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CHEMICAL WARFARE BULLETIN

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CHEMICAL WARFARE BULLETIN

Published Quarterly
by
The Chief of Chemical Warfare Service

A review of developments in the
application of chemicals
to military effort.

REPRODUCTION PLANT
CHEMICAL WARFARE SCHOOL
EDGEWOOD ARSENAL, MARYLAND

A Surprise Attack!

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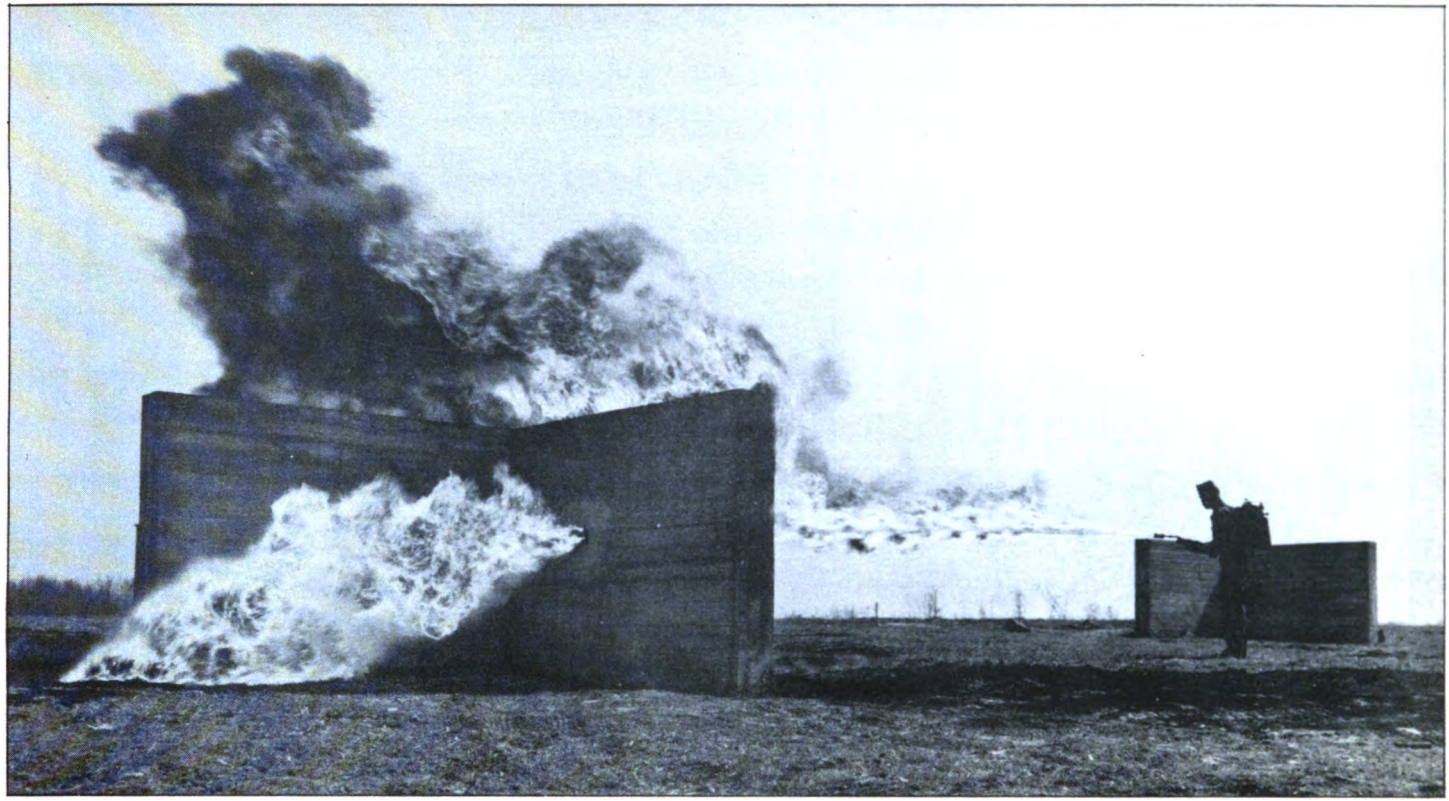
Views expressed in signed articles are those of the writers and should not be construed as official.

Original articles and discussions are welcomed.

Address all correspondence to Chief of the Chemical Warfare Service, Washington, D.C.



Flame throwing demonstration at Fort Belvoir

THE CHEMICAL WARFARE SERVICE IN NATIONAL DEFENSE*

Maj. Gen. William N. Porter
Chief, Chemical Warfare Service

At this time when the armament of the nation is a subject constantly in the minds of all of us; you as chemists are doubtlessly interested in just what part the service which has "Chemical" as a portion of its name, plays in promoting and insuring our national security. You should know, for we in the Regular Army have always considered ourselves the military representatives of your great Society and have, through the years, unhesitatingly asked for your assistance in many problems. We need your help now to the utmost possible extent. Science, and not manpower, is increasingly predominant in war, with one happy, and I may say unexpected, result in decreasing casualty lists. Brains and not brawn will decide the terrific issues which alienate the nations of the world today.

Thus far, gas warfare as we knew it in the World War, and more recently in the Italian-Ethiopian campaign, has been absent from the battlefields of Europe and Asia; but you should know that it is perfectly possible for it to burst into full intensity at any moment.

We know that all of the European belligerents are well equipped with chemical agents and well prepared to use them. Regardless of the treaties which exist between them, it is fully realized by all that the best insurance against such an attack lies not only in gas masks and protective clothing, but in the ability to retaliate immediately. We are well informed in the Military Intelligence Section of our Army of weapons, gases, and instructions for their use by all belligerents, and we have a very considerable knowledge of the amounts and kinds of agents being manufactured and stored in the arsenals of Europe, ready for instant use.

Whether or not gas warfare will be used depends solely on whether Hitler's generals feel that the advantage to them would surely outweigh any disadvantages. Until now they have

**Address at 102d meeting of the American Chemical Society in Atlantic City, N. J., September 10, 1941.*

not felt so, and I think rightly, since persistent gas at least is primarily a defensive weapon and would have been of much more value to the retiring Russians than to the advancing Germans. Hitler understands well that mustard gas on British beaches would add materially to the precariousness of an invasion. On the other hand, should he believe that one gigantic overwhelming stroke with gas would win the war for him, I am convinced that he would use it without question. Treaties signed and sealed have not restrained dictators from any course of action suited to their purpose. This war will never be really "all out" until gases once more flood the battlefields.

Improvements in technique make possible gas attacks on a far wider scale than any seen in the World War. Fleets of airplanes equipped with chemical tanks make it possible to spray large areas with vesicant liquids, not only on military personnel, but upon the civilian population as well. That a gas attack is considered possible at any time is evidenced by the fact that all of the belligerent nations have equipped their armies with gas masks and have them ready for immediate use. General Staffs do not require soldiers to carry three or four pounds of extra weight just for fun.

Mussolini, besieged by the sanctions of fifty two nations, did not hesitate to use mustard gas on the unprotected Ethiopians to bring to a sudden end the first Abyssinian campaign. We have the testimony of Haile Selassie himself that mustard gas was the final blow which lost his war. You can be certain that neither Hitler nor Mussolini have forgotten this.

Internationally, our situation is peculiarly different. We are parties to no treaty prohibiting the use of gas in war. Other important powers which did not sign the Geneva Protocol against gas include Brazil, Argentina, and Japan. The Senate of the United States, after full consideration of the facts, refused to tie the hands in war of the greatest scientific and industrial nation of the world. All nations have laws against murder, but none as to how it should be committed. To attempt international regulation of warfare is to regulate a paradox. It must be remembered, however, that not even the fiction of a treaty exists to prevent the Axis powers from using gas against our military forces. Safety lies only in the best possible defensive measures, coupled with the ability to retaliate to such an extent as to be overwhelming. It is the job of the Chemical Warfare Service to take care of these matters.

We are charged by the law of the land with military problems relating both to offense and defense in the general field of poison gases, screening smokes, and incendiaries. In actual practice, however, the functions of the service are expanded much beyond the bare outline of the law. Today we are not only the adviser of both the War and Navy Departments on all

matters pertaining to chemical warfare, but also on many problems of chemical manufacture pertaining to national defense. As a result,the links joining the Chemical Warfare Service and many members of the American Chemical Society are numerous and the contacts close.

For many years the President of your Society has appointed each year a group of some twenty distinguished members to serve as a committee to guide and assist us in carrying out our mission. This committee has a rather long and formidable name--the Committee of the American Chemical Society on Cooperation with the Chemical Warfare Service--but in common parlance we term it the Advisory Committee of the American Chemical Society. This group is divided into four subcommittees: research, development, physiological, and production. The Advisory Committee meets from time to time to study the problems of the Chemical Warfare Service and to offer its suggestions that those problems may be solved in the most expeditious manner. The various individuals forming this committee have always been generous in giving us the benefit of their professional advice.

In addition to the Advisory Committee, there are over one hundred members of the American Chemical Society who have been appointed as consultants to the Chemical Warfare Service. Thus one hundred twenty to one hundred thirty members of this great Society are intimately concerned with many of our most important technical problems. Much of the success which this service has achieved in meeting the pressing problems of national defense during the past two years is due to the American Chemical Society as an organization and to the individual members who have given so freely of their time and information.

Our work naturally divides itself into research, development, procurement and manufacture, and supply to the Army of those things which pertain to chemical warfare. Unlike the other supply services, we are further charged with training and combat functions. The Chemical Warfare Service supervises the training of the entire Army in gas defense and also trains chemical troops in the offensive use of gases, smokes, and incendiaries. As a result of these varied activities, our officer personnel includes not only men with chemical training,but men who must be well versed in all forms of military art. I, myself, am only a chemist by Act of Congress.

When our defense efforts were speeded as a result of the European conflagration our research and development was, with the assistance of members of the American Chemical Society, sufficiently far advanced to enable the designs to be crystallized, manufacturing instructions to be set forth in precise detail, and procurement to be initiated immediately when funds were made available. The result has been a happy one--our production schedule has been met on time.

In two years the Army of the United States has been increased from a small Regular establishment to more than 1,500,000. Two years ago there were one hundred nine officers in the Regular Army on duty in the Chemical Warfare Service, the smallest number in any branch. No Reserve Officers were available to the Chemical Warfare Service except for short training periods. Today, in addition to the Regulars, we have on extended active duty almost 1,000 Reserve Officers. By bringing these to our aid, and most of them are members of the American Chemical Society, we have gained the assistance of a great array of talent from the industries, colleges, and the scientific institutions of the United States. These men have supplemented the efforts of our Regular establishment enormously and are today our chief dependence for carrying out our mission.

There are said to be nine Principles of War; but the principle of surprise is the one on which the bets are usually paid off. Of all the weapons of war, chemical agents are potentially best suited for surprise tactics: intensified research is our greatest protection against such possibilities. Our research organizations at Edgewood Arsenal, working at an accelerated pace, have been greatly supplemented in recent months by the invaluable aid of the National Defense Research Committee. Through this organization, the best chemical talent in the country has been made available under the most capable leadership. As you know, Dr. James B. Conant, president of Harvard University is the head of this organization. Dr. Conant's contributions to the Chemical Warfare Service in the last war, particularly in connection with Lewisite, are familiar to most of you, and it is fortunate indeed that he can find time to devote to the work of the National Defense Research Committee in the present emergency. Here also we are greatly and constantly indebted to Dr. Roger Adams.

To supplement these two agencies, we have recently set up a development laboratory of considerable size at the Massachusetts Institute of Technology. Through the cooperation of that great institution, we shall be able to carry on work on many problems which the facilities there make possible.

On the defensive side the first item, of course, is a suitable gas mask for military purposes. Plans existed for the production of enormous quantities of gas masks for our greatly expanded Army. We have maintained a gas mask plant at Edgewood Arsenal since the World War, operated by a skeleton force. Recognizing the need for spreading our activities over a wider area, so-called educational orders were placed with a number of private firms as early as 1939. These educational orders gave manufacturers an opportunity to tool up for production and to train their workers in the operations peculiar to the manufacture of masks. This is not a simple process; there are

many perplexing production problems. There are eighty three component parts in our service mask.

