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CHEMICAL WARFARE DEFENSE SERIES—1

INTRODUCTION TO CHEMICAL WARFARE

This is the first in a series of technical bulletins designed to acquaint the civil defense worker, and others who may be called upon to assist and advise him, with the nature of chemical warfare and defense against chemical warfare agents. Later bulletins in this series will describe protective measures against chemical warfare agents and treatment of casualties.

From the dawn of history, men have fought their battles with clubs, spears, arrows, darts, catapults, and similar weapons. With the development of gunpowder in the thirteenth century, wars have been fought chiefly with firearms, which destroyed the enemy by the physical impact of a projectile, its blast, or both.

More unconventional means of waging war were also considered and practiced with some success. The use of pitch pots by Aeneas in the defense of Troy about 1200 B. C., and "Greek" fire used in the seventh century B. C., which is often referred to as the beginning of chemical warfare, are good examples. Flame throwers were tested operationally in the early part of the eighteenth century by the Prussian Army.

During the Civil War, John W. Dougherty of New York City recommended the use of chlorine in artillery shells as a means of routing the entrenched enemy. These are a few of the many instances where unconventional warfare, of which chemical warfare is an example, intrigued the minds of scientists and military men. It was not until the end of the nineteenth century, when the foundation for a great chemical industry had been established, that the use of toxic chemicals as an instrument of warfare became an international problem. It was placed on the agenda of an international conference which, upon the initiative of the Russians, met at The Hague in 1899. It is interesting to look at the official position of the United States Government with regard to chemical and other unconventional methods of warfare at that time, and through the succeeding years.

The agreement offered at The Hague conference would have bound all contracting powers "to abstain from the use of projectiles, the sole object of which is the diffusion of asphyxiating or deleterious gases."¹

The American delegates were instructed by Secretary of State John Hay to take the position that "the expediency of restraining the inventive genius of our people in the direction of devising *means of defense* is by no means clear . . . the delegates are, therefore, enjoined not to give the weight of their influence to the promotion of projects, the realization of which is so uncertain."² . . . (Italics are those of the editor.)

The United States, although sympathetic to the purpose of the proposal, hesitated to become a party to an agreement which was not clear and which might stimulate search for other means of dissemination. Technically, the Germans, who signed The Hague agreement, did not violate that agreement when they released chlorine gas from cylinders with devastating effects at Ypres in 1915. The agreement specifically limited the signatories to abstain from using toxic chemicals "in projectiles."

¹ "The Hague Declaration (IV, 2) of 1899 Concerning Asphyxiating Gases," Pamphlet No. 8 Carnegie Endowment for International Peace, Division of International Law (Washington: The Endowment, 1915).

² Ltr, Secretary of State to Hon. Andrew D. White et al., 18 April 1899, in Special Missions, Department of State, Vol. IV, October 15, 1886-June 20, 1906. National Archives.

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The Hague anti-gas agreement became a scrap of paper after the Ypres attack, and both the Central and Allied powers used chemical warfare agents in a variety of ways, including projectiles, for the balance of the war.

After World War I, there was almost universal opposition to the use of war gases. At the 1921 Conference on Limitations of Armament, meeting in Washington, the United States strongly supported the outlawing of toxic chemicals in war. The United States proposal was incorporated as Article 5: "To the end that this prohibition shall be universally accepted as a part of international law binding alike the conscience and practice of nations, declare their assent to such prohibition, agree to be bound thereby as between themselves, and invite all other civilized nations to adhere thereto." Since France, as one of the principal signatories, never ratified the treaty, it did not become binding.

The matter of outlawing gas warfare was again brought up at the 1925 Geneva Conference to consider regulating international traffic in arms. Here, the United States was instrumental in introducing what has been called the Geneva Gas Protocol. This instrument, after reiterating the condemnations of toxic agents in war, agreed "to extend this prohibition to the use of bacteriological methods of warfare and . . . to be bound as between themselves according to the terms of this declaration."³ This protocol, although signed by the United States delegation, was never ratified by the United States Senate.

