

THE CHEMICAL WARFARE SERVICE OF THE UNITED
STATES ARMY DURING THE INTER-WAR PERIOD

by

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CHAPTER I

INTRODUCTION

The CWS played a small role in the chemical warfare activities during the war in comparison with its respective counterparts in other countries but still received much criticism for its controversial role. There is a lack of information about the American Chemical Warfare Service (CWS) and its activities during World War I and especially in the interwar period. This paper examines the everyday activities of the CWS during its turbulent existence in World War I and the interwar period. It looks at the different measures the CWS undertook to complete its duties during the war and to insure its survival during the interwar period. The CWS actively sold itself to the military and Congress from 1917-1939 and engaged in non-military experiments to demonstrate its worth to a critical public. The CWS did much of the selling and writing of propaganda during the 1920s when the great powers of the world idealistically sought to abolish warfare. After Congress guaranteed the existence of the CWS in 1925, its focus on activities modified from trying to change public opinion to developing the CWS as a more active branch within the army. The 1930s saw a peak in other military branches' interest towards the CWS and as a result that decade witnessed its most important times.

Some literature exists on the history of the CWS, but the best book, Frederick Brown's, *Chemical Warfare: A Study in Restraints*, is nearly forty years old and principally focuses on the diplomatic issues that surrounded the CWS and how those

issues related to nuclear disarmament discussions after World War II.¹ Brown discusses the major interwar period disarmament conferences and the political jousting that occurred at the conferences, but addresses almost nothing on the everyday activities of the CWS. Amos Fries, the most prominent figure in the CWS, co-wrote *Chemical Warfare*, in 1921, but it is very clearly biased, first hand promotion of the CWS.² However, Fries' account is a good primary source for the everyday workings of the CWS during and immediately after the war. Tim Cook's, *No Place to Run: The Canadian Corps and Gas Warfare in the First World War*, is relevant because of its discussion of the first gas attack at the Second Battle of Ypres and the propaganda war that resulted because of the first use of poison gas.³ Victor Lefebure's, *The Riddle of the Rhine*, covers the "merchants of death" and the importance of the chemical industries in propagating chemical warfare during the interwar years.⁴ The heaviest concentration of German chemical industries was in the Rhine land and the riddle was how to allow the chemical plants to continue operating without producing the chemicals needed for gas warfare, a very difficult thing to do since many of the chemicals used in making war gases were also chemicals used in making every day goods. James Whorton's, *Before Silent Spring*:

1. Frederick J. Brown, *Chemical Warfare: A Study in Restraints* (Princeton: Princeton University Press, 1968).

2. Amos A. Fries and Clarence J. West, *Chemical Warfare* (New York: McGraw-Hill Book Company, Inc. 1921).

3. Tim Cook, *No Place to Run: The Canadian Corps and Gas Warfare in the First World War* (Toronto: UBC Press, 1999).

4. Victor LeFebure, *The Riddle of the Rhine* (New York City: The Chemical Foundation, Inc., 1923).

Pesticides and Public Health in Pre-DDT America, is a good discussion on the chemical culture that developed in the nineteenth-century and the Americans' dependence on chemicals for everyday uses.⁵ The book also describes the campaigns the chemical industries undertook to insure that their chemicals were used even when increasing evidence indicated that some everyday chemicals had a high toxicity when ingested by humans.

All the major works that examined the CWS, chemical warfare, and the chemical industry lack discussion of the everyday advancements made in the CWS during the interwar period. They all lack a detailed description of the public relations campaigns that Amos Fries and the CWS initiated to gain a wider public acceptance. The chemical industry is not covered in depth in this paper since this topic has been thoroughly developed. The history of the CWS is one of a constant struggle with Fries leading its drive for more money and recognition. Fries is the central character in the history of the CWS, and the trail he blazed, carving out a small niche for an independent and semi-autonomous CWS, is important. He steadfastly fought for a cause in which he fiercely believed, and thus helped the CWS survive into the 1930s. Without Fries' persistent begging, pleading, arguing, and deal making, the Engineering Corps would have absorbed the CWS and research and training in chemical warfare would have ceased after World War I. However, Fries did not allow the Engineering Corps to absorb the CWS. Rather, he gave the CWS a mission to train the infantry in case of another war and

5. James Whorton, *Before Silent Spring: Pesticides and Public Health in Pre-DDT America* (Princeton: Princeton University Press, 1974).

increase the military's overall preparedness for chemical warfare. Even after Fries' retirement, the CWS actively pursued the training of men and the development of materiel for chemical warfare. The fight for the CWS was always an uphill battle but the Service gained small concessions during the twenty years between the two world wars.

