

**GULF COAST PLANT - IRI**  
**UNITS 1 AND 2**  
**UNIT SHUTDOWN**

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## **IRI UNIT SHUTDOWN - UNITS 1 AND 2**

### **I. Purpose**

This procedure provides information and guidance for the correct and safe shutdown of the Unit (1 or 2).

### **II. Prerequisites**

- A. Ensure all personnel are aware of equipment shutdown and are clear of any eminent dangers present during equipment shutdown.
- B. Review shutdown sequence and operator local actions to be taken during the shutdown to ensure shutdown activities are performed in a safe and effective manner.
- C. Review actions to be taken immediately following shutdown with operators. Examples include: Drains to be opened, and Boiler and Baghouse Doors to be opened.
- D. Verify DCS Graphic designations for instrumentation and control are functional and operating.
- E. Contact Maintenance Department and identify equipment maintenance to be performed. Prepare equipment Clearance Tags ahead of time for repair of equipment causing the shutdown/forced outage. Tags can be hung and clearances signed on immediately following the shutdown and equipment tagout. This ensures that equipment can be prepared for safe work activity while reducing outage time.
- F. Identify and prepare Permit Confined Space. Locate and have ready any equipment required for Confined Space Entry. This includes equipment such as: handheld combustibles/oxygen sensor, etc.

### **General Operational Guidelines**

In the event that major changes in Unit control setpoints are made, equipment is started or shut down, or unstable operations exist just prior to or at shift change, the off-going shift Control Operator Supervisor (COS) and appropriate Operators shall stay and work with the oncoming shift until:

- The initiated changes are well in hand
- Unit operation has totally stabilized
- The on-coming shift is fully aware of all aspects of changes and/or root causes.

Maintain Electronic Log and Turnover Log for oncoming shift as record of changes/unstable conditions.

