REDUCTION OF SCALING IN LIME KILN WET SCRUBBERS

Kevin Taylor, B.Sc., M.Sc. (Chemistry), PChem
Taylor Industrial Research, Inc.
Tel: 250-418-5705 Fax: 250-361-0099
Email: kevin.taylor@industrialresearch.ca Website: www.industrialresearch.ca

BACKGROUND

Wet scrubbers are used at some Kraft mills to reduce particulate emissions from the lime kiln. Some of these mills experience serious scaling problems in the scrubber system. In some cases, this scaling has caused mill shutdowns from kiln shutdown and insufficient lime production.

At a coastal BC Kraft mill, the lime kiln wet scrubber showed continuous formation of scale in the Peabody venturi, scrubber separator and piping. A hard, layered scale formed in the scrubber separator and piping. As a result, the scrubber and kiln were regularly taken off-line to clean the venturi and separator body. There is a significant cost associated with this problem because it recently resulted in a mill shutdown due to insufficient lime and white liquor production. Numerous unsuccessful process changes were made to the system in recent years in attempts to address the problem.

At a Kraft mill in Maine, significant scaling was occurring in the clarifier underflow lines. Frequent line cleanouts were required.

STRATEGY

A number of scale samples from different locations in a lime kiln scrubber system were characterized in detail. Samples of scrubber slurry, feed waters, lime, lime mud and kiln fuel were also carefully characterized. A chemical equilibrium model was used to evaluate scaling potential of the scrubber slurry.

RESULTS

At the BC Kraft mill, the main components of all scale samples were calcium sulfite (two mineral types) and calcium carbonate (three mineral types). Calcium sulfate was a minor component in some samples. Scale formation mechanisms in the scrubber were identified. Process modifications were recommended to reduce scrubber scaling and plugging.

At the Maine Kraft mill, clarifier underflow scaling was identified as calcium hydroxide. A formation mechanism was identified. Process control modifications eliminated plugging of the clarifier underflow lines.