

and Canadian vessels but by the vessels of all of the major maritime nations of the world. Nevertheless, nearly 90% of the lake commerce consists of the movement of bulk commodities such as iron ore, coal, grain and limestone and this fact has led to the development of a uniform type of vessel, both American and Canadian, specifically adapted to the handling of bulk cargo.

PECULIAR DESIGN OF GREAT LAKES VESSELS

The design of the Great Lakes bulk cargo ship is peculiar to the Great Lakes. These ships, from the smallest to the largest, are in general of similar construction with bridge and deck crew houses in the forward end, the engine and boiler spaces being in the after end, together with the engineers' crew house. The intermediate portion of the ship, devoted entirely to cargo, is provided with athwartships hatches permitting the entire deck to be thrown open to the reception or discharge of cargo. The ships have double bottoms for the carriage exclusively of water ballast and for safety in the event of bottom damage. They are also equipped with side tanks which, in addition to the purposes served by the double bottoms, gives the cross-section of the cargo hold a hopper shape that facilitates cargo handling. These construction features of the typical great Lakes ship become extremely important when water pollution control methods and measures are considered.

The Great Lakes vessel industry is most anxious that the water quality of the Great Lakes be preserved. It is very often necessary for Great Lakes vessels to use water directly from the lakes for their water supply, both potable and for boiler use. Lake Carriers' Association first expressed its concern over pollution as early as 1914, when a Sanitation Committee was created within the Association and directives were sent to the vessels informing the masters as to the specific areas to be avoided in replenishing water supplies and not to take on potable water within 15 miles of any large city. The function of delineating areas from which potable water supplies may be safely obtained has long since been taken over by the Public Health Service.

SEWAGE TREATMENT FACILITIES ON VESSELS

Every new vessel constructed on the Great Lakes since World War II, and nearly every major conversion since that time, has included some type of sewage treatment facility. The original type of unit first installed on vessels was based on the septic tank principle with chlorination in the final stage. By 1960 the Bio-Gest system, through private research and at considerable expense, had been developed. This system is based on a bacteriological and oxygen process and actually digests wastes. A Bio-Gest tank is about 10' x 8' x 4' and occupies some 320 cubic feet of vessel space, not including the necessary piping. Because of the particular construction of Great Lakes vessels, with both a forward and after house, at least two tanks are required on each vessel, and some vessels have installed three.

In 1964 the Bio-Gest system, through further private research and development, was considerably improved, so that today vessel operators consider it to be a highly efficient unit. Nevertheless, it has been impossible to obtain approval of the Bio-Gest system, or any other system, by the United States Public Health Service. The difficulty in approving such a system is that there are no official standards or criteria for waste treating facilities.

Despite the fact that there are no official standards or criteria to guide vessel operators, they have voluntarily installed some 75 waste treatment units on 41 vessels at a cost of about \$15,000 per unit, not including the cost of piping and installation. This meant an initial expenditure for each vessel, just to purchase the equipment, of from \$30,000 to \$45,000 depending on whether two or three units were installed.

NO RESOLUTION OF WASTE DISCHARGE REGULATION QUESTION

Immediately prior to the opening of the St. Lawrence Seaway, the Public Health Service, in cooperation with the several Great Lakes States, the Canadian Health Department and vessel operators, initiated a Great Lakes study project. The result was amendment of the Interstate Quarantine Regulations to prohibit vessels from discharging sewage, ballast or bilge water within certain delineated areas around water intake cribs in the lakes and rivers. Unfortunately, from a