

SAFE WORK PROCEDURE "BLR-A1"

POWER DEPARTMENT
APPROVED SAFE WORK PROCEDURES

BOILER 1 LIGHT-OFF FROM COLD CONDITION

BOILER
PROCEDURE NO. A-1

BOILER CLOSE-UP AND PREPARATION PROCEDURE

1. INSURE ALL PERSONNEL ARE OUT OF BOILER; YELL INTO EACH OPENING AND EXAMINE INTERIOR WITH FLASHLIGHT BEFORE CLOSING UP. ADVISE CRAFTSMEN SUPERVISOR OF THIS PROCEDURE AND THAT HE IS TO MAKE A HEAD COUNT OF HIS PEOPLE. POWER SUPERVISOR IS TO DO THE SAME FOR POWER DEPARTMENT PERSONNEL.
2. ASK AN INSTRUMENT MAN TO MAKE SURE THAT ALL SWITCHES AND RELAYS RELATED TO THIS BOILER ARE ENABLED IN THE MODICON.
3. STARTING AT TOP OF BOILER, INSPECT EACH ACCESS DOOR INCLUDING TOP AND BACK OF ECONOMIZER SECTION, ACCESS TO SUPERHEATER SECTION, PENTHOUSE, ETC., FOR SCAFFOLDS, LADDERS, TOOLS. INSURE EVERYTHING IS REMOVED BEFORE BOILER ACCESS DOORS ARE CLOSED. INSURE ALL ACCESS DOORS IS CLOSED AND TIGHTLY BOLTED.
4. INSURE THAT ALL RED TAGS HAVE BEEN PROPERLY RELEASED, CLEARED AND REMOVED.

SAFETY CONSIDERATIONS FOR BOILER START-UP

1. ABOVE PROCEDURES COMPLETED.
2. ALWAYS TRICKLE FEED BOILER WHEN BRINGING IT UP. OVERHEATING THE ECONOMIZER FROM LACK OF FLOW COULD CAUSE A RUPTURE.
3. ALWAYS USE IGNITORS FOR LIGHTING BURNERS. NEVER TRY TO IGNITE FROM HOT BRICK WORK OR ADJACENT BURNERS.
4. OBSERVE FIRES CLOSELY DURING PRESSURE RAISING.
5. MAKE SURE ALL GAGS ARE REMOVED FROM SAFETY VALVES.
6. WEAR NOMEX SUIT WHEN LIGHTING GAS BURNERS.
7. TRIP BOILER ANY TIME WATER LEVEL DROPS OUT OF SIGHT IN GAUGE GLASS.