To further clarify the position of the United States Government on the matter of the use of toxic chemicals in war, Secretary of State Frank B. Kellogg stated on December 7, 1926: "All governments recognize that it is incumbent upon them to be fully prepared as regards to chemical warfare, and especially regards defense against it, irrespective of any partial or general international agreements looking to the prohibition of the actual use of such warfare. I have never seen any proposal seriously advanced by any government to provide that national preparation for the use of and for defense against chemical warfare, if such warfare should be used by an enemy contrary to treaty agreements, should be abolished or curtailed in the slightest."⁴

Implementing this, the joint Army-Navy policy on chemical warfare was stated in 1934 as follows: "To make all necessary preparations for the use of chemical warfare from the outbreak of war. The use of chemical warfare, including the use of toxic agents, from the inception of hostilities, is authorized, subject to such restrictions or prohibitions as may be contained in any duly ratified international convention or conventions, which at that time may be binding upon the United States and the enemy's state or states."⁵

All Presidents of the United States between World War I and World War II sought to eliminate gas as a military weapon. Presidents Hoover and Roosevelt were particularly outspoken in this matter. The American people have consistently advocated the outlawing of gas and biological warfare. However, the Government has always realized that these are potential hazards in the hands of an aggressor nation, and has taken precautionary measures for chemical and biological warfare defense. Modern tactical developments make these precautionary measures of great importance to our civilian population.

The effective use of toxic chemicals did not become of international significance until after the turn of the cen-

³ Department of State, Papers Relating to the Foreign Relations of the United States, 1925 (Washington: Dept. of State, 1940), I, 89-90.

⁴ Cited in Congressional Record, Vol. 68, Pt. I, p. 366.

⁵ Ltr. The Joint Planning Committee to the Joint Board, October 17, 1934, sub: Use of Chemical Agents. Joint Bd Doc No. 325, Serial 542.

try—for our purpose, the date was April 22, 1915. The element of surprise, so important to unconventional warfare, caused 5,000 casualties and completely demoralized 15,000 troops when the Germans released chlorine gas at Ypres. Chlorine is far from an ideal chemical warfare agent and the British rapidly developed gas masks, which were relatively effective against it. The Germans, convinced that the point of attack should be the respiratory system, successfully used phosgene, or carbonyl chloride (COCl₂) and other lung irritants in rapid succession within the same year. The element of surprise was gone, and the Allied forces satisfactorily protected the respiratory systems of their troops.

The Germans, who for the last half century have been masters in the field of chemical warfare, then decided to use an entirely different approach and attack the unprotected skin. Again at Ypres, during the night of July 12, 1917, they introduced an entirely new chemical warfare agent—mustard gas, bis (betachloroethyl) sulfide. During the first three weeks of its use, mustard gas caused more than 14,000 casualties and 500 deaths. During the remainder of the war, mustard gas was used extensively by both sides and became the greatest single casualty producer of all the weapons in use during this period. It is estimated that it and other vesicants, or skin-attacking agents, were responsible for more than 400,000 casualties.

American scientists, not to be outdone by their German counterparts, developed a vesicant agent called lewisite, similar in skin effect to mustard gas. It differed in that it contained arsenic, which caused systemic poisoning, thereby complicating the treatment of gas casualties. Although manufactured in the United States and shipped to France in 1918, lewisite was never used operationally.

For many years most of the thinking concerning chemical warfare was concentrated on new and better vesicants as well as improved agents that could penetrate standard gas masks. Out of this research grew a group of compounds called nitrogen mustards, which bear the same relation to ammonia as mustard does to hydrogen sulfide and lewisite to arsenic trichloride. These nitrogen mustards had certain advantages over standard mustard gas, particularly since they actively affected the eyes as well as the skin. It is believed that they were manufactured and tested by the Germans as well as by the Allies in World War II. Protective clothing was developed which shielded the skin from mustard, lewisite, and the nitrogen mustards and their toxic effects, as did the mask from lung irritants.

The Germans, believing that a new element of surprise was necessary, were quick to realize the potentialities of certain phosphorus compounds, which had been developed as insecticides. These toxic agents known as anticholinesterase agents could enter the body through the respiratory system, although they were not lung irritants, or through the skin, although they were not vesicants and did not attack the skin. Their ultimate objective was paralysis of the central nervous system. These are known as nerve gases or G agents, and together with the mustards will be considered in more detail in a later technical bulletin.

Chemical warfare, like other unconventional types of warfare, depends greatly upon the element of surprise—as to date, place, and agent. The first two are important tactical factors in conventional warfare, but not the last. Conventional weapons may change but the high explosive element remains more or less the same. In chemical warfare, a new agent attacking a different vital organic system is an ever present threat that calls for ceaseless vigilance.