We have had to procure activated charcoal, soda lime, and other materials in tremendous quantities. The charcoal problem has been particularly difficult. The development of a fully molded rubber facepiece was found to possess distinct advantages over previously designed masks. In addition to our expanded plant at Edgewood, we have today many privately operated firms making masks with special equipment which is government-owned. I am happy to tell you that every soldier in our expanded Army is now provided not only with his individual gas mask for training purposes,but there is on hand a service mask ready for issue to him when necessary. At this time when the newspapers are full of reports of shortages of equipment, you will be gratified to learn that the Chemical Warfare Service has fulfilled that portion of its duties 100 percent.

Defense against chemical agents requires many other items than gas masks. Protective clothing must be procured; protective ointment must be provided;the shoe impregnite, which protects the feet against vesicants, must be supplied; the charcoal production must be greatly expanded and accelerated. Many minor but important items for protection must be manufactured and distributed.

Protective devices, of course,are not in themselves enough. The second great task which the emergency thrust upon us was the supervision of the training of our expanded Army in defense against chemical attack. One of the greatest dangers from such an attack is the psychological response found in untrained personnel. Gas has been a particularly frightening weapon; it is only by patient and thorough anti-gas training that troops can overcome their instinctive fear of such attacks. To meet this situation our Chemical Warfare School at Edgewood has been greatly expanded during the past year from the usual 200 graduates to more than 1,000 in order to supply an officer with the requisite knowledge to each regiment and comparable Air Corps unit. This graduate then conducts anti-gas schools within his unit, assuring we hope, that the first big step has been taken to provide adequate training for the men of our Army.

We are now conducting classes to train firemen and other civilian workers to defend our cities against incendiary attacks. They will act as instructors for the many thousand civilian wardens who would be necessary should we be attacked.

Our Service works very closely with the Office of Civilian Defense under Mayor LaGuardia. We have designed a suitable mask for civilian use containing the minimum of strategic materials, and through educational orders are ready to start production of large quantities without delay.

In addition to the work at the Chemical Warfare School it-

self, every other service school, Infantry, Cavalry, etc.,carries on its staff an officer of this Service, and there is a chemical officer on the staff of every army, corps, and division. There is also at least one at every camp, post and station. While far from satisfied with the extent of the anti-gas discipline and training today we are working hard at it.

The picture of what we are doing and what we plan to do defensively is not complete without some reference to the Chemical Warfare special troops who are organized for defensive duties entirely. For example, each of our four armies, as well as the overseas forces, include, or will include, decontamination companies prepared to neutralize vesicant gas and other chemical agents in key positions and along routes of travel to important locations. Of course each unit of the Army is taught to carry out the decontamination of its own equipment in its own area. The purpose of special decontaminating companies, therefore, is to handle those situations which are beyond the capacity of the line troops and to provide what might be called foremen for working parties of such troops.

Depot Companies are provided to handle our rather difficult supply problem. Maintenance Companies exist for the repair of chemical warfare material in the combat zones and to keep such equipment operating in the best possible condition.

Another company of unusual interest treats contaminated clothing to make such garments again wearable in the minimum time. These companies also impregnate ordinary uniforms with chemicals so that the wearers have increased protection against vesicants.

One last group of special chemical troops is the Chemical Field Laboratories. These units, provided with portable chemical and physical equipment, complete even to a technical library, will operate in an advance zone of the Theatre of Operations. Analyses of enemy chemical agents and munitions will be made by them in the field so that the Army Commanders can be informed with the least possible delay as to what protective measures should be taken. These Field Laboratory Companies are the most highly educated groups in the Army today. More than half of their personnel hold college degrees. In the two companies now existing we have four doctors of philosophy, eight masters of science, and seventy-five who hold bachelor's degrees. All of the officers and nearly all of the enlisted men are chemists. A total of fifty-two colleges and universities are represented, including all of our best known institutions. I would not have you think that we need this array of talent for these particular outfits. It results from the fact that these individuals were inducted into the Service by the operation of the Selective Service Act. As a matter of fact we are trying to return some of these men to industry where they are badly needed.

Lastly, we are concerned, of course with adequate preparations for offense. Wars are not won by gas masks or other defensive material. To overcome an enemy we must take the offensive.

I am one of those who believe that the word "defense" has actually hindered our military preparations in this country. If we are to carry out the declared purpose of our Commander-in-Chief and crush Hitlerism, no amount of defensive preparations can do the job. Only an Army organized as a striking force can build a true and disciplined morale. Defense is a negative word, an insincere word, and no word at all around which to rally a military effort. It has its place, of course, in any military vocabulary, but we have endowed it in this country with connotations which have destroyed its proper meaning.

To be unprepared to retaliate with any form of weapon is to invite attack by that weapon. For that reason alone, our Chemical Warfare Service must be prepared to supply the Army with great quantities of chemical agents, should they be needed for carrying on active hostilities. War gases cannot be manufactured on short notice. Based generally on industrial products, additional and complicated steps must be passed through before we can change the chemicals of peacetime to those of war. Manufacture requires specialized equipment and highly trained personnel. New factories must be constructed; production problems are many and difficult. Large quantities are needed, since toxic gases are only of value in war when used in the largest quantities.

In order to prepare ourselves for offense activities, plants at Edgewood Arsenal have been rehabilitated and many new ones have been constructed. An additional arsenal is now being built at Huntsville, Ala., well protected from hostile activities which might occur along the seaboard. We are confident that these two arsenals, backed by the enormous chemical industry of the United States, will force any hostile power to think seriously before using chemical agents against us.

One of the outstanding developments in war today has been the widespread use of incendiaries. Two and four-pound bombs constructed of magnesium alloy with a thermite starting charge have been dropped by the tens of thousands on Great Britain and the continent of Europe. Should our nation engage in hostilities, our Air Corps requirements in this type of weapon alone will run into many millions of such bombs. The Chemical Warfare Service is charged with the design, production, and issue of incendiaries of this type for our Army. This is a new responsibility. Headed in my office by Col. J. Enrique Zanetti, of Columbia University, the work is going forward as rapidly as conditions will allow.

It is highly probable that if gas is used it will find its

greatest application to Air Corps tactics. The Field Artillery were large users of gas in the last war. The Chemical Warfare Service includes in its organizations units for the offensive use of chemical agents, including smoke,on the largest scale. Screening smoke, a responsibility of ours, has been used by all of the European combatants to protect the advance of attacking infantry and tanks against aimed fire. Lately, large area smoke screen installations have come into being over many of the German industrial cities, as well as some of the factories in England. These installations cover many square miles and must be ready to operate in a very short period of time. With our national shortage of antiaircraft guns, it is an important job of our service to see that we excel in these military aids.

All of this gives your representatives in the Army plenty to do. Our work is far from routine. No dead hand of tradition grasps at our ankles. We are imbued with the idea that should we become actively involved in the war, we must plan to win it by some greater application of technical means than is possible to our enemies. If Hitlerism is to be defeated, we must do more than follow his pace-making. Some three hundred German divisions alone, well trained and well equipped, were at his disposal when the Russian campaign began. There is good reason to believe that there are considerably less now, but it is still a fact that our Army, partly trained and partly equipped, consists today of some thirty-three divisions. Some technical means, some finer weapons, some superior intelligences, must bridge the gap.

In preparing the United States for its security or for waging a war on a foreign shore if need be, the Chemical Warfare Service is doing its bit as a member of the Army team. Modern all-out war demands for our country team work between the chemical profession represented by the American Chemical Society and those in the military profession represented by the Chemical Warfare Service. By our coordinated efforts in the past, we have made available to our Army many improved devices and techniques as well as new materials. This spirit of cooperation between our organizations is most gratifying to us in the military service.

I am confident that our nation need have no fears concerning chemical warfare so long as this close collaboration between the American Chemical Society and the Chemical Warfare Service exists; and I am certain that it always will.

CIVILIAN DEFENSE*

Mayor Fiorello H. LaGuardia
Director of the Office of Civilian Defense

Commanding Officer, gentlemen:

I am very happy to have the opportunity of coming here this morning because I know that you would want me, on behalf of the cities and States to express our thanks and appreciation to the Army and to the Chemical Warfare Service, and to the Commanding Officer of this School. I want to thank you, gentlemen, for the very fine cooperation which you have given us.

You are the first class of its kind. Classes will follow now until we have covered every city in the country.

When you return to your homes to resume your duties you will have the responsibility not only of training your own department, but also training the auxiliary forces that will be enrolled and that we find necessary to supplement existing fire departments,and in making up our air raid warden service.

There is one point I would like to make. I am sure that every one of you will be confronted with this question: "Why is this all necessary? Does the Army expect our towns to be bombed and attacked?" Of course, the answer is that we do not expect to be attacked or bombed tonight - or tomorrow - or the day after tomorrow, but that this specialized and highly technical training that you have taken is necessary today in view of existing conditions and in the face of an entirely new technique of war.

There was a time when the civilian population did not have very much to worry about in times of war, insofar as their own personal safety was concerned. Cities were not generally exposed to attack. There were forts along the coasts that afforded sufficient protection. All that has changed. The technique of attack has changed, ships have been built larger, the range of guns has increased. And now, with the advent of aviation, there is no longer any such thing as localizing war,and about the safest place to be in is a first-line trench. It is

*Address to first Civilian Defense class at Chemical Warfare School, Edgewood Arsenal, Maryland, July 11, 1941.

the cities that are attacked,and the non-combatant population, women and children, are actually exposed to attack.

Now, we have seen that distance cannot be relied upon entirely for protection. We are now delivering planes to England, flying them over. A few weeks ago a plane left a certain point in North America and reached a certain point in England in 8 hours. If that can be done one way, it can be done the other way. So that the comfort of distance simply does not exist any longer.

You and I are just city officials, and we have nothing to do with shaping the foreign policy of our Government. The American people have delegated that to the President and to the Congress. That is not our job. It is our job to protect the people of our cities and of our States. We do that in case of fire or disease,we afford policy protection and health protection. On top of this has come this new responsibility, and that is to give protection to the civilian population in the event our country is attacked or becomes engaged in war. We have the responsibility of being prepared and ready.

I am sure you will all realize that all this is new to us, and it is going to take time, first, to have the necessary training in the permanent departments of our cities, and then to educate the people of our cities to have self-imposed discipline so that they will follow instructions and obey orders in the event of an attack.

In addition to that, every city and community will have to obtain necessary equipment, and no city has that equipment today.

We have taken an inventory based upon the experience of the English cities, and we are now about complete in our estimate as to just what additional supplementary fire-fighting equipment each city should have, and we have taken the engine company as a basis.

We know that we should train an auxiliary fire-fighting force from 3 to 5 times the number of the permanent professional fire force. That depends upon the layout of the city, the type of construction and the equipment now available.

These auxiliary companies will have to be equipped, not with the same type of apparatus we now use, but with portable pumpers placed at strategic points, and other necessary equipment that has been tried and found necessary in the English cities. No city in this country and no State that I know of, has available at this moment the money with which to buy the equipment that is necessary. And even if we did have the money, the equipment does not exist.

We must also take care that we all agree on the type of apparatus needed. We are now in consultation among the cities concerning the best type of equipment that can be obtained, again based on English experience, in order to have uniform

specifications and uniform equipment all through the country. The reason for that is obvious, and we discourage cities rushing in and seeking to obtain equipment on their own specifications, and we have a general agreement on that.

It is my intention,as soon as this inventory is completed--and I have conferred with all of the Mayors of the country and with a great many of the Governors--to present the matter to Congress and to seek to have Congress provide for all the additional emergency equipment that is required and needed throughout the country. Naturally, the needs along the coasts, Atlantic, Gulf and Pacific, are much greater than they are west of the Alleghenies or east of the Rockies.

