</sub> supply. Then use the installed handwheel for valve position control.

4.5.7 Throttle the main steam 24" block valves as necessary to maintain Tave at 535°F.

4.6 Establish turbine generator unit shutdown conditions:

- 4.6.1 Verify exciter 4KV ACB open.
- 4.6.2 Check turbine speed decreasing observing that governor impeller oil pressure is decreasing.
- 4.6.3 Check auxiliary oil pump started.
- 4.6.4 Put turbine oil temperature on manual control, lower to 85°F.
- 4.6.5 Close MOV-14, (ACB 42-1364), MOV-15 (ACB 42-1372), MOV-16 (ACB 42-1375), MOV-17 (ACB 42-1379), reheater steam supply valves, using local breaker or valve operation.
- 4.6.6 When the turbine stops, verify that turning gear motor (ACB 42-1317) starts and engages.

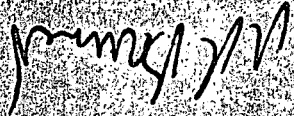
SHUTDOWN FROM OUTSIDE THE CONTROL ROOM

4.7 SUBSEQUENT OPERATOR ACTION (Cont'd)

4.6.7

When the turbine is on turning gear, start turning gear oil pump (ACB 42-1302) and stop auxiliary oil pump (ACB 52-1315).

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