

# THE CLUSTER RULE— THE ROAD TO PROMULGATION

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*A SUMMARY OF THE MAJOR PROVISIONS OF THE ENVIRONMENTAL REGULATIONS PACKAGE.*

ORIGINALLY CONCEIVED AS THE U.S. ENVIRONMENTAL Protection Agency's new approach to industrial point source regulation, the integrated air and water Cluster Rule for pulp, paper, and paperboard sources has been driven by a court order from the settlement of a case initiated by the National Wildlife Fund (NWF) and the Environmental Defense Fund (EDF) to propose regulations that control the discharge of dioxin and furan from pulp and paper mill effluent. Throughout the decade in which the rule has been developed, the amount of information and data collected and assessed by EPA has been rivaled only by the parallel technological development and change within the industry itself.

As the Cluster Rule moves through to final promulgation and implementation, the in-plant sources of dioxin and furan generation have been identified and, for the large part, controlled to minimize their discharge to the environment. The impacts of the regulation will not only be confined to the pulp and paper industry. As the first EPA regulation to require compliance "up the pipe" within the process, the rule will have a fundamental impact on how future regulations are developed by the Agency.

Over the numerous years of its production, the regulation resulted in the collection of detailed operating and economic data from more than 500 pulp, paper, and paperboard facilities obtained through the 1990 Census; long- and short-term variability studies; numerous industry-sponsored and EPA-sponsored sampling studies; over 100 engineering site visits; selected industry surveys to collect data on in-plant equipment; installation costs; operating practices; and system performance, generating a "docket" of industry information that is quite likely the largest of its kind ever collected. Development of the regulation also involved construction of cost models to estimate the site-specific impacts of compliance for each element of the Cluster Rule.

More than 3800 technical comments were received

from the public since the proposed Cluster Rule was published in December 1993, each of which EPA is obligated to respond to prior to promulgation of the regulation, as required by the Clean Air Act (CAA) and the Clean Water Act (CWA). In addressing the comments, EPA undertook additional sampling and data gathering projects, and revised their cost estimation models, resulting in the revised proposals of 1996. The promulgated regulation is the result of additional revisions and modifications made since that time.

### MAJOR CHANGES SINCE PROPOSAL

The provisions of the regulation have changed significantly since the original EPA proposal in 1993. At the time of writing of this article, the contents of the regulatory package is anticipated to be as discussed below; however, there is still some uncertainty as to the details of the final regulation. The provisions highlighted below are believed to be those that will be the most critical for mills to address.

The regulatory package to be signed by Carol Browner, the EPA Administrator, has been referred to as "Phase I" of the Cluster Rule, and includes effluent limitations for two of the dozen revised industry subcategories: bleached papergrade kraft and soda (BPK), and papergrade sulfite (PGS). Later phases of the regulation will address the remaining effluent guideline subcategories. It also includes emission standards for all chemical pulping and bleaching facilities. Major changes to the regulation since its proposal are discussed below, with comment on their impact to the approaches mills will likely take in addressing them.

### THE WATER SIDE

The "water side" of the regulation is a set of effluent limitations for conventional, non-conventional, and toxic pollutants, which are based on the performance of specific technology options. Under the CWA, EPA is only permitted to specify limitations, and cannot specify the

method or technologies used to achieve them.

In the regulatory package sent to the Office of Management and Budget in June of this year and returned to EPA in October, revision to existing best practicable control technology (BPT) limitations for conventional pollutants, though proposed in 1993 and 1996, has been deleted. Mills will therefore continue to be held to existing limitations for BOD<sub>5</sub> and TSS, unless the local permitting authority makes site-specific changes. This change has significantly decreased the scope of wastewater treatment plant modifications that might have been necessary at numerous facilities, leaving mills to focus on in-plant process changes.

