E. DDT 25%
Kerosene 10%
Sovacide 544C 60%
Atlox 1256 5%

This formulation has a balanced specific gravity of the concentrate at about 1.0 to produce very slow creaming with moderate emulsifier content.

F. DDT 25%
Xylene 50%
Triton X-100 25%

This formulation emulsifies in either fresh or sea water with a minimum of agitation and is excellent as an all-purpose mosquitocide especially for military purposes.

4. Benzene Hexachloride and Lindane
   G. Lindane 20%
   Velsicol AR-60 72.5%
   Atlox 1045A 7.5%

   This formulation has a lower flash point than the xylene formulations such as D and F.
5. Aldrin and Dieldrin
   H. Aldrin or Dieldrin 25%
   Xylene 70%
   Atlox 1256 5%
6. Heptachlor
   I. Heptachlor 25%
   Xylene 70%
   Atlox 1045 5%
7. Parathion
   J. Parathion 50%
   Thiosolve 50%

   This formulation produces a very stable, solvent-free, colloidal solution and also has reduced hazards of skin absorption over the solvent-type formulations.

[1] All percentages by weight.

TABLE 1—*Solvents Commonly Used for Preparation of Emulsion Concentrates for Mosquito Control.*

	Specific gravity	*Boiling point*	*Flash point*	*Solubility in grams per 100 ml. solvent 25° C.*				
Solvent	*20° C.*	*° F.*	*° F.*	*DDT*	*lin-dane*	*toxa-phene*	*al-drin*	*hepta-chlor*
kerosene	0.82	147-261	100-165	8	2	280	28	19
xylene	0.880	135-145	80	60	25	450	235	102
methylated naphthalenes	0.98-	240-290	245	60				82

Mr. Geib: Thank you, Mr. Wilde, Gordon and Bob. As we've run overtime, Embree Mezger, who was going to talk about Diesel Oil-DDT Toxicity Studies on Salt Marshes has requested that his paper be not presented, but you will find it printed in the proceedings. I am indeed sorry that we've run overtime so much, and I appreciate your patience. On behalf of the Association, I wish to express appreciation to all of you gentlemen who participated on this symposium and traveled many miles to come here and present these papers. In a personal vein, I would like to add that it's with sincere regret that I have left mosquito control. I have become a farmer, and it is with real regret that I am leaving this field. I hope that I will not lose my many friends and associations acquired during recent years as a mosquito control worker. I am looking forward to seeing you again as frequently as possible.

SALT MARSH FIELD STUDY FOR TOXICITY COMPARISON OF DIESEL OIL, DIESEL OIL-DDT CONCENTRATE, AND DDT-WATER EMULSION ON AEDES DORSALIS (MEIG.) LARVAE

Mezger, Embree G.[1], Aarons, Theodore[2], Gray, Harold F.[3] and Onishi, Koichi[4]

Repeated failures of Diesel oil and Diesel oil-DDT solutions to obtain high mortality in routine operational practices prompted the development of a field test project on the uncontrolled marshes of Sonoma County. This cooperative study between the Alameda County and the Solano County Mosquito Abatement Districts was conducted during the summer of 1951.

The San Antonio Creek Marsh, located on the west side of Petaluma Creek approximately 4 miles south of Petaluma, was used as the test area. This characteristic salt marsh site covered fifteen acres. The conspicuous vegetation throughout the area was the common pickleweed, *Salicornia ambigua.*

Each monthly high tide through the summer flooded the test site, resulting in high density hatches of *Aedes dorsalis* (Meig) larvae. Using both the pint dipper and the sampling technique of Hess (1941) (4" diameter net sweeping 3' of water surface) the average larval density was 156 per square foot or approximately 6,500,000 per acre.

MATERIALS AND METHODS

Four standard Diesel oil brands were used in the oil testing phase: Shell, Signal, Union and Tide Water Associated. These consisted of the brands most commonly used by the mosquito control agencies in the San Francisco Bay area. (Table I).

A commercial sample of technical grade DDT was used in all formulations. A 25% DDT mixture, using xylene and no emulsifier, was added to Diesel oil to make up the different percentages. (Table II). A xylene-DDT-Triton x-100 water emulsion was used for a direct overall comparison with the Diesel oil, and Diesel oil-DDT solutions.

Individual test plots, consisting of 1/16 acre areas (17 yds. x 8.5 yds.), were marked off on the marsh. Twenty-six plots were used in a single test. One-sixteenth acre plot size proved to be a convenient test area. Many such plots can be marked off in a relatively small larval source area, thereby allowing for several replications of each test material.

Pre-and-post larval counts were made on each test plot. Counts made prior to larvicide application were taken throughout the entire plot while post-larval counts were made near the center. By restricting post-larval counts to the center of the plots, the possibility of larvicide materials transferring from on plot to another through wind action or general water diffusion was minimized.

One-and-one-half gallon hand pressure sprayers (B & G Mfg. Co.) were used in applying the toxicants. Harang Engineering Company No. 8002 fan type nozzles were employed. The spray rate was timed so that the surface of each plot received two passes of larvicide. After each plot was sprayed, the sprayers were rinsed with water.

Encouragement and technical assistance during the studies was supplied by Dr. R. M. Bohart, Assistant Professor of Entomology, University of California, Davis; by H. C. Pangburn,

[1] Entomologist, Solano County Mosquito Abatement District.
[2] Assistant Manager, Alameda County Mosquito Abatement District.
[3] Engineer-Manager, Alameda County Mosquito Abatement District.
[4] Assistant Entomologist, Alameda County Mosquito Abatement District.

