

# DDT, TIFA, AND THE POLIO EPIDEMIC AT SAN ANTONIO, TEXAS

FRANK K. STEINROCK

Todd Shipyards Combustion Equipment Division

*Pres. Ruth:* I am sure we shall all be interested in hearing a report from Mr. Frank K. Steinrock relating to the current outbreak of poliomyelitis at San Antonio, Texas, and to special measures employed in the hope that they might help to relieve the situation.

*Mr. Steinrock:* You have all read of the current polio epidemic in San Antonio, Texas. A week ago yesterday about 2 o'clock in the afternoon, I had a call from the Director of the City of San Antonio Department of Health. His call was urgent. He said, "You have probably read that we have a terrific polio epidemic in San Antonio. What can you do to help us?" "Frankly," I said, "I don't know a thing that I can do; I'm *not* a doctor; I don't know anything about polio; and I don't know anyone who does. At best, I am only a sort of half-way mechanic." The director said, "Our doctors have come to the conclusion, even

if it is not a complete conclusion, that the polio was brought to San Antonio by a tropical mosquito and that it is being transmitted by insects such as mosquitoes or houseflies, and the like. We have read, of course, of the fine work that your TIFA has done at Jones Beach and elsewhere, and wonder if it could not help us."

I said, "If you are willing to start at that point and use that as a definite conclusion, I, as a mechanic, can tell you what I would do if I were in your position; and if you like, we will try to help you."

I told him that I had been privileged to participate in, and had personally observed the use of our TIFA in experiments carried on by the scientific research personnel of various state agencies and I knew that DDT, properly applied, will kill mosquitoes, houseflies, stable flies and various other dangerous and annoying in-

sects. I recommended that inasmuch as they had planes already on hand, and had done some spraying and some dusting from the air, that they encircle the city by a protective zone sprayed or dusted with DDT according to equipment that might be available. I also suggested that they call in from the neighboring ranches as many spray rigs and spray operators as they could get, and with these spray rigs they treat their dirty spots such as garbage dumps, stables, etc., and with their Health Department knapsack crews that they treat places which could not be reached effectively by the spray rigs or from the air. I suggested that when TIFA arrived they pick the spots—the houses—where polio cases had occurred, and fog thoroughly the area for several blocks about such houses. Then at night, when the fog would not interfere with traffic or with business, to work the downtown and congested areas; and later, after that was done, to go over the entire city, which meant covering approximately 1,000 miles of streets.

After about 45 minutes of discussion the health officer seemed to have but one problem left—how to get TIFA to San Antonio, and quickly. We had offered the use of a unit, together with an experienced technician and mechanic. He asked for a short time to enlist transportation help, and at 4 o'clock he called back to tell me that a plane would be at the Newark airport at 7 to take TIFA and the men specially and directly to San Antonio.

We dropped all other business at hand and the machine and men were loaded on the plane on time—all soaked by a terrific thunderstorm, and too hurried even for supper. Upon arrival the next morning at San Antonio, the program outlined by phone was immediately got under way. Yesterday I had a phone call from our men, who are now stranded in San Antonio on account of the railroad strike. They have trained three or four local crews; and TIFA is working, and will continue to work 24 hours a day

until the situation is improved. Results have shown that they were able to run the machine through the city streets and do what appeared to be an effective coverage at the rate of 10 miles an hour. Even at 10 miles an hour it will require 100 hours to get over all of the city streets.

While a general application of DDT may not prove to be the answer to the polio epidemic, the obvious effort to do something about it must have real psychological value in combating the panic which is likely to appear in a situation of this kind; and the general elimination of mosquitoes and flies which such use of DDT is sure to bring about, should be very much worthwhile in itself through reduction of other diseases known to be carried by these insects.

I might conclude by calling attention to the fact that the use of planes, power sprayers, knapsack sprayers, and TIFA illustrates a point which I have often made—that a good mechanic will not try to do all of his work with a single tool, but that he will equip himself with a full kit of tools suitable for any job that may come along.

San Antonio reports that the rapidly rising number of new cases has turned downward. I hope, and we all hope that the epidemic may soon be stopped.