We estimate that it will take from a year to a year and a half to provide all of this necessary emergency equipment, so that we will be in need of additional apparatus for several months to come. In the meantime, we can train our auxiliary fire forces.

Now, when I talk about auxiliary fire forces, I mean just that--companies that will be stationed in the zone of each engine company and that will move out on call to fight fires. That does not include the spot firefighter, the incendiary bomb spotter. He will be enrolled in the air raid warden service.

In all likelihood, in your respective cities you will have the responsibility of training this part of the air raid warden service. Under our present table of organization, a large percentage of the air raid wardens are trained for spot firefighting. They use the sprays and the snuffers and sand. They are placed on roofs, on the streets, and at all strategic points, and they serve with the air raid wardens. That force is separate and over and above the necessary auxiliary fire forces. In some of the smaller communities in all likelihood you will combine it under one command.

There is another problem that will present itself to you in your respective cities. Naturally, we will want to use the cooperation of all existing organizations--American Legion, Veterans of Foreign Wars, women's auxiliaries, and other organizations. But you men who are experienced know that in times of emergency, we must not have any conflict of command or any confusion. I have sought to make that perfectly clear throughout the country.

I have conferred with the heads of most of the national organizations, and they understand the necessity of complete, undivided command and discipline in these auxiliary forces. Therefore, these organizations can help you in enrolling your personnel. They can help in some of the training. For instance, the Red Cross in many localities will continue its course in nursing and first aid and rescue work, on a standard approved by the Office of Civilian Defense. We must have uni-

form standards. But when their members report for duty to the regular establishments of the city, they lose their identity as members of any specific organization, and become members of the auxiliary fire force or of the air raid warden service. That must be made clear, because you will readily see the confusion that would result when and if we are called into action, were each of the various organizations working with you to expect that they will command their own members. I think the confusion that would follow would cause greater damage than the bombs themselves. So that must be avoided--but make it very clear at the outset that we need their cooperation in enrolling members, that they can help in training, but that your regular departments will assume responsibility and command.

Now, the Departments of the cities are the logical departments or agencies to take over this emergency and protective work. The fire departments, of course, are trained to fight fires, and the auxiliary force necessary to meet an emergency is under the direct command of that fire department and becomes a part of it when in action. There can be no division of authority. Where, as in the larger cities, you also have your air raid warden service separate from the fire department, then the Commissioner of Public Safety, or the Police Commissioner or Chief, as the case may be, assumes command,and all of the air raid wardens are under his command and become part of that police department.

When we come to clearance, removal of debris, rescue of people out of demolished or shattered buildings, those squads do not move until they get the clearance. Your public works department or whatever corresponds to that, your street repair department, your water supply department, must all be merged along with your utilities, the telephone and gas companies--they must all be merged into your clearance and repair service. Gas mains, water mains, sewers,are all exposed, and may be and are very often shattered and broken, but all of your repair squads must be coordinated, and you must provide these rescue squads, whether they are telephone, gas, water supply or sewers, with additional labor divisions, because very often they will require a large number of men to make the necessary clearance so that they can get to the utility to make the temporary repairs.

Your health department comes very close to these repair squads, because if your sewer is in close proximity to your water main and they are both broken, then your health division must come right in and see that there is no contamination, and if there is the slightest danger of contamination, they must shut off that supply system in the area that might be infected. Then you must provide for an emergency water supply for the section involved.

You will find that organizing your repair squads will not be difficult because every city and every community has a pretty good nucleus in their road repair, street repair, water supply and sewer departments. The telephone and gas companies have equipment. While this equipment, available now, may not be quite enough, you must improvise equipment and commandeer trucks,and the departments of cities as a rule have sufficient number of trucks to move your labor battalions out in order to make the necessary clearances and repairs.

Your medical divisions are entirely separate, and your health officer or head of the hospital system or senior medical officer would take charge of that. That is entirely apart and distinct from your line. They will function and come on call when necessary. There will be men and women who are trained in first aid among the air raid wardens, and the rest of your squads of course will rescue people and they will be cleared from the field stations to the hospitals.

Now, it is a big job, men. There is much detail to it, and you have had the advantage now of special instructions in a highly specialized and technical branch of civilian protection.

All that we can give our people is this passive defense. It is not our function to fight the enemy off. We are helpless. If the enemy gets by our bases, our Army and our air force,all we can do is to provide passive defense, that is, to protect the people with no means at all of fighting back. That isn't as spectacular as having the weapons and the opportunity to fight back. All we can do is to afford the maximum protection, and one of the most important parts of our work is gradually but persistently train the civilian population to the necessity of cooperating and following instructions.

Your building departments will classify the buildings in your cities so that the residents of each house will know just exactly what part of the building to go to. The clearance of streets immediately following the first alarm is necessary, and everybody must be off the street.

We do not contemplate at this moment the building of shelters. Judging from the English experience, shelters are being used less and less, although the intensity of the bombing has increased. Therefore, each building must be classified and identified, and the occupants of that building advised just what to do. In every plant you should train the air raid warden for that plant and fire protection. Every plant must have its own emergency squads in addition to your regular city-wide service, so that among their own people they can provide the first protection. If the plant or factory is running 24 hours a day, there should be 3 shifts of men and women trained to do this work. If it does not operate at night, then among its employees living in the vicinity of that plant there should be

some who are trained and disciplined to report for the protection of that particular plant or factory, in the event of an attack.

Uniform instructions and manual of procedure will be provided from the Washington office. Naturally, in all the instructions that come from Washington or from your Civilian Defense Director in your particular corps area, or from your State Council of Defense or local council of defense, you must remember that they should be adjusted to your local conditions. The instructions can only be very general.

And now, as you go home, please bear in mind that this is only precautionary, just the same as the precautionary measures that the health departments and police departments provide. The health department provides measures against epidemics, not because we expect to have epidemics, but because we must be ready should they come. The same is true in your work of civilian defense.

I want to congratulate you on having had the opportunity of taking this course. I want to thank the faculty of the school and the Commanding Officer for their kind cooperation. Let the whole world know that while we do things in our own way, we are not goose-stepping into action; we are getting ready, and we are afraid of nobody.

* * * *

"I am firm in my conviction that *** there is no calamity which a great nation can invite which equals that which follows from supine submission to wrong."

- Cleveland

* * * *

PICTORIAL TRAINING

Lieut. R. C. Burn, CWS

There is a fundamental principle of psychology employed in the technique of instruction. That is, that teaching benefits if demonstration or illustration is used to amplify lecture material. Teachers realize that it is easier for a man to do a thing after he has seen it done than it is for him to do it after merely being told how. Obviously a student would have a difficult time trying to dissect a frog if he had only been told the method employed. If, however,he was shown how at the same time that it was being explained the task would be greatly simplified.

Illustration is becoming more and more widely depended upon as a means of disseminating all types of subject matter. For example there are the picture magazines; *LIFE*, *LOOK*, and many others which depend largely on pictures to tell a story. Advertisers use pictorial designs or cartoon strips to attract interest in their products. Then, too, many people would rather see a news reel than read a newspaper to find out what is going on in the world. Even statisticians realize that pictures have a universal appeal and are using series of small pictures to present their statistics, rather than relying on the old type bar charts. Why are all these things true? They are true because people like to find out about things,to learn about things, in the easiest and most pleasant way possible. Certainly it is true that a series of pictures is more comprehensive and easier to understand than a page of type.

The Army Signal Corps has realized the value of pictures as a means of instruction, and have turned out some excellent films and film strips depicting many essential phases of training. There is however, one fault or flaw in this method of instruction. The film is usually shown to a man but once, and is in time forgotten. It remains, then, for the Chemical Warfare Service to present a series of training pictures that may be retained by each man for reference when needed.

This could be accomplished by devising a training presentation of Chemical Warfare consisting of a series of pictures showing: historical background, modern technique, types and characteristics of agents,methods of dissemination, first aid,

and decontamination procedure. This presentation would consist of seven booklets, bound together and presented to each man as he came into the service. The first booklet would contain a pictorial history of Chemical Warfare, and also show modern weapons and their tactical use in the dissemination of chemical agents. The other six booklets would each tell the story of a situation in which one of the six types of chemical agents (Lung Irritants,Vesicants, Lacrimators,Irritant Smokes, Screening Smokes, and Incendiaries) would be employed. These situations which will be either during training or in combat will portray the experiences of several soldiers in dealing with gas attacks of one type or another. Each booklet would contain all the pertinent facts about one of the classifications of agents.

This method of presentation has several distinct advantages. First, it would answer the question, "What is Chemical Warfare", which is in the minds of nearly all personnel. Second, it would stimulate interest. This is important. It is important because all the training in the world is of no avail if a man is not interested in what he is doing. Third, it portrays methods of using Chemical Warfare materiel and depicts actual situations in which the soldier may find himself. Fourth, it is an interesting and painless way in which to learn. Fifth, it would be handy to the individual for reference and would contain all the material now contained in several different sources, and much pictorial material which is not available at all.

The following is the outline for the booklets, and on the pages following that is a sample presentation taken from *The Story of Mustard and Other Vesicants*.

OUTLINE FOR PICTORIAL TRAINING BOOKLETS

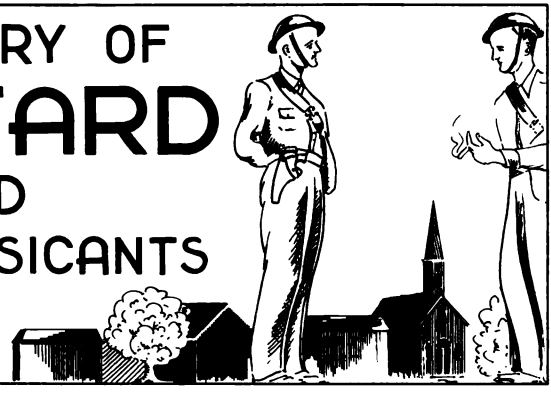
I. Booklet Number One. Title - *History and Modern Technique of Chemical Warfare* - containing:

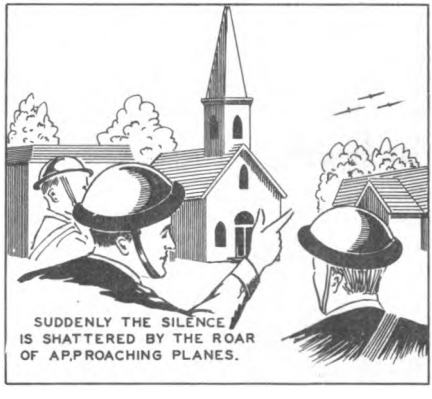
A. History of Chemical Warfare. A series of pictures showing the early development of the use of chemicals in war, starting with the earliest use of incendiaries and working up to the World War. This makes an effective opening by arousing interest and providing a background for modern technique.

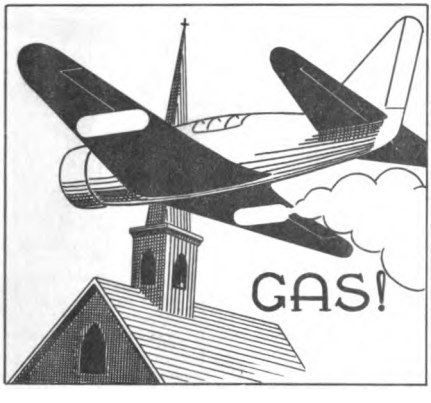
B. Weapons and Munitions used in Chemical Warfare, and their tactical employment. A series of drawings and diagrams showing the design, methods of setting up, and tactical situations in which the following would be employed.