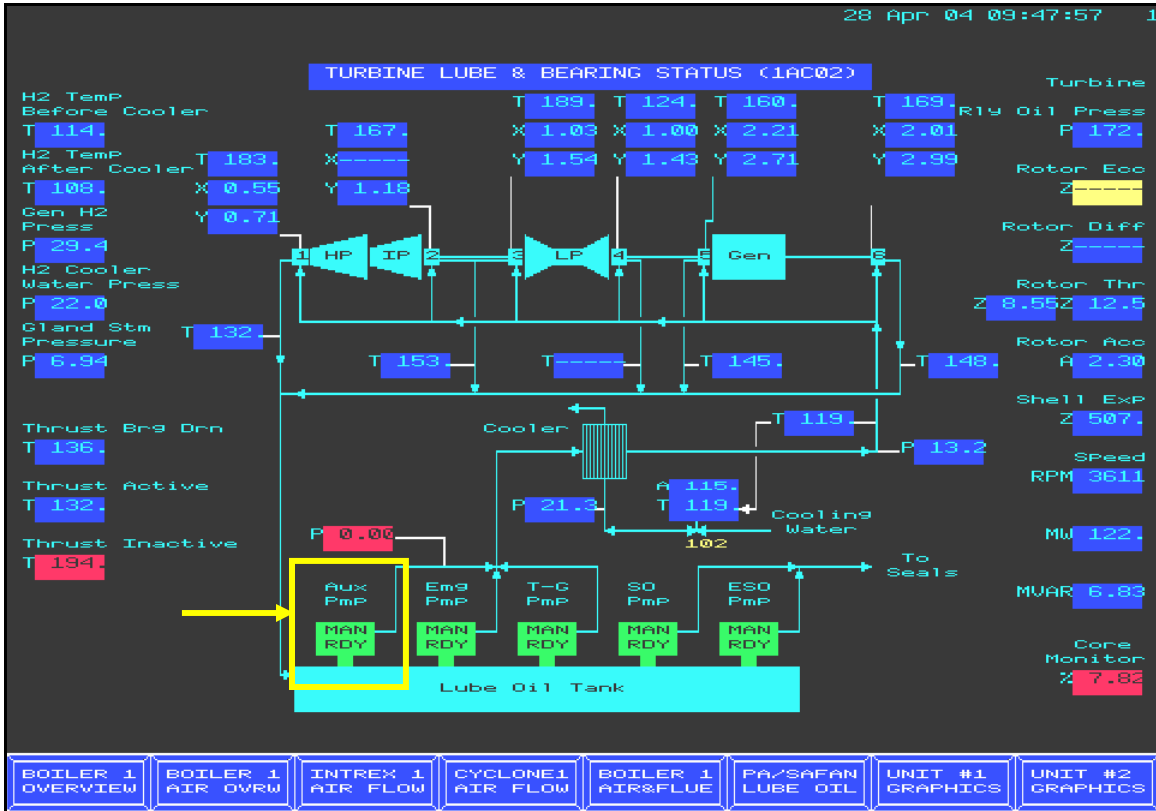
### **III. Procedure**

#### **Forced Shutdown – Turbine Trip**

Anytime the unit has reached 20 MW or above the 86TX relay, located in the old control room, should be reset and will cause a boiler trip in the event of a turbine trip.

#### **\_\_\_\_ 1. Secure the Turbine/Generator.**

- a. From the control room verify that the Reserve Station Service Breaker is CLOSED in and the Normal Station Service Breaker is OPEN.
- b. Locally verify that the Reserve Station Service Breaker is CLOSED in and the normal Station Service Breaker is OPEN. These breakers are located adjacent to the turbine generators.
- c. From the control room verify the Exciter Field Breaker is OPEN.
- d. Locally verify the Exciter Field Breaker is OPEN. This breaker is located on the ground floor of the turbine building.
- e. From the Control Room, SELECT the DCS Turbine Lube and Bearing Status Graphic. SELECT the Auxiliary Oil Pump (if it is not already running.), then START and ENTER. This starts the Auxiliary Oil Pump.
- f. Select the Seal Oil Pump, then START and ENTER. This starts the Seal Oil Pump.



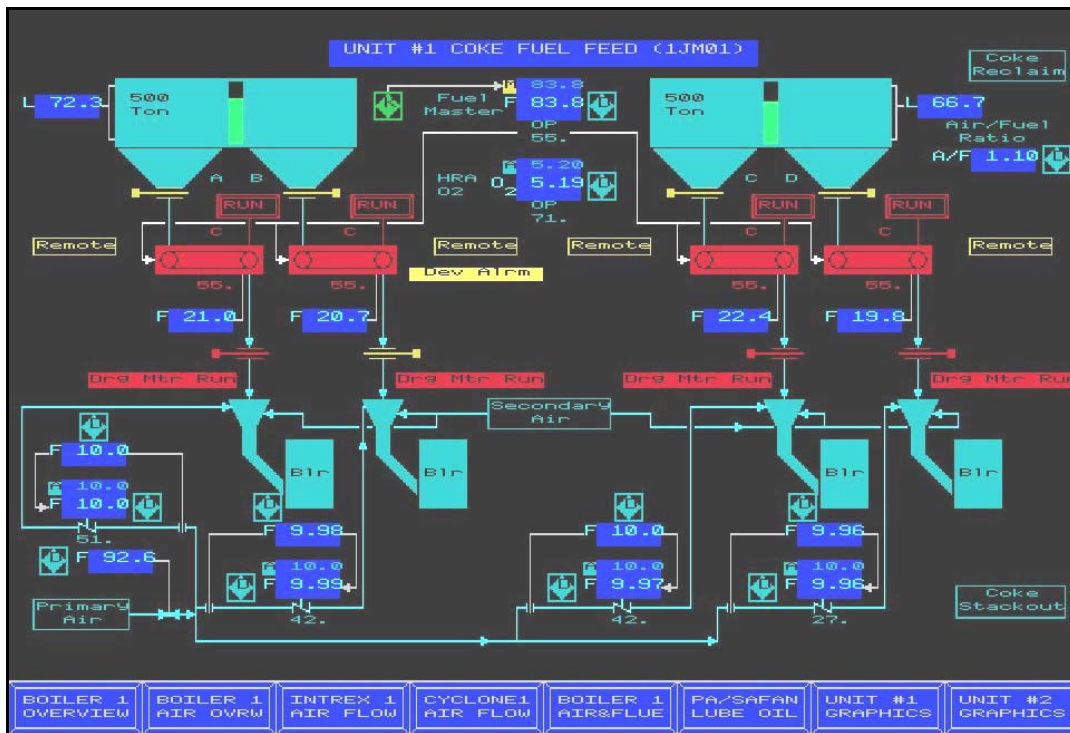
**Turbine Lube and Bearing Status Graphic**

