

# PROJECTS

## BOISE PLANTS BENEFIT FROM INNOVATIVE EMISSIONS CONTROL SYSTEMS

Eastern Oregon facilities reduce costs and emissions with help from an alliance of emissions controls vendors.

BY DAN SHELL

Fulfilling a U.S. Environmental Protection Agency (EPA) abatement agreement, Boise Building Solutions has successfully installed and implemented two innovative emissions control systems at its Elgin, Ore. plywood plant and LaGrande, Ore. particleboard plant, thanks to an alliance group that includes Pro-Environmental, M-E-C, TurboSonic and Prototech.

In 2002, Boise was looking to upgrade emissions controls at various plants, working with Geoenergy. Yet when Geo went out of business, Boise found itself in a bind and quickly invited a group of vendors to its Idaho headquarters.

Boise Region Engineer Jared Rogers, who has responsibility for the plants at Elgin and LaGrande, says the company's engineers were charged with accomplishing the required VOC compliance with the lowest possible ongoing operating costs.

At Elgin, Boise replaced a wet ESP system with a 60,000 ACFM Pro-Environmental thermal catalytic oxidizer (TCO) to handle emissions from three existing steam-heated dryers.

"We were able to use the TCO because the dryers were indirect-fired," says Rogers, who adds that "The electrical costs were almost a wash since we had already been running the wet ESP, but we're able to keep natural gas costs in check because we can operate with a catalyst."

Operating the unit thermally at 1,500° F requires much more in natural gas costs than when using a Prototech precious metal catalyst, which allows the TCO to be run effectively at only 800° F.

"When you run the system with a catalyst, levels of nitrous oxide (NOx) and carbon monoxide (CO) are almost non-detectable," says Pro-Environmental President David Chiles, adding that testing has shown a 100% conversion of CO.

The LaGrande plant emissions control project was a much tougher nut to crack, Rogers says, thanks to the particleboard plant's direct-fired (sander dust) dryer, which emits large amounts of ash and sub-micron salts when compared to an indirect-fired unit. In addition, the dryer's existing wet ESP was being pushed hard and barely able to meet particulate removal objectives.

Boise had M-E-C supply a new single-pass rotary drum that fit right on the same trunions as the old unit, plus a dryer recirculation system. The recirculation system uses the cooler 200° air at

dryer outflow to blend with and temper the super-hot direct heat at dryer inflow. The system reduced the total dryer exhaust rate to the ESP system and RTO by almost 40%, plus reduced overall NOx and particulate matter loading.

"With the recirculation, the wet ESP's removal efficiency goes way up, and then in the RTO we don't have to heat near the volume of air," Rogers says, noting that "the recirculation system was a good payback just in natural gas cost savings alone."

Moving to the wet ESP itself, Boise selected TurboSonic to upgrade three main areas: the pre-scrubber, transformer rectifier and mist eliminator.

According to TurboSonic President Ed Spink, most existing pre-scrubber hydraulic systems don't truly saturate the incoming gas stream. Instead, his



TurboSonic quench nozzles



Testing looks good for running the Pro Environmental RTO at LaGrande catalytically.



**TCO at Elgin saves on gas by operating catalytically at 800° F.**



**Extra set of mesh pads between wet ESP and RTO at LaGrande.**

company added compressed air atomization nozzles at the pre-scrubber that provide full saturation, he says.

The atomization process also provides a light, constant wash-down that doesn't affect the wet ESP's electrical performance and also makes a wet ESP's standard, periodic fresh water flushing more effective.

"Depending on incoming drop size, we improved performance by 30%-50% just by upgrading the pre-scrubber alone," Spink says, adding that effective pre-scrubbing "really eliminates the sub-micron salts that do so much degrading of catalytic media."

Rogers adds, "The new compressed air quench nozzles are removing more of the particulate before it even gets into the electrical parts of the ESP—the source testing showed that."

In addition, during the project TurboSonic installed a patent-pending new design mist eliminator that replaced the existing mesh pad-style mist eliminator, which required ongoing maintenance to operate effectively, Spink says.

The new mist eliminator uses a plenum-type design that slows gas stream velocity and lets gravity do the work since the mist droplets aren't moving fast enough to get sucked into the Pro-Environmental 70,000 ACFM RTO. "The design traps mist droplets out of the airstream and removes them to a contained area where they can drain to the sump," Rogers says.

However, to address concerns that uninsulated ductwork from the ESP to RTO might create too much condensa-

tion, Boise elected to install a secondary mesh pad mist elimination system from Pro-Environmental at the RTO inlet.

Another big ESP change was two new three-phase NWL transformer rectifiers, also provided by TurboSonic, that deliver higher average power to the ESP electrodes along with a smoother signal and less background noise.

Rogers says he and others were impressed with the difference the new rectifiers made: "The average power inside the unit went from 38 kilovolts to the high 40s kilovolt level, with less drop-off, and the milli-amps went from 140 to almost 500."

The region engineer says overall improvements to the wet ESP alone resulted in approximately 40% less particulate going into the RTO. "Overall, the project was a tremendous improvement to the ESP," he says.

Most promising is that thanks to the upstream improvements, it looks like Boise will be able to operate the RTO catalytically. Boise, PEI and Prototech personnel have recently been testing Prototech wash-coated ceramic saddles in two thief baskets, one at the top of each RTO chamber, looking primarily for buildup, deterioration and other signs that would point toward catalyst "blinding."

The first test basket has been removed and resulted in a great report from Prototech. If the second batch tests as well, "It looks really possible that we'll be able to run the RTO at 800° catalytically and still maintain over 95% VOC destruction efficiency," Rogers says.

The Elgin emissions system started up in June 2003 and has run constantly ever since, receiving its issue of compliance last September. The LaGrande system started up in November. "We did our online source testing in December and passed effortlessly," says LaGrande Environmental Manager Jon Christensen. "We easily demonstrated more than 95% destruction capacity."

He adds that operating a direct-fired rotary dryer with wet ESP and catalytic RTO would be a bit of "a bold step. It hasn't been tried a lot, but so far it looks like it will be possible to do it successfully with the upgrades we've made to the existing equipment."

Christensen says the recently-installed systems have given no problems outside the normal calibrations the first week or so following startup. "The best thing is the system just kind of hums in the background."

According to Chiles, the strategic alliance developed among PEI, M-E-C, TurboSonic and Prototech gives manufacturers a full set of options when it comes to the latest emissions control technology, in applications that can fit everything from existing equipment retrofits to new turnkey systems.

"During the past year, we've been giving technical seminars as an alliance to show people all their options," Chiles says, adding that the four companies work well together, avoiding the traditional "fingerpointing" that such multifaceted projects can generate.

We believe we've developed a great answer for the industry," he says. **PW**