Manager, Solano County Mosquito Abatement District; and G. Paul Jones, Manager, Marin County Mosquito Abatement District.

RESULTS

An evaluation of four brands of Diesel oil (Shell, Union, Signal and Tidewater Associated) gave indications that no single brand was decidedly more toxic to larvae than others. (Table I). Also 12 and 8 gallons of Diesel oil per acre gave about the same mortality while 4 gallons of Diesel oil per acre gave a slightly lower mortality.

Using the Diesel oil-DDT solutions (Table II), results obtained indicated that when materials containing ½% and 1% DDT were applied at 8 and 4 gallons per acre, the average comparative mortality was nearly the same. 8, 4 and 2 gallons per acre containing ½% and 1% DDT failed to give a 100% mortality. The highest mortality obtained was effected through the application of 8 gallons per acre at ½% (0.35 lbs./acre) and 1% (0.7 lbs./acre). Average mortalities obtained were 94.1% at ½% DDT and 96.5% at 1.. DDT. Shell Diesel oil was used in all tests of Table II.

Two and a half gallons of DDT water emulsion were used at the rate of 0.2 lbs./acre. Average mortality was 97.6%

TABLE 1—*Diesel oil toxicity field test. Aedes dorsalis larvae, 4th instar salicornia salt marsh, brackish water.*

Gallons Per Acre	*Average % Mortality*			
	Shell	*Union*	*Signal*	*Associated*
12	99.5	99.1	99.5	93.9
8	99.0	94.1	91.1	90.0
4	83.8	84.8	86.3	85.2

TABLE 2—*Diesel oil-DDT toxicity field test. Aedes dorsalis larvae, 4th instar salicornia salt marsh, brackish water.*

Gallons Per Acre (Shell)	*Pounds Per Acre-DDT*		*Average % Mortality*	
	1/2%	*1%*	*1/2%*	*1%*
8	.35	.70	94.1	96.5
4	.175	.35	91.3	96.4
2	.08	.175	75.4	88.1

TABLE 3—*DDT emulsion toxicity field test. Aedes dorsalis larvae, 4th instar salicornia salt marsh, brackish water.*

Pounds Per Acre	*Gallons Per Acre at 1%*	*Concentration % Mortality*	*% Mortality Average*
.20	2.50	99.5	
.20	2.50	100.0	
.20	2.50	100.0	
.20	2.50	98.6	
.20	2.50	100.0	97.6
.20	2.50	99.6	
.20	2.50	94.6	
.20	2.50	92.2	
.20	2.50	99.8	
.20	2.50	93.1	

SUMMARY AND CONCLUSIONS

Tests conducted to determine the toxicity of three larvicides, Diesel oil alone, Diesel oil-DDT solutions, and the DDT water emulsion, on fourth instar larvae of *Aedes dorsalis* indicate the following:

1. 12 gallons of Diesel oil failed to give 100% mortality (99.1%-99.5).
2. 12 and 8 gallons of Diesel oil per acre gave about the same mortality. The 4 gallons per acre applications resulted in a relatively low mortality.
3. No one brand of Diesel oil used was appreciably superior to other brands in toxicity to the larvae tested.
4. The Diesel oil-DDT solutions—8 gallons per acre at ½% DDT (0.35 lbs./acre) and 8 gallons per acre at 1% DDT (0.7 lbs/acre—failed to give a 100% mortality.
5. The Diesel oil-DDT solutions of 8 and 4 gallons per acre at ½% and 1% DDT gave similar average mortalities. Relatively low mortality was obtained from 2 gallons per acre with both ½% and 1% DDT.
6. The DDT water emulsion at 0.2 lbs. per acre gave consistently higher mortality than the other two types of materials used. This comparison was based on gallon volumes and pounds per acre.

Literature Cited

Hess, A. D., 1941. New Limnological Sampling Equipment, Limnological Soc. of Am., Spec. Pub. No. 6.

EVENING SESSION
OPEN HOUSE, FIELD STATION OF BUREAU OF VECTOR CONTROL, AGRICULTURAL CAMPUS FRESNO STATE COLLEGE
8:00 P.M.

The field station was thrown open to visitors, and the operations, projects and equipment of the station explained. Colonel Carpenter also projected a series of Kodachrome slides illustrating the problem of sylvan yellow fever in Panama and Costa Rica.

FOURTH SESSION
STUDENT UNION HALL, FRESNO STATE COLLEGE
FRIDAY, FEBRUARY 15, 1952, 9:00 A.M.

President Henderson: I welcome you again this morning to our fourth session of our 20th Annual Conference. In the reports that were given yesterday, the report of the Membership Committee wasn't given. I thought it might be interesting to give you the number of members of our Association that we had as of January 21st. I believe there are a few more members of this Association now. As of August 18, 1951, we had 22 corporate members. As of January 21st, 1952, we had 38 corporate members. As of August 1951, we had 25 associate members; as of January 21st we had 45. We had as of January 21st one sustaining member. However, I believe it goes into probably half a dozen or more now.

I will now turn the first half of the morning program over to Bob Peters, the Vice President of the Association.

Mr. Peters: Will the members who are on this panel please come forward? Our purpose is to approach the subject of mosquito source reduction in an informal manner. I hope that either members on the panel or anyone in the audience who has anything to contribute will participate. In starting to discuss the subject today we should have consideration of the terms we