COMMERCIAL FISHERIES REVIEW

May 1947 Washington 25, D.C. Vol. 9, No.5

MOBILE LABORATORIES FOR FISHERY TECHNOLOGICAL RESEARCH

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ABSTRACT

Much of the work of fishery technology must be performed in the field. Establishment of temporary, efficient, field laboratories has not always been possible.

The mobile unit described in this article has been tested under a variety of conditions. The results have been so satisfactory that non-governmental organizations which have investigated its performance have ordered similar units.

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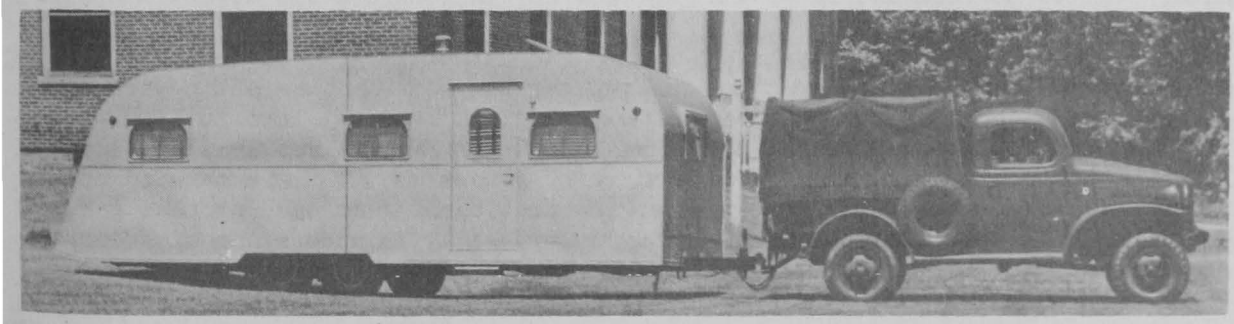
Because problems in fishery technology frequently lend themselves to study only in the field, there has been a growing need for increased laboratory facilities in fishery areas to meet the needs of the industry. The establishment of temporary field stations has not always been entirely satisfactory. The laboratory set-up in such situations is nearly always makeshift; the equipment must be dismantled, packed, and shipped to the next station as the site of work is changed. Continual transportation leads to excessive breakage, and possible loss of expensive scientific instruments, and the physical facilities are frequently unsuited to the type of investigation to be made. In some instances where better facilities have been unavailable, technologists of the Division of Commercial Fisheries have worked in temporary quarters where the tide regularly rose 6 to 10 inches above the floor; where rain and snow became integral parts of the investigation; and where insects and rodents pried into the test tubes and fed on the bacteriological cultures.

Although it is possible to work under inadequate conditions, efficient operation is not obtained. Frequently, as much time had to be spent in maintaining the field station as was devoted to actual investigation. To overcome these disadvantages and to improve its service to the industry, the Technological Section of the Division of Commercial Fisheries designed and equipped three trailer laboratories. At present, they are based at College Park, Md.; Boston, Mass.; and Seattle, Wash. These mobile units have proved to be very satisfactory and are so superior to the usual makeshift arrangements that at least one organization has



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built a similar unit patterned after the trailer equipped at the Division's Fishery Technological Laboratory at College Park, Md. Requests from other organizations indicate that there is a need for a complete description of the latter laboratory.

The detailed information presented hereafter concerns the mobile unit assigned to the College Park Laboratory. The laboratory is housed in a four-wheel, house-type trailer and is pulled by a four-wheel-drive, half-ton truck. It is equipped for bacteriological, chemical, and technological investigations and can rely on its own water, gas, and electric supplies, if necessary, so that it can be used anywhere a commercial fisheries problem may arise.

To date, the trailer laboratory has been used in investigations in regions from Massachusetts to Virginia. The outside temperatures encountered have ranged from minus 5° up to 96° F., and no difficulty has been found in operating under these varied conditions. The problems studied have ranged from those of research to large-scale routine determinations, and crews have ranged from one to six men. The unit has proved to be so flexible that there are very few technological problems which can not be handled on a laboratory scale.

Figure 1 shows the general plan. The trailer has an over-all length of 24 feet and an over-all width of 8 feet and is divided into two compartments. Fitted cabinets, drawers, and work benches were built to specifications. The work benches can accommodate three persons comfortably. Adequate storage space is provided for all loose equipment. There are three roof-ventilators and eight windows. Two sets of screened and tight doors lead to the outside.

The plumbing installations consist of two 30-gallon galvanized water tanks, one 25-gallon copper-alloy tank for distilled water, and two sinks, each with two faucets and a drain. The water tanks are located in the forward ceiling cabinet and are filled through a hose connection at the front of the trailer. When a convenient water source is available, this same connection is used to supply water directly to the cold-water taps on the sinks. The hot-water taps are connected to a second hose coupling, which is used when hot water is available from the outside. The storage tanks are filled only when water is unavailable on location or in winter when a constant hose connection would freeze. The sink drains are connected to a common outlet to permit sullage to be carried to a sewer or away from the trailer by a hose. The distilled water tank is installed in the ceiling cabinet above the small sink. It is filled through an inlet on the outside of the trailer, and the water is delivered through a special valve located over the sink. The large sink in the forward part of the trailer is equipped with a stainless-steel drain board. A peg board is built over the sink for the draining of flasks, beakers, etc.