What finally comes from the San Antonio experiment you folks will read in your daily papers, and in your scientific magazines.

#### MORE ABOUT THE POLIO EPIDEMIC AT SAN ANTONIO, TEXAS

As the September number was going to press, photostat copies of the following correspondence came to the editor's desk. While the fogging experiments were not carried out with any scientifically rigorous checks, these comments by the public health officers concerned, and particularly the graph showing such an abrupt drop in the number of cases following the use of DDT in the manner described, occurring so much earlier in the season than polio epidemics usually subside, make this later material so aptly supplemental to Mr. Steinrock's report and seemingly so significant and of such general interest, that space was made for it in this number.—Editor's note.



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PLEASE ADDRESS YOUR REPLY TO

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Subject: "TODD" Insecticidal Fog Applicator  
"TIFA"

Lr. Robert D. Glasgow, State Entomologist,  
The University of the State of New York,  
State Geological and Natural History Surveys,  
Albany 1, New York

Dear Doctor Glasgow:

In response to your wish expressed over the telephone yesterday afternoon, we are pleased to send herewith the original letters and data, relative to the San Antonio, Texas poliomyelitis epidemic.

We are following your advice, and sending them via registered mail.

Very truly yours,

TODD SHIPYARDS CORPORATION  
(COMBUSTION EQUIPMENT DIVISION)

NMcDonald:EVS  
Encl.  
Reg. 3-3.R.

TODD SHIPYARDS CORPORATION  
and Subsidiaries

## INTEROFFICE CORRESPONDENCE

FROM: Mr. Norman McDonald PLANT:

TO: Mr. Frank Steinrock PLANT:

RE: "TIFA"  
SAN ANTONIO POLIO EPIDEMIC DATE August 6, 1946.

I called Mr. H. L. Crittenden of the San Antonio Health Department and asked how the "TIFA" fog machine had performed for them in combating Polio.

He was most enthusiastic, and said, "It was an answer to our prayer" "It stopped an incipient epidemic in its tracks before it could reach its normal height". I asked him if he really felt that the fogging had reduced the number of cases and he said - "Unquestionably". Moreover, he said that the job just could not have been done in any other way because of the cost element. Our fogging method he feels is over 90 times cheaper. As an example he pointed out that previously they sent a crew of six men with spray equipment to do four square blocks around a polio case and this took almost one day.

This is not as yet the time when polio ordinarily reaches its climax; yet at the present time, the number of cases are gradually dropping off to many less than in the past year and this in spite of an extremely early start. In fact, at present, all bans have been lifted.

Dr. T. Phany, Director of Public Health at Laurel, Mississippi, wrote and asked Dr. Marvel Bir of San Antonio, Public Health Department if he had to go through this critical period again what would be his method of control. Mr. Crittenden reports that Dr. Marvel wrote that fogging would again be the method.

The Pueblo, Colorado Health Department also wrote Mr. Crittenden in regard to the same problem, and specifically inquired about "TIFA". A similar letter was sent to them.

Copies of both these letters will be in the mail today.

NMcDonald:st

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DIRECTOR OF PUBLIC HEALTH

## City of San Antonio

### HEALTH DEPARTMENT

128 WEST COMMERCE STREET  
SAN ANTONIO 5, TEXAS

August 6, 1946

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PHONE F-4361

Todd Shipyards Corporation  
(Combustion Equipment Division)  
1 Broadway  
New York, New York

ATTENTION: Mr. N. M. McDonald

My dear Mr. McDonald:

In accordance with our understanding when your Corporation so generously loaned the Tifa machine in our polio emergency, I am enclosing correspondence in lieu of our sending a report to you on our opinion of the efficacy of the machine and reasons for our desiring to purchase it. This seems to me to be the best method to demonstrate our real and sincere opinions.

We certainly believe that to the extent flies, mosquitoes and other insects spread disease germs to humans, the Tifa fogging machine should be given the major credit as far as equipment is concerned, for reducing the incidence of disease here this summer, particularly "polio".

