Boiler & Steam Systems, LLC. –

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Dave Sharp

09/25/13 9:00

Soot blowing and grate cleaning – cannot meet 40%. Once a day to 3 times/day. When they soot blow for 8-10 minutes, out of compliance. Newer boilers with post filtration knock out a good portion but permits make allocation for it so soot blowing is not needed as much. Knock out box then to multiclone dust collector (primary) then to secondary filtration. Working on super multi-clone to jack up efficiency.

Multiclone takes a cut. Anywhere from 75% to 88% efficient, even low 90s%. Equal percentage situation. If you put twice to it, you get twice as much out. Some old boilers with high emissions levels, have high carry over. Tuning helps that. Sometimes need to add over fire air for consistency and \_\_\_\_\_\_. Allows to drive down CO and NOx may increase a tiny bit but PM will go down, along with carbon fraction.

Good audit of air system, dampers close and air still gets around them. Heat can warp dampers. Annual inspection of all of air control systems. Boiler casing leaking also has an impact.

When you start pushing oilers hard, air velocity goes up and potential for carry over goes up. Control systems, mechanical and electrical are not up to the task.

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In some cases, Dutch ovens are more unique than other. To upgrade, very difficult to put in a more precise air system, depends on individual layout, tend to be good on wet fuel (strength).

Casing leakage to reduce condensation and infiltration. Those are usually hard to make CO on. Design had a purpose in 1940s, later became a detriment, even in NG boilers, hard to meet NOx.

**45,000 lb/hr** - $900,000 ESP EQUIPMENT ONLY?

20,000 lb/hr – ESP - $600,000

Baghouse = 60% of ESP

Multiclone = 15% of ESP – technology has improved, can improve multiclones and reduce as much as 50%, depends where you are starting from. Can put 2 multiclones, second one can get 50% of what it gets. As long as there is fan capacity. If within 10-20% of limit, can upgrade multiclones to meet. Smaller diameter cones give higher cleaning efficiency. Something as simple as how the air comes in can make a huge difference. Can meet 0.3 to .35 lb/MMBtu. Small diameter 6” can get down to .18 lb/MMBtu. Ceramic multiclone .15 lb/MMBtu or .13 lb/MMBtu. 90% of whatever comes in! Need to optimize boiler to minimize carryover.

Wet scrubbers – until 1980 or 1990 a lot of scrubbers use. They use a lot of horsepower. As requirements got tighter, can do 80-90% but not 95% device. Need wastewater treatment, not good for a sawmill but okay for pulp mills.

Process ash as little as possible and get to dumpster offsite.

Start as close to the boiler as possible, get as much gain on front end then work through system. A lot is just maintenance. As things wear out, operators don’t realize.

1908 boiler in Glendale! 1902 in Montana. Life cycle court case (through EPA) showed boiler life 60+ years

Tune-up 2 days onsite, < $4,000 for air system, find valves deformed or aren’t working. Maintenance guys don’t pick up on that. They do a lot of patching.

Assessment if they don’t tune well, minor repairs, welding, can’t see dampers - $3,000 to $4,000, same as tune-up. Depends on repairs needed. May need to redesign air system.

2/3 could have benefit from evaluation, repair and tuning

MACT requires tuning every 2 years. CA requires tune 4 times/year and no ST for gas boilers.

Could find information online, Dave has seen a number of studies online, has contributed numbers to them. New York state did a study? Washington State? U of W book?