SUBJECT: Preliminary Recommendations Concerning Improvement of Mosquito Control at Military Establishments in Japan.

TO: Chief Surgeon, United States Army Forces, Pacific, AFO 500.

1. Preliminary observations have been made on mosquito control by our military organizations in Japan, and certain recommendations based thereon are submitted herewith. These recommendations are presented now, on the basis of incomplete data, for the reason that we are at the beginning of the season of great mosquito production, and if protection against mosquitoes and mosquito transmitted disease is to be given to our military forces in Japan, a more effective attack upon these insects must be carried on now with the new equipment and materials now available.

2. The recommendations based on the observations discussed in the Appendix, are as follows:

a. Unit commanders should have their attention again called to the necessity of adequate mosquito control during the months of July, August and September, and they must be required to put into actual effect the mosquito control operations called for by Circular No. 43 dated 14 August 1945 (Especially the appointment and operation of insect and rodent control details, which appear frequently to be either neglected, or the details are diverted to other work).

b. Circular No. 42 should be amended to eliminate the confusion with regard to the area to be controlled, that appears to exist as a result of the issuance of Eighth Army Circular Number 125, dated 9 May 1946, Section VII, paragraph 2.

c. No unit commander should place any dependence upon Japanese civil government insect and rodent control teams for insect control work in the vicinity of his military post or camp.

d. The area of mosquito control about any military establishment should be modified from the arbitrary distance of one half mile, to whatever distance is actually needed to obtain satisfactory mosquito abatement.

e. The effectiveness of actual mosquito control shall be determined in each command by the numerical presence of adult mosquitoes caught by appropriate devices set up in each command area, rather than by larval checks alone which seems to be the common practice in many installations.

f. In addition to mosquito control by larvicidal methods, the standard methods of protection of personnel by screening, DDT residual
spraying, and adult destruction with aerosol insecticide dispensers should receive greater attention and be intensified during the next three months.

\[g\]. Additional details or labor gangs, with mechanical equipment as needed, should be furnished to accelerate the elimination of mosquito breeding water in burned areas adjacent to military establishments, by filling, etc., proceeding in an orderly manner block by block.

\[h\]. Insect and rodent control details should be required to be appointed, and to work, for Army, Corps, and Divisional Headquarters Areas, as well as for tactical and other units. Sole dependence upon the Malaria Control Detachments attached to these headquarters should not be permitted, as there is too much work now for these detachments to perform adequately.

\[i\]. Better ground control of airplane spraying is necessary if the spray materials are to be applied so as to produce effective coverage of the designated areas. This should be worked out by the Air Forces with the technical advice of officers of the Malaria Survey Detachments and Malaria Control Detachments. The use of small portable balloons (any six feet diameter) as markers for the beginning and end of spraying lanes, is suggested. Ground to plane radiophone intercommunication is also advised for better control of these operations.

\[j\]. Airplane spraying is a supplement to ground control of mosquito breeding, and not a substitute for the latter under Japanese urban conditions. It will probably be of some value in devastated areas. In the unburned city of Kyoto the use of airplane spraying is almost certainly a waste of effort and materials, and should be discontinued.

\[k\]. In some areas there appears to be either a deficiency in larvicidal materials, or difficulty in obtaining them when and as needed. This statement applies especially to DDT, kerosene, and diesel oil. Supplies of DDT emulsion concentrate (QM Item 51-I-156) do not appear to be available in Japan. This material, which can be diluted with water for either residual spray effect or for use as a larvicide, should be made available this season, if possible, to at least the Malaria Control Detachments. Adequate supplies should be made available next year for all our military establishments in Japan.

\[l\]. Every possible effort should be made to keep the Malaria Survey Detachments and Malaria Control Detachments up to full strength with trained and experienced men, especially during the critical period of the next three months. The effectiveness of these units could be materially increased by relieving the commanding officers of the relatively large burden of administrative detail, either by addition of special administrative officers, or by combination of units, or by some other appropriate means.
APPENDIX

A. INSECT AND RODENT CONTROL DETAILS.

1. Considerable variation in practice appears to be the rule with regard to the appointment and operation of "Insect and Rodent Control Details" required by EFPAC Circular No. 43 (14 August 1945).

