

Eco-System Recovery:

Liftings of Fish Consumption Advisories for Dioxin Downstream of U.S. Pulp and Paper Mills

The Alliance for Environmental Technology

2005 UPDATE

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Executive Summary

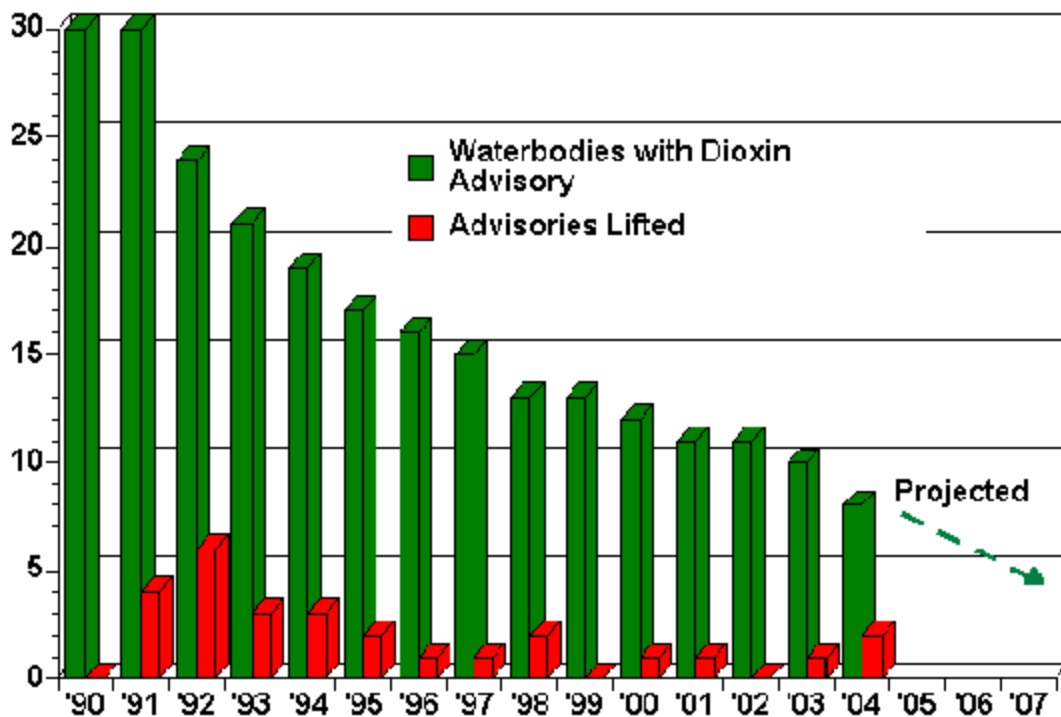
On April 15, 1998, the United States Environmental Protection Agency (EPA) announced its conclusion regarding the technology basis for Best Available Technology (BAT) options as part of its pulp and paper Cluster Rule. The Cluster Rule sets effluent limitations and pretreatment guidelines for all bleached pulp, paper, and paperboard mills. In most cases mills were required to be in compliance with the Cluster Rules in 2001 through their National Pollutant Discharge Elimination System (NPDES) permits. Importantly, according to EPA, the Cluster Rule will virtually eliminate dioxin discharges and as a direct result will eliminate, over time, all remaining dioxin-based fish advisories that have been attributed to pulp and paper mills. Former EPA Administrator Carol M. Browner stated [1]:

"Today we are taking significant steps to protect the health of millions of American families from contaminated air and water from pulp and paper mills. This action puts us well on our way to cleaning up more than 70 rivers and streams throughout the nation."

EPA chose to base its Cluster Rule guidelines on a technology option that includes the complete (100 percent) substitution of chlorine dioxide for chlorine - so called Elemental Chlorine-Free (ECF). While the Cluster Rule seeks elimination of dioxin, the U.S. industry was already far ahead of the rule in achieving this goal.

