

A SNAPSHOT OF THE CURRENT STATE OF CLUSTER COMPLIANCE FOR KRAFT MILLS

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A SURVEY OF 124 KRAFT MILLS INDICATES THE STATUS OF CLUSTER RULE COMPLIANCE. SOME MILLS ARE CHANGING THEIR OPERATIONS, AND OTHERS ARE CLOSING OR BEING SOLD.

TO DETERMINE THE ACTUAL STATE OF COMPLIANCE FOR the U.S. pulp and paper industry to Cluster effluent regulations, the author surveyed 124 kraft mills consisting of 86 bleached kraft mills and 38 unbleached kraft mills. Use of personal knowledge, vendor information, and commercial databases provided an industry profile.

EFFLUENT GUIDELINES

The 86 bleached kraft mills have a total of 136 individual bleach lines covered by subpart B of the Cluster effluent regulations. At the very least, these mills must change their bleach plants to elemental chlorine free (ECF). An accompanying increase in the production capacity of the chlorine dioxide plant will often be necessary. In January 1998, **Figure 1** shows that 55 of the 86 mills (64%) could bleach with 100% ClO_2 substitution for elemental chlorine and meet their product quality criteria. Some mills may choose to improve their bleaching operation additionally with more process modifications such as new mixers or steam heaters. One mill is already totally chlorine free (TCF), one is considering closing their operation, and one has discontinued its bleaching operation. The remaining 28 mills must increase their ClO_2 production capacity, add oxygen delignification or another ECF bleach process, or change to a TCF process.

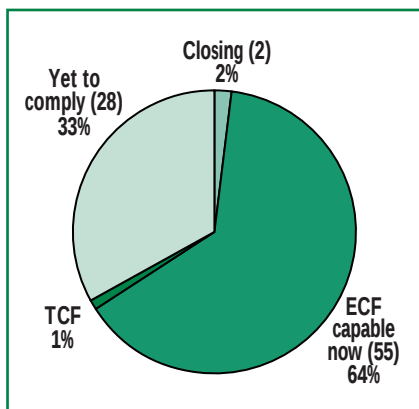
Improving existing facilities or installation of a new ClO_2 plant can increase ClO_2 production. The decision to install a new plant often depends on the amount of additional ClO_2 necessary, the age of the existing plant, and the number of previous upgrades already made. If the incremental amount of ClO_2 represents more than approximately 50% of the existing production, many mills will opt for a new plant. The present survey indi-

cated that at least 14 mills will increase their production with a new ClO_2 plant. Five mills will upgrade their existing ClO_2 plant. The remaining nine mills had not decided at the time of the survey. Five of these with undeclared compliance plans were selling the pulping and bleaching operations or the entire mill. **Figure 2** shows these mills.

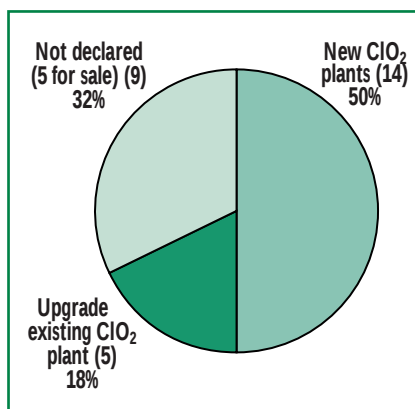
The dilemma many mills face is whether to invest in a new oxygen delignification stage and keep their existing ClO_2 production as is, or increase their ClO_2 production and eliminate the oxygen stage. While oxygen delignification is not necessary under the Cluster regulations, it does have advantages and will help the mill achieve compliance. The upgrade of the ClO_2 production with no oxygen delignification frequently requires less capital expense, but it offers no payback. Forty-four oxygen delignification stages are in use at 33 U.S. bleached kraft mills. This is 32% of the bleach lines and 38% of the mills having oxygen delignification stages as **Fig. 3** shows. Most oxygen stages are on softwood lines. Three mills indicated that they were considering the installation of oxygen delignification as part of their Cluster compliance plan. The advantage would be the possibility of a three-year extension on the compliance deadline by committing to a Tier I bleaching technology and the accompanying higher control standards.

MACT I

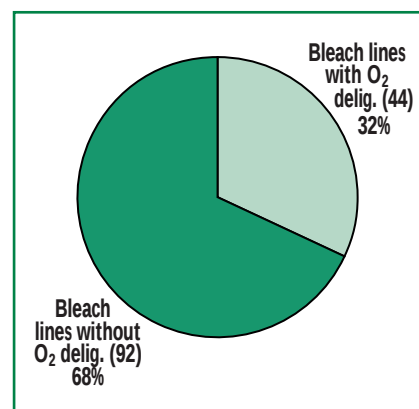
Maximum Achievable Control Technology (MACT) I covers all bleached and unbleached kraft mills and will affect all 124 mills in the survey. MACT I will require kraft mills to collect specific condensates from the pulping operations and treat them with one of several methods. Many mills will have to segregate their condensates by adding internal baffles in the evaporator bodies or more exter-



1. Compliance status of 86 U.S. bleached kraft mills



2. Compliance plans for 28 bleached kraft mills



3. Oxygen use in 136 U.S. bleached kraft lines

nal heaters or bodies to concentrate the methanol into smaller streams. They may also separate the more foul condensates by re-piping and collecting the stronger streams to treat. Most mills have done some degree of condensate separation to comply with earlier TRS regulations or odor problems. Most mills have not modified their condensate systems to the point required for easy Cluster compliance. More concentrated condensate streams made by segregation and separation equate to less volume to treat. Unfortunately, no good numbers are available on the extent of condensate segregation and separation. A leading evaporator equipment vendor indicated installation of segregation modifications on 26 different pulping systems since 1980.