- g. Monitor Turbine Lube Oil System Pressure, verifying that it is adequate.
- h. The Control Room Operator SELECTS the DCS Turbine Valves Graphic and verifies that the Turbine Stop Valves are CLOSED.
- i. From the Old Control Room, verify Generator Breakers are OPEN. The associated OCB breaker Green (OPEN) status lights should be energized.
- j. Locally, OPEN the Exhaust Hood Spray block valves.
- k. Reduce Condenser Vacuum by locally opening the Vacuum Breaker, at a rate so as to reach 0-inches Hg vacuum at the same time as zero (0) speed. This requires communication between the Local Operator and the Control Operator.
- l. At zero speed on the Turbine, locally START the Turning Gear Motor and engage the clutch using the clutch handle.
- m. Locally CLOSE the Gland Steam Supply Valve.
- n. STOP the Gland Steam Exhauster
- o. Locally CLOSE the Turbine Auxiliary Steam Valve
- p. OPEN the following drains:
  - Before seat drains
  - After seat drains

- Main steam drain to blowdown tank - 2 rounds
  - 2nd, 3rd, 4th, and 5th point extraction drains
  - Diaphragm unloading valve drain
  - Balance piston drain
  - Inner cylinder drain
  - Inlet bend manifold drain
  - Steam chest drain
  - Hot reheat and cold reheat drains to the floor
- q. CLOSE the Main Steam Lead Valve MOV.
  - r. From the Old Control Room, LOCK OUT the Generator Breaker Control Switches and Exciter Field Breaker Control Switch.
  - s. Locally, run the Load Limiter back to zero.
  - t. Locally, START the Generator Space Heater.

