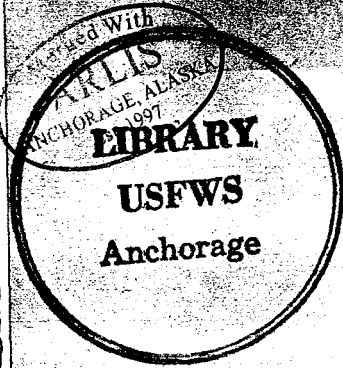




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ARCTIC ALASKA
REPORT NO. 101**

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REPORT NO. 101

by

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COMBATING MOSQUITOES IN ARCTIC ALASKA

Mosquitoes, their control, and the effects of the latter on the environment are three serious matters in arctic Alaska. Mosquito biting and annoyance are severe handicaps to outdoor occupations and recreational activities. On the North Slope the mosquito-biting season lasts about a month, from the second week in June through the early part of July, and at its peak it is probably the most intense in the world. The endless breeding area produces infinite numbers of mosquitoes, and the absence of trees enables a light breeze to carry them for miles.

Young mosquitoes live in stagnant water. In summer the North Slope is a vast expanse of boggy tundra and brushy valleys, where hordes of mosquito larvae breed in small potholes, puddles and pools, and along the margins of ponds. The eggs hatch as soon as the snow and ice disappear, and larval development is rapid in the continuous daylight. During the pupal period, when the larvae are changing to adults, the pupae are highly resistant to insecticides. The adults emerge, mate, and suck nectar from flowers. Then, seeking a blood meal, the females attack humans and other animals, but the males do not because they can not bite. The mosquito population on the North Slope consists of about five species of Aedes, all of which overwinter in the egg stage. They have but one generation a year, yet mosquito "control" is virtually impossible in the usual sense of the word.

The only chemical tested in Alaska and now cleared for use in mosquito control in Alaska is technical Malathion, applied at 3.14 ounces (0.2 pound) per acre. For airplane spraying, both plane and spray equipment must be certified by the Federal Aviation Administration and planes so equipped may not carry passengers. After the spray equipment is removed, the plane must be re-certified for passenger service. The pilot must also obtain a waiver to fly below the normal safe-flying altitude and must give notification of the area to be sprayed, the time of the spray operation, and the insecticide to be used. Certification, waivers and related information can be obtained at the FAA Flight Standards District Office in Fairbanks.

DDT and other chlorinated hydrocarbons are no longer cleared for use within the State of Alaska. These stable compounds become concentrated in the food chains, eventually contaminating large animals, including man. Though these insecticides can no longer be used, they are the only ones that have been tested on a large area in Alaska. The following results of a 100-square-mile test with DDT show what relief can be expected from large-area spray operations.

At Eielson Air Force Base in 1949 a plot 10 miles square was sprayed the last week of May for control of mosquito larvae, and a 94 percent kill resulted. Within three days after the adults emerged from the surrounding untreated area, the mosquitoes were in the center of the 100-square-mile plot in annoying numbers. In mid-June the entire plot was sprayed again, this time for the control of adult mosquitoes. Half was sprayed during the day, and half at night. After 24 hours there was 92 percent fewer mosquitoes in the area sprayed at night, and an actual increase in the mosquito population in the area sprayed during the day. Observations made on water during the entire spray operation showed that considerably more spray reached the ground during the night, which may account for the poor results from daytime spraying. Also, mosquitoes are more active in the evening, so that more were exposed to the spray. A week later a second spray-application for adults was made, resulting in a 95 percent reduction of the mosquito population after 24 hours, and 87 percent after 48 hours. This third spray-application appeared relatively effective for almost two weeks, although by early July the mosquito population is already in a natural decline. At Eielson there are considerable forested areas that may serve as natural barriers to mosquito movement, whereas on the North Slope there are no trees, so it is doubtful that protection for an appreciable period could be achieved from a large-area spray operation. Even so, from an economic standpoint, it is not considered practical to attempt control over large areas unless a single treatment is effective for an entire season. Large-area spraying is not recommended unless accompanied by scientific studies of its effects upon the environment.

Small-area spraying is even less effective than the large, because of rapid invasion from the surrounding untreated area. Therefore, repeated treatments at

short intervals are required to furnish very temporary relief. The results of experimental small-area spraying follow.

In 1967 Malathion was used on a 24-square-mile plot near Eielson Air Force Base. In this ultra-low-volume aerial spray test for control of adult mosquitoes, a C-123 aircraft, equipped with 38 D2-13 hollowcone tips, was flown at a speed of 150 miles per hour at an altitude of 150 feet. Output was 3.14 ounces (0.2 pound) technical malathion per acre. Application was made between 8:00 and 10:00 P.M. This treatment gave better than 80 percent reduction of the adult mosquito population for 4 days, dropping to 55 percent by the sixth day. Absence of trees on the North Slope would very likely facilitate even faster invasion from the surrounding untreated area.

Though Malathion has been tested and approved for use in mosquito control in Alaska, no studies have been made here on its repeated use as an adulticide throughout a season, or over several years, so there is no way of predicting effects on other organisms in a food chain; or on the predators and parasites of mosquitoes, which may play a large role in natural control of the mosquito population. If repeated small-area spraying is to be done, it should be minimal and it is desirable to coordinate it with scientific studies. Only through concerted action can satisfactory results be obtained without risk to the environment and Alaska's renewable resources.

Repellents are far more effective per unit of cost than insecticides. They will prevent biting but will not keep the mosquitoes from swarming around people. If applied to exposed skin and clothing they will keep the mosquitoes from biting for six to eight hours after application. Diethyl toluamide (DET or DEET) is perhaps the most effective repellent available when used in concentrations of approximately 50 percent (normally in alcohol). One common repellent, sold as a liquid in a bottle, contains 47.5 percent of the active ingredient, whereas the contents of the pressurized can contain only 14.25 percent active ingredient. Skin surfaces are best protected by smearing, making sure that all exposed surfaces (except eyes and mouth) are covered. The repellent dissolves paints, and plastics and other synthetic materials. Clothing can be treated by spraying

DEET around the neck and shoulders, ankles and wrists, or most effectively, by soaking garments and drying before wearing. A stock solution for this purpose consists of 90 percent (by volume) of DEET and 10 percent emulsifier (laundry soap) to which water is added in the proportion of 1 gallon to 1/2 pint of solution.

Most insect repellents on the market, in cream, lotion, or pressure cans, contain less than 50 percent of the active ingredients. People spending long periods in highly mosquito-infested areas may find it worthwhile to obtain concentrated repellents and make up their own solutions. The following companies manufacture Diethyl toluimide:

Cowles Chemical Company, 12000 Shaker Blvd., Cleveland, Ohio.

Hercules Inc., 910 Market Street, Wilmington, Delaware.

Hub States Chemical & Equipment Corporation, 2002 N. Illinois St.,
Indianapolis, Indiana 46202.

Lethlin Products Company, 15 MacQuesten Parkway, South,
Mt. Vernon, New York.

McLaughlin Gormley King Company, 1715 Fifth Street, S. E.
Minneapolis, Minnesota 55414.

Montrose Chemical Company, 104-12 Lister Avenue, Newark, N. J.

Pet Chemicals, Inc., P. O. Box 656, Miami Springs, Florida 33601.

Southern Mill Creek Products Co., P. O. Box 1096, Tampa, Florida 33166.

Superior Chemical Products, Inc., 3942 Frankford Avenue,
Philadelphia, Pennsylvania 19124.

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