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1. FILL BOILER TO TWO GREEN PORTS OR -2 ON EYE-HYE. THIS ALLOWS FOR NATURAL SWELLING OF WATER ON HEATING AND WILL LESSEN BLOWING DOWN TO HOLD WATER LEVEL UPON CONTINUED HEATING. FILL WITH MAKE-UP, NOT DEMIN, BECAUSE MAKE-UP WATER HAS A LOWER O2.
 2. OPEN THE FOLLOWING VALVES:
 - _____ A. EYE-HYE WATER COLUMN AND DRAIN BLOCK VALVES (AT DRUM).
 - _____ B. DRUM VENTS.
 - _____ C. SUPERHEATER OUTLET VENT.
 - _____ D. EAST & WEST SUPERHEATER DRAINS ON DRAIN MANIFOLD
 - _____ E. DRUM PRESSURE GAUGE.
 - _____ F. CONTINUOUS BLOWDOWN VALVES (AT THE DRUM)
 - _____ G. CHEMICAL FEED VALVES.
 - _____ H. FLOW AND PRESSURE TRANSMITTERS.
 - _____ I. ECONOMIZER INLET.
 - _____ J. DRAIN ON BOILER SIDE OF MOV FOR BOILER STEAM LEAD LINE.
 - _____ K. FLASH TANK BY-PASS
 - _____ L. DRUM LEVEL TRANSMITTERS.
 - _____ M. ALL BLOWDOWN VALVES
 - _____ N. AUTO BLOWDOWN BLOCK VALVES
 3. CLOSE THE FOLLOWING VALVES:
 - _____ A. EYE-HYE AND GAUGE GLASS WATER COLUMNS AND DRAINS
 - _____ B. ECONOMIZER DRAIN (AT DRAIN MANIFOLD).
 - _____ C. FEEDWATER MOTOR OPERATED SHUTOFF VALVE
 - _____ D. 2" MANUAL FEEDWATER BY-PASS VALVE.
 - _____ E. FEEDWATER MOTOR OPERATED BY-PASS VALVE.
 - _____ F. AUTO BLOWDOWN VALVE AND SHUT-OFF.
 - _____ G. 4" FILL VALVE ON S.H. OUTLET HEADER.
 - _____ H. CONTINUOUS FLOW DOWN GRADUATED VALVE
 - _____ I. FLASH TANK S.V. AND STM D.V. TO DEAERATORS
- PLACE SUPERHEATER DAMPER IN 100% POSITION (ALL FLUE GAS THROUGH THE PRIMARY SUPERHEATER)
5. PLACE ALL PREHEATER BY-PASS DAMPERS IN OPEN POSITION.
 6. OPEN ALL BURNER AIR REGISTERS.
 7. CLOSE ALL BURNER GAS COCKS.
 8. TURN ALL BURNER GAS SWITCHES AND IGNITOR SWITCHES OFF
 9. INSURE THAT OUTLET DAMPERS ON FD FANS ARE OPEN AND LOCKED IN POSITION.
 10. INSURE THAT FLEXIBLE CONNECTOR IS REMOVED FROM S.H. OUTLET HEADER FILL VALVE AND PLUG IS INSTALLED IN GRALOCK FITTING PRIOR TO LIGHTING OFF BOILER.
 11. START EDTA AND CONTROL PUMPS AND SET FOR NORMAL PROJECTED BOILER LOAD
 12. INSURE THAT INSTRUMENT AIR IS TURNED ON TO FAN VANE OPERATORS
 13. CHECK OIL LEVEL IN BEARINGS ON INDUCED DRAFT AND FORCED DRAFT FANS AND START AN I.D., THEN AN F.D. ONE AT A TIME

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PURGE CYCLE AND TRIP CHECKS

1. ESTABLISH NECESSARY AIR FLOW FOR PURGING (APPROX. 60%).
2. "VALVES CLOSED" LIGHT ON. THE FOLLOWING VALVE SHOULD BE CLOSED:

IGNITOR SSO
GAS SSO
3. DISABLE DRUM LEVEL TRIP SWITCH " LOW DRUM TRIP " LIGHTS SHOULD FLASH.
4. ESTABLISH AND MAINTAIN APPROX. 40# GAS PRESSURE ON GAS LINE.
5. SET MIN. GAS FLOW CONTROL VALVE AT 20% ON MANUAL.
6. "OPEN CV" LIGHT FLASHING.
7. OPEN GAS CONTROL VALVE
8. "OPEN SSO" LIGHT FLASHING
9. OPEN GAS SSO VALVE
10. "GAS SSO OPEN" LIGHT ON.
11. BURNER HEADER PRESSURE (25#) MUST BE ESTABLISHED WITHIN 30 SECONDS THEN GAS SSO VALVE CLOSSES AUTOMATICALLY
12. CLOSE GAS CONTROL VALVE
13. "PURGE ON" LIGHT ON. HEADER PRESSURE PROVING. AIR PURGE ON. GAS HEADER PRESSURE MUST REMAIN ABOVE 10 PSIG FOR 5 MINUTES TO CONTINUE
14. AFTER A 5 MINUTE DELAY, "OPEN SSO" LIGHT FLASHING
15. OPEN GAS SSO VALVE
16. "GAS SSO OPEN" LIGHT ON
17. BURNER HEADER WILL PURGE 2 MINUTES
18. "END PURGE" LIGHT ON.
19. ADJUST AIR FLOW TO APPROX. 25%. IF AIR FLOW IS ALLOWED TO DROP BELOW 25% PRIOR TO LIGHT-OFF, BOILER WILL TRIP.
20. RESET ALARMS AND TRIPS.
21. OPEN IGNITOR SSO HEADER VALVE.
22. "L O. READY" LIGHT ON.