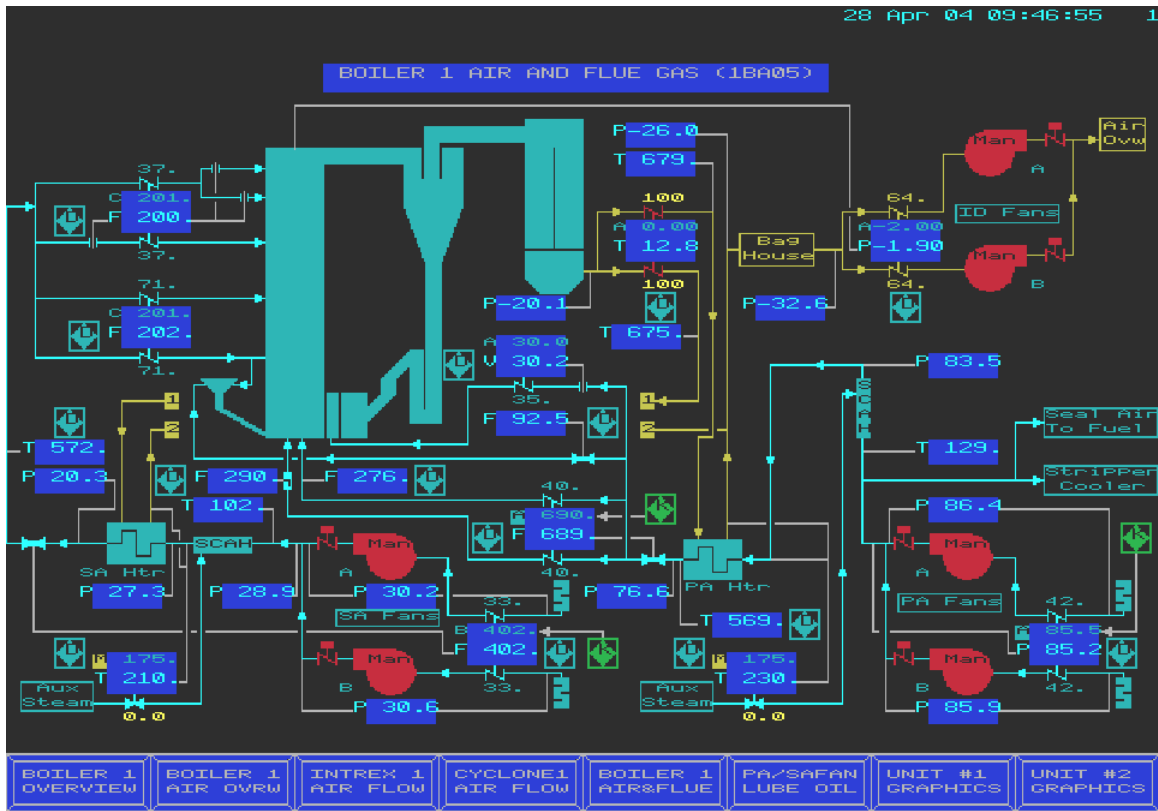
**2. Secure the Boiler.**

- a. SWAP the Export Steam (if needed) from the unit that has tripped, to the unit that is operation.
- b. From the Control Room DCS Coke Feeder Graphic, put a hard STOP on all Coke and Limestone Feeders.