The regulation of non-conventional and toxic pollutants [chlorinated phenolics, chloroform, AOX, 2,3,7,8-TCDD (dioxin), and 2,3,7,8-TCDF (furan)] through best available (economically achievable) technology (BAT) for BPK mills has shifted from the basis of extended delignification plus 100% chlorine dioxide substitution, to an option centered around 100% substitution alone. Except in site-specific cases due to constraints such as furnish or wastewater treatment system AOX removal efficiency, or in states that have more stringent requirements (e.g., Maine), facilities have essentially been looking towards implementing ECF bleaching without the capital expenditure associated with the implementation of oxygen delignification or extended cooking.

For PGS mills, magnesium-, calcium-, and sodium-based facilities will be required to implement totally chlorine free (TCF) bleaching if they have not already done so, as the regulatory package includes an extremely low AOX limitation. The limitations for ammonium-based mills were developed using data from elemental chlorine free (ECF) bleaching, but due to the lack of mill-scale data, EPA has focused these limits on achieving non-detect levels of dioxin, furan, and chlorinated phenolics. A limitation for AOX is to be put in place once ammonium-based mills have implemented ECF bleaching and have assessed its performance full-scale.

Not all mills have begun construction on ECF bleach plant conversions, but virtually all mills have performed feasibility studies and appropriation-grade cost estimates for this work, in order to obtain approval to begin these projects as soon as possible after promulgation. These initial studies will also serve to provide sufficient time for start-up and optimization prior to EPA's compliance period for the effluent limitations.

Although the "incentives" package for BPK mills has not been particularly focused on by many facilities, it is likely that several will choose to use this method of prolonging the time over which capital expenditures would be made to satisfy regulatory requirements. Moving to Tier I essentially requires extended delignification in

addition to 100% substitution and full brown-side closure, but provides a two-year extension to the payback time frame for capital investment.

Best management practices (BMP) will affect both BPK and PGS mills during this first phase of the regulation; it will be applied to other chemical pulping facilities during "Phase II" of the Cluster Rule, upon which EPA has already begun working. BMP will in fact be the first segment of the regulation mills will need to address, as the BMP Plan will be required within the first year of promulgation for mills with discharge permits expiring within the next three years. It is estimated that about one quarter of the approximately 95 BPK and PGS mills have already begun working on their plan, with another quarter taking steps to begin as soon as the rule is promulgated. Capital expenditures for BMP will be staggered over the next three years, as mills meet the two- and three-year compliance schedules for monitoring and alarms, and equipment installation, respectively.

Effluent limitations for indirect dischargers (pretreatment standards for existing sources—PSES) mirror those for direct dischargers, as noted above. Those for new sources (new source performance standards—NSPS, and pre-treatment standards for new sources—PSNS) will be based on using extended delignification technology, in addition to 100% chlorine dioxide substitution, for BPK mills.

Limitation of final effluent COD has been "reserved," with EPA making it clear it intends to begin detailed sampling to limit this parameter within a year or two of promulgation of Phase I of the rule. This has thrown a wrench into many mills' plans for in-plant modifications, as they work towards integrating BMP and BAT requirements with those of the "air side." Although EPA has indicated that the COD limitation will be one that mills will be able to meet with well-operated BMP systems and ECF bleaching without extended delignification, the unknowns related to this aspect of the regulation have and will play a role in each mill's plans for modifications to meet other parameter limitations.

## THE AIR SIDE

Originally formulated as an all-encompassing collection of dilute and concentrated non-condensable gases (NCGs) and bleach plant chlorinated emissions, EPA has shifted to establishing emission standards for specified sources of these high volume low concentration (HVLC) and low volume high concentration (LVHC) gases, as well as bleach plant chlorine emissions. Regulation of other sources of volatile hazardous air pollutants (HAPs) from non-chemical pulping operations or paper machines should not significantly impact facilities, and plans for meeting the air side of the Cluster Rule are focused on

the pulping and bleaching areas of the mill. Chemical recovery combustion sources will be regulated under standards proposed within this first phase of the Cluster Rule, with a significantly lower capital cost impact than when they were first put forward several years ago.