2. The original Circular 43, on page 3, states that the primary function of such details is to "maintain insect and rodent control within the camp area and in surrounding territory for a distance of one half mile." On the other hand, Eighth Army Circular Number 15 (9 May 1946), in Section 7 (page 5), states that "Insect and rodent control is the responsibility of unit commanders and will be executed within each unit in accordance with references a and c above."

3. As a result of the apparent discrepancy in directives, some military units are attempting to exercise control both within the camp area and outside, while others are exercising control within the camp area only. In the latter case, the dependence appears to be on the work of Japanese civil government insect and rodent control teams, for control work in the area adjacent to military camps. From my observation, admittedly incomplete, I am reasonably certain that only in unusual circumstances will these Japanese civilian teams obtain moderately adequate mosquito control during 1946 and probably for several years thereafter. They have neither the training, experience, understanding, nor high interest in their work, nor do they usually have sufficient effective equipment and materials. A later report will cover this subject in detail. Suffice it to say that during the present year, and until it has been proven that the Japanese civilian teams are doing effective insect and rodent control work, the protective measures for our troops must be executed by American personnel using American equipment and supplies. Unit commanders should be instructed on this point.

4. A question is further raised as to the adequacy of the one half mile radius of control stipulated in Circular No. 43. It is possible that for personnel quartered in large cities the arbitrary distance of one half mile may be sufficient for protection in most cases, but for personnel quartered in rural areas it is almost certainly inadequate in most cases. It is common experience that a protective zone having a minimum width of one mile needs to be maintained, and usually further distances in particular directions needed to be treated for adequate protection.

5. I, therefore, suggest that Circular No. 43 be amended on page 3, so that the paragraph numbered (3) near the middle of the page reads as follows: "(3) It will be the function of these details to maintain insect and rodent control within the camp area and in surrounding territory for a minimum distance of one half mile in all directions beyond the periphery of the camp and for such further distances as may be deemed necessary to obtain adequate protection of personnel against insect and rodent infestation. These details shall not be diverted from their duties prescribed in this Circular, to the performance of other work, except in actual emergencies."
Where area overlapping occurs, commanding officers of the units concerned will decide jointly on the area to be controlled by each detail. Their work will be inspected and technical advice and assistance will be given by Malaria Survey Detachments and/or Malaria Control Detachments assigned to the same major command. The following operations will be carried out:

(a) Ditching, draining, filling, clearing, cleaning and/or destruction of natural or man-made insect breeding places in and around camps.

(b) Larvicidal measures directed against mosquitoes flies, mites, fleas and other insect vectors of disease.

(c) Spray killing of adult mosquitoes and flies, including the use of DDT residual effect sprays and aerosol insecticide dispensers.

(d) Inspection and minor maintenance of screening.

(e) Maintenance of mosquito and fly collection stations and traps.

(f) Poisoning, trapping and other rodent control measures.

B. CRITERIA FOR DETERMINING THE EFFECTIVENESS OF MOSQUITO CONTROL.

The criteria for adequate mosquito control at military establishments is not the effectiveness of larvac control in the camp and the adjacent area, but is the relative numerical prevalence of adult mosquitoes in quarters and in the camp area. To determine this relative numerical frequency of adult mosquitoes, the insect and rodent control details should, under the technical supervision of the Malaria Survey Detachments and/or the Malaria Control Detachments, make use of traps, mosquito collection stations, or other devices.

C. TRAPS AND CATCHING STATIONS AS MEASURING DEVICES OF THE EFFECTIVENESS OF MOSQUITO CONTROL WORK.

1. Traps and catching stations for measuring the effectiveness of mosquito control operations in a particular area may be of several types.

2. It is suggested that at least one light trap be operated by each company, battery or equivalent unit during the period from 1 July to 1 October. If a military unit is located in a rural area near rice fields, the light trap should be located at the edge of the camp between the camp and the rice fields. For other units the light traps may be placed in any central location reasonably sheltered from wind. These light traps should be operated between sunset and sunrise.

3. An inverted wooden nail keg or wood box (approximately 3' x 3' x 3') set on stilts in a cool shaded place with its lower edge about two feet above the ground level and partially covered with boards, shrubbery, etc., makes an excellent catching station for many types of nocturnal biting mosquito species.
4. Window traps placed in the lower half of windows on the lee side of barracks or other housing also make good traps for mosquito species which feed principally on men.

