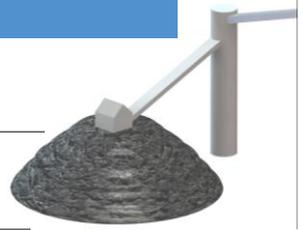


Fuel Factors Checklist

1 What type of fuel(s) are we firing or co-firing?

Coal Biomass Gas Oil _____

2 Is the fuel supply consistent? Yes No



3 Do we have two ultimate coal analysis tests to compare? Yes No

HGI a. _____ b. _____
(Hardgrove Grindability Index)

Slagging index a. _____ b. _____

T250 temperature a. _____ b. _____

4 Do we have two ash mineral analysis tests to compare? Yes No

a. _____

b. _____

5 Other things to check

- Coal supplier/mine/seam location
- Coal size (average & top size)
- Sampling method
- Ash fusion temperatures (oxidizing & reducing)
- Proximate coal analysis (w/high heating value)
- Crusher condition

Pulverizer System Checklist

1 Are all the mills functioning properly? Yes No

2 Are primary/secondary air flows optimized?

Yes No _____

3 Are feeder flow rates optimized? Yes No

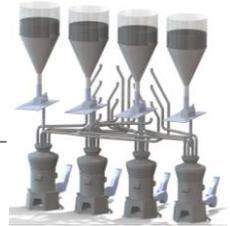
4 Mill temps: *inlet* _____ *outlet* _____

5 Air temps: *primary* _____ *secondary* _____

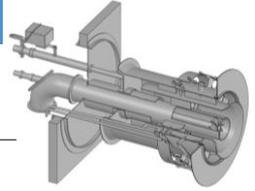
6 Is fuel fineness from transport pipes optimized? Yes No

7 Other things to check

- Horsepower per ton of coal
- Mill loading (typical/design capacity)
- Performance capacity (corrected for fineness, HGI, moisture, sizing)



Combustion Checklist



1 Do we have good, complete combustion?

Yes No _____

2 Oxygen levels

Furnace exit _____

Boiler exit _____

Economizer exit _____

3 Air-to-fuel ratios

Primary _____ Total _____

4 Is fuel distribution to all burners consistently balanced? Yes No

5 Gas temperatures

Furnace exit _____ Boiler exit _____

6 Forced draft (FD) fan settings

Current _____

Damper _____

7 Primary air fan (or exhauster) settings

Current _____

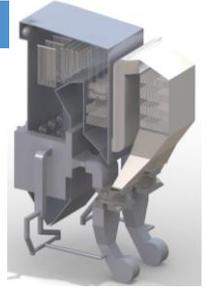
Damper _____

8 Other things to check

- Burner belt stoichiometry (air per MMBtu) Feeder flow rates
- Furnace-to-windbox differential pressure Furnace exit gas profile
- Furnace exit O₂ profile Over-fire air settings (% , flow, distribution)
- Secondary air flow & dampers Boiler exit velocity profile
- Pressure drop across windbox, furnace, convection pass, AH, backend



Steam Cycle and Boiler Reliability Checklist



1 Are all controllable losses optimized? Yes No

Turbine cycle heat rate _____

Furnace heat release rate _____

Net plant heat rate _____

2 Are we able to maintain design steam temperatures?

Yes No _____

3 Do we have any air in-leakage originating in the boiler? Yes No

Infiltrations between... furnace & penthouse penthouse & airheater

Other _____

4 Furnace exit gas temperature _____
(measured by water-cooled probe)

5 Outlet header condition assessment _____
(recommended every 2-5 years) (date)

6 Visual boiler inspection _____
(recommended each outage) (date)

7 During inspections, did we find unburned carbon on tubes in the upper furnace (above the burner belt)? Yes No

8 What is our most recent EFOR (Equivalent Forced Outage Rating)?

Date _____ Rating _____

9 Other mechanical issues to check

Burner mechanical condition Condition of soot blowers

Upper furnace/convection pass tube alignment

De-superheating spray flows (superheater and reheater)

Tube metal temperatures

10 Other process issues to check

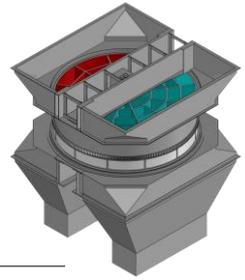
Turbine cycle deviations Steam/water isolation problems

Feed water heater problems Long-term condenser issues

Losses from combustion of moisture & hydrogen Dry gas losses



Airheater Performance Checklist



1 Is airheater performance optimal? Yes No

2 Do we have ports available for representative testing? Yes No

3 Do we have representative performance data available? Yes No

Inlet data Outlet data Oxygen Temperatures Static pressure

4 Oxygen levels

Airheater inlet _____

Airheater outlet _____

5 Are the gas outlet flows and/or temperatures stratified? Yes No

6 Performance results

Leakage _____

X-ratio (air-to-gas) _____

Air-side efficiency _____

Air-side differential pressure (ΔP) _____

Gas-side efficiency _____

Gas-side differential pressure (ΔP) _____

Corrected no leakage exit gas temperature _____

7 Other things to check

Recuperative and/or regenerative airheater mechanical conditions
(seals, heating elements/tubes, plates, gears, turn-down, motor,
diaphragm, pin racks, fasteners, soot blowers, other components)