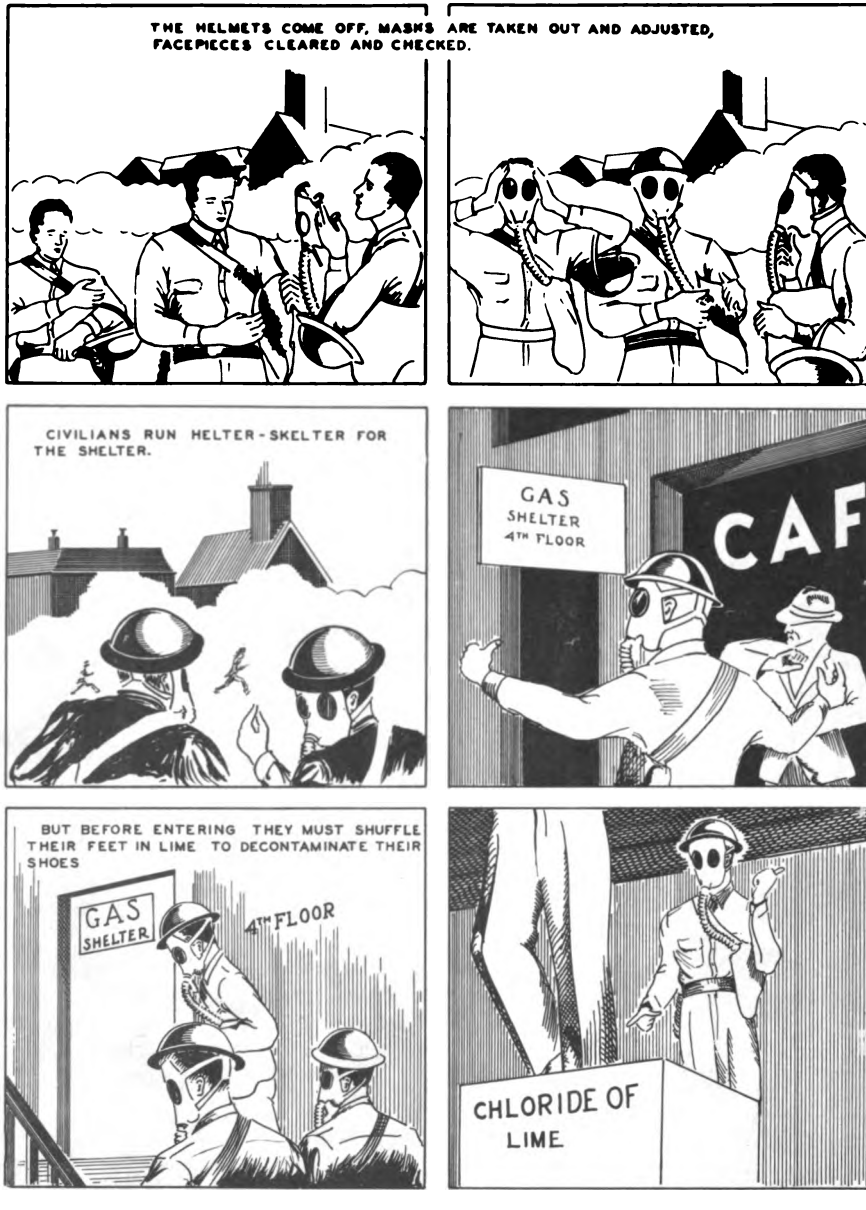
1. Weapons and Munitions used by the Chemical Warfare Service.

THE STORY OF MUSTARD AND OTHER VESICANTS

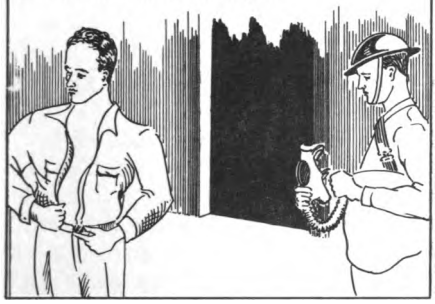






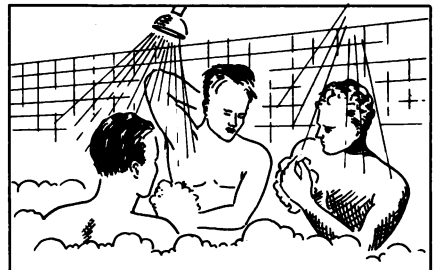


BEFORE ENTERING THE INNER ROOM THEY HAVE BLOWN MOST OF THE MUSTARD VAPOR OFF THEIR CLOTHES BY USING THE AIR BLOWER IN THE AIR LOCK.



THEN THEY UNDRESS···

AND WASH THEMSELVES WITH GASOLINE. MUSTARD GAS IS A VESICANT. VESICANTS ARE AGENTS WHICH CAUSE BLISTERS TO FORM ON ALL EXPOSED PARTS OF THE BODY GASOLINE DISSOLVES THE MUSTARD AND IF USED IN TIME WILL PREVENT THE BURNS. IF POSSIBLE IT SHOULD BE USED WITHIN FIVE MINUTES AFTER EXPOSURE.



THEN A HOT SHOWER WITH PLENTY OF SOAP TO REMOVE ANY REMAINING MUSTARD AND THE GASOLINE WHICH ITSELF WILL IRRITATE THE SKIN.

HERE COMES THE SERGEANT LOOKING FOR SOME HELPERS TO AID IN DECONTAMINATING SOME OF THE ROADS AND BUILDINGS IN TOWN

VESICANTS ARE PERSISTENT AGENTS RETAINING THEIR TOXIC EFFECT FOR AS LONG AS A WEEK IF NOT DECONTAMINATED

THESE MEN ARE CARRIED THROUGH DECONTAMINATION PROCEDURE USING ALL METHODS AND EQUIPMENT. AFTER THAT THE DIFFERENCES BETWEEN MUSTARD AND LEWISITE, AND MUSTARD AND ETHYLDICHLORARSINE ARE BROUGHT OUT IN A CONVERSATION BETWEEN TWO SOLDIERS.

a. 4.2-in. Mortar
b. Livens Projector
c. Chemical Cylinder
d. Chemical Land Mine
e. Chemical Grenade
f. Smoke Pot
g. Candle

2. Weapons used in dissemination of Chemical Agents by Arms other than the Chemical Warfare Service.

a. 75-mm. gun
b. 105-mm. howitzer
c. 155-mm. gun and howitzer
d. Airplane Spray Tank
e. Airplane Bombs

II. Six booklets each giving all the pertinent facts about one of the six classifications of agents. These will be in story form built around the actions of several soldiers in various types of gas attacks. Some will portray actual combat situations and some will portray the use of Chemical Agents in training. These soldiers will undergo the identification of agents, first-aid procedure,and decontamination methods, under the various classifications.

A. Booklet Number Two. Title - *The Story of CN and Other Lacrimators.*

B. Booklet Number Three. Title - *The Story of Phosgene and Other Lung Irritants.*

C. Booklet Number Four. Title - *The Story of Mustard and Other Vesicants.*

D. Booklet Number Five. Title - *The Story of Adamsite and Other Irritant Smokes.*

E. Booklet Number Six. Title - *The Story of Incendiaries.*

MARCH FIELD DECONTAMINATION STATION

For the purpose of instruction, and to determine the practicability of using existing facilities, a personnel decontamination station was constructed at March Field by the Third Chemical Company, Service (Aviation). The station functioned at certain designated periods, with contaminated personnel going through all phases of decontamination. Several officers including the base commander and the chemical officer, Fourth Air Force, observed the functioning of this facility.

The post gymnasium was selected for the installation inasmuch as it was representative of the average setup of shower and dressing rooms in other buildings throughout the post. Constructional procedure as outlined could in a large measure be duplicated in a number of other buildings on the reservation.

It is to be noted that the undressing benches were placed outside of the undressing tent. This was done because experiment showed this procedure to be less hazardous than allowing outer garments to be removed inside,thus building up a dangerour concentration.

A wall tent was placed flush with the gymnasium wall with the center at the window of the gymnasium. An airlock, 6 feet long, 4½ feet high, and 3½ feet wide, was constructed at the entrance of the tent. This was made by placing the bows from a 2½ ton truck parallel to one another at the tent opening. A heavy impregnated canvas was thrown over these and all joints made vapor-proof. A standard entrance for gasproof shelters was placed at the front and with an impregnated weighted blanket door. The rear blanket door of this airlock was constructed in the same manner. Steps were placed against the gymnasium leading up to the window.

An airlock between the tent and shower room was provided by means of blankets on either side of the window frame. Although this airlock was only 2 feet in length, it served to prevent vapor seeping through possible crevices that might be caused by air currents swaying the wall tent.

From the showers, railings directed the men to the examining medical officer. One-fourth of the dressing room was allocated to the medical aid room for the treatment of casualties. The dressing room was equipped with a large table where

fresh clothing could be obtained, and benches were provided to facilitate dressing. After dressing, personnel remained in the gymnasium room until the all clear signal.

Six men at a time were allowed to go through the decontamination station. It was found that the time required for the decontamination process was approximately 10* minutes per man. This included thoroughly sponging the body with kerosene, followed by soap and water under a hot shower, examination by the doctor, and dressing.

Experiments conducted at the Chemical Warfare School indicate that if a decontamination station is in continuous use for any length of time, succeeding groups will require a much shorter time per man than the first group.

WEATHER AND TERRAIN

Lieut. R. Beverly Caldwell, CWS

The objective of the course on Weather and Terrain, as it is conducted at the Chemical Warfare School in unit gas officers' classes, is to train the unit gas officer to make a local prediction of short range. No attempt can be made to discuss the newer phases of meteorology in the short time allotted for this course. Consequently, air mass analysis and front analysis, can not be included. This is apparent if we remember that these subjects are highly technical and require considerable time to discuss. Indeed, it is felt that they are beyond the scope of the needs of the unit gas officer. In order to consider air mass analysis, it is necessary first that much information be assembled from wide areas; and secondly that this information be interpreted in the field. Naturally, this must be the function of some specialized service. It may be said, however, that this phase of meteorology will not be neglected by the Department of Technique of the Chemical Warfare School. Obviously, these more technical matters can not be included in the unit gas officers' classes, which last only four weeks.

The mission of the unit gas officer is not the same as that of the division chemical officer. An extensive knowledge of modern meteorology and the ability to interpret weather reports should be part of the mental equipment of the chemical warfare officer. This is not true of the unit gas officer, however,who is charged with gas duties under local conditions.

With this in mind, the program of the Weather and Terrain course for the unit gas officers' classes was set up, as follows:

1. Weather Elements and Instruments - 1 hour
2. Effects of Weather on C.W. Agents - 1 hour
3. Weather Forecasting - 1 hour
4. Exercise in Forecasting, field - 1 hour
5. Classroom Exercise in Forecasting - 1 hour

In presenting this program, emphasis is placed on the rule of thumb formerly printed on the daily weather maps of the Weather Bureau, which is:

