units must be equipped with a macerator or with some other type of agitator which will cause the breakup of solids to permit disinfection and to inhibit settling of solids in the chlorinator.

2. *Incinerators.*—These units are designed to trap the waste material, generally in a previously inserted bag, and to hold the materials until the device is activated. Upon activation, the bag with the sewage materials is dropped into a burning chamber where it is consumed by a burner which is ignited by turning the burning control as prescribed. These units are usually provided with exhaust fans to remove odors from the area to over-board vents. Generally, appropriate controls are provided to assure that the device cannot be activated when the toilet is in use.

3. *Holding Tanks.*—A holding tank is simply a waste tank placed on board the vessel and attached to the marine toilet so that all materials are pumped from the toilet into the tank. Such devices can be emptied in one of two ways, the first through a pump attachment which empties the tank into a shoreside sewer or septic tank and the second by pumping the materials directly into the waters of the lake.

Each of these units has some disadvantages which should be mentioned.

1. *Chlorinators.*—An "Evaluation of Marine Toilet Chlorinators" is a report prepared by Syracuse University in 1962 for the New York State Department of Health and contains some excellent suggestions relative to the use of chlorinators. This report as well as the experience of others in using chlorinators indicates that the devices must retain the waste materials for a minimal period of time to assure adequate treatment by the disinfectant used with the device. Also, should the boat owner allow the disinfectant source to become depleted, there is no way that the unit can be designed to continue to hold the materials until a disinfectant is introduced. It is believed that this situation could be greatly alleviated simply by having manufacturers of such devices print on the devices themselves or on literature designed to be placed in the head of a boat, instructions as to its use. It is not considered probable that many boat owners who have had these units installed will permit them to be regularly operated in a manner designed to destroy their effectiveness.

2. *Incinerators.*—The principal objections to units of this nature relate to their size and to the fact that most use propane gas as fuel. In other respects, they are considered to be the most effective anti-pollutant device because they destroy the wastes entirely. Although the size limitation cannot easily be modified, the danger of introducing propane gas on board a boat can be almost completely reduced by a carefully designed and proper installation of the unit and the fuel bottles.

3. *Holding Tanks.*—Units of this nature seem to have the greatest appeal to health officials, probably because they are regarded as the next best thing to actually sealing a toilet. However, these installations are not without disadvantage. If holding tanks are to be pumped ashore, relatively expensive sewer installations at marinas are required. If they are to be emptied in outlying waters, the possibility of their being discharged at dockside will continue to exist and, should such happen, would completely negate the installation of the device. Holding tanks also require considerable space on board boats where space, regardless of the size of the boat, is always limited. Holding tanks should have chemicals added from time to time to reduce the increased bacteriological effects of retaining sewage for prolonged periods of time. The longer such materials are retained without the introduction of appropriate chemicals, the more virulent the waste materials become. However, it is believed that with the provision of appropriate instructions to the user, any boat owner utilizing such an installation will assure that it is used properly.

Although there are disadvantages to each of these units, it is not felt by the Committee that these are such that the only alternative to continued pollution is the sealing of toilets. Certainly these units will perform with no less effectiveness than the average municipal sewage treatment plant, and because of the boat owner's interest in unpolluted waters, it is believed by the Committee that the units will be carefully and properly maintained and operated.

It is therefore the conclusion of the Committee that suitable and adequate devices are presently available for installation aboard recreational watercraft that will treat sewage to a standard acceptable to most health officials. Since any of the three units above are acceptable treatment devices, and since the selection of one of the three by a boat owner will be based on personal considerations, it is recommended that a model law permit the use of any of the three devices.