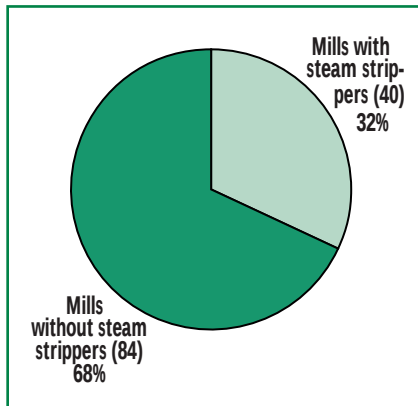
The options allowed by Cluster regulations for treatment of the collected condensates include hard piping to the biological treatment portion of the wastewater treatment plant. The practicality of this depends on the proximity of the wastewater treatment plant to the mill and its ability to assimilate the stream. A rigorous and continuing compliance demonstration will be necessary for this option, but it represents the least capital cost. Another option is to steam strip the collected condensates for methanol removal. The stripper off-gas may be condensed to form liquid methanol for burning on-site. An alternative is to burn the uncondensed stream in a lime kiln, boiler, or stand alone incinerator. The survey identified 38 steam strippers in use at 31 bleached kraft mills and 10 steam strippers in use at nine unbleached kraft mills. **Figure 4** shows the combined proportions of mills with and without strippers. The average age of the installed strippers is eight years, and the average capacity is 385 gal/min of condensate. Even mills with existing steam strippers may have to increase their stripping capacity or reduce the volume of the condensate. Records indicate that approximately half the strippers

are integrated into the process. This is important to a steam limited mill.

A third option for handling of collected condensates is to recycle them to enclosed process equipment. This is not practical unless completely hooded washers exist. The author knows of no mill doing this to an extent that precludes other treatment. Conventional vacuum washers almost without exception do not have this kind of enclosure yet. Satisfying the Cluster High Volume Low Concentration (HVLC) regulations will be necessary in eight years, but the condensates must be addressed within three years. A fourth option to handle condensates is the "Clean Condensate Alternative." This amounts to collecting most condensates and treating them in a stand alone package biological treatment plant. The option requires a capital investment for the treatment plant, some variable costs, and operator attention to a biological treatment system. If properly done, this move could keep a mill from having to install washer hoods and the HVLC system in eight years. The author knows of pilot scale trials of these systems at four mills, but no mill has apparently made it work satisfactorily yet.

MACT I also requires each bleach line to have a scrubber to treat the emissions from the towers, washers, and seal tanks of stages using a chlorinated bleach agent. The survey showed records of multiple scrubbers being installed on a given line over time. Obtaining an accurate picture of the number of scrubbers in service is difficult, since many were supplied by small fabricators. The three largest suppliers of bleach plant scrubbers concur that approximately 90% of the 136 bleach lines have scrubbers in place that will comply with the MACT I requirements as **Fig. 5** indicates. Most installations were necessary to meet state regulatory requirements for air toxic concentrations at the mill fence lines. Of the 32 bleached kraft mills for which the author has complete records,

CLUSTER RULE

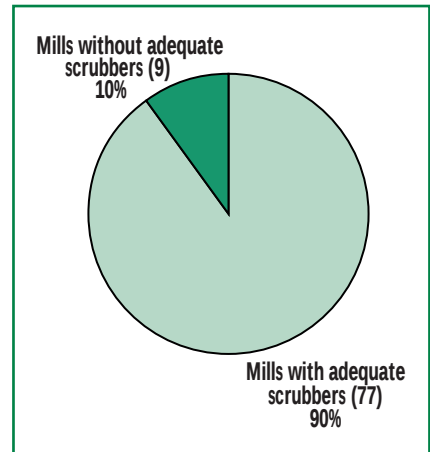


4. Steam strippers found at 124 U.S. bleach and unbleached kraft mills

the average combined scrubber capacity for a mill is approximately 22,000 actual ft³/min (ACFM). The largest combined scrubber capacity is 68,000 ACFM.

The owners of three bleached kraft mills and two unbleached kraft mills are selling them rather than invest in the modifications required for Cluster compliance. Four other mills are selling their pulping and bleaching operations. In several cases, these decisions accompany a shift in market strategy by the owners. TJ

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5. Estimate of scrubbers at 86 U.S. bleached kraft mills