

ENVIRONMENTAL FOOTPRINT COMPARISON TOOL

A tool for understanding environmental decisions related to the pulp and paper industry



EFFECTS OF DECREASED RELEASE OF CHLORINATED COMPOUNDS ON DISCHARGE TO WATER

Wastewater and Water Quality Impacts Associated with Pulp Bleaching

The aftermath of the 1986 association of elemental chlorine bleaching with the release of dioxins brought scrutiny to the industry's impact on receiving streams and aquatic life. In 1990, there were 30 fish consumption advisories for dioxin downstream of U.S. bleached pulp mills. This reflected a judgment by state officials that dioxin contamination levels posed a health risk to sport and subsistence fishermen, as well as the general public, who catch and consume locally caught fish.

Since 1990, changes in bleaching technology, specifically the replacement of chlorine with chlorine dioxide during the first stage of pulp bleaching, have reduced dioxin discharges to a point where they cannot be detected in routine effluent monitoring tests. As a result, tissue concentrations in fish in the receiving waters downstream of those mills have decreased substantially. These decreases have allowed many of the former fish consumption advisories to be rescinded. By the end of 2004, there had been a 90% decrease in the number of dioxin advisories downstream of pulp and paper mills since 1990 (AET 2005). See Figure C17. As of 2012, there were six remaining dioxin advisories downstream of pulp and paper mills.

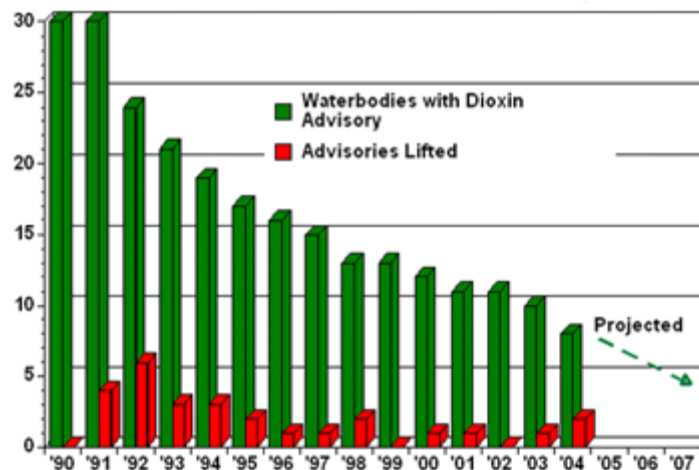


Figure C17. Dioxin Advisories Downstream Of Pulp Mills (Source: AET 2005)

Nowhere was the industry's role in the dioxin contamination of aquatic life more rigorously examined than in the state of Maine. In 1997, the Maine legislature enacted a statute prohibiting bleached pulp mill discharges of dioxins into receiving waters of the state. Paper mill compliance with that requirement was to be demonstrated by a statistical comparison of fish tissue (or surrogate) samples collected below the mill's wastewater outfall and samples collected from an upstream location unaffected by the mill's discharge. In 2003, after consultation with an expert review panel, Maine Department of Environmental Protection settled on an approach involving three species: white sucker, smallmouth bass, and caged mussels. Judgments were to be made with application of uniform statistical methods and on the basis of a

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preponderance of the evidence. All bleached kraft mills in Maine successfully achieved the demonstrations required by the original law.

These outcomes support U.S. Environmental Protection Agency statements made at the time the agency issued rules requiring what had already been well underway within the industry – the installation of ECF bleaching technology. In a November 1997 announcement, EPA observed that “today’s rule will eliminate, over time, all dioxin-based fish advisories that have been attributed to the mills, particularly benefiting subsistence fishers who depend primarily on fish for food” (USEPA 1997).

Though there may be reasons to suggest going beyond elemental chlorine free (ECF) bleaching, addressing the issue that first gave the industry its dioxin visibility is no longer among them.

Apart from eliminating the formation of the most environmentally significant dioxins and chlorinated phenolic compounds to less than measurable levels, the replacement of elemental chlorine with chlorine dioxide also provides significant reduction in other chlorinated substances and effluent color. Even quantifiable levels of TCDF are now rare. Oxygen-demanding substances, typically measured as BOD and COD, are more influenced by the extent of delignification remaining to be accomplished in bleaching, thus giving advantage to greater degrees of delignification during pulping. Where circumstances permit, more extensive use of oxygen-based bleaching agents in lieu of chlorine-based agents create additional opportunity for filtrate recirculation and further reduction in pollutant contributions to wastewater. TCF bleaching eliminates the formation of chlorinated compounds during bleaching.

Some substances liberated during bleaching resist biological degradation and are only partially removed in biological treatment systems. Among them, color is least affected by conventional wastewater treatment practices. However, conventional wastewater treatment practices are generally effective in conditioning bleached pulp mill effluents to accommodate receiving stream water quality needs.

References

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