Incidentally, we have been advised by the representatives of the gasoline motor here to use white gasoline on account of the daytime temperature in summer.

Trusting that the material enclosed, in so far as it represents a health department's considerations, will be helpful to you, I am

Sincerely yours,

H. L. Crittenden  
Administrative Assistant

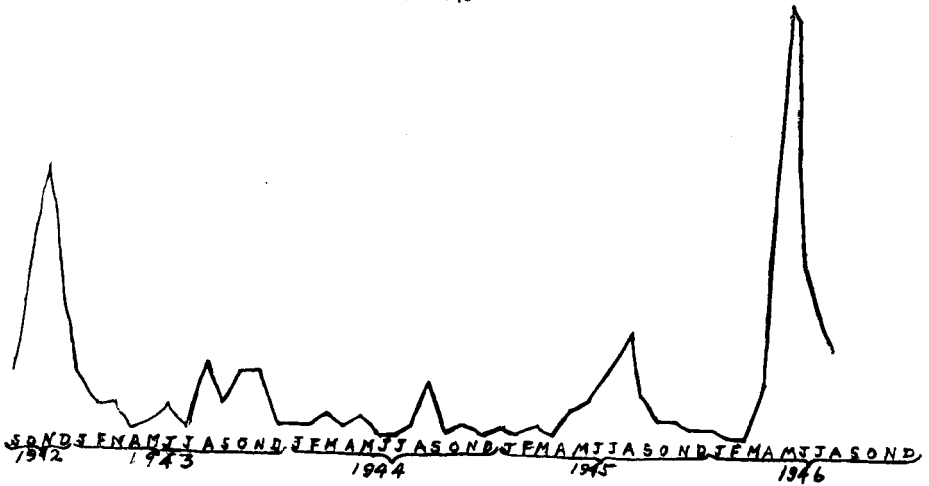
The following graphs hastily drawn in pencil were accompanied by a penciled memo as follows:

### SAN ANTONIO HEALTH DEPARTMENT INTER-DIVISION MEMOS

"Please excuse juvenile work; but I wanted to have this get to you with other materials. Do they give you figures you wanted?"

# POLIOMYELITIS

MONTHLY BY DATE OF ONSET  
1942-1946

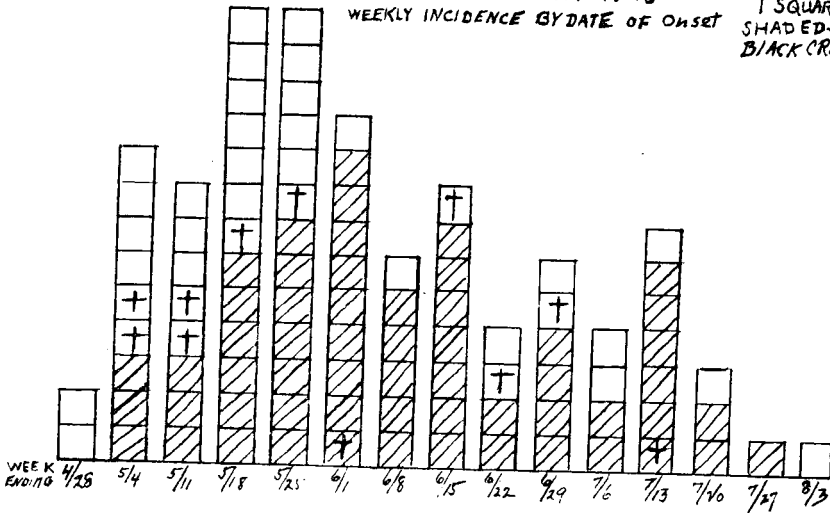


## POLIO AND ENCEPHALITIS

MAY OUTBREAK 1946

WEEKLY INCIDENCE BY DATE OF ONSET

1 SQUARE-1 CASE  
SHADED-UNLCL 15  
BLACK CROSS-DEATH



San Antonio, Texas  
May 22, 1946

Mr. R. W. Bowes, President  
C/o Todd Combustion Equipment  
601 West 26th. Street  
New York City, New York

Dear Mr. Bowes:

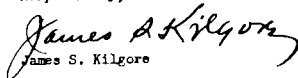
Speaking for the City Health Department, as well as the public, we are deeply grateful for your assistance in our campaign against polio. Your Mr. Steinrock has been most generous and cooperative in lending the machine to San Antonio for this purpose. Mr. M. McDold and his Engineer, Mr. Linen have been very representative of your company and their advice and aid have been most beneficial.

