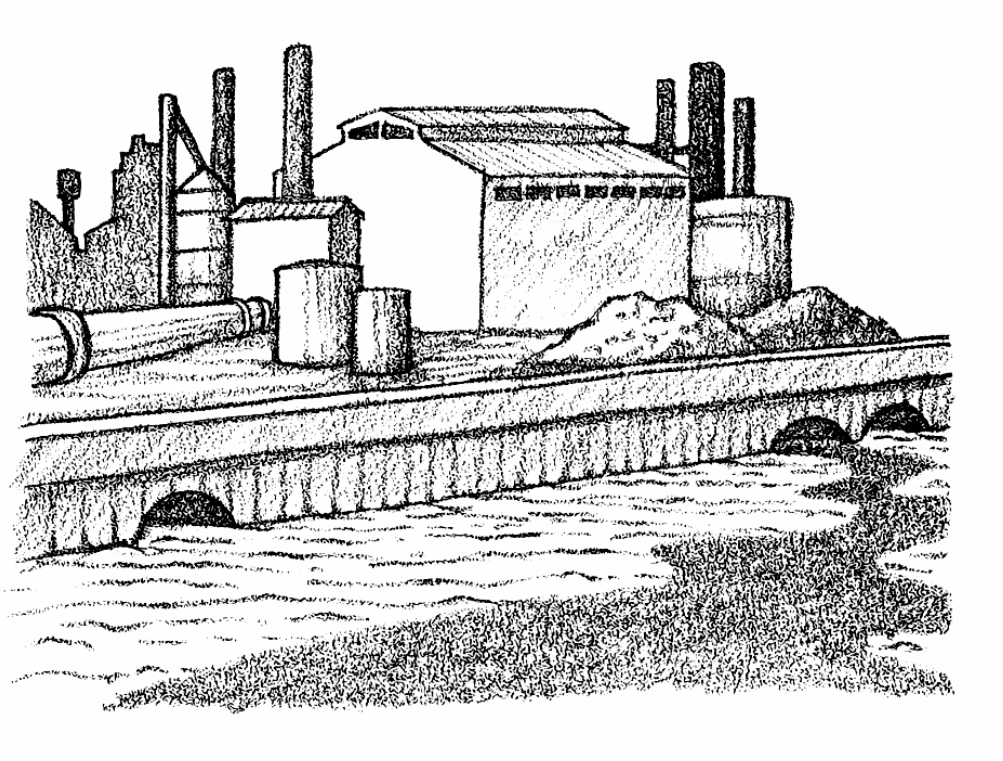
Effects of Pulp-Mill Effluents

by Kenn Oberrecht



Among the most common forms of pollution found in the estuaries of the Pacific Northwest are pulp-mill effluents, municipal sewage, and agricultural wastes. In fact, our larger estuaries are subjected to all of these and more.

It's safe to say that no body of water was ever improved by the introduction of pulp-mill effluents. Nevertheless, the effects of pulp-mill pollution vary greatly from one mill or mill location to another and are influenced by other factors as well, including temperature, time of year, and even the type of wood or blend of woods being pulped.

A large mill might release more than 50 million gallons of effluent per day into a river or estuary, introducing a variety of toxic materials and tons of organic wastes.

The pulping process employed also affects the quality and amount of the effluent. In the kraft process, wood chips are usually digested in a chemical solution, much of which is recovered before the effluent is discharged into the river or estuary.

The more contaminating sulphite process requires huge amounts of water nearly 500 gallons per ton of pulp. A large mill might release more than 50 million gallons of effluent per day into a river or estuary, introducing a variety of toxic materials and tons of organic wastes.

Mercaptans are sulphur-containing compounds that cause the horrible stench associated with pulp mills. They can also irritate the gill surfaces of fish, as can the acids and sulphides found in pulp-mill effluents, making it

difficult for the fish to breathe. Concentrations of methyl mercaptans can kill fish by paralyzing the nerves of the gill muscles.

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Even low levels of pulp-mill wastes can be harmful to estuary residents. Fish, for example, might experience both breathing and growth problems. Oysters might remain closed longer than usual, and their pumping rates, growth, and reproduction can be reduced. Pulp-mill effluents might introduce acids or alkalis to the estuary, either of which will affect the water's pH, or neutrality, and become potentially harmful to fish and other animals unable to tolerate excessive acidity or alkalinity. To alleviate such problems, operators of some mills mix the acidic and alkaline compounds before release, thus neutralizing the effluent.

Sea salts are natural buffers that help neutralize both excess acidity and alkalinity. So the higher the salinity near a pulp-mill's outfall, the less pH deviation will be a problem.

Breakdown of great quantities of organic material requires an abundance of oxygen in the outfall area. This oxygen demand can create severe problems, especially in small estuaries or those with poor circulation.

Organic wastes in the effluent consist mainly of lignins and wood fibers. Lignins stain the water brown, inhibiting sunlight penetration and photosynthesis, which retard plant growth. Wood fibers also affect photosynthesis and respiration by reducing the exchange of gases in plant cells. When the fibers sink to the bottom to decay, they can reduce or eliminate oxygen there.

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The ideal pulp mill would be one that dumped no pollutants into the river or estuary, one with a so-called closed system, in which no effluents are discharged. But this may be an environmental ideal that's impossible to achieve. Even if the technology were advanced enough to permit it, the closed system might prove too expensive to implement.

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