"When the wind sets in from points between south and

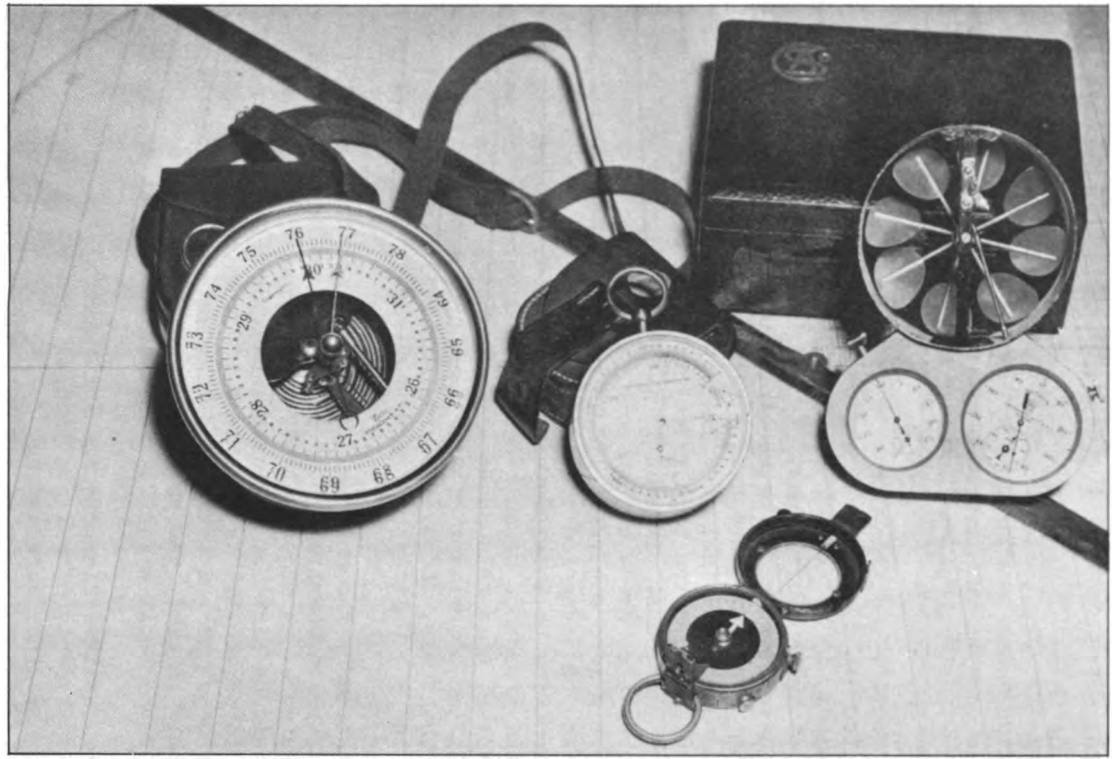


PHOTO BY CALDWELL

From left to right: The Aneroid Barometer, semi-portable, The Aneroid Barometer, portable, The Prismatic Compass, The Hand Anemometer, ML-62.

southeast and the barometer falls steadily, a storm is approaching from the west or northwest, and its center will pass near or to the north of the observer within 12 to 24 hours; with winds shifting to northwest by way of west.

"When the wind sets in from points between east and northeast, and the barometer falls steadily, a storm is approaching from the south or southwest, and its center will pass near or to the south or east of the observer within 12 to 24 hours; with winds shifting to the northwest by way of north.

"The rapidity of the storm's approach and its intensity will be indicated by the rate and amount of the fall in the barometer."

It is believed that the officer in the field, without access to weather maps and reports, can make relatively certain predictions as to wind direction, temperature changes, and probable precipitation based on the rule quoted above.

To use this wind direction barometer relationship, the unit gas officer must have a barometer. If he can not get one through the regular channels of supply, he should have one as part of his personal equipment. It is not necessary that the instrument be scientifically accurate. It is necessary only to know whether the barometer is falling or rising, that is to say, whether the atmospheric pressure is decreasing or increasing. For field work, it is best to have a portable type of aneroid, but any light weight aneroid will do.

In observing his barometer, the unit gas officer must not neglect to take altitude changes into account. To interpret the barometer, it is only necessary to read it, if no change of position is involved. But if the readings are taken at different points, it is necessary to correct for differences in altitudes. This may be done easily by observing bench marks or from other available information.

In conclusion, the course on Weather and Terrain is not intended as a course on Meteorology in its scientific sense. It is intended to give the unit gas officer sufficient background that he may discharge his duties in the field efficiently. *Modern Meteorology* by Captain Wenstrom, Signal Corps, offers a clear, simple discussion of wave front analysis for those who wish to go deeper into the subject.

References -

Modern Meteorology, Capt. William H. Wenstrom, Sig. C. Chemical Warfare Bulletin, April 1936, pp 53-68.

Introduction to Meteorology, Petterssen.

MILITARY DEFENSE AND CIVILIAN DEFENSE

Lt. Col. George J. B. Fisher, CWS

There are some things about the way wars are fought today that we Americans dislike very much. One of them is the ruthless bombing of open cities with the resultant killing of civilians. That business doesn't set well with professional soldiers of our breed. It is certainly contrary to the aims and wishes of the American government. And it is looked on with loathing and disgust by the American people.

However, there is no point in bemoaning the fact that warfare today is not conducted as we should like. Distasteful as the facts are, we must face them and meet them with courage if we are to survive. Should we be drawn into this war, we must be prepared--well prepared--by mastering the special techniques of defending our cities against aerial attack.

The defense of modern cities against bombing attack includes two distinct modes of action. The first is military defense; the second, civilian defense. In examining these two types of defense so as to clearly understand how they are integrated and how each complements the other to serve a common purpose, we must realize that civilian or "passive" protection is the second line of defense and that it comes into action only after the first line of *military* defense has been penetrated.

Before reviewing the details of these two distinct modes of defense,it is well to recall that the shielding of cities from hostile attack is now, as it has been throughout recorded history, a very important object of military action.

To defend centers of population and industry from being pillaged and destroyed by invading armies, fortifications were devised in the shape of walls that encircled every important metropolis of antiquity. When the wall fell the city capitulated. When the wall could not be breached the attackers settled down to siege operations and waited patiently, sometimes for many months, until starvation forced the inhabitants to surrender.

Much ingenuity was exercised to speed the operation of breaking down the circling walls of ancient cities. Some of the first applications of chemical warfare were tried out for

this purpose. Everyone remembers how Joshua, by utilizing sound waves, brought down the walls of Jericho.

The mechanical catapult, which had been used with varied success up until the Fourteenth Century, was replaced about this time by artillery.

Here we witness a radical change in military strategy brought about by a fundamental innovation in military weapons.

The first important use of artillery in siege operations occurred in the year 1331. It was the Germans who first employed this weapon, using it in attacking Italian cities. The earliest siege weapon was a heavy mortar called a "bombard", a term that in the ensuing centuries has acquired a sinister meaning.

Once means had been devised and perfected for shattering the walls of cities, this form of defense ceased to be effective. To prevent the attacker from dropping his projectiles on the city itself and thus smothering it in ruins, it became necessary to organize a field army and send it outside the city to meet the approaching enemy at some distance beyond the range of his artillery.

This then became an essential of military strategy for the next six centuries--to meet the attacker and destroy him before he could reach and destroy the city. This gave a special significance to military maneuver, so that much of military history from the fourteenth century down to very recent times is a record of one army attacking and another army defending a city, even though both armies might maneuver at considerable distances from the actual cities they were attacking or defending.

It will be recalled that the operations of the two principal armies in the American Civil War were based almost entirely on the effort of the Army of the Potomac to capture Richmond and the effort of Lee's Army of Northern Virginia to capture Washington. When at long last Lee's Army could no longer protect Richmond, the war was over.

In the First World War we see this same general motive behind the maneuvers of Germany's armies of the west to capture Paris; the failure of this effort marked the First Battle of the Marne as one of the important turning points of that war.

However the First World War completed a full cycle in the history of military strategy, since it was the last war in which a field army could successfully defend a city by merely holding an enemy force at bay. The airplane, which entered the scene for the first time during this war,changed all that.

The airplane afforded a weapon with which military commanders could reach over and far behind defending armies to strike directly at those very cities which ground forces were attempting to protect. In doing so, the airplane forced modifications in military tactics that were as radical and as far-

reaching as those that followed the introduction of artillery weapons in the Fourteenth Century. And, because of the tempo at which we live today, these changes were brought about very much faster.

The airplanes that were standard in 1917 were mere fledgelings compared to the fearsome instruments of aerial destruction that have since been developed. The typical World War airplane carried a load of about half a ton. Its cruising radius was only three or four hundred miles. Its speed seldom averaged more than 100 miles per hour. Today a military airplane that travels less than 300 miles per hour is considered a liability in battle. Modern aircraft are capable of cruising continuously for thousands of miles, carrying munition loads of as much as five tons. These facts explain why it is possible for modern air power to reach far into the interior of an opponent's territory and there wreak havoc and destruction at almost any point it elects.

This fact certainly does not render field armies useless as defenders of a nation's centers of population and industry. What it does mean is that field forces are today obliged to change their methods of approaching this eternal problem. And it does mean that the inhabitants of cities, who in the past have relied on the military for their defense, must today be prepared to undertake special tasks for their own protection.

First let us see what innovations this new weapon of warfare, the aerial bomber,has brought about in *military* defense.

In order to simplify this discussion, it is well to hold closely to the central idea of the defense of cities. There is much more to military combat, aerial combat, and naval action than the mere protection of centers of civilian population and of industrial production. Soldiers and sailors and airmen all exist primarily to seek out the enemy and destroy him wherever he is. Yet the fact remains that in war today the enemy is very likely to be found somewhere on his way to strike at cities, at airplane factories, at anything the destruction of which he thinks will weaken our ability to fight.

The first step in forestalling this type of aerial invasion is obviously to strike down and immobilize the enemy's air power. The farther this can be done from our own shores, the better are our chances of escaping the effects of aerial invasion. A great deal of nonsense has been written during recent years by people opposed to our engaging in military operations beyond the sight of our own coast lines. That shortsighted policy certainly never found any support among those who understood the implications of aerial strategy.

If we cannot keep invading aircraft beyond our own horizons, then we must maintain control of the air over our own national territory. Control of the air means that we are at least able to intercept and fight it out with invading bomber

formations before they reach their targets--usually the populous city or important industrial facility that is marked for destruction.

In order to do this, we must first have timely warning of the approach of enemy aircraft. For this purpose an aircraft warning net is set up, consisting of innumerable sentries stationed at lonely listening posts on the fringes of our territory and at sea. These sentries, watching continually by day and night, flash the warning of approaching danger--by telephone or radio--to what is known as a "filter center" or a central point into which may come the reports of a great many watchers.

The filter center is thus enabled to absorb all the messages of individual observers. These are used to quickly plot the course of the approaching enemy. The filter center then relays this information to the regional center under which it operates. The aircraft warning net with its filter center and regional center are all installations under control of the United States Army Air Force.

Our regional center to which warning of approaching aircraft has been transmitted has now to take some very quick and vitally important action.

In the first place, it must notify the intercepter commander of the location, speed and direction of the approaching enemy aircraft in order that fighter planes may take off instantly and engage the enemy as far as possible from his objective.

At the same time, other elements of the military defense are likewise alerted. For example, the appropriate antiaircraft artillery commanders are warned and balloon barrages are placed in position. When the attack is coming at night, necessary blackouts are ordered. These are all features of active defense and all function under control of the local air force commander, who is responsible for the principal or aerial defense and who must therefore control the secondary or auxiliary *military* defense.

In the present stage of the development of aerial warfare, however, it is not humanly possible for this military defense to prevent in every instance all the elements of the hostile fleet from breaking through and reaching its target.

We can realize to some extent why this is so by remembering how difficult it is to see even in broad daylight an airplane flying at an altitude of 20,000 feet. Not only can an approaching airplane escape our vision, but by shutting off its motors and gliding down high altitudes it can avoid being picked up by our most acute listening apparatus.

What military defense against aerial invasion may reasonably be expected to accomplish is to make the toll of enemy bombers shot down so heavy--say ten percent of the total--as

to render this form of attack prohibitive. The military defense can also force the enemy bomber to fly so high and under such unfavorable circumstances as to deny him accurate aim. It can force the enemy to abandon large-scale daylight bombing operations and resort to night attacks which are much less effective. But the military defense can never assure, either here or abroad,that hostile aviation will not succeed in dropping bombs on some part of our national territory.

We will concede, then, that it is necessary to warn all cities and important industrial facilities in the path of the approaching aircraft of the impending danger in order that measures of civilian protection may be put into effect.

It is these measures of civilian protection that are being taught in civilian defense courses now being conducted at the Chemical Warfare School--especially the techniques of defense against incendiaries, explosive bombs, and war gases.

Any one who has studied closely the effectiveness of aerial attack against European cities in the present war must be struck by the fact that the curve of this effectiveness rises sharply at first; then levels out; and finally begins to drop off. What causes this drop is largely the fact that measures of passive defense, when finally perfected, do counteract very materially the destruction of life and property resulting from aerial bombardment.

