ACME Procedure			OPS-0003-B
Title:	**ACME Unit 1 Hot Start procedure**		
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Summary

This procedure provides a step by step instruction for ACME Power Unit 1 start up from hot conditions. It shall be used as a reference each time this plant is started and a record kept of plant start up progress and any issues, events or error for future improvements.

On ACME Power Unit 1, a hot start is one in which the steam turbine rotor temperature as measured at thermocouple 1MAB10CT005 is >450 deg C.

Hot Start

The main differences compared to a warm start are;

- Need evener higher steam temperature, pressure and flow from the boiler to match the steam turbine requirements.
- You may require to start a coal pulveriser before running up the steam turbine to achieve these temperature requirements.

A step by step procedure so as to accomplish a hot start is below and this should be followed as closely as possible to achieve the best possible score.

1. CHECK circuit breaker 1ADA10GS001 to backfeed power to 11kV electrical board 1BBA10 (0AEA10GH001 ON).
2. CHECK plant fuel oil supply system (0EGC10AP001 ON).
3. CHECK gland steam supply is available. If not then START the auxiliary boiler (0QHA10GH001 ON).
4. CHECK turbine lube oil pump (1MAV10AP001 ON).
5. CHECK turbine jacking oil pump (1MAV20AP001 ON).
6. CHECK turbine turning gear (1MAK10AE001 ON).
7. CHECK condensate extraction pump (1LCB10AP001 ON).
8. CHECK condensate extraction pump controller in AUTO (LCB (CEP-AUTO)).
9. CHECK feedwater pump (1LAC10AP001 ON).
10. CHECK feedwater pump controller in AUTO (LAC (FWP-AUTO)).

11. CHECK condenser cooling water pump (1PAB10AP001 ON).
12. CHECK gland steam system (1MAW10GH001 ON).
13. CHECK condenser vacuum pump (1MAJ10AP001 ON).
14. START furnace fans;
    (a) CHECK air heater (1HLD10AC001 ON). Air heater speed should be around 3 rpm.
    (b) START induced draught fan (1HNC10AN001 ON).
    (c) START forced draught fan (1HLB10AN001 ON).
    (d) SELECT furnace air flow controller (AirFlow (AUTO)) to automatic.
15. PURGE the furnace (PURGE button).
16. START fuel oil burner (1HHA10AV001 ON).
17. START primary air fan (1HFE10AN001 ON).
18. START coal pulveriser B (1HFC20AV001 ON).
19. START electrostatic precipitator (1HDE10AT001 ON).
20. ADJUST furnace burner tilt angle (1HFD10GF001a) to ensure superheater outlet temperature (1LBA30CT001) is 460 deg C $\pm$20.
21. CHECK turbine bypass valve (1MAN20AA251) will OPEN after a short period.
22. When the following turbine steam inlet condition are met the turbine can be started;
    (a) main steam temperature (1LBA60CT001) 460$\pm$20 deg C.
    (b) main steam pressure (1LBA60CP001) 120$\pm$10 bar.
    (c) main steam flow rate (1LBA50CF001) $\approx$25 kg/s.
23. CHECK turbine control oil pump (1MAX10AP001 ON).
24. RESET turbine trip.
25. CHECK generator synchronising circuit breaker (1MKA10GS001) has closed.
26. CHECK turbine load increases to minimum continuous load of approx. 15 MW (gross).
27. SELECT Turbine CTRL mode to "Turbine MW AUTO".
28. INCREASE pulveriser B coal flow controller (1HFB20CQ001) to 20 t/hr.
29. START coal pulveriser A (1HFC10AV001 ON).
30. STOP fuel oil burner (1HHA10AV001 OFF).
31. INCREASE pulveriser A and pulveriser B coal flow controller (1HFB10CQ001 and 1HFB20CQ001) to 40 t/hr each. This should be done slowly whilst being mindful of boiler limits on rate of increase for pressure and temperature.
32. ADJUST furnace burner tilt angle (1HFD10GF001a) to ensure superheater outlet temperature (1LBA30CT001) does not exceed design values (design = 540 deg C; alarm = 545 deg C; trip = 555 deg C).
33. STOP plant fuel oil supply system (0EGC10AP001 OFF).
34. Increase boiler fuel firing until unit full load (approx. 150 MW gross) is reached.

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