We understand that we are the first city to use all known forms of weapons against various vectors of diseases in the same operations, namely; sprayers, both hand and power; dusters, both air-borne and land; and the fog applicator.

Our program has been thoughtfully outlined and prepared and your amazing fog generator with its ability to cover thoroughly and economically the desired areas in a minimum length of time is most gratifying and amazing. I know of no other way of having been able to cover the business district when aeroplane dusting is prohibited and I stood astonished as I saw the fog climb the side of those buildings as it struck the building at a lower level.

Please accept my personal thanks as Supervisor of the spraying program.

Respectfully,

  
James S. Kilgore

C O P YC O P Y

## HEALTH DEPARTMENT

CITY OF PUEBLO

Bert. L. Beaty  
Commissioner of Health

W. E. Buck, M.D.  
Chief of Department

Frances M. Henigman  
Chief Clerk

PUEBLO, COLORADO

July 29, 1946

Health Officer  
City of San Antonio  
San Antonio, Texas

Dear Sir:

I understand that San Antonio has done a great deal of DDT spraying because of the Polio epidemic. We are having a few cases of the disease here, in fact we have five cases so far in Pueblo, and of course, we want to do everything we can, not only to control Polio, but to get rid of the flies if we can possibly do so.

May I ask you to give us a little detail of what you did, what spray or strength of spray you used, how and where. Also, the results as far as the elimination of flies was concerned and whether or not you think it did anything to help control Polio or any other diseases. With the experience you have already had, what would you do again under similar circumstances.

Thanking you for an early reply, I beg to remain,

Yours very truly,

DEPARTMENT OF HEALTH,  
INSPECTION & SANITATION  
(signed)

W. E. Buck, M. D., Chief

WEB/h  
Enc.



July 31, 1946

W. E. Buck, M. D., Chief  
Department of Health  
Inspection & Sanitation  
City Hall  
Pueblo, Colorado

Dear Sir:

This is in reply to your inquiry of July 29, regarding control measures used in our polio epidemic. We shall endeavor to briefly answer your questions and give you an idea of the procedures which were followed.

The outbreak was rather explosive in nature with a mortality of 50%. Of course, this high mortality rate did not continue but it did serve to shock our city and arouse everyone to immediate action. Our first efforts at control, in addition to general clean-up efforts and special drive for covered garbage containers, was in the nature of spraying operations. Both power and pressure hand sprayers were used at this stage of our campaign. A DDT concentrate in xylene and tritoe of about 25% strength was used. This was diluted with water to 7%. A considerable area around each case was treated in this manner.

After the first wave of hysteria wore off and we were enabled to collect ourselves and more carefully make out our approach, the spraying procedure was somewhat changed and other control measures instituted. Power spraying was used only on creeks and ditches and this was later abandoned altogether. Spraying was inaugurated and is still being carried on at the various garbage dumps and sanitary fills. Garbage trucks upon being emptied are also sprayed before being returned to the city. A 5% DDT solution in kerosene is used for this purpose.

Since we have considerable areas where sanitary sewers are not available, it follows that we have a large number of pit toilets. Larviciding of these pits was begun as a measure towards fly control. Because we desired for the public to take over this operation and carry on their own larviciding operations, we decided to make it as simple as possible. Therefore only straight kerosene was used in this operation, and its continued use has been requested of the individual householders.

W. E. Buck, M. D.

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July 31, 1946

After we had been in our polio campaign for something like two or three weeks, the Todd Ship Building Corporation made available to us one of their fogging machines. This machine blankets an area with about 10% DDT fog. Kerosene is vaporized in order to create this fog. While the residual thus created is not heavy, it does have some lasting effect, and has the redeeming feature of being mobile and rather rapid in coverage. It is operated from a truck. We subsequently purchased this machine and are now using it for all case area control, and, in fact, for all city-wide fogging operations.

