

nical advice to districts which they could not otherwise afford.

State Appropriations. In Virginia the State Board of Health contributes annually to the mosquito control commission a sum not more than 25 percent of the gross amount obtained from tax levy and not to exceed \$10,000 in any one year. In Delaware, Maine, and Rhode Island, the State Legislature makes an annual appropriation for mosquito abatement. Any town in the last-named State desiring to make use of State funds must match such funds. Legislation passed in Florida in 1949 provides for State aid to organized mosquito control districts and county health units, such funds being administered by the State Board of Health. Districts and county health units must match the State contribution which may not exceed \$15,000 per county per year. During recent years the State Legislature of California has made substantial appropriations to the State health department for assistance to local abatement districts and health departments in the control of disease-bearing mosquitoes (vectors of encephalitis and malaria).

Suggestions for Inclusion in State Legislation. Provisions which would be desirable for inclusion in abatement laws are briefly summarized as follows:

1. Each district should be under the technical supervision of an officer of a designated State agency who would approve plans, methods, and cost estimates.

2. The district should have the jurisdiction to control pests other than mosquitoes, such as flies, fleas, ticks, rats, and other vermin which affect the public health.

3. It should be possible to organize any number of adjacent municipal and county governmental units into insect and pest control districts throughout the State.

4. The administrative body (board) for the district should consist of a definite number of members -- such as five or six -- and the board should include at least one member from a local health department. The State health officer should be ex officio member of each board.

5. The board should have the power to make inspections and to perform control work on territory adjacent to the district.

6. The State should render technical assistance by making preliminary surveys, by preparing abatement plans, and by determining cost estimates of same.

7. Provision should be made for the enlargement by annexation or consolidation, and for discontinuance of any insect and pest control district.

It is believed that these provisions would be of considerable help to States without enabling laws for insect and rodent control when they wish to promulgate this type of legislation. Several States have already requested information from the Communicable Disease Center concerning such legislation.

Some Highlights of the 1949 Residual Spray Program

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GENERAL

In the spring of 1945, when the residual spray activities were inaugurated on what then was designated as an Extended Malaria Control Program, many problems confronted personnel engaged in those activities. Supplies of insecti-

cidal chemicals were limited, suitable new commercial type vehicles were not available, and spray equipment designed specifically for residual spraying did not exist. Hard and fast policies or rules were not established to unify or standardize program-wide operational procedures and

techniques. Areas applicable for participation were jointly agreed upon by the Public Health Service and the various States, and a minimum DDT application rate was recommended. The Atlanta office did establish facilities to develop, procure, and test new equipment and materials and to correlate over-all program requirements. Each succeeding spray season has seen an increase in efforts by both headquarters and field personnel to accomplish more effective insect control at a reduced cost. These efforts have produced many new and improved facilities. Many are significant from an over-all program standpoint, and a large number of facilities have been developed by individual programs or from ideas originating in the field. During fiscal year 1949 more new or improved materials, equipment, and processes were employed than in any previous year. A few of these are presented herein with no attempt being made to evaluate specific effects on the program.

Chemicals and Experiments To insure procurement of the highest quality chemicals possible, the Engineering, Administrative, and Technical Development Services participated jointly in the preparation of chemical specifications. Schedules for collection and submission of samples were worked out and procedures were adopted for testing chemicals for conformance with specifications.

During the season samples from three shipments of DDT failed to meet some requirements of these specifications and were rejected. All unused portions of these shipments were replaced. In the field of new insecticides and formulations, the Technical Development Services tested and recommended for use on outside surfaces, where fly breeding produced a significant problem, a formulation containing pine rosin as a sticking agent. The rosin formula was employed on five State programs to treat outside premises surfaces and interiors of barns and other out-buildings. The effectiveness of this formulation has not been demonstrated fully.