Airheater reliability Cold-end corrosion



Selective Catalytic Converter (SCR) Performance Checklist

1 Are we experiencing ammonia slip? Yes No

If yes, how much? (PPM) _____

2 Are we experiencing pressure drop issues? Yes No

Inlet pressure _____ Outlet pressure _____

3 NO_x concentration

Inlet _____ Outlet _____

4 Sulfur trioxide (SO₃) concentration

Inlet _____ Outlet _____

5 SCR temperatures

Inlet _____ Outlet _____

6 Other things to check

- Ammonia distribution
- Ammonia flow
- Gas velocity distribution
- Bypass damper position
- Mercury oxidation issues
- Catalyst poisoning, deactivation and/or accelerated erosion

Sorbent Injection (Spray Dryer) Performance Checklist

1 What type of sorbent are we using? _____

2 Are we over- or under-injecting? Yes No

Sorbent injection rate _____

3 Are all the spray atomizers in service? Yes No

4 Percent solids _____

5 pH of injected fluid _____

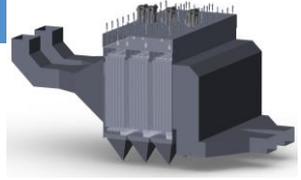
6 Temperatures

Inlet _____ Outlet _____

7 Outlet gas humidity level _____



Precipitator Performance Checklist



1 Are secondary voltage and current readings within normal range? Yes No

2 Gas temperatures

Inlet _____

Outlet _____

3 What type of fuel(s) are we firing or co-firing?

Coal Biomass Gas Oil Other

4 Do we have high levels of unburned carbon in ash? Yes No

How much? _____

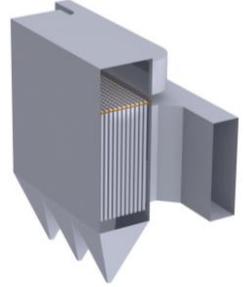
5 Opacity trace trends (spikes, etc.)

6 Other things to check

- Primary voltage and current
- Spark rate
- Flue gas flow rate
- Rapper systems (mechanical, programming)
- Inlet temp profile
- Hopper collection profile
- O₂ differential across unit
- Chemical injection rates upstream of ESP (SO₃, NH₃, etc.)
- ESP fly ash resistivity
- Particle size distribution (inlet/outlet)
- Hopper catch ash mineral analysis
- Mass loadings (inlet/outlet)
- Velocity distribution (inlet/outlet)
- Pressure differential across unit
- Performance of SO₂ injection system (upstream of ESP)
- Condition/performance of data collection systems
- Condition/performance of economizer & airheater hoppers (upstream)



Baghouse Performance Checklist



1 Are we experiencing opacity exceedances?

Yes No

2 What is the differential pressure (ΔP) before and after cleaning?

Before _____

After _____

3 Is cleaning energy sufficient? Yes No

Reverse air: inches H₂O. Pulse jet: compressed air pressure (PSI)

4 Are we using an appropriate cleaning method (online or offline)?

Yes No

5 Are all compartments in service? Yes No

6 Do we have hopper pluggage/high hoppers? Yes No

7 Other things to check

- Flue gas flow rate O₂ differential across unit (air in-leakage)
- Hopper catch ash mineral analysis Gas temps (inlet/outlet)
- Inlet/outlet mass loadings Inlet/outlet particle size distribution
- Sorbent injection rates upstream of baghouse
- Appropriate air-to-cloth ratio (filter area)

R/A, 1.75:1-2.5:1 | Pulse jet, 3.25:1-4.0:1 | Shaker, 2.0:1-2.5:1



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Gas Scrubber Performance Checklist



1 Is scrubber performance consistently optimal? Yes No

2 Temperatures

Inlet _____ Outlet _____

3 Differential pressure (DP, ΔP) between inlet and outlet

4 Scrubber solution pH _____

5 Other things to check

- Water makeup Scrubber efficiency
- Energy consumption Mist eliminator performance
- Large particle size (LPA) Corrosion/alloy condition

Induced Draft (ID) Fan and Stack Checklist

1 Are we using more fan than in the past? Yes No

2 Do we have two sets of stack test results to compare? Yes No
includes O₂, CO, CO₂, SO₂, NO_x, temp, PM, Hg, opacity, D&Fs, HCl

a. _____

b. _____



3 Fan settings

Current _____

Damper _____

4 Fan inlet temperature _____

5 Other things to check

- Continuous emission monitoring system (CEMS) parameters
(all available)