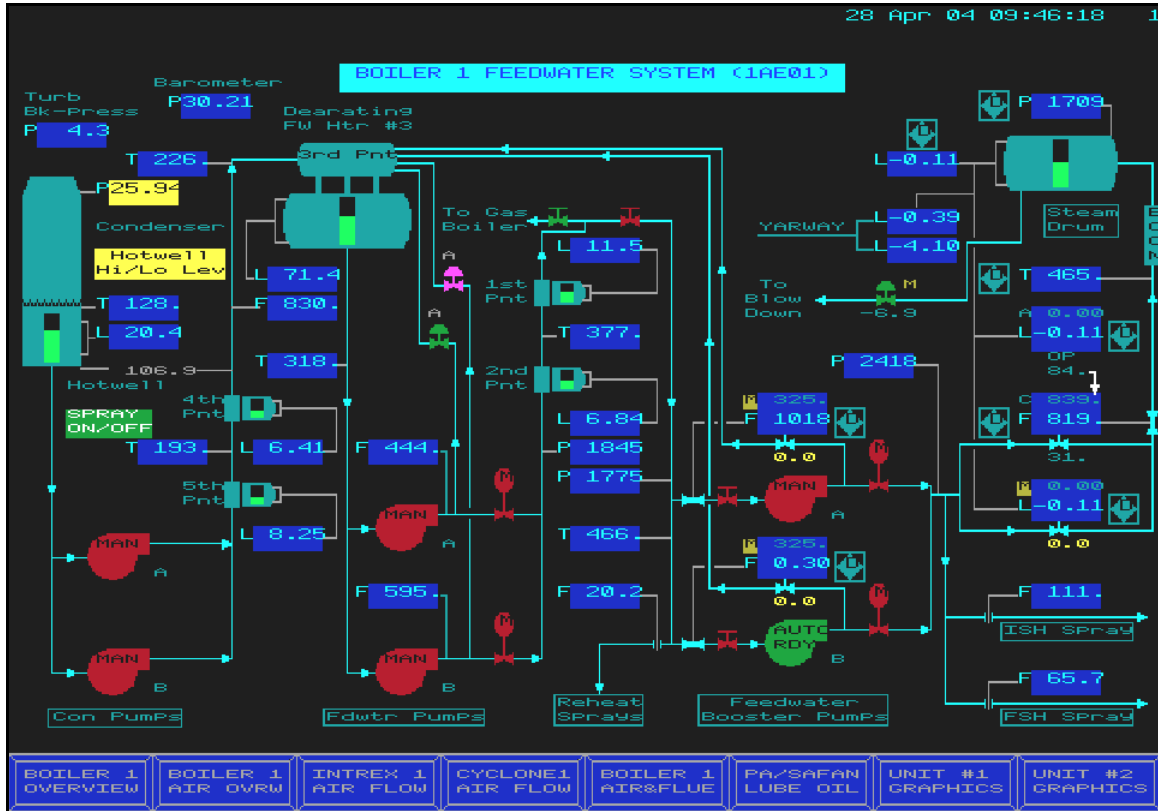
**Coke Feeder Graphic**

- c. Locally verify all Coke Feeder and Limestone Feeder furnace gates are CLOSED.
- d. Locally, OPEN the INTREX protection vent valve to help control boiler pressure.
- e. Regain control of the Boiler Air System, and adjust accordingly to cool the furnace or bottle up the heat - depending on whether or not a restart is anticipated.



**Boiler Air and Flue Gas Graphic**

- f. From the Control Room DCS Condensate and Feedwater Graphic, shutdown the boiler feed booster pump that is running if it did not trip off. Selecting the BFBP, then selecting STOP and ENTER does this.



**Boiler Feedwater System Graphic**

- g. Locally, CLOSE the Reheat Desuperheater Sprays block valves.
- h. If there are no plans to go into the furnace, from the Control Room: SELECT and STOP the Stripper Coolers.
- i. Locally CLOSE the Stripper Coolers cooling water block valves.
- j. When Drum pressure is less than 200 psi, from the DCS Condensate and Feedwater Graphic, SELECT and shut down the Boiler Feed Pump.
- k. Locally OPEN boiler vents when the drum pressure is less than 25 psig.

**3. Check that downcomer drains are not plugged.**

- a. Verify that the drum pressure is no more than 500 psi.
- b. Locally, and from the DCS, verify drum level is OK.
- c. Have adequate pumps on for drum makeup.
- d. Locally test each individual downcomer drain for flow.
  - OPEN each of the drain valves several rounds, observe flow from the Quenching Pot Sewer Hub.
  - CLOSE the associated drain valve.

- Downcomer Drain Valves are as follows: V-46 A&B, V-47 A&B, V-84 A&B, V-85 A&B, V-86 A&B.