SAFETY TRIP CHECKS (ROUTINE)

USE MODICON TRIP CHECK LIST

SAFETY TRIP CHECKS (NON-ROUTINE)

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LOW DRUM TRIP :

1. SHUT OFF TRICKLE FEED TO DRUM AND OPEN BLOWDOWN VALVES. WHEN DRUM LEVEL DROPS TO -10", GAS SSO VALVE SHOULD CLOSE.
2. REPURGE.

BURNER LIGHT-OFF: (TYPICAL FOR #1 IGNITOR)

1. AIR FLOW SHOULD BE 25%; CLOSE AIR REGISTERS ON BURNERS TO BE LIT.
2. "L.O. READY" LIGHT ON.
3. TURN IGNITOR SWITCH #1 TO ON POSITION
4. WHEN IGNITOR LIGHTS, OPEN REGISTER TO ABOUT 10%. IF IGNITOR FAILS TO LIGHT, TWO MINUTE PURGE IS REQUIRED. AFTER TWO MINUTES, "L.O. READY" LIGHT IS ON AND IGNITOR IS READY TO BE TRIED AGAIN. ON THE FIRST IGNITOR ONLY, THE BOILER WILL TRIP AFTER UNSUCCESSFUL FLAME DETECTION ON THE SECOND TRY. THIS WILL REQUIRE RE-PURGING OF THE BOILER. AFTER A FLAME IS ESTABLISHED, IGNITORS MAY BE TRIED OVER AND OVER WITH ONLY A TWO MINUTE DELAY BETWEEN TRIES.
5. IGNITOR LIGHT WILL REMAIN ON AS LONG AS IGNITOR FLAME IS PROVEN

BOILER LIGHT-OFF (GAS BURNER) (TYPICAL FOR #1 BURNER)

NOTE MAKE SURE WINDBOX IS NO HIGHER THAN 24 PSI TO MINIMIZE BLOW BACK ON AIR THROUGH BURNER GUN

1. TURN GAS BURNER SHUT-OFF VALVE SWITCH TO OPEN AND HOLD UNTIL "VALVE OPEN" LIGHT COMES ON. THEN RELEASE SWITCH
2. OPEN GAS COCK ON #1 BURNER, WHILE ADJUSTING AIR REGISTER
3. IF FLAME FROM BURNER IS NOT PROVEN WITHIN 4 SECONDS, BURNER SSO VALVE WILL CLOSE.
4. "FLAME ON" LIGHT IF FLAME IS PROVEN; IGNITOR WILL SHUT DOWN (5 SECOND DELAY). IF NO IGNITORS ARE LIT, THE IGNITOR HEADER VENT WILL BE OPEN; THEREFORE, IT IS BEST TO EITHER HAVE AN IGNITOR LIT OR CLOSE THE IGNITOR SSO VALVE.
5. PUSH DIFFUSER IN UNTIL IT GLOWS, THEN BACK IT OUT UNTIL THE GLOWING STOPS.
6. CLOSE ALL REGISTERS EXCEPT ON BURNER LIT AND THOSE DIRECTLY ABOVE
7. AFTER FIRST BURNER IS LIT ADJUST MINIMUM PRESSURE FOR 2-3#.

AFTER LIGHT OFF.

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1. FOLLOW THE CURRENTLY APPROVED PRESSURE RAISING CURVE BY THROTTLING THE SUPERHEATER VENT AND/OR ADJUSTING MINIMUM BURNER PRESURE REGULATOR
2. INSPECT FURNACE FREQUENTLY FOR PROPER COMBUSTION.
3. TRICKLE FEED BOILER WITH 1-1/2" BY-PASS AND CONTINUE UNTIL BOILER IS ON THE LINE TO PREVENT WATER FLASHING IN THE ECONOMIZER.
4. BLOW DOWN FRONT AND SIDE HEADERS EVERY 20 MINUTES FOR FIRST TWO HOURS OF FIRING AND EVERY 30 MINUTES THEREAFTER UNTIL BOILER IS ON THE LINE. (OPEN AS FAST AS POSSIBLE AND CLOSE AS FAST AS POSSIBLE)
5. AS BOILER STARTS TO STEAM, SNUG UP ON HANDHOLE AND MAN-HOLE COVERS IF GASKETS HAVE BEEN REMOVED.
6. INSURE THAT CONTINUOUS BLOW-DOWN BLOCK VALVE AT FLASH TANK IS CLOSED AND BY-PASS IS OPEN.

