

is quite obvious that the average amount of sewage discharged from a towboat is relatively insignificant. We should then look for other objectionable factors, namely, the aesthetic and the hazards to health. The aesthetic factor can be taken care of by triturating the solids to very fine particles which, if they float, would not be visually identifiable. The health hazard can be eliminated by sterilization. This reduces the treatment requirement to trituration and sterilization.

STERILIZATION

Chemical sterilization has several problems: (1) Cost; (2) Storage of chemicals; (3) Handling of chemicals; (4) Applying the correct dosages; (5) Provision for and maintaining adequate contact time for the bactericide to penetrate the solid particles in order to kill the disease or pathogenic bacteria contained therein; (6) The selection of a bactericide that will not have a residual toxicity to marine life. The most common chemicals used for this purpose are hypochlorite solutions. Even though a strong chlorine residual is maintained throughout the entire contact period, solid particles may not be penetrated sufficiently to kill the bacteria in the core of the particle. Therefore, virile pathogenic bacteria can still be present in heavily chlorinated sewage. If the effluent shows the presence of *any* *Bacterium Coli*, then it can be assumed that pathogenic bacteria can also be present.

The most effective bactericide for this application is heat. In the pasteurization of milk, the milk is heated to 140 F and the temperature held for 30 min. The same could well apply to sewage. However, it would be advisable to provide a tank capacity for a minimum of 24 hr to avoid the necessity for discharging while the boat is standing idle. Such a contact period at a minimum of 140 F would be more than sufficient to kill any pathogenic bacteria. The treatment plant would consist of a sump tank coiled to heat the sewage almost instantaneously, a pump, triturator, collection tank coiled in order to hold the temperature, and a discharge pump. The source of heat could be the engine and exhaust-manifold cooling water. Hypochlorite should be carried on the boat and applied to the system when the boat is standing idle and a source of heat is not available.

SUMMARY AND CONCLUSIONS

By briefly considering the physical, chemical, and bacteriological characteristics of sewage, the writer has attempted to arrive at a logical and practical solution to the problem of disposing of sewage from towboats that would prevent any objectionable pollution to the rivers and also prevent any jeopardy to the health of humans and marine life.

It is the writer's sincere belief that any study of the facts surrounding the degree of pollution that towboats cause with respect to the discharge of human excreta will substantiate the foregoing dissertation.

[From December 1967 issue of the Skipper]

FLOTSAM & JETSAM

It may have been a mistake to drop that copy of the Federal Water Pollution Control Administration's recent report on "Wastes from Watercraft" on The Skipper's desk, but we did. We had hopes that, with the federal government's monies and resources, perhaps a little sanity would enter the question of watercraft pollution to allay the over-charged emotionalism that has blossomed around it.

But from the welling of thumps, snorts, and imprecations that emanated from his sanctorum—enough to rattle the overhead and shake the concrete slab on which we live—we gathered that the report left something to be desired, so we weren't surprised when the copy was returned looking a little like the backsides of a bird-shotted corn poacher. The Skipper has one of those nylon-tipped, red ink pens that he particularly favors, and there were very few of the sixty-two pages in "Senate Document No. 48" that hadn't been underlined, circled, exclamation pointed, or loaded with virulent commentary.

After leafing through the bespattered pages, it seemed to us that The Skipper's scathing conclusion, which he had scrawled across the cover, was somewhat justified. Said he: