A P STAFF REPORT

Clean Air

Boise Cascade scrubs out emissions

When it comes to air quality control, bleached paper producers in Maine face the potential of a double whammy. Not only does the federal Clean Air Act mandate the use of maximum achievable control technology (MACT), but the State of Maine has some of the toughest air quality standards in the nation. Maine allows each paper mill air emissions of only 3 lbs/hr. of chlorine and chlorine dioxide.

MACT

To design a MACT air scrubber system for its bleached paper mill at Rumford, Maine, Boise Cascade Corp. called on Caldwell-MacKay Co. Inc., Birmingham, Ala.

"The maximum technology we could offer Boise Cascade was the four-tower scrubber system, which results in total emissions well below 1 lb/hr," said Rick MacKay, Caldwell-MacKay's vice president of engineering. The designers specified a two-line system containing four identical scrubber tower vessels, each measuring 8 ft by 56.5 ft.

Both lines feature scrubber vessels for chlorine and chlorine dioxide in sequence, explained Jim Stewart, Boise Cascade's project coordinator. "One line is used for our hardwood bleach plant the other for our softwood bleach plant," he added.

"The chlorine scrubbers utilize either a caustic solution containing 30% sodium hydroxide or weak white liquor containing 25 grams/liter of tritable alkaline (TTA)," Stewart said. "The chlorine dioxide scrubbers use either weak white liquor or white liquor containing 120 grams/liter of TTA."

"The first tower removes roughly 95% of the chlorine gas and 40% of the chlorine dioxide gas," added MacKay. "The second tower removes the remaining trace chlorine and the remaining chlorine dioxide. The end result is a minimal emission of less than one lb/hr of chlorine and chlorine dioxide."

The Rumford mill scrubber system comprises four identical scrubber towers.

SPECIFICATIONS

The scrubbers were designed to handle 800-1,200 gpm of liquids and 17,000 cfm of gases. Normal operating temperatures range from 120°F TO 140°F, with a maximum design temperature of 170°F.

The vessels feature one-piece dual-laminate construction with a 3/16-in. thick PVC inner lining laminated with an outer shell of 5/8-in. thick fiber-reinforced plastic (FRP). The FRP secondary corrosion barrier was fabricated using a 1/8-in.thick hand-laid inner laminate made of Derakane™ 411-45 epoxy vinyl ester resin, followed by a 1/2-in. thick filament-wound outer structural laminate made of Derakane 510C-350 resin, cured with methyl ethyl ketone peroxide/ cobalt naphthenate. Derakane resins were supplied by Dow Chemical Co., Midland, Mich.

Nyacol APE-1540 also was used in fabricating the outer structural laminate for additional fire retardancy. A 20-mil Nexus® veil, overwrapped with 105 mils of chopped stand "E" glass mat, was used at the PVC/FRP bond interface.

CPF Dualam Ltd., Montreal, Que., was the contractor for the actual system fabrication. Paul Habib, vice president and general manager of CPF Dualam, said that while the dual- laminate construction may be slightly more expensive than typical FRP equipment, the extra cost is justified by the additional service life. He noted, "Fiberglass alone would provide about five to seven years of service. When combined with PVC laminate, it should provide a service life of 15 years."

The scrubbers were designed to withstand a 100-mph wind load with a 10-to-1 safety factor. Structural design parameters meet seismic zone 2 requirements. Pressures on the system include 5 psig at the header and the design vacuum was 30-ins. water gauge with a 5-to-1 safety factor.

In service since May 1992, the system is still in good operating conditions and has presented no problems to date, said Stewart. Pm