RAISING STEAM PRESSURE.

1. SET EDTA PUMP STROKE AT MANUAL PROJECTED BOILER LOAD AND START PUMP
2. AT 25 PSIG, CLOSE DRUM VENTS AND THROTTLE SUPERHEATER VENTS
3. WHEN BOILER REACHES 500# AND AT 100# INTERVALS THEREAFTER CLOSE SUPERHEATER VENT FOR 15 SECONDS AND THEN OPEN WIDE FOR SURGING THE SUPERHEATER TUBES TO AID IN REMOVAL OF CONDENSATE
4. BEGIN WARMING BOILER STEAM LEAD LINE FROM HEADER TO NON-RETURN. THROUGH LEAD LINE WARM UP BY-PASS AND LEAD LINE VENT. PUT ALL BOILER METERS, ON CRT, IN SERVICE
5. ROTATE #1, #2, #3, #4, AND #5 BURNERS EVERY HALF HOUR TO CLEAR CONDENSATE IN SUPERHEATER TUBES BEING CAREFUL TO OBSERVE PROPER PROCEDURES AS DESCRIBED IN SAFE WORK PROCEDURE C-1.
6. WHEN FLOW OF STEAM EMITTING FROM LEAD LINE APPEARS TO BE DRYING OUT, ADJUST VENT VALVE TO MINIMIZE FLOW ALLOWING LEAD LINE TO PRESSURE UP.
7. PUT POWER ON MOTOR-OPERATED VALVE ON BOILER LEAD LINE AND FEEDWATER LINE.
8. WHEN DRUM PRESSURE REACHES 1200 PSIG, HAVE LEAD LINE PRESSURED AND WARMED UP AND OPEN NON-RETURN. INSURE ALL TUBES ARE CLEAR OF CONDENSATE. TUBE METAL TEMPERATURES SHOULD NOT EXCEED 875-900 DEGREES F.
9. RAISE BOILER PRESSURE BY INCREASING GAS OR CUTTING BACK ON SUPERHEATER VENT. HOLD BOILER LOAD AT 50 TO 60M/# HP FOR 15-30 MINUTES AS A PRECAUTION AGAINST CONDENSATE REMAINING IN SUPERHEATER TUBES THAT DO NOT HAVE THERMOCOUPLES.

BOILER ON THE LINE:

1. CLOSE DRAIN AND VENT VALVES. CLOSE SUPERHEATER DRAINS.
2. GO TO MAIN FEEDWATER REGULATOR AS SOON AS PRACTICAL.
3. ADJUST SUPERHEATER DAMPER TO OBTAIN MAXIMUM OUTLET STEAM TEMPERAURE NOT TO EXCEED 950 DEGREES F.
4. CLOSE AIR PREHEATER BY-PASS DAMPERS WHEN OUTLET FLUE GAS TEMPERATURE FROM THE PREHEATER REACHES 212 DEGREES F.
5. AFTER ALL T.C.'S INDICATE THAT THE SUPERHEATER ELEMENTS ARE CLEAR OF CONDENSATE, INCREASE BOILER LOAD TO 100M#/HR AND RUN AT THIS LOAD FOR AT LEAST TWO(2) HOURS BEFORE INCREASING LOAD.
6. INSPECT BOILER THOROUGHLY FOR LEAKS, SIGNS OF UNEVEN EXPANSION, PROPER COMBUSTION, ETC
7. AS SOON AS PRACTICAL, PUT COMBUSTION CONTROL ON AUTO. AND ENABLE DROM LEVEL TRIP
8. INSURE THAT BLOCK VALVES IN FEEDWATER MOTOR-OPERATED BY-PASS LINE ARE OPEN AND ALSO THAT STAND-BY GAS REGULATOR IS READY FOR SERVICE
9. OPEN BLOCK VALVE TO FLASH TANK AND CLOSE BY-PASS.
10. CLOSE IGNITION TO VALVE AS SOON AS ALL BURNERS ARE LIT, OR AT LEAST ONE IGNITION IS NO LONGER REQUIRED
11. CHECK ALL INSTRUMENTED VALVES AND TURNS