5. Malaria Survey Detachments and Malaria Control Detachments can furnish directions for the construction, placement and operation of mosquito traps. Nightly catches from these traps should be collected by the insect and rodent control details, the mosquitoes segregated from other insects, the total number of mosquitoes counted, placed in a container properly labeled as to place and date, and collection delivered at least weekly to the nearest Malaria Survey Detachment for species identification and enumeration. The total number of mosquitoes caught should be reported daily to the unit surgeon, segregated by individual trap counts.

D. RESIDUAL DDT SPRAYING OF QUARTERS ETC.

Residual DDT spraying of quarters, recreation halls and messes should be checked on, and if such buildings have not been sprayed since June first they should be resprayed with 5% DDT spray. On screens the DDT should be applied with a brush, both on the screen itself, and around the frames and immediately adjacent window and door casings. This work appears to have been fairly well done in most of the areas visited, but needs checking on to insure through results.

E. QUARTERS SPRAYING WITH AEROSOL INSECTICIDES.

During the months of July, August and September intensive work must be carried on at night within the quarters to insure that all mosquitoes gaining entrance are killed. The use of the aerosol dispenser in the prescribed manner should be rigorously carried out under the supervision of the insect and rodent control details. The term "quarters" should include recreation halls, messes, and all housed places where personnel may gather at night.

F. SCREEN CONSTRUCTION AND MAINTENANCE.

1. My observation has been that the important details of screening are not carefully attended to in the original construction nor in maintenance, and as a result the screens are only partially effective. This is true of both officers' and enlisted men's quarters.

2. All screens should be examined carefully at frequent intervals to see that they are effectively mosquito proof, especially around the edges of the screen frames, between these frames and the window and door casings. Wood strips should be carefully applied to prevent passage by insects between the screen frames and window and door casings. Small holes or spaces may be plugged with putty.

3. Screening installed by Japanese contractors should be especially suspect as to its effectiveness, as they appear to have no idea whatever that screens must be so installed that they are insect-proof. Their carelessness in such work can hardly be imagined unless actually seen.
I. In devastated areas of Japan cities within the one half mile protected zones it appears that over-emphasis has been placed on spraying methods for the control of mosquito breeding, at the expense of the more logical and more permanently effective method of filling in water containing basins, wells, basements, and depressions, so as to minimize the amount of mosquito breeding water available. In some areas the use of a bulldozer will be most expeditious and advantageous. In other areas, where rebuilding is occurring, the use of Japanese labor gangs with shovels, picks and sledges may be better adapted to the conditions. More attention should also be given to the clearing of street drains so as to remove drainage water effectively, keep the water moving, and prevent pooling in the drains.

In general, the elimination of artificial water containers in both the burned and unburned sections of cities has been fairly well done, especially as regards the concrete tanks for holding water for fire protection. However, there are still quite a few containers left in practically all areas, burned or unburned, and continued detailed inspection will be required to locate and eliminate or effectively treat such containers.

Larvicidal spraying will continue to be necessary in the burned areas, but the amount of spraying can be greatly reduced if an organized effort is made to permanently eliminate breeding water within the protected zones, proceeding block by block in an orderly manner and on a definite plan.

II. MOSQUITO CONTROL AT MAJOR COMMAND HEADQUARTERS.

At major command headquarters dependence for mosquito control appears to be entirely upon the Mosquito Control Detachments attached thereto. I was not able to determine whether insect and rodent control details are actually appointed in headquarters companies and are functioning, but I did not discover any at work, and in no case was there any evidence presented to me that such work was being performed by these details from headquarters companies. In view of the amount of meticulous detailed inspection and corrective work required for successful mosquito control work under Japanese conditions, it is strongly recommended that such insect and rodent control details be required to be appointed and to function, at least during the critical months of July, August, and September. The work of such details, in addition to the work of the Malaria Control Detachments, is needed at the major command headquarters visited by me, and presumably at all others.