Experimental projects involving the use of different chemicals and formulations were approved for operations in several States. One such project conducted in Tennessee utilized

water-wettable DDT in one section and methoxy-chlor in another. On a county-wide respray project the Mississippi program employed on inside surfaces a 2½ percent DDT-kerosene solution in one area and a 2½ percent DDT emulsion in another. A 2 percent chlordan-3 percent DDT formulation was applied to outside surfaces in both areas. Selected areas in Arkansas were resprayed with an emulsion containing DDT of low setting point. Other experimental activities included limited application of chlordan and methoxychlor in Arkansas and chlordan in Alabama. Preliminary results of the Mississippi project indicate very little residual effect of chlordan when applied to outside surfaces. The low setting point DDT got no better results with respect to fly control than DDT purchased under applicable specifications.

Time-Motion Studies At no time during the life of the residual-spray malaria control program had there been a special effort to evaluate the amount of time devoted by field personnel to the various items of spray operations until the summer of 1949. The Engineering Services formulated plans for the inauguration of a time-motion study to be conducted in a representative number of States. The primary purpose of the study was to provide a means by which individual States could direct efforts towards conservation of time and increased efficiency. The Malaria Section obtained automotive equipment and several types of spray equipment, and provided a supervisor to direct field activities. Studies were conducted in four States: Alabama, Arkansas, Tennessee, and Texas. Actions of spraying personnel using local equipment during a spray day were timed. In each State program, spraying personnel were given an opportunity to become acquainted with both hand and power constant-pressure spray equipment provided for that purpose. A final summary of the time-motion evaluation has not been completed to date.

As an aid to the various States in the development of efficient local insect-control activities, the equipment used on the time-motion study is available for demonstrational activities. The insecticidal equipment includes a standard posi-

tive displacement-type pump power spray unit; pneumatic-type power spray unit, supplied with air from a modern truck-engine mounted compressor; an exhaust aerosol generator; and various types of the latest hand-spray equipment. Detailed sketches showing the arrangements of equipment have been prepared and will soon be available for distribution.

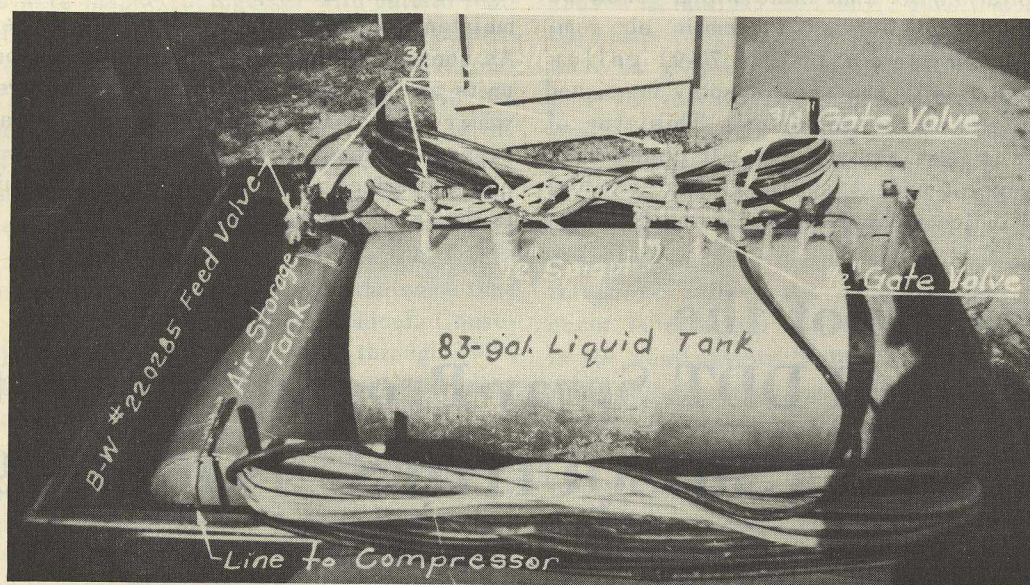
Insect Abatement The establishment and operation of insect abatement programs within States received increased consideration during the year. Activities in the Florida abatement program were expanded. Revised regulations were prepared in Virginia for presentation to the Legislature to permit State-wide coverage. The Texas State Health Department was successful in securing local abatement legislation covering some sections of the State.