It is our good fortune in the United States that time has worked in our favor in this connection. By taking advantage of the tragic experience of the British in withstanding aerial assault, we should be able to level off the curve of attack effectiveness at the very start instead of suffering severely (as the British did) before we work out our passive defense arrangements and put them into effect.

By active military defense, then, we mean those things for which the armed forces are responsible: first using the Army, Navy, and Air Force to hold the enemy as far from our shores as possible; and, when an aerial attack is on the way, to determine its direction and probable target, then bring into action our own fighter planes, darken the enemy's path,ready our antiaircraft defenses and antiparachute forces, and finally alert our cities to the impending attack. Now let us look more closely at what the city itself must do to lessen its danger.

The best place to start consideration of passive defense measures is when warning of the approach of hostile aircraft is given by the military authorities. Active defense measures preceding this point are responsibilities of the Army, particularly the Army Air Corps. Once the warning is given, however, it is the properly constituted civilian authorities who must put into effect appropriate measures of civilian protection.

Let us first consider the warning as it is turned over to civil authority by the military.

To illustrate how this works it may simplify the problem to consider for a moment the warning service worked out by the Chinese to protect their inland capital at Chungking.

Chungking is an extremely inaccessible point in the interior of China. When the Japanese set out to raid this city, they must travel a distance of several hundred miles over an area which offers no attractive targets for bombing attack. Therefore when Japanese planes are seen heading out on a bombardment mission in the general direction of Chungking, there is no question in the minds of the Chinese warning net operators where they are going. Not only is the objective clear, but the Chinese are able to predict with accuracy when the bombs will begin to fall on Chungking and to predict this from one to two hours in advance. It is a simple matter to telephone or radio the warning to the Chinese military and civil authorities at the capital and to afford ample time for even a leisurely evacuation of the city.

This problem however is by no means so simple when applied to the continental limits of the United States.

Let us assume, for instance, that a hostile air force is reported by observers stationed on the northeastern tip of Maine. This force is seen approaching from the direction of Newfoundland and heading generally toward New England. It is quite impossible to determine from this information which of a thousand cities,towns or important industrial facilities scattered from Boston to New York City might be the object of the coming attack. It is also bad business at this stage to become excited and warn everyone in this large and busy area and, thereby interrupt the whole social and economic activity of the territory.

However, certain people must be advised that the hostile air force will strike somewhere in New England. This therefore calls for warning message Number One, which may be in the nature of a *secret* warning alerting the military and giving a flash to only the highest civilian authorities--possibly the governors of states and mayors of certain important cities--but withheld as a general proposition from the man on the street and the worker in the factory.

Any further general warning at this particular point would only be playing into the hands of the enemy, who would be delighted to be able to turn our most important industrial area into a turmoil by merely feinting with a few bombardment airplanes.

However, as the enemy approaches and his path is quickly and clearly plotted, it may be possible within a space of minutes to form a definite idea of his objective. So as the flight progresses it becomes possible to give the second or stand-by warning, what might be called a "probability of attack" warning. This second warning justifies the initiation

of certain general defense measures, such as the assembly of auxiliary police, fire, and medical units, in appropriate cities, towns, and isolated industrial facilities.

The third type of warning to be given by the military authorities is an "all-out alert", under which everyone in the area most likely to suffer attack is notified. It should be noted that the military does not notify the man on the street, but notifies the appropriate civilian authorities,who in turn, according to the prearranged air raids protection measures in vogue in that locality, spread the warning by means of sirens, whistles, telephone, radio, and other means of communication.

All this happens rapidly. The enemy air fleet is traveling, let us say, at a speed of 300 to 400 miles per hour. That means that the enemy will travel from the frontier of northeastern Maine all the way to New York City in no more than an hour and a half. The warning net system must work quickly and accurately, remembering always that needless alarm should not be sounded, but that at the same time as much advanced notice as possible must be given in the area where the blow will fall.

The civilian agencies must undertake at this point an - equally important and in some ways more complicated job of actually carrying into effect prearranged measures of passive defense.

This work must be done with courage and competence. The courage we know our populace possesses. But courage alone is not enough; and even this can be quickly vitiated unless we know what we are doing and are competent to do in an expeditious manner, those things that must be done.

And our civilian protection measures will, for the most part, be carried out under the handicap of darkness, with every vestige of artificial light that may help to guide an enemy aviator blotted out. Day attacks come only in modern aerial warfare when the defender has lost control of the air. The only real chance an enemy has of breaking through our own intercepter air force is at night, and although this imposes the greatest handicap in carrying out civilian air raid protective measures, we must have clearly in mind the need of being prepared to conduct this work in inky darkness, except for such illumination as might follow the firing by incendiaries of our own warehouses and factories.

The problem of civilian protection, then, is this: What must be done when the air raid siren sounds at night?

One of the first things, of course, is to call to stations those active groups who will cooperate with the city's permanent public safety agencies, such as

Air raid wardens
Auxiliary police
Auxiliary fire fighters

Decontamination squads
Medical and first aid groups

Next--or even simultaneously--the general public must be warned, down to the last man, woman, and child, to take shelter; either public or private.

Then--during the raid and even for some time after the raid --the situation calls for disciplined control all along the line while steps are taken to counteract the effects of a rain of high explosive and incendiary bombs and poison gas, any or all of which may be loosed simultaneously.

In other words, when the air raid warning is received the civilian protection PLAN is put into operation--a plan so complete and far-reaching as to cover, in some degree at least, the activity of every inhabitant in the city. For everyone is either actively employed in some feature of the civilian defense program, or else must conform with the city's defense regulations while the raid is in progress.

All this involves planning, organization, and training--a great deal of each.

The more this problem is studied, the move obvious is the need for the perfection of a coordinated,smooth-working scheme of action that can be put into effect at a moment's notice when warning is received of an impending attack.

So the keystone of passive defense is a PLAN: first a master plan developed by the state Defense Council; then county and municipal plans coordinated with this master plan; and such other subordinate plans as may be necessary to the defense of isolated industrial units.

This planning for passive defense--and the organization and operation under these plans--are all aspects of the protection of civilian life and property which under the American form of government are functions of local civilian authority. The Federal Government can and will advise on technical features of civilian defense, but it does not propose to usurp from local government its responsibilities in this field.

One of the methods by which the War Department is cooperating with the Office of Civilian Defense in this direction is in the instruction of selected civilian officials at the Chemical Warfare School in special techniques with which the Army is quite familiar: protection against war gases; the handling of incendiary and explosive bombs; and medical aid.

Certain civilian groups must master these special techniques. They must not only be able to apply them when necessary, but they must also be able to instruct others--active and inactive participants in the local air raids protection program.

It is inconceivable that in these days of electrified warfare we should send an army into the field unless it be well trained, well equipped, and well led. Nor can we afford to

enter modern warfare without being equally well organized on the civilian front. In the latter field there are three clearly defined objectives--

First, to minimize casualties from air raids

Second, to prevent impairment of the industrial war effort

Third, to sustain national morale.

Today for the first time in our history the civilian and the soldier are marching in step toward active and self-sacrificing participation in national defense. Each has his appointed mission--each complements the efforts of the other;together they promise to make America invulnerable.

* * * *

Tactics, the science of the engineer, of the gunner, can be taught nearly as well as geometry. But the knowledge of the higher parts of war can only be acquired from experience and from studying the history of the wars of the great Commanders. You can not learn from a grammar how to write a book of the Iliad, a tragedy of Corneille.

- Napoleon

* * * *

PRACTICE ANTITANK OR SMOKE MINE FOR USE IN TRAINING AND MANEUVERS*

Col. Adelno Gibson, CWS

Under date of April 15, 1941, the War Department furnished the mimeographed description of a practice antitank or smoke mine for unit training as shown by figure 1. The mine consists of two pieces of wood fastened together by metal straps or wood lath with a bottle of FM smoke mixture and a bottle of water between the pieces of wood.

The pressure of the tank tread fractures the bottles. The mixture of water and FM produces a smoke signaling the umpire that the tank has struck a mine.

These practice mines were used during Second Army Maneuvers in June this year with a certain amount of effectiveness. Experience gained during these maneuvers indicated that certain modifications would enhance the effectiveness of these mines and at the same time lessen the amount of material, time, and labor necessary for their fabrication.

The modification suggested by Col. Adelno Gibson, CWS, and adopted for use in Second Army Maneuvers, August - September, 1941, is shown in figure 2. The case is a standard commercial waxed paper container such as is ordinarily used for holding semiliquid materials such as cottage cheese.

The bottle of FM is placed in the container and sharp-edged stones about two inches in diameter are placed on top of the bottle. The remaining space is then filled with water and the lid replaced.

The mine is then planted in the ground with the top projecting at least two inches above the surface. The bottom should rest on a stone or gravel foundation to insure that the weight of a heavy vehicle passing over it will cause the FM container to break.

Advantages of this modified type of antitank or smoke mine are: the saving of time, material and expense;and a much larger smoke cloud. The container is almost identical in size, shape and weight with the standard antitank mine now used.

The smoke cloud resulting from such a practice antitank mine is shown in figure 3.

**Abstracted.*

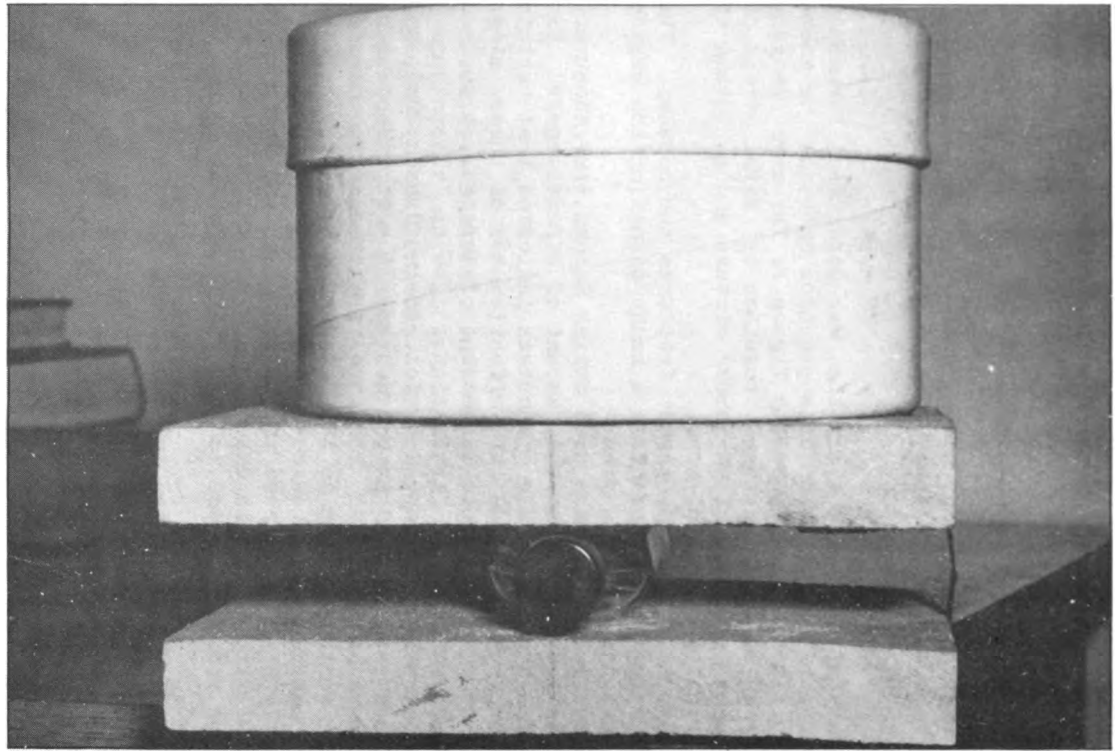


Figure 1. Fiber container type of practice Antitank or Smoke Mine devised by Col. Adelno Gibson, resting above wooden practice Antitank Smoke Mine used in June Maneuvers, Second Army.