\_\_\_\_ **4. Check Stroke on the Turbine Governor Valves.**

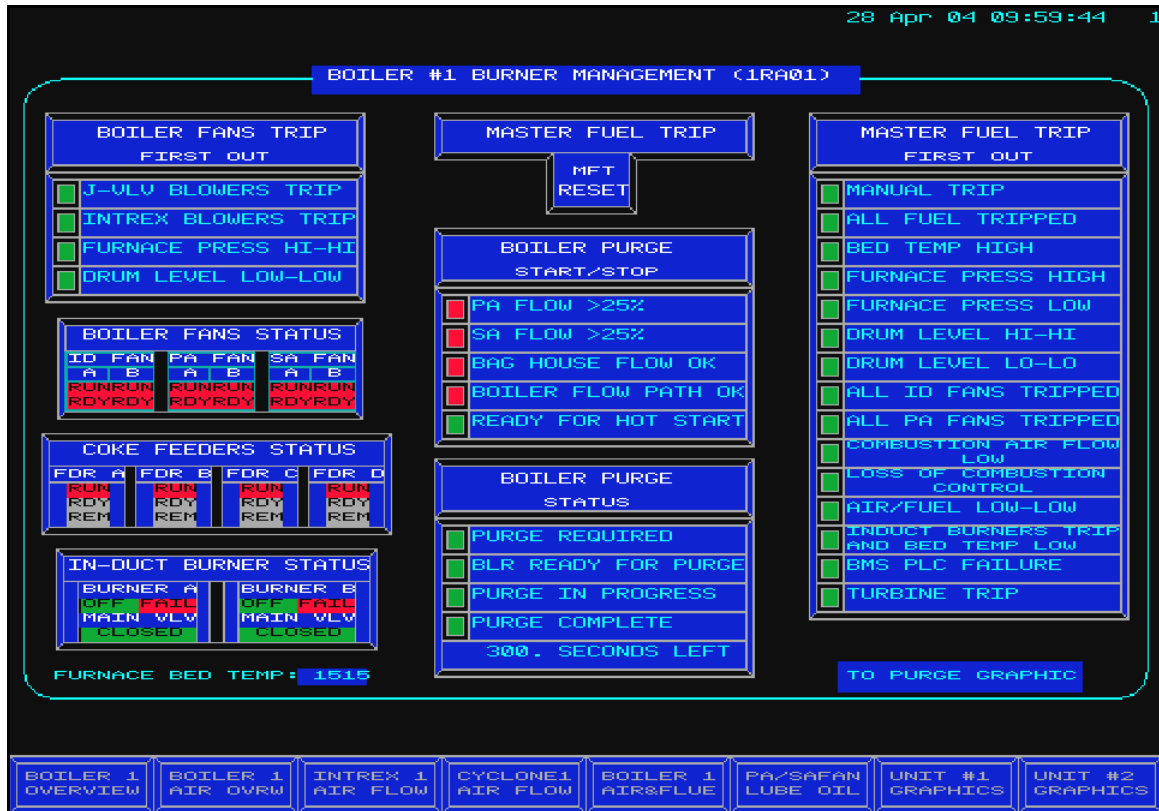
- a. Verify Turbine Auxiliary Oil Pump is running.
- b. Verify that the Turbine Stop Valves are CLOSED.
- c. Look and verify that the six (6) Governor Valves are completely CLOSED.
- d. Locally position the Load Limiter to fully OPEN.
- e. Use the Governor to fully stroke the Turbine Governor Valves OPEN and then back CLOSED.

**Boiler Tripped**

If an MFT occurs the boiler will trip and the turbine will not. It is possible to get a Hot Restart on the Boiler before the Turbine has to be tripped. All fuel will be shut off to the Boiler. All Primary and Secondary Air Controllers will transfer to MANUAL, and the Advanced Controls will SHUTDOWN.

\_\_\_\_ **1. Determine what tripped the Boiler.**

- a. Look at the DCS Burner Management Graphic (\_RA01) to determine the MFT first out (cause of trip).



**Boiler Burner Management Graphic**

- b. From the first out alarm you should be able to find out if the condition is temporary.

**2. Reset Boiler Master Fuel Trip (MFT)**

- a. Make sure the boiler is ready for “Ready for Hot Start” by selecting the DCS Burner Management Graphic.
- b. STOP all Coke Feeders to get “READY” lights on them.
  - a. The Purge Complete green target should be lit.
  - b. SELECT the MFT Reset and hit ENTER.
  - c. The Purge Complete Target will turn red, and on the Burner Management page (RA01) the First Outs will turn green.

**3. Maintain pressure using the Turbine Governor (Locally).**

- a. In the old control room, PUSH DOWN on the Governor Controller to get control from there.
- b. Hold the pressure up while allowing flow to keep the Turbine temperatures up. This will help control the drum level, Feedwater flow problem.

\_\_\_ **4. Restart all Coke Feeders – (From the Control Room DCS).**

- a. From the DCS Coke Fuel Feed Graphic (\_JM01) SELECT the START Button for the 'A' Coke feeder (JM\_HS01A) and ENTER.
- b. When the feeder shows a run, select the flow controller (JM\_FK09A) and raise the output to about 10 percent. Then place the controller in CASCADE.
- c. Continue until all Coke Feeders are ON, at 10 percent output, and in CASCADE.
- d. Raise coke flow with Coke Flow Controller (JM\_FC09) in MANUAL until the coke flow is at or near the flow it was before the MFT occurred.