The Bunsen burners, stove, and autoclave are connected to two 60-pound tanks of propane gas. These tanks are located under the work bench in the forward right corner and are equipped with a pressure gauge and an automatic change-over valve which permits the exhaustion of the gas from one tank before the other is opened.

All of the electrical equipment operates on 110 volts A.C. so that, if available, current can be supplied from an ordinary house outlet on a two-wire cord. In the selection of equipment, care was taken to keep the total load to 1500 watts, or less, to prevent overloading the line. Where current is not available, power is obtained from a 1500-watt, 110-volt, A.C. generator which is carried on the truck. The generator is driven by an engine that burns gasoline, propane gas, or No. 2 fuel oil, and which starts and stops automatically in accordance with current requirements.

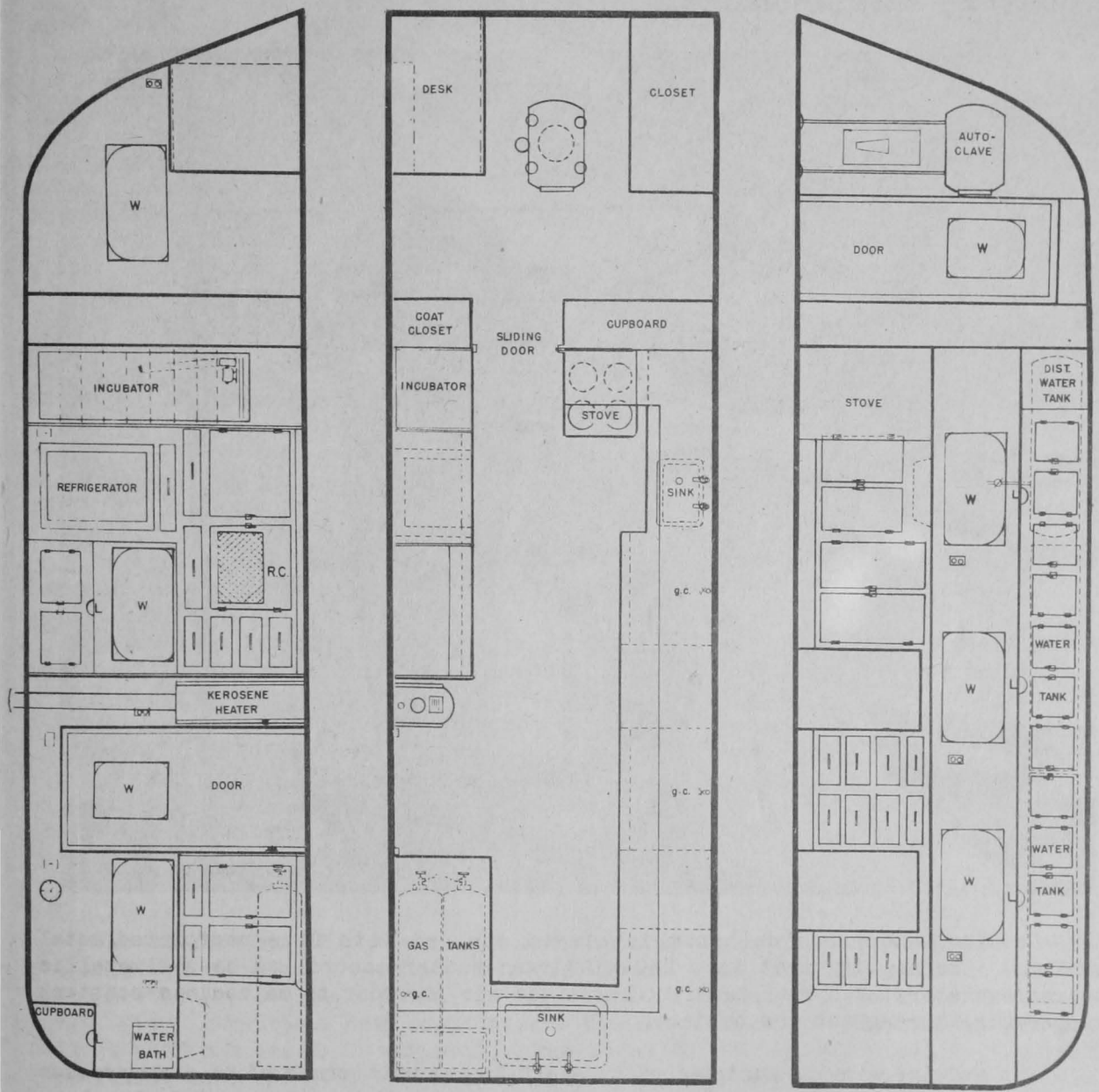

FIGURE 1

OVER-ALL LENGTH INSIDE--23 ft. 8 in.; WIDTH--7 ft. 3 in.

