

It is important in this regard not to get confused regarding B.O.D. *concentrations*. A pound of B.O.D. is a pound of B.O.D. If you take a certain amount of solid organic matter, enough to have a B.O.D. of one pound and throw it into a lake, eventually one pound of oxygen will have to be absorbed from the lake. It does not matter whether you mix the organic matter with one gallon of water or with 100 gallons of water or with no water at all before dumping it in; it still is going to use up one pound of oxygen and the lake "doesn't care" which you do.

Understandably, some workers in the waste disposal field are used to thinking of municipal sewage systems where the daily waste from one human is mixed with about 100 gallons of water before it arrives at the sewage plant.

A hand pump boat toilet conversely may use only one to three gallons of water to flush the same amount of waste, so the B.O.D. concentrations from the boat without a treatment device may be typically 30 to 100 times as high in terms of mg. B.O.D. *per liter* of effluent. Some of those workers are dismayed at these higher concentrations and think that somehow or other boats have "more" potential pollution than other sources. It is not so, and it is important therefore, that meaningful terms such as "% reduction in B.O.D." be used in boat water-pollution regulations rather than concentration figures such as milligrams of B.O.D. per liter of effluent.

Nutrients (remember Phosphates and Nitrates) are another stumbling block to logical regulations. Nobody wants their lakes full of algae so they say, let's not allow macerator-chlorinators on our lake since macerator-chlorinators do not reduce nutrients. This is a fairly logical approach provided that there are, or soon will be, no sewage systems at all dumping into the lake.

But if some sewage treatment systems, particularly the system servicing the dock-side pump-out station eventually return to the lake, this approach is futile! Why? Because even secondary sewage treatment systems do not reduce nutrients! Therefore, you do not help the algae situation by requiring holding tanks which are pumped out into a municipal system, if the effluent from that municipal system eventually feeds back into the lake. Nutrients, as found in sewage effluents, are primarily in a dissolved condition. So far, there do not seem to be any good commercially available, and economically feasible, systems available for removal of nutrients from municipal sewage. Many experts are working hard on experimental and pilot plants for removing nutrients, but until such systems are at least firmly on the horizon from a commercial standpoint, we should not discriminate against the boat owner by requiring that he dump his nutrients into the lake by way of a holding tank, a pumpout station, and a municipal sewage system.

From all the foregoing, we can summarize that modern macerator-chlorinators can do a better job in most cases than holding tanks (the cases where dock-side pump-out sewage goes through at best, a primary treatment municipal system before being returned to the waterway.) In many other cases where the dock-side pump-out would go through a secondary treatment system, they can do almost as good a job as the holding tank, (B.O.D. reduction, of $\frac{2}{3}$ as compared to $\frac{1}{10}$. . . both systems pass nutrients.) Holding tanks logically might be allowed, and macerator-chlorinators prohibited on water bodies where no municipal sewage treatment plant effluents at all are permitted.

A word of caution: Free use of typical numerical values for various items have been used throughout this report. Characteristically, the many variables involved in waste treatment cause large scatter in data that is obtained, so that it is not unusual to find individual pieces of data several times as big or several times smaller than the figures mentioned.

Waste treatment in general, is a dynamic field these days. Important advances have been made recently and more will undoubtedly be made in the near future. We hope laws and regulations will be flexible enough to keep pace with the advancements in technology, yet fair in their requirements of boat owners, fishermen, swimmers, marina operators, industries, and municipalities.

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(Congressman Olsen indicated he will submit a statement for the record at this point. His statement follows:)