\_\_\_ **5. Regain Control of the Air system (Control Operator).**

- a. SELECT the DCS Air and Flue Gas Graphic (\_1BA05).

Place the Primary Air Flow controller (BA\_FC33) in AUTO

- b. Place the Primary Air Pressure Controller (BA\_PC24) in AUTO and maintain the pressure at a point where the Primary Air Flow Dampers are at or near mid travel.
- c. Place the Secondary Air flow controller (BA\_FC10) in AUTO.
- d. If the Total Air Flow has dropped off, raise Primary and Secondary air flows at a rate that corresponds to the increases in fuel flow being made.

\_\_\_ **6. Bring the Unit back to full load.**

- a. After the pressure has recovered, leveled off and is under control, from the old control room PULL The Handle on the Turbine Governor Controller UP. This returns control to the DCS.
- b. When full load is restored and there are no more swings in process variables (controllers are controlling and manual control is no longer necessary), place the Advanced Controls back in service.

## **Forced Shutdown**

It is assumed that a planned shutdown is performed so that work can be done. Any part that does not correspond to the work to be performed may be ignored. For example: If the majority of work to be done is on the turbine, you may or may not want to remove the bed material from the furnace.

### **\_\_\_\_ 1. Remove the Boiler from service.**

- a. Locally, swap the Export Steam Supply to the unit that is to remain in service.
- b. Locally, isolate the Export Steam Supply from the Unit being shutdown.
- c. TURN OFF Advanced Controls (Control Room).
- d. Lower the bed temperatures and final superheater pressure and temperatures.  
(Performed from the Control Room.)
- e. Blind the Nuclear Detectors on each of the Coke Feeder chutes. (Locally)
- f. CLOSE the slide gates above each Coke Feeder (Locally)
- g. From the DCS Coke Fuel Flow Graphic put a full STOP on each Coke Feeder as the feeders empty. (Control Room)
- h. The boiler Master Fuel Trip occurs when all coke feeders are off. (Control Room)

### **\_\_\_\_ 2. Prepare for the Turbine Trip.**

- a. Run oil trip test (Control Room and Locally)
- b. Select the DCS Turbine Lube and Bearing Status Graphic and START the Auxiliary Oil Pump. (Control Room)
- c. CLOSE in the Reserve Station Service Breaker. (Control Room)
- d. OPEN the Normal Station Service Breaker. (Control Room)
- e. Test RUN Turning Gear Oil Pump. (Locally)
- f. Have the operator in the old control room PUSH DOWN the Turbine Governor Control Switch to take Turbine control. (Old Control Room)
- g. Maintain the Boiler pressure using the Turbine Governor and watching drum level  
(Old Control Room)

### **\_\_\_\_ 3. Secure the Turbine/Generator.**

- a. Verify the Exciter Field Breaker is OPEN. (Locally and in Old Control Room)
- b. START the Auxiliary Oil Pump from the DCS Turbine Lube and Bearing Status Graphic. (Control Room)
- c. START the Seal Oil Pump.

- d. Verify that the Turbine Stop Valves are shut by looking at the DCS Turbine Valves Graphic. (Control Room)
- e. Verify that the Generator Breakers are OPEN. (Old Control Room)
- f. OPEN the Exhaust Hood Spray block valves. (Locally)
- g. Reduce vacuum, by opening the vacuum breaker, at a rate so as to reach zero (0) inches Hg Vacuum at the same time as zero speed is reached on the Turbine. (Coordinated effort between Control Room and Operator locally controlling Vacuum Breaker valve)
- h. At zero speed on the Turbine, START the Turning Gear Motor and ENGAGE the clutch to initiate turning gear rotation of the turbine. (Locally)
- i. CLOSE the Gland Steam supply valve. (Locally)
- j. STOP the Gland Steam Exhauster.
- k. CLOSE the Turbine Auxiliary Steam Valve. (Locally)
- l. OPEN the following drains: (Locally)
  - Before Seat drains
  - After Seat drains
  - Main Steam drain to Blowdown Tank – 2 rounds
  - 2nd, 3rd, 4th, and 5th Point Extraction drains
  - Diaphragm Unloading Valve drain
  - Balance Piston drain
  - Inner Cylinder drain
  - Inlet Bend Manifold drain
  - Steam Chest drain
  - Hot Reheat and Cold Reheat drains to the floor
- m. CLOSE the Main Steam Lead Valve MOV. (Locally)
- n. LOCK OUT the Generator Breaker Control Switches, illustrated on (Old Control Room)
- o. LOCK OUT the Exciter Field Breaker Control Switch
- p. Run the Load Limiter back to zero (0) (Locally)
- q. START the Generator Space Heater. (Locally)