In less than a year, the excitement of August 1914 vanished and the realization of a static, bloody war of attrition opened many eyes to the harsh realities of trench warfare. Commanders of both the Allies and Central Powers recognized very early that victory by Christmas 1914 was a dream conjured up in the euphoria of August 1914. Many believed that the Great War would be a good thing for Europe, something to work out its many problems. Americans thought that this war was just a continuation of the wars Europeans had fought with each other for centuries. The United States felt secure with the Atlantic Ocean separating the two continents, and most Americans were more than willing to let Europe fight out their differences without much concern as to who won.⁶

Those neutral attitudes quickly vanished with the initiation of chemical warfare by the Germans in April 1915 and the sinking of the *Lusitania* the following month. Overnight a negative position on Germany's conduct in the war flowed freely in the U.S. media outlets, with England and France both fostering America's negative feelings towards Germany. Both countries readily supplied stories about the atrocities committed by the "Hun" not only to entice sympathetic American feelings for the Allies but also to draw the United States ever closer to war.

6. Ross Gregory, *The Origins of American Intervention in the First World War* (New York: Norton, 1971).

The horror stories of the first gas attack at Ypres in April 1915 painted a vivid picture of the German atrocities, and Great Britain and France labeled Germany's actions as sub-human and barbaric. The negative attitudes not only were directed towards Germany but also toward the use of chemical warfare in general. The British, French, and Americans all "resorted" to chemical warfare because Germany had forced them to do so. Even with the United States firmly supporting England and France, President Woodrow Wilson did not organize any significant military mobilization until immediately before the American declaration of war in April 1917.⁷ The United States reluctantly accepted the important job of preparing for chemical warfare, as a result their percentage of casualties from gas were higher than those of France, England, and Germany. Apathy toward undertaking chemical warfare persisted throughout all levels of American society from the citizen at home, to the line and staff officers, to the doughboy in the trench. The CWS had a difficult time gaining the support they needed to not only conduct chemical warfare "offensively," but also in the acquisition of the most basic defensive measures such as the gas mask.

As the use of chemical warfare began in the Great War, the infrastructure did not previously exist to adequately manufacture the proper equipment to conduct chemical warfare; therefore, Americans relied heavily on their allies for supplies. By the time the United States built the necessary infrastructure, the war had ended, and the major world

7. David L. Snead, "Why was the United States Unprepared for War? Woodrow Wilson's Military Preparedness Program Before April 1917," *Woodrow Wilson Matters: A Quarterly Newsletter of the Woodrow Wilson Presidential Library* 4:1 (Winter 2004), 1-3.

powers looked for a way to guarantee world peace. Given the huge human sacrifice and suffering of World War I, the general public recoiled from virtually all things military, and again sought to limit American involvement in European affairs. In this new atmosphere, the CWS was an easy target for criticism. The 1920s saw many attempts to restrict armaments and abolish chemical warfare, but through much political maneuvering and luck, the CWS remained an institution, albeit one with limited capabilities. As a result of the limitations placed on the CWS, it devised unique schemes to generate funding from Congress and build support from the general public. Most of the projects initiated by the CWS saw limited success, but one project, the development of the crop duster, had a lasting impact. The CWS even initiated medical research projects with poison gas to help fight a wide range of respiratory ailments.

Each chapter of the thesis addresses a specific era in the CWS' history and development. Chapter II discusses the organizational development of the CWS before and during World War I. It analyzes the prevalent attitudes about chemical warfare and how those attitudes affected the CWS during World War I and many years after. Chapter III examines the various disarmament conferences that occurred during the 1920s and 1930s. It explores Fries' importance in guiding the CWS through the challenging times of the twenties and the eventual shift in War Department and Congressional policy to understanding the need for more chemical warfare study. However, the executive branch never wavered in its dislike of the CWS throughout the interwar period. Chapter IV discusses the CWS's efforts to gain popular support at home during 1920s. The activities increased the CWS's exposure and highlighted its "good aspects," thus allowing its

continuation. The projects had the added benefit of garnering more money for the CWS to continue research and development. Chapter V discusses the post-war era of the War Department allowing the CWS to offer more training in case of war. During this period, discussion increased between the different service branches about how the CWS could be incorporated into their respective policies. The Cavalry, National Guard and the Air Corps all vigorously discussed and applied the possibilities of chemical warfare into their doctrines.

Attitudes slowly changed in the American military and Congress in the 1920s. Thus the various military branches entered the 1930s talking openly about how to incorporate the CWS into current doctrine. Not since World War I had the CWS received so much attention concerning refining chemical warfare training and the application of techniques. Congress made concessions to the CWS when it realized that the U.S. military needed a higher level of preparedness in case of chemical warfare. This limited acceptance paved the way for the War Department to loosen its reigns on the CWS, which in turn created much discussion as to the application of the CWS in the various military branches. This discussion led to new developments in the CWS, and it finally obtained a level of respect in the military.

CHAPTER II

CHEMICAL WARFARE: FROM CONCEPTION TO REALITY

While chemical warfare was not a new idea to war, the degree of its application