The above efforts resulted in a remarkable reduction in the number of flies. While flies are not 100% eliminated, they are rendered very, very scarce. It is our belief that the rather wholesale elimination of insects, such as flies and mosquitoes, not only aided in the campaign towards polio control, but that it has also reflected a reduction in the number of cases of infant diarrhea. We have also experienced -- at least up to this date -- a reduction in the incidence of typhus but we cannot be so definitely assured that our current campaign against polio had been reflected in our trouble with typhus.

You asked the question, "With the experience you have already had, what would you do again under similar circumstances?" We would concentrate on two things -- city-wide fogging operations and especially efforts towards fly control. These special efforts would be, specifically, garbage control and larvaciding of pit toilets. It is our belief that those measures would serve to reduce the insect population.

In addition to the above information as to control measures, other things incidental to the campaign might be worthy of mention. Due to the excitement, this office was flooded with hundreds of complaints. As is usually the case, many of these had no connection with public health and were rather trivial in nature. We processed these to the best of our ability, and, of course, did succeed in the elimination of many health hazards. The pressure of the campaign and of public opinion, naturally enabled us to accomplish things which would have been very difficult under ordinary circumstances. One of the most profitable by-products of the campaign developed in the form of a house-to-house or premise-to-premise inspection service. We developed and still have operating a crew of 16 men who operate as a unit. A block is cleaned up before proceeding to the next block. Of course, several blocks are covered each day. In fact, the number of premises inspected daily will run from 800 to 950. We have now covered a number of about 35,000 premises. Five points are included in this survey sheet. A copy of it is herewith inclosed.

It might interest you to know that the ban on public gatherings which was proclaimed at the beginning of the polio campaign in May has just been lifted as of July 29.

W. E. Buck, M. D.

- 3 -

July 31, 1946

We trust this will give you the information desired. Should there be anything further, do not hesitate to write us.

Very truly yours,

R. L. Marvel, Chief  
Environmental Sanitation

Approved:

E. J. Arendt, M. D.  
Acting City Health Officer

August 6, 1946

Dr. F. P. Hunsy  
Director of Public Health  
Laurel, Mississippi

Dear Sir:

Dr. E. J. Arendt, Acting City Health Officer, has asked me to write to you concerning cost of our DDT operations and the equipment we used, particularly the Fifa fogging machine manufactured by Todd Shipyards Corporation.

#### Background

When "Pellic" broke out early in May we had knapsack sprayers and dusting equipment. The State Health Department assigned a power sprayer to assist us in the emergency. We put sixty special men on spraying and house-to-house inspection crews, besides our fifteen regular sanitarians.

The Fifa fogging machine was called to our attention and after consulting the local representative, Martin-Smith Company, it suggested such improvements over the type of equipment we were using and others that were offered to us that we accepted the offer of Todd Shipyards Corporation to loan and try out their machine. We had the Fifa machine flown from New York, together with a technical expert and mechanician. We purchased the machine after giving it a thorough trial which demonstrated its superiority and economy over our other methods.

Cost of operations. We were directed by our Medical Technical Committee to spray an area of four city blocks around each case. This originally required squads of six men each, a pressure knapsack sprayer for each man, using 25% DDT Concentrate @ \$2.50 a gallon mixed with five parts of water. We could not use DDT with an oil base since we were directed to spray windows, doors and screens of houses and interiors, if possible. This method of operating took six men two days using 60 gallons of DDT concentrate. These men had to be supervised and transported, thus tying up one truck, six pressure sprayers and two "spare" sprayers per squad. This cost us about \$225.00 per pellic case besides transportation. The whole area was not covered but just approaches of flies to each house.