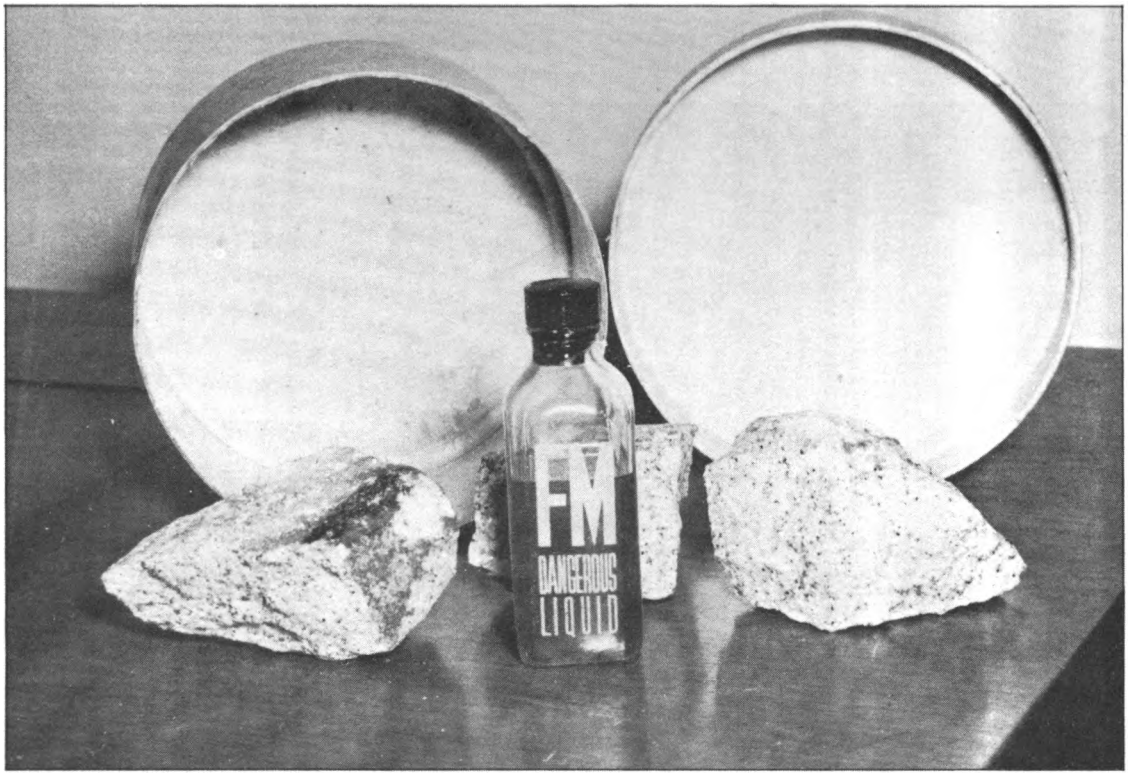


Figure 2. The bottle of FM, 3 rocks and a quart of water (not shown) constitute contents of mine.

Figure 3. Smoke resulting when wheel of Command Car struck a fiber container practice Antitank or Smoke Mine.

CHEMICAL WARFARE TRAINING IN THE COAST GUARD

Lieut. (jg) J. S. Loewus, USCG

In formulating the training for the Coast Guard in chemical warfare defense, many plans were suggested. However, after considering them all, headquarters decided to take the training to the various units, rather than have the key men assemble at centralized locations and there hold classes of instruction. In order to carry out this scheme, two factors were essential--namely, well qualified instructors specifically trained in this field, and mobile equipment.

Due to the nature of the subject, part of which is secret, part of which is confidential, and all of which is restricted, it was decided to hold two types of classes, namely, one for commissioned and warrant officers, to include all types of training,the other for enlisted personnel to include the practical application and to deal with restricted information. The same instructors were assigned to teach both types of classes. Lieutenants (jg) S.G. Guill and J.S. Loewus were sent to the Chemical Warfare School, Edgewood Arsenal,Maryland, for a specialized course of instruction which lasted six weeks. Two seamen, E. Kramer and E.W. Rinehart, were selected to assist Lieutenants S.G. Guill and J.S. Loewus, respectively, as well as to drive the trucks over the entire circuit. They were also given a week's training at the Chemical Warfare School to qualify them for their assigned duty.

The two instructors were given every opportunity to attend classes then in session in the subjects considered of value for their particular duty. In addition, they were given special instruction, in separate classes, by men of both the Army and Navy well qualified in their various fields. This course included all of the subjects necessary for a complete understanding of chemical defense, such as, observing practical demonstrations of the firing of various types of incendiaries under field conditions with effective equipment for extinguishing them; an actual gas attack in the field; decontamination of vesicants under field conditions; putting on and testing of the gas masks in tear and lethal gas chambers; a tour through shell filling plants; a tour through the gas mask factory, so as to understand the component parts of the masks,

canisters, etc. These men completed their course and were graduated in due form at the end of January, 1941.

Considering that all necessary equipment had to be mobile, it was decided to fit out two special trucks for its transportation from unit to unit. The equipment consists of 25 mark 2, and 25 mark 3 gas masks, a twelve by sixteen Army type tent which can be set up as a gas chamber, a strip film motion picture projector and such other materials, as tear gas, disinfecting equipment, blackboard, chalk and erasers, repair kits, protective clothing, film strips, etc., as were required. In order to teach the personnel *when* to put on the gas masks, a sniff set is used for training the enlisted personnel and both the sniff and detonating sets are used for the officer's classes.

The officer's course is of four days' duration. It covers the subject of chemical defense as completely as the time allotted will permit. It includes recognition of, protection against, decontamination,and first-aid procedure for all chemical warfare agents. This is accomplished by lectures, moving pictures and field exercises covering the various aspects of situations that have arisen during and since the last war. The course makes as practical as possible the assimilation and application of the subject. Sufficient theory is given to enable personnel to understand the drills and the field exercises. Officers who have taken the four-day course, in turn instruct in more minute detail the units to which they are attached.

The class for enlisted personnel takes approximately two to three hours, and covers the subject of chemical defense in a general way. First, a short talk is given on casualty, harassing, screening and incendiary agents. Then the mask is inspected while the instructor explains its various parts and the function of each. The proper mask for ship or shore is used depending upon the nature of the unit receiving instruction. The former uses the mark 3, or head canister type; the latter, the mark 2 or side carrier type. After inspection of the mask, drill and care of the mask are carefully explained, then the students go through the gas chamber. In order to know *when* to put on or take off the gas mask,an opportunity is given personnel to sniff some of the actual casualty chemical warfare agents. This is done under the personal supervision of the instructor. The four basic casualty agents used are the vesicants, mustard and lewisite; and the lung irritants,chlorpicrin and phosgene. This teaches the men *when* and *how* to put the mask on, how to care for and disinfect the mask, and *when* and *how* to take the mask off.

Lieutenants Guill and Loewus started the first course of instruction together in New Orleans about March 1. Lieutenant Guill proceeded west in the New Orleans District as far as Mexico and then came east to the Charleston District covering

that part north of Charleston, South Carolina and all of the Norfolk District, thence to the Boston District, going as far north as Portland, Maine. He is now about ready to proceed westward to give instruction in the Chicago District and Lake Superior area of the Cleveland District, continuing thence westward to cover the Seattle District.

Lieutenant Loewus proceeded east in the New Orleans District from New Orleans, covering all of the Jacksonville District and north in the Charleston District as far as Charleston, South Carolina, thence north, covering the Philadelphia and New York Districts. He is now ready to proceed north to cover that portion of the Boston District north of Portland, Maine to the Canadian border, thence turning westward to cover that portion of the Cleveland District, which includes Lake Ontario, Lake Erie, and Lake Huron. He will then continue west covering the San Francisco and Los Angeles Districts. Thus the two men, in approximately nine months, will have covered all shore units, as well as the floating units available in coastal waters.

It might be interesting to note, that, as far as it is known, this is the first time that any of the services has had a traveling school for training its personnel at their regularly assigned stations. While the above itinerary is not yet complete, it has proved very satisfactory considering the time saved, men trained, and low cost.

To supplement the above instruction, approximately 150 enlisted men, drawn from all parts of the country, have been given a one week's course of instruction at the Chemical Warfare School in the various phases of chemical defense.

Specially equipped truck for the traveling Chemical Warfare School of the United States Coast Guard

THIS GASLESS WAR

Lt. Col. Harold Riegelman, CW-Res

Where is gas in this gasless war? An ever-present threat, gas is a potent weapon in the modern arsenal. It absorbs great sums of money which would be spent in other ways if there were no threat of its use. Reminders of that threat are constantly at the sides of millions of men, women and children, while they sleep and while they are about their daytime work and pleasures.

Herbert Morrison, Minister of Home Security, on March 28th warned the British people that neutral observers, who ought to be in a good position to know, had reported that Germany was making active preparations to use gas. "Whether this is so," Mr. Morrison declared, "I cannot say, but I can say that it is essential for us to be prepared." The United Press report of July 23d that Russians had captured German instructions for use of gas in the Russian campaign lends color to Mr. Morrison's statement.

The use of gas is repugnant to the American people. The fact that, when used against properly protected troops, it effectively causes casualties with fewer deaths and less enduring disabilities than any other weapon, has not made gas acceptable to the public. America will never initiate the use of gas.

But that is not enough. America must insure that gas is never used against Americans.

That gas has not thus far been used in the present war suggests some inquiry into the causes for restraint, with a view toward ascertaining whether those causes can be fortified in case we become involved.

It is axiomatic that in a situation in which an available weapon is tactically useful it will be employed,in the absence of controlling-non-tactical reasons to the contrary.

The speed with which the German armies were able to accomplish their earlier continental missions deprived them of any incentive to use gas.

But gas might have been usefully employed to retard their armies in the Battle of France, and in the Albanian, Greek, African and Russian campaigns.

We may assume that gas has been available. Why was gas not used? Three reasons suggest themselves.

First: American public opinion has been an important element in the present war. No belligerent desires to irritate or arouse that opinion any more than its own national interest appears to demand. The American antipathy against gas is well-known and while not a controlling factor, at least it may have contributed to the non-use of gas. If America should become involved in the war, it is possible that the effect of this factor for enemy restraint will appreciably diminish. Other factors for enemy restraint may, however, persist.

Second: However deadly and decisive gas may be when used against ill-equipped, untrained, undisciplined effectives, if used against troops who have the means to protect themselves and know what to do, and do it, gas becomes (again quoting Mr. Morrison) "little more than a serious nuisance." A very costly nuisance to create, it may be added. The fact that the cost may not be justified by the results is an enormous factor for restraint. The extent and adequacy of British gas defense is a matter of common knowledge. From the very beginning of this war the Army and the public have been well equipped, continuously drilled and kept alert. Yet there will always remain the attraction of surprise, and the assurance that attack on civilians will have a disorganizing and demoralizing effect. There is another factor which appears to have closed that avenue.

Third: The motives which might prompt an enemy to use gas may well prompt him to wish to spare his own troops and civilians retaliatory punishment.

There is reason to believe that no present belligerent has failed to accumulate substantial supplies of lethal gas, and an adequate variety of implements for its projection.

Of the three apparent deterrents against the use of enemy gas--public opinion, adequate defense and fear of reprisal,--the first may continue to be effective,particularly if America is not involved as a belligerent. Should America become involved, enemy restraint might depend upon our adequate defense and fear of reprisal.

Adequate defense demands sufficient quantities of standard protective devices, and unremitting training and discipline in their use.

Fear of reprisal suggests the production of reserves of lethal gases, staff and artillery instruction in their uses,production of special weapons and thoroughly trained, efficiently officered units of specialized chemical troops.

CORRUGATED HOSES FOR GAS MASKS

Lieut. Samuel M. Rankin, CWS

Readers of the Bulletin will know by this time that during the first half of the year 1941 nearly two million gas masks were produced. Most readers will have some idea of the many different parts and materials that must be procured before assembly of the mask may begin. (85 parts and materials are used in the service mask.) Some will know how carefully the mask is inspected when completed, but very few will have any conception of the intensive inspection the different parts receive before they reach the assembly plants; for example, the hose.