\_\_\_\_ **4. Shut down the Boiler.**

- a. STOP all Limestone Feeders. (Control Room)
- b. Verify all Coke Feeder and Limestone Feeder furnace gates are CLOSED. (Locally)

- c. STOP the Boiler Feed Booster Pump that is running - if it did not trip off. (Control Room)
- d. CLOSE Reheat Desuperheater Spray block valves. (Locally)
- e. When Drum pressure is less than 200 psi, STOP the Boiler Feed Pump. (Control Room)
- f. OPEN the Boiler Vents when the Drum pressure is less than 25 psi. (Locally)
- g. Regain control of the Boiler Air System, and adjust accordingly to cool the furnace. (Control Room)
- h. Shutdown the operating Condensate Pump(s) after drum level is stable and the need for makeup is no longer required. (Control Room)

**5. Cool Down the Boiler.**

**NOTE:** Leave one (1) train of fans (ID, SA, and PA), three (3) INTREX Blowers, and three (3) J Valve Blowers in service (running)

- a. Manually START a baghouse cleaning cycle to get all fly ash off the bags. (Control Room)
- b. Lower the Furnace Bed setpoint to "0" to drain the furnace area. (Control Room)
- c. Remove the blanks from the INTREX drains. Then OPEN the valves and drain the INTREX. (Locally)
- d. OPEN crossover doors to allow cool air into the J-Valves. (Locally)
- e. OPEN any furnace doors that may help cool the furnace for the earliest entry possible. (Locally) (Refer to the Access Doors Lists found in section V of this procedure.)
- f. When the Baghouse exit temperature decreases to 200 degrees Fahrenheit the baghouse will bypass and the proper authorities must be notified of the flyash release. (Control Room)
- g. OPEN Reheat and Superheat dampers 100 percent. (Control Room)
- h. When the furnace is sufficiently cool, SHUT DOWN all fans except one (1) ID fan and OPEN all dampers to 100 percent. This will allow continued airflow through the boiler. (Control Room)

**6. Check Stroke on the Turbine Governor Valves.**

- a. From the Turbine Lube and Bearing Status DCS Graphic, verify that the Turbine Auxiliary Oil Pump is running. (Control Room)
- b. From the DCS Turbine Valve Graphic, verify that the Turbine Stop Valves are CLOSED. (Control Room)

- c. Look and verify that the six (6) Governor Valves' are completely CLOSED.  
(Locally)
- d. Run the load limiter to fully OPEN. (Locally)
- e. Use the Governor to fully stroke the Turbine Governor Valves OPEN and then back CLOSED. (Old Control Room)

**\_\_\_\_ 7. Check Downcomer drains to verify they are not plugged. (Locally)**

- a. Check each Downcomer Drain for flow.
- b. OPEN each of the drain valves several rounds, observe flow from the Quenching Pot Sewer Hub.
- c. CLOSE the associated drain valve.
- d. Downcomer Drain Valves are as follows: V-46 A&B, V-47 A&B, V-84 A&B, V-85 A&B, V-86 A&B.

**\_\_\_\_ 8. Prepare the unit for startup at the completion of the controlled shutdown activities. (Refer to the Unit Startup Procedure valve list in Section IV.)**