Anticipating a continued downward trend in Federal funds available for residual spray operations, the Engineering Services, in the interest

lations were obtained from States where these statutes are in effect. To date a preliminary draft of an insect abatement district code has been prepared. The original draft contains the entire code which may be included in State enabling legislation. A short form will be prepared whereby the essentials only will be included in the enabling legislation, with the State Health Department or other State agency promulgating the rules and regulations.

COMBINED MALARIA AND TYPHUS OPERATIONS

In an effort to reduce operational cost and expand field activities, the Florida CDC program combined residual-spray malaria and typhus-dusting control activities in three rural county programs. In counties where the typhus problem was urban or semiurban and residual spraying was strictly rural, only one activity was conducted at a time. Where both problems were rural, spraying and dusting were conducted simultaneously by the same crew personnel. In one county, crews



Pneumatic power sprayer. (Courtesy of North Carolina State Board of Health).

of long-range planning, began preliminary studies and the development of an instrument by which effective vector control might be continued through increased local financing. Copies of all existing insect abatement laws, rules, and regu-

consisted of three men, and in two counties, two men. In the strictly rural areas, according to available data, the cost of combined operations was considerably less than when the two activities were conducted separately. However, where

the typhus dusting was restricted to cities and small towns, the reduction in cost was not significant.

Spray Equipment Since the beginning of the residual spray program, considerable controversy has developed on the question of hand equipment versus power equipment. Each State has adopted whatever type equipment appeared best for that particular area. Originally, power equipment consisted largely of orchard-type positive displacement power units. With the quality of hose available at that time, considerable trouble was experienced due to hoses breaking inside of houses, and this type of equipment soon fell into disrepute. During the 1947 spray season, the Tennessee program developed a pneumatic power spray unit. With reliable hose, satisfactory results have been experienced. Other States developed similar equipment which was used on certain portions of State programs during the 1948 spray season. At the beginning of the 1949 season, the North Carolina program had developed a standard unit (see illustration) for that State which consisted of the truck-engine-driven automatic air compressor, an air storage tank, a 70-90 gallon emulsion tank with two sets of spray hose, and necessary pressure regulators. This type of equipment was provided in all preapproved counties except one. A summary of seasonal activities indicates an increase of about 25 per-

cent in sprayman output over the 1948 season.

A constant-pressure hand-spray can, developed by the Technical Development Services, was field tested during the season. The unit consists of two concentric-drawn aluminum tubes welded at top and bottom; a constant-pressure regulator; and hose and wand assembly. From test results, it appears that the unit is practical, and negotiations are under way whereby similar units may be manufactured commercially.

AUTOMOTIVE MAINTENANCE

One of the largest problems encountered in the residual spray program has been that of procurement, operation, and maintenance of automotive equipment. Procurement has been a headquarters problem, but operation and maintenance have been of local importance. Some States have relied on commercial facilities for maintenance and repairs, but most of them have set up shop facilities within the program and have succeeded in developing maintenance techniques with varying degrees of success. Two States in particular, Arkansas and Louisiana, inaugurated preventive maintenance practices during the 1949 season. As soon as the spray season is over, automotive units are brought to the State headquarters shop where they are completely overhauled and all exposed surfaces repainted or coated with a special rubberized paint preparation. The equipment is then stored at a central point.

Results of the Residual DDT Spray Program Against MALARIA MOSQUITOES, 1945 - 1949

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The DDT Residual Spray Program for malaria control initiated in 1945 by State departments of health in the southeastern United States in cooperation with the Communicable Disease Center of the Public Health Service has completed 5 years of operational work, during which period

over five million house sprayings have been made. In 1949 the number of counties in which operations were carried on reached 344, and the number of individual houses treated was nearly one million.

The reduction of the malaria hazard by the