As a result of the increased use of chlorine dioxide, ECF, and the other technical and process changes adopted by the industry, dioxin discharges have been virtually eliminated. The eco-system is reaping the benefit of this successful strategy, while the total number of waterbodies under some type of advisory is rising in the U.S., the number of waterbodies under a dioxin advisory downstream of bleached chemical pulp mills is falling. In fact such advisories are a very small and diminishing percentage of the overall total of affected waterbodies in the country. Recently, two more advisories were lifted, continuing a trend established in the nineties and in line with EPA's projections. See Figure 1 below:

Figure 1:
Dioxin Advisories Downstream Of Pulp Mills Are Falling



Fish Advisories Summary

Fish advisories are an issue of concern for both anglers and those government agencies charged with safeguarding public health. In response to this concern, the Alliance for Environmental Technology (AET), periodically conducts an analysis of EPA and state environmental and health authority data for fish consumption advisories [2].

This most recent analysis reveals three important findings regarding fish consumption advisories for dioxin.

1. **First, according to the AET analysis, the total number of waterbodies, such as lakes, rivers, or bays, under a dioxin advisory represents three percent of the total number of affected waterbodies in the U.S.** According to EPA's 2004 National Listing of Fish Advisories (NLFA), there are currently 3,221 waterbodies under some type of advisory restricting fish or shellfish consumption. Of this total, 106 waterbodies are under a consumption advisory for dioxin. Significantly of the new dioxin advisories posted in 2004, none were downstream of a U.S. bleached chemical pulp mill.
2. **Second, for waterbodies downstream of U.S. bleached chemical pulp mills, dioxin advisories are rarer still.** There are only 8 advisories downstream of bleached chemical pulp mills, amounting to less than 0.2 percent of the 3,221 water bodies under some type of advisory.
3. **Third, the small number of waterbodies downstream of U.S. bleached chemical pulp mills that are under a dioxin advisory is steadily diminishing.** Since 1990, state authorities have cleared, i.e., lifted, dioxin advisories from 27 waterbodies downstream of pulp mills, which is 90 per cent of the 30 such advisories in effect in 1990. Two additional advisories were lifted in 2004.

Process changes in pulp production, including the increased use of chlorine dioxide as a bleaching agent, have virtually eliminated dioxin discharges and as a result markedly reduced tissue levels in fish living in mill receiving waters. State officials lift advisories once dioxin fish tissue levels drop and remain below state action levels.

In addition, the number of waterbodies downstream of pulp mills under a dioxin advisory is projected to continue downward. In an EPA study of dioxin advisories, all such advisories will be lifted following implementation of the Agency's recently promulgated Cluster Rule, which has as part of its BAT, bleaching with chlorine dioxide.

State Fish Consumption Advisories

State environmental and health departments issue fish consumption advisories or bans to protect sport and subsistence anglers, and the general public, from the risk of consuming locally caught, contaminated fish.

Fish consumption advisories are based on the contamination levels of specific target chemicals, which include, among others, mercury, PCBs (polychlorinated biphenyls), and various pesticides. As such, these advisories are one indicator of the environmental status of a particular aquatic eco-system, for example a lake, bay, or river. Removing or partially rescinding a fish consumption advisory or ban generally signals positive change in the aquatic eco-system under study.

Since 1989, when the EPA completed the first national survey of state fish/shellfish advisory programs, the number of states reporting advisories has increased, as has the total number of advisories. In 2004, forty-eight states, and the District of Columbia reported a total of 3,221 waterbodies under some type of advisory restricting fish/shellfish consumption [3].

Dioxin Advisories

In 2004, only 8 waterbodies have a dioxin advisory downstream of bleached chemical pulp mills. These 8 affected waterbodies represent **less than 0.2 percent** of the total 3,221 U.S. waterbodies under some type of an advisory. (See Figure 1).

The EPA National Dioxin Study conducted in the mid-1980s provided one of the first indications that bleached kraft pulp mills were a possible source of dioxin. Following this study, and as a result of other work such as the "104 Mill Study" conducted jointly by EPA and the industry in 1988, scientists identified dioxin as an inadvertent by-product of the then prevailing pulp bleaching process [4].