MACT I (maximum achievable control technology, the basis for CAA regulatory standards development) will have an impact that will be staggered over the next eight years, as EPA has extended the time period by which mills will be required to comply with HVLC controls. MACT I is comprised of three portions, affecting specific emission sources from pulping, bleaching, and pulping wastewater streams. Most mills have performed studies to evaluate different options for collection and treatment of these streams, including pilot-scale evaluations of specific methods, to identify the most cost-effective approach to meeting the requirements.

With the significant decrease in the scope of limitations for the water side of the regulation, meeting air side requirements has taken center stage, as mills evaluate the pros and cons of different alternatives, exploring the difficulties associated with implementing a broad program for the collection of dilute NCG sources. Addressing bleach plant chlorine emission requirements is seen to be fairly straightforward; it is the selection and optimization of a system of pulping and pulping wastewater emission source collection and treatment that has begun to receive the most attention for arriving at practical, efficient solutions.

For chemical recovery combustion sources, MACT II is being proposed simultaneously within the promulgated Phase I Cluster Rule package. The economic analysis related to this portion of the regulation is tied to the other segments, in an attempt to "cluster" the estimated impacts of the overall regulation. Originally intended to inherently require conversion of direct contact evaporator systems to low-odor recovery boilers, MACT II was re-configured to include a sub-categorization based on a mill's existing type of recovery boiler—DCE or non-DCE. The impact of this is to dramatically decrease the required capital expenditure to meet the proposed regulatory requirements. As it will be in a proposed format rather than a promulgated regulation, and includes sub-categorization as noted above, mills have generally not begun evaluating specifics related to compliance with MACT II. The impact of this segment of the regulation will likely be far less significant than originally believed.

MACT III, covering emissions from non-chemical pulping and bleaching facilities, including paper machines, is to be included in the Phase I Cluster Rule regulatory package. The impacts of this regulation should not be significant, and mills have accordingly shifted focus to meeting the requirements of MACT I.

### SUMMARY OF OVERALL IMPACT

In general, the Cluster Rule will have significantly less impact on mills than originally foreseen in 1993. With the shift in regulatory basis for BPK mills to the option based on 100% chlorine dioxide substitution, most mills will turn their focus to meeting requirements for BMP and MACT I cost-effectively. It remains to be seen, however, how individual facilities will be affected, since the Cluster Rule will be implemented through state or regional operating permits.

It is likely that most facilities will be able to meet the regulatory limitations for the water side with 100% substitution alone, or even with less than complete substitution for facilities operating with hardwood furnish. However, the chloroform limitation may have a significant impact on intended bleach plant modifications.

Meeting BMP criteria is fairly straightforward, but mills will need to consider the due diligence aspect of having such an assessment performed for their site. In the end, minimizing exposure from any future spill incidents will likely have a larger impact on the development of a BMP Plan than will the requirements of the regulation themselves.

The unknowns associated with future regulation of COD from the wastewater treatment plant will greatly influence the technology selections made to meet BMP and MACT I portions of the rule. Allowing for future flexibility in operational changes will minimize unforeseen impacts of this forthcoming effluent limitation.

Minimizing the cost to comply with MACT I may include some novel approaches at facilities. It will be necessary to evaluate the trade-offs between constructing an extensive HVLC collection system versus replacing equipment such as brownstock washers to address current MACT I requirements while minimizing brown-side sources of COD. Though the cost trade-offs appear straightforward, the impact on the future regulatory compliance position for the facility is not.

In spite of the significantly decreased regulatory requirements EPA intends to promulgate, approaching compliance with an eye toward overall operations and future operational strategy will become a challenge for each facility. The answer will rest in evaluating the options available to each particular facility, to arrive at an optimal solution that minimizes capital investment while meeting environmental goals. **TJ**

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