I. PROTECTION OF DEPENDENT HOUSING AREAS.

Appraisal of the actual amount of risk to personnel and their dependents living in requisitioned housing is difficult. In some cases this housing is located at considerable distances outside of any presumably protected zone occupied by our forces, and within areas in which the mosquitoes may be infected with the virus of Japanese B encephalitis. This housing is being given residual DDT spray treatment and screening, but the problems of control of mosquito breeding in such dependent housing regions do not appear to me to have been fully evaluated. Certainly dependence cannot be placed on the efforts of Japanese civil government insect and rodent control teams to protect these areas. It may prove necessary for headquarters and unit commanders to appoint and equip additional insect and rodent control details.
to carry on mosquito control work in the vicinity of dependent housing areas located outside of the protected zones described in Circular No. 42.

Similar remarks may apply to the various recreational areas in Japan, but time has not been available to visit such areas yet.

J. SPECIAL PROBLEMS OF MOSQUITO CONTROL IN JAPAN.

Our Malarial Survey Detachments and Malaria Control Detachments were trained and equipped originally for the prevention of malaria. Later some of these units encountered problems in the prevention of dengue under tropical island conditions. None of the detachments, so far as I can ascertain, were trained for the particular type of operations which are encountered under Japanese urban conditions, with which we are at present primarily concerned. They are, however, learning fast. Emphasis needs to be laid on the immense amount of meticulous detail required under urban conditions in inspecting, locating and correcting the breeding places of urban Japanese mosquitoes, especially *Culex pipiens pallens* and *Aedes torqu.* The problem of concealed breeding water, its importance, and the difficulty in locating and correcting such concealed breeding water, needs to be emphasized to these detachments and to the insect and rodent control details.

K. REMARKS CONCERNING AIRPLANE SPRAYING AS A MOSQUITO CONTROL MEASURE IN JAPANESE CITIES.

I have not as yet had time and opportunity to meet with the groups responsible for the airplane spraying of cities with DDT and my remarks on this subject are necessarily tentative. However, I am not particularly impressed with the value of DDT spraying of Japanese cities occupied by our forces. In the burned and devastated areas it can be presumed that noticeable results may be obtained in mosquito and fly control, for periods of a week or ten days after each spraying. But in the absence of a better ground control of the airplane spraying then appears to be in effect, the improvement can be expected to be "spotty." For example, observation in the Central Tokyo area indicates that the breeding of the common house mosquito, *Culex pipiens*, has been little affected by the airplane spraying performed at the end of June.

If it is furthermore my opinion that the airplane spraying of undamaged cities is practically wasted effort and materials, as fully 90% of the spray will fall on roofs, streets and the upper walls of buildings, where it can have no effect upon the mosquito or fly population. For this reason it appears to me that the airplane spraying of the city of Kyoto is wasteful and ineffective. A less amount of insecticidal materials applied selectively by ground crews to points of actual mosquito or fly production would be far more effective.

L. MALARIA SURVEY DETACHMENTS AND MALARIA CONTROL DETACHMENTS.

1. At a later date a report will be prepared making certain recommenda-
tions concerning the Malaria Survey Detachments and the Malaria Control Detach-
ments. These units have done excellent work in the past, but at present they appear to me to be plagued with two major difficulties:

(a) Separations from the service of trained and experienced officers and enlisted men, with either no replacements for them or
completely untrained and inexperienced replacements.

(b) A large burden of administrative detail imposed on the officers of these detachments, which prevents them from giving their entire attention to planning and directing the real work of these units.

M. EXTENT OF THE PRESENT SURVEY

1. The preliminary observations on which these recommendations have been based have been confined to a limited area on the island of Honshu, Japan, and to a few military units only. The areas so far visited are parts of Okayama, Kobe, Osaka, Kyoto, Yokohama and Tokyo, and parts of their adjacent areas.

2. Necessarily because of initial unfamiliarity with conditions in Japan and the short time available, a thorough and complete appraisal of conditions at any military unit has not been possible.

3. Further studies may cause some changes in these recommendations, but time is not now available for the attainment of more perfected recommendations. For the proper protection of American occupation forces against Japanese B encephalitis infection during the 1946 season, every available mosquito control and protective method must be used to its fullest extent during the critical period of July, August and September. These operations will be effectively performed only if commanding officers of the units affected are thoroughly impressed with their importance and necessity.

[Signature]
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