The single largest yearly increase -- 17 waterbodies in 1990 -- was due to increased federal and state regulatory attention following the results of the national dioxin studies.

Industry and Eco-system Responses

In response to the discovery of dioxin as an inadvertent by-product of the then prevailing bleaching process at kraft mills, the pulp and paper industry introduced a number of technical changes and process modifications. These modifications included, among others, dioxin precursor-free defoamers, improved brown stock washing, and low multiple bleaching.

Key to the industry's dioxin reduction strategy has been the increased substitution of chlorine dioxide for chlorine gas as a bleaching agent [5]. As a result of the increased use of chlorine dioxide, and the other technical and process changes adopted by the industry, dioxin discharges have dropped considerably and have been virtually eliminated [6]. As a result of the process changes at bleached kraft mills 27 advisories have been lifted. (See Figure 1).

Dioxin Advisory Liftings

Since 1990, states have lifted a number of fish consumption advisories for dioxin demonstrating that current and declining levels of dioxin in receiving waters downstream of bleached chemical pulp mills are an insignificant risk to the aquatic eco-system. State environmental and health authority data show that since 1990, states have lifted dioxin advisories on 27 waterbodies downstream of pulp mills.

As previously discussed, fish tissue levels of dioxin downstream of bleached chemical pulp mills have dropped significantly following process changes made since dioxin was first linked to pulp bleaching. In general, states lift advisories when the dioxin levels in tissue samples taken from fish species in the waterbodies of concern decline below the state's action level, and remain below this level during subsequent samplings.

Future Prospects

On April 15, 1998, EPA published a notice in the Federal Register announcing its conclusion regarding the technology basis for BAT options as part of its pulp and paper Cluster Rule. The Cluster Rule sets effluent limitations and pretreatment guidelines for all bleached pulp, paper, and paperboard mills. EPA chose to base its Cluster Rule guidelines on a technology option that includes the complete (100 percent) substitution of chlorine dioxide for chlorine [7]. Furthermore, EPA has stated that process changes, which are aimed to reduce the formation and discharge of dioxin in mill effluent to comply with guidelines, will provide for the potential lifting of fish advisories at sites downstream of pulp mills [8]. In an analysis of the remaining dioxin advisories, using the Dioxin Reassessment Evaluation model approach and the EPA's Best Available Technology option, the agency found that all remaining dioxin advisories downstream of pulp mills could be lifted once the guidelines are implemented [9]. [Figure 1](#), consistent with EPA's projections, shows the declining number of waterbodies downstream of pulp mills under a dioxin advisory.

References

1. **EPA** "EPA Eliminates Dioxin, Reduces Air and Water Pollutants from Nation's Pulp and Paper Mills." Press release, Friday, November 14, 1997.
2. **AET** "Eco-System Recovery: Lifting of Fish Consumption Advisories for Dioxin Downstream of U.S. Pulp Mills - 2005 Update." Alliance for Environmental Technology, Washington D.C. (2005)
3. **EPA** May 2004. Update: National Listing of Fish Consumption Advisories, Fact Sheet. U.S. Environmental Protection Agency, Office of Water. EPA-823-F-02-007.
4. **EPA**. 1990. U.S. EPA/Paper Industry Cooperative Dioxin Study, "The 104 Mill Study": Statistical Findings and Analyses. U.S. Environmental Protection Agency, Office of Water Regulations and Standards.
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7. **EPA**. July 1996. 61 Federal Register 36837. (7/15/96).
8. **EPA**. December 1993. 58 Federal Register 66078, 66160. (12/17/93).
9. **EPA**. November 1993. Regulatory Impact of Proposed Effluent Guidelines and NESHAP for the Pulp, Paper, and Paperboard Industry. U.S. Environmental Protection Agency, Office of Water Regulations and Standards.

Appendices

Appendix A:

This study is based on an analysis of U.S. Environmental Protection Agency and state environmental and health authority data for fish consumption advisories.

The 2004 version of the Listing of Fish Advisories may be retrieved from the EPA web site at <http://www.epa.gov/waterscience/fish/advisories>.

