Common Operating Ranges in Large Scale Coal Fired Power Plants

Boiler Conditions

- Residence time – 2-3 seconds
- Temperature (after leaving convective section) 1200-1400F
- Composition – approximately: 3-4% O2, 12-15% CO_2, 5-7% H_2O, 2000-3000 ppm SO_2, 150-500 ppm NO (depending on the use of low NOx burners or staged combustion). There are times when the O_2 levels can approach 0% locally. These low O_2 areas are also at a higher temperature than the rest of the flue gas.

Economizer

- Residence time <0.5 second
- Temperature at outlet < 750F (600-750F typical)

SCR (Selective Catalytic Reduction)

- Typical inlet temperature 650 to 620 F
- May require reheat to maintain minimum gas temperature
- Typically 3 to 5 beds of catalysts @ 1 in w.c. per bed
- Ammonia slip typically 2 to 5 ppmv
- Residence times of less than 1 second
- Can remove 90+% of NO depending on amount of NH_3 injected
- Can oxidize 0.5%-1% of SO_2 to SO_3

Air Heaters

- Air leakage – Approximately 7% of bulk flow
- Outlet temperature of flue gas < 350F (280 to 350F typical)
- Residence time – negligible

Precipitators

- Pressure drop < 1 in w.c.
- Residence time < 10 seconds (about 2 seconds per field)
- Outlet temperature < 350 F (280 to 320 F typical, limited by the SO_3 content of flue gas)
- 99+% particulate removal typical

Wet scrubbers

- Pressure drop < 8 in w.c.
- Residence time of the flue gas < 2 seconds (1 second in intense contact zone)
- Outlet temperature < 140F (and saturated with water, typically 125F)
- 90+% SO2 removal typical, 95+% typical

Typical flue gas volume 3500-4500 acfm @325F per megawatt