U.S. Government Regulation of Chlorinated Dibenzo-para-dioxins and Dibenzofurans in the American Pulp and Paper Industry

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ABSTRACT

On April 30, 1990, the U.S. Environmental Protection Agency (EPA) announced the findings of an inter-governmental, multi-media risk assessment, and the steps the U.S. Government will take to address the risks posed by chlorinated dibenzo-p-dioxins (CDDs) and chlorinated dibenzofurans (CDFs) in the American pulp and paper industry.

I. INTRODUCTION AND BACKGROUND

This paper describes risk management actions committed to by the U.S. Government to address the risks associated with CDD and CDF formation during chlorine bleaching of pulp and paper. These risks were identified in a multi-media, integrated risk assessment performed by three U.S. government agencies between April 1989 and August 1990.

The initial discovery of CDDs and theories about their formation and presence in various media led the EPA to undertake the National Dioxin Study, begun in 1983 and published in August 1987. This was a nationwide, multi-media evaluation initiated at the request of the U.S. Congress.

Findings from this study prompted EPA and the paper industry to enter into a joint screening study of five U.S. bleached kraft pulp and paper mills. The results of the "5-mill study" verified that CDDs were present in the treated effluent, sludges, and bleached pulps, and that 2,3,7,8-TCDD and 2,3,7,8-TCDF were formed during the bleaching of kraft pulps with chlorine and chlorine derivatives.

In April 1988, as a follow up to the 5-mill study, EPA and the paper industry entered into another screening study, this one involving all 104

bleached kraft and sulfite pulp and paper facilities in the U.S. Data was collected under the "104-mill study" for 2,3,7,8-TCDD and 2,3,7,8-TCDF in effluent, industrial sludge and bleached pulp samples. Information was also provided on bleach plant and waste treatment operations, waste discharge characteristics, and industrial sludge disposal practices.

Prior to the two screening studies, the Environmental Defense Fund (EDF) and the National Wildlife Federation (NWF) filed a citizen's petition under section 21 of Toxic Substances Control Act (TSCA) on October 22, 1984. EPA denied the petition, prompting a lawsuit brought by the two groups. A settlement was reached without trial and a consent decree was signed by the plaintiffs and EPA on July 27, 1988 (Civil Action No. 85-0973).

The consent decree established several requirements for EPA, including conducting a multiple pathway risk assessment of pulp and paper mills using chlorine bleaching, beginning no later than April 30, 1989. No later than one year after commencement of the risk assessment, the consent decree required EPA to take at least one of four possible actions with respect to CDDs/CDFs in the pulp and paper industry.

II. MULTI-MEDIA RISK ASSESSMENT

Since the risk assessment under the consent decree required EPA to consider various exposure pathways normally under the jurisdiction of the U.S. Food and Drug Administration (FDA) and the U.S. Consumer Product Safety Commission (CPSC), both agencies were invited to participate in the analysis.

The risk assessment integrated eight major risk analyses, with over 120 exposure pathways evaluated across various media. Toxicities to humans, aquatic organisms, and avian and terrestrial wildlife all were considered. Both cancer and non-cancer endpoints were examined for human health.

III. EPA RESPONSE TO RISK ASSESSMENT FINDINGS

In response to the risk assessment findings, EPA announced on April 30, 1990 the steps it will take to address the risks of concern identified in the integrated assessment: risks to humans and aquatic life from effluent; risks to terrestrial and avian organisms from sludge land application (soil

conditioner use); and risks to humans from food packaging.

The risks of greatest concern identified were those associated with waste water effluent. In the United States, these effluents are required to undergo both primary and secondary treatment before being discharged into receiving waters. Although secondary treatment is more than is required in many countries, it was determined that these technologies are inadequate to protect human and aquatic species from adverse health effects.

Because the health effects associated with CDDs/CDFs have been suspected for some time, regulation development under the Clean Water Act (CWA) began before the integrated assessment confirmed the risks. Action under CWA will be three-fold. One action is the development of water quality criteria for CDDs/CDFs. The criteria are numerical health-based CDD/CDF concentration limits for receiving waters. Individual state governments can either adopt these criteria or can adopt criteria which are more stringent. If they choose to adopt less stringent criteria, they must receive EPA approval.

Another CWA action is the development of individual pulp and paper mill CDD/CDF discharge permits under the National Pollutant Discharge Elimination System (NPDES) of the CWA. These permits are based in part on the water quality criteria, and are both health-based and technology-based standards. They are either developed by each individual state government, and submitted to EPA for approval, or are developed by EPA in some cases.

The third action, the only one subject to consent decree conditions, is the proposal under CWA of revised effluent limitations guidelines and standards for regulating CDDs/CDFs in pulp and paper mill effluents. These will be technology-based standards which will address CDD/CDF contamination as well as total chlorinated organics formation. Alternative bleaching technologies, particularly those which minimize use of chlorine, will be a major focus of this effort. EPA plans to base its regulatory decisions on the results of an industry questionnaire, the 104-mill study, and short-term and long-term sampling at selected mills. The consent decree requires proposal of these standards by April 30, 1993.

The risk assessment revealed risks of concern to terrestrial and avian organisms from land application of sludge. EPA announced a two-fold action to address these risks. The first action will be regulations under TSCA, which provides EPA with broad authority to regulate chemicals and mixtures

throughout their lifecycles. In order to take regulatory action under TSCA, a finding of "unreasonable risk" must be made. This unreasonable risk finding takes into account the benefits of the product or chemical to society, the costs of regulating the product or chemical, the risks presented by the chemical to both the environment and to humans, and other unique issues associated with the chemical. The consent decree requires that rule be proposed for public comment no later than 4/30/91.

The second action will be to gather information on sludge landfills and surface impoundments under authority of the Resource Conservation and Recovery Act (RCRA). The consent decree, as noted earlier, allows for a one-year information-gathering effort, with an additional 6-month analysis period. This action began on April 30, 1990 and will conclude on or before October 30, 1991, at which time EPA will announce the need for regulations under RCRA to address risks associated with landfilling and surface impounding of bleached pulp and paper mill sludge.

Although the estimates of food packaging risk are considered low by both EPA and FDA, they do involve large segments of the populations and these levels of risk can be further reduced. Many pulp and paper manufacturers have announced their intent to reduce CDD/CDF levels in food contact papers to below the level of detection, and some paper manufacturers have already achieved this goal. Given this demonstration of feasibility in reducing CDD/CDF exposures from chlorine bleached pulp and paper, and the wide-spread use of such paper in food packaging and food preparation, EPA has chosen to formally refer this problem to FDA for regulatory action. This referral will be made under the authority of TSCA section 9.

IV. CONCLUSION

In addition to the regulatory actions described, EPA is initiating a major "pollution prevention" initiative to explore ways of reducing or eliminating all chlorinated organics from pulp and paper manufacture. It will focus not only on ways to reduce chlorinated organic formation by changes in pulp bleaching technologies, but will also explore ways to reduce demand for chlorine bleached paper where unbleached paper is an adequate substitute.