LEGEND: g.c.-GAS COCK W-WINDOW L-LIGHT R.C.-REFRIGERATOR COMPRESSOR

The electrical installations consist of six double-outlet wall plugs above the work benches; five "spot" lights above the benches; three fluorescent ceiling lights; an electric refrigerator; automatic controls on the autoclave; a 37° C. incubator; a heater fan; and certain other scientific equipment such as a Waring blendor, microscope lamp, water bath, etc. These latter items are used only intermittently for short periods of time.

The incubator is a cellotex-insulated cabinet with five perforated metal shelves. The heating unit is a 250-watt oven heater controlled by a bimetallic thermoregulator. A blower fan circulates the air in order to maintain a constant temperature throughout the cabinet.

The refrigerator is equipped with a shelf-freeze unit connected to a compressor and condenser unit mounted behind a perforated metal door in a cabinet below.

The four plate burners of an apartment-size gas range are used for the preparation of culture media. The oven, which is equipped with an accurate temperature control, has adequate capacity for the sterilization needs of the unit and has proved to be very satisfactory for this purpose.

The autoclave is double-jacketed, heated with gas, and electrically controlled. It is equipped with a water-level safety valve, pressure control switch, air ex-

STERILIZING MEDIA

EXAMINING CULTURES

haust valve, and the usual pressure and temperature gauges. All of this equipment is fully automatic.

The trailer is heated with the usual type of fuel oil stove. An electric fan is used for circulating the heat.

In addition to the above permanent installations, the following equipment is stored in cabinets, drawers, or in special compartments on the benches:

BECKMAN pH METER
QUEBEC "DARK-FIELD" COLONY COUNTER
CONSTANT-TEMPERATURE WATER BATH
WARING BLENDOR AND SUPPLY OF CONTAINERS
TRIPLE-BEAM BALANCE
FIRE EXTINGUISHERS
CLOCK
INTERVAL TIMER
FAN

BOTTOM-WATER SAMPLER
MUD DREDGE
RUBBER HOSE
ELECTRIC CORDS
SHOVEL
AXE
FLARES AND EMERGENCY LIGHTS
ROPE AND TOW CABLE
LABORATORY GLASSWARE, THERMOMETERS, ETC.

The cabinet space in the rear compartment is used for storage of the field-sampling equipment, hose, etc. A clothes closet and a cupboard with shelves are also located here. The cupboard is used for the storage of sterile media, cultures, etc. A built-in desk with drawers is also available. The compartment can be shut off from the main workroom. The location of the autoclave in the rear compartment makes it possible to keep the laboratory working compartment cool in summer if the sliding door is kept closed while the sterilizer is in operation.

With very little additional equipment, the usefulness of the unit can be expanded. For experimental canning, for instance, a can sealer could easily be mounted on one of the work benches. For chemistry, only the necessary glassware and reagents would be required.

In addition to purely investigative activities, the unit has been used for educational purposes. Exhibits have been arranged on the benches, visitors en-

tering by the forward door and leaving by the rear. The portable power plant makes it possible to show movies on fish cookery or industrial practices in areas where such facilities do not exist at present. The laboratory can also be used for fish-cookery demonstrations to small groups.

The successful use of the mobile unit, thus far, indicates that trailers of this sort can serve as practical and effective auxiliary arms to the permanently established laboratories. This has been realized to a limited extent by this and other agencies which usually have equipped units on a restricted basis for specialized jobs. The trailer described here is an "all-purpose" laboratory unit designed to enable the Fish and Wildlife Service to give a variety of effective aid to the fishery industries.

FISHERIES EDUCATION AND RESEARCH IN JAPAN

In keeping with the importance of fish and marine products in the general economy of Japan, the Japanese Government has placed much emphasis on fishery education and fisheries research, both biological and technological.

Japan has 32 prefectural fisheries schools in 24 prefectures. These schools give special training in the biology of fishes and chemistry of marine products as well as technical and practical training in fishing, fish processing, navigation, boat building, and allied subjects. The schools are designed to train men to be expert fishermen, and cannery managers. Graduates from the prefectural fisheries schools are eligible to enter the two fisheries colleges, one of which is at Hakodate, Hokkaido, and the other at Tokyo. The colleges offer three- and five-year courses in fisheries. Three of the seven Imperial universities in Japan have fisheries departments in their faculties of agriculture. The departments offer a three-year course leading to a college degree. This is the highest level of fisheries education in Japan. Japan has 118 Government-supported fisheries and marine products research stations and branches. Six are operated by the Government and 112 by prefectures. These stations conduct research in fisheries biology, fishing methods, and fisheries products.

--Fishery Leaflet 236