2 - Dr. E. P. Handy - Laurel, Mississippi - August 6, 1946

While this was going on a crew of two men with the Tifa machine transported on a one ton truck, stake body, were covering twenty-five times the area at a cost of about \$100.00 and getting complete coverage and not just special selected "targets". DDT technical grade at \$.50 per pound delivered at San Antonio mixed with low grade kerosene was used in the "fogger".  $3\frac{3}{4}$  pounds of DDT was used with each ten gallons of kerosene or 120 pounds of DDT and 320 gallons being used each eight-hour shift with the truck going at the rate of ten miles an hour. Five square miles per each eight-hour shift can be covered. Incidental equipment consists of one rotary kerosene barrel pump, one five gallon gasoline can, eight ten-gallon milk cans and a measuring can for DDT. We asked householders to open up doors and windows to let the "fog" inside the house. We added pine oil in proportions of one quart to ten gallons of liquid or eight gallons per eight hour shift at a cost of \$12.00 to avoid the slightest possibility of criticism of odor and received no complaints.

We used pressure sprayers on special restricted areas such as garbage dumps, using seven ounces of DDT technical per gallon of kerosene. Spraying went on intermittently during dumping hours.

Based on our experience, we abandoned individual spraying except in special known fly-breeding spots in favor of the Tifa fogging machine for the following reasons:

1. Cost. The Tifa fogging machine very substantially reduces operating costs over other methods and brings the cost within ordinary budget resources. It can, therefore, be standard equipment and not dependent upon special emergency budgets.
2. Coverage. Immediate, expeditious and reasonably complete coverage is attainable.
3. Flexibility. Due to simplicity of the operating unit and its mobility, the Tifa machine can be diverted from systematic area fogging to special areas without loss of time or confusion.
4. Supervision and Organization. No large organization has to be built up "overnight" in case of emergency with its attendant problems of squad supervision, allocation and upkeep of many units of equipment, material-mixing and transportation.
5. Public Reception. No complaints based on bad effects of "fogging" have been filed. Numerous complaints based on intrusion into private property and damage have been received as a result of squads entering premises and spraying fly and mosquito entrances to houses.
6. Safe Mixture. Uniform, all purpose mixture was assured and the elimination of the "human factor" was procured. Changes from one type of DDT mixture to another and supervision in selecting appropriate mixture for site to be "sprayed" is eliminated.

3 - Dr. T. P. Haney - Laurel, Mississippi - August 6, 1946

7. Downtown areas can be "fogged" at night and is the only practical method we have found to cover this special area expeditiously, safely and effectively.

8. Incidental and special uses. Public auditoriums, dairy farms, stadiums and insect nuisance spots can be treated inside and out with "fog" quickly, effectively and economically. The good will resulting to the Health Department is an important consideration since other departments of municipal government, the business world and public are benefited. The equipment can be moved into areas any "power sprayer" can reach.

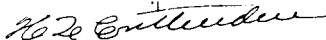
9. The capital investment of Tifa machine delivered, plus all incidental equipment is under \$1,500.00. The savings over spraying and dusting by other methods has already paid this cost and shows a saving.

10. High authorities question the efficacy of "dusting" from air and ground and spraying DDT except in limited and known fly-breeding areas. This whole controversy seems to us to be beside the point since it is predicated on the use of previously standard equipment, which we have abandoned in favor of the Tifa fogger since it obviates the defects of the other methods. At any rate, our Technical-Medical Advisory Board is extremely complimentary as to the results achieved by our field force. See Time magazine, Prof. C. E. Winslow, San Antonio Evening News and San Antonio Light of August 5 and San Antonio Express of August 6th. Colonel Charles F. Craig, tropical disease expert, is quoted as saying Prof. Winslow's opinion is "one of the worst out-of-date statements I ever heard".

You will understand that this analysis is written solely from the "operations" point of view. In other words, after the directors and experts have ordered what is to be done, the mechanics, selection and procurement of equipment and materials; the problems of organizing field work and at a reasonable cost are the responsibility and "headache" of the chiefs of divisions and staff of the Health Department.

Trusting that this covers the questions in your mind when you telephoned Dr. Arendt and will be of assistance to you, I am

Very truly yours,



H. L. Crittenden  
Administrative Assistant