All parts and materials are made according to specifications and drawings formulated after much research and consultation by the technical division of the Chemical Warfare Service. New ideas and improvements are incorporated as fast as they can be thoroughly tested and approved. The drawing for *Hose, Gas Mask* has had seven revisions in less than three years.

It is specified that the rubber compound used for the hose shall contain not less than 75 percent by volume of new, first quality plantation rubber, or its equivalent, shall be non-blooming and contain an antioxidant.

The raw materials, compound preparation, and manufacture, as well as the finished product are constantly being inspected by a resident Chemical Warfare Service inspector and engineer.

It is customary for the contractor to conduct a series of preliminary inspections during the course of the manufacture for his own information so that flaws may be corrected immediately and without unnecessary loss.

When the hose are delivered to the Chemical Warfare Service inspector, he immediately selects test samples for tensile strength and elongation, both for the unaged hose and hose to be aged in an oven for a week at 158° F. Samples are also selected to be tested for flexibility and kinking.

The hose are then passed on to the gas mask inspection force. This force is composed of assistant minor gas mask inspectors hired and trained locally; minor gas mask inspectors who have taken the prescribed training at Edgewood Arsenal;

and supervisors who have been selected to take charge of the inspection. All of these young ladies have passed a thorough physical examination, with a special emphasis on their vision. The resident inspector actively supervises the work of these inspectors.

The plants working on the program are frequently visited by the executive officers of the different procurement districts, their representatives, or by the civilian experts attached to the Office of the Chief, Chemical Warfare Service.

Each inspector is comfortably seated at a table. She has her own goose-neck lamp. She carefully examines the ends of the hose, paying particular attention to the seams. Then she stretches about one-quarter of the hose so that any defects between the corrugations will show up plainly. If she is satisfied, she proceeds to the other sections of the hose in the same manner.

If she discovers foreign matter such as wood or string deeply imbedded in the rubber, she rejects the hose. The same fate awaits badly blistered hose or hose with other objectionable surface imperfections.

If she suspects that any part of the hose is thin, she hands the hose to the supervisor who applies a balloon test. This means that the hose is inflated with air pressure of ten pounds per square inch for at least 90 seconds. If during that time any part of the hose stretches beyond its natural diameter, it is rejected.

If the hose feels too stiff or too soft, a similar procedure is gone through. This time the supervisor places the hose on the flexibility testing apparatus and then tests it to see if it will kink. If at any time the supervisor is in doubt, she consults with the resident inspector.

When questions come up which he does not have the authority to answer, he immediately communicates with the executive officer of his procurement district.

After visual inspection, the hose which are found satisfactory are run through the leakage testing machine. This machine uses a principle familiar to all of us who have ever looked for a leak in an automobile tire inner tube by inflating it and then immersing it in a water bath. Those of us who have had such an unfortunate experience will remember how a long stream of bubbles glaringly indicated the exact spot where the nail went in.

In like manner, the hose, gas mask are all tested for leakage in a water bath with an internal air pressure of at least five pounds per square inch. The test is briefly described as follows: A brass rod ¼ inch in diameter is loosely inserted inside each hose. The ends are then securely fastened with clamps by one of the two operators running the apparatus. The hose slowly revolves under the water. When it first touches

the water, the air pressure is automatically applied. A large gauge closely watched by the operator clamping the hose on indicates the air pressure being applied. The inspector at the other side of the machine watches for leaks which are of course indicated by a stream of bubbles. She places leaky hose in a special reject box and places good hose on trays or on a conveyor where they are left to dry.

The dried hose are then packed under the supervision of an inspector and stamped, *Approved.*

Methods of inspection are constantly being revised. A long series of tests has proved that a better visual inspection may be obtained by inflating the hose with ten pounds of air. The technical division is now designing apparatus that will make it possible for the gas mask inspectors to easily inspect hose inflated to meet this requirement. This anticipated change is evidence of the high degree of cooperation between the technical division at Edgewood Arsenal,the Chemical Warfare Procurement Districts and the civilian experts attached to the Office of the Chief, Chemical Warfare Service; all these different elements taking an active part in the many tests leading to adoption of this new method.

It is the mission of the resident Chemical Warfare Service inspector and engineer to:

1. Assist the contractor in every possible way in the construction of the hose according to specification.
2. Inspect for the government the completed hose.
3. Inspect the raw materials used in the processes.
4. Inspect the operation of the plant, to determine productive capacity of equipment, personnel required, and whether or not the production rate stipulated in the contract is being maintained.
5. Supervise all Chemical Warfare Service inspectors.
6. Supervise the packing and shipping of the accepted hose and the method in which rejected hose are disposed of.

Other parts of the gas mask are tested as carefully as the hose. During the course of the assembly, the mask is carefully inspected after every important operation and then the completed mask undergoes a final thorough examination before leaving the assembly plant.

Many gas masks of foreign design and manufacture have been carefully tested at Edgewood Arsenal. We are convinced that our own service mask is superior to any of them. Part of this superiority can unquestionably be attributed to the thorough inspection they have undergone throughout.

CURRENT COMMENT

Huntsville Arsenal.

The new Huntsville Arsenal of the Chemical Warfare Service, construction of which has already begun, will be located near Huntsville, Alabama,and will produce smoke materials and other chemical warfare agents, supplementing the manufacturing facilities now carried on at Edgewood Arsenal. The tract selected includes more than thirty thousand acres and the project will cost approximately forty million dollars. Many sites in different states were considered for this new arsenal, but Huntsville was finally selected as best combining transportation facilities, proximity to materials of construction and raw materials for later operation, available electric power (Tennessee Valley Authority) and fuel, as well as relative immunity from air attack in time of war. The new arsenal will include chemical manufacturing plants, shell loading plants, a storage depot, laboratories, shops, offices, hospitals, and warehouses for receiving and shipping. More than one million square feet of floor space will be required for the manufacturing operations.

Incendiary Bombs.

The Chemical Warfare Service has been charged with the manufacture of incendiary bombs for the Army. The widespread use of incendiary bombs in the current European conflict makes it advisable for our Army to be supplied with tremendous numbers of these munitions. Construction of several new plants to produce incendiary bombs,under the direction of the Chemical Warfare Service, is now contemplated.

Chemical Warfare Service Veterans' Association.

The secretary-treasurer of the Chemical Warfare Service Veterans' Association reports a successful meeting held in conjunction with the Milwaukee convention of the American Letion in September. The following officers were elected for the ensuing year:

Commander:	J. Fred Bellois, Jr. Philadelphia, Pa.
First Vice Commander:	R.T. Vanettisch Los Angeles, Calif.
Secretary-Treasurer:	Geo. W. Nichols Kingston, N.Y.

Honorable Mention. (Service Record of Tech. Sgt. Oliver C. Miller).

Tech. Sgt. Oliver C. Miller was retired on July 31, 1941, at Fort Lewis, Washington, where he has been serving since 1932.

Sergeant Miller has had a long and honorable Army career. He enlisted in the Coast Artillery Corps in 1911, and in 1916 transferred to the band section at the U.S. Disciplinary Barracks, Governors Island, New York.

At the beginning of the World War, Sergeant Miller became band leader of the 308th Infantry Band and remained with that organization throughout the war. During the Meuse-Argonne Offensive, together with the rest of the band, he volunteered for service as a stretcher-bearer, spending 120 consecutive days under fire. As one of the volunteers who attempted to reestablish communications with the "Lost Battalion," Sergeant Miller's pack was shot off his back, although he himself escaped unharmed. He is one of the few remaining members of the 154th Brigade,to which the famous "Lost Battalion" belonged.

Sergeant Miller graduated from the A.E.F. Bandmaster & Musicians' School, Chaumont, France, and was commissioned a second lieutenant (band leader) serving in that grade until 1919, when he reverted to the rank of master sergeant. From 1920 to 1923, he served in the band section of the First Gas Regiment. He was then transferred to the Chemical Warfare Service, in which service he remained until his retirement. He served with the First Chemical Regiment at Edgewood Arsenal,Maryland, and at the Philippine Chemical Warfare Depot, and on returning to the United States was assigned to duty as Chief Clerk in the Chemical Office at Fort Lewis, Washington.

He will reach the age of 57 on November 12. He has been advanced on the retired list to the grade of second lieutenant, after thirty years of loyal and excellent service.

RECENT BOOKS

WAR IN THE DESERT. *By Raoul Aglion. New York: Henry Holt & Company 1941. 300 pages. $2.75.*

Dr. Aglion is a former attache' of the French legation at Cairo. His book is in two parts: the first deals with the historical background of the war in Africa, beginning with Pharoah's wars, continuing with Alexander and Caesar, the Crusades, Napoleon, and through the first World War. The second part is an eyewitness's account of the formation, training and battles of the Army of the Nile under General Wavell, to whom the book is dedicated.

Dr. Aglion finds many similarities between present-day political and military conditions in northeastern Africa and those of many centuries ago. His book is interesting--and informative.

DEFENSE OF THE AMERICAS. *By Andre' Cheradame. New York: Doubleday Doran & Co., Inc., 1941. 306 pages. $3.00.*

Since 1901 the author has been warning the world, and particularly his native country, of the dangers of the Pan-German plan for world conquest. He regards Hitler as "only a moment in German history. If he were to die tomorrow the Pan-German policy would continue to be worked out by the German General Staff, which has been responsible for its development for over forty years."

President Theodore Roosevelt wrote in 1918: "I am not speaking hyperbolically when I say that M. Cheradame has literally done more than any other man in the world to make the allied nations understand where the really vital danger from Germany lay."

The author contended that the Armistice of 1918 was a mistake in that it prevented a decisive victory. Later (in 1934) he prophesied that the destruction of Czechoslovakia would inevitably follow the Austrian anschluss; that if either Czechoslovakia or Poland failed to appreciate that their vital interests were linked together, it would be condemning itself to dismemberment and slavery.

At the beginning of the war of 1939 M. Cheradame urged that Italy be attacked at once while the German energies were absorbed by the Polish campaign. An Italian conquest would have

freed the British from danger in the Mediterranean, and Yugoslavia and Greece from the Italian threat in Albania. He considered also that the creation of a Balkan front was required by the experiences of the war of 1914-1918. "Central Europe is the key to the world."

The author, in this book published early in 1941, also forecast the German attack on Russia. He gives a carefully studied and well-documented analysis of the reasons for German success, and recommendations for the defense of the Americas which, in the light of M. Cheradame's record, deserve the respectful attention of anyone interested in world politics.

The style of the English translation is somewhat stiff and pedantic, but the subject matter makes this an absorbing book.

THE BATTLE FOR ASIA. *By Edgar Snow. New York: Random House, 1941. 431 pages. $3.75.*

Edgar Snow's latest book is an honest and competent account of what a trained reporter saw, heard and felt in Shanghai, Peking and Nanking during the battles, in the wake of the battles, and with the Chinese guerrillas in the "occupied" zones. It is also an analysis of China's military, political, economic and social position at the present time, and includes a discussion of some possible results of the Chinese war.

Mr. Snow's knowledge of military strategy and tactics is unusual, his acquaintance with the Chinese leaders and people of long standing, and his book may upset some preconceived notions about the situation in Eastern Asia. The author is frankly a liberal in his social and economic views, frankly pro-Chinese.

CHEMICAL WARFARE SCHOOL CONFERENCE PROBLEMS

Conference problems for instructional purposes which are now available through the Book Department are:

Tactical Employment of the Chemical Battalion	$.50
Supply Requirements of the Separate Chemical Battalion	$.50
Defense of Airdromes (Chemical Phase)	$.50

Conference problems now in preparation and which will be available later are:

Incendiary Defense	$.50
Decontamination	$.50
Training for Gas Defense	$.50

Maps and overlays necessary for the solution of these problems are furnished.

Books reviewed in these pages may be obtained through the Book Department, Chemical Warfare School.