Each record in the NLFA is associated with a population code, which indicates both the target population affected by the advisory and fish species affected by the advisory. Each record also specifies the chemical contaminant(s) responsible for the advisory. State health advisories (see Appendix B for an example) range from prohibitions against consumption of all or certain species of fish for all persons, to limited consumption for certain groups of individuals, e.g., pregnant women. In addition, each record contains a contact name and phone number.

Most advisories include more than one contaminant and may concern more than one species of fish and/or shellfish. While it is difficult to count advisories by contaminant, it is possible to tally the number of advisories that include a particular contaminant. For the sake of consistency, the EPA counts the advisories by waterbody, such as a bay, lake, or reach of a river.

Different states employ different counting and tissue sampling methods for issuing advisories. The threshold levels for contaminants detected in fish tissue also vary across the states. The EPA counts by waterbody affected to allow the states to be combined into a single format for nationwide reporting and analysis.

Total Number of Advisories

The 2004 EPA NLFWCA reports a total of 3,221 waterbodies currently under some type of fish consumption advisory nationwide.

Advisories for Dioxin

Following the EPA methodology, AET's analysis counts dioxin advisories by waterbody. For instance, two advisories for different reaches of the same river or for the same river running through two states, with both advisories attributed to the same source, are counted as one advisory.

Appendix B:

No.	State	EPA ID Number	Waterbody	Issue Date
1	LA	9163/	Bayou La Fourche/	3/25/94
		164	Wham Brake	11/23/87
2	ME	9986	Maine Coastal Waters	2/2/94
3	ME	172	Androscoggin River	1/1/85
4	ME	173	Kennebec River	1/1/87
5	ME	174	Penobscot River	1/1/87
6	NC	772/	Albermarle Sound/	3/1/91
		774/	Roanoke River/	8/1/90
		9176	Welch Creek	8/1/90
7	NH	699	Androscoggin River	1/1/89
8	TX	855	Houston Ship Channel/	9/1/90
			Upper Galveston Bay	

Appendix C:

No.	State	EPA ID Number	Waterbody	Issue Date	Date Lifted
1	AL	None	Lay Lake/Coosa River	9/24/90	9/29/91
2	AL	None	Tombigbee River	5/29/91	8/29/91
3	AL	None	Lower Mobile River	5/29/91	1/8/92
4	AR	10	Arkansas River	1/1/90	7/17/91
5	AR	9	Coffee Creek/ Ouchita River	9/1/90	10/8/96
6	AR	11	Red River	4/16/90	8/17/93
7	CA	2257	Pacific Coastal Waters	9/24/90	11/1/94
8	CA	51/2259	Sacramento River	11/1/88	11/1/94
9	FL	None	Eleven Mile Creek	9/21/90	1/1/93
10	FL	8154	Fenholloway River	9/21/90	12/31/03
11	MD	180	Potomac River	3/1/89	8/6/93
12	ME	175	Presumscot River	3/21/90	2/10/92
13	ME	176	Sebasticock River	3/19/90	2/10/92
14	MI	222	Eschanaba River	7/1/89	1/11/93
15	MI	236	Menominee River	1/1/93	1/1/98
16	MS	656	Leaf River	11/1/89	4/1/95
17	MS	657	Escatawpa River	1/1/90	7/1/96
18	NC	2271	Nuese River	9/1/90	4/1/91
19	NC	775	Chowan River	1/1/93	12/31/00
20	PA	818	Codorus Creek	2/1/90	7/28/94
21	SC	825	Sampit River	6/1/89	10/1/92
22	TN	833	Pigeon River	4/1/89	12/31/02
23	TX	854	Neches River	9/1/90	12/5/95
24	VA	865	Blackwater River/	1/1/93	3/26/98

			Nottoway River		
25	VA	866	Jackson River/	12/1/89	2/2/93
			James River		
26	WA	9177	Lake Roosevelt	4/1/91	12/31/03
27	WI	916	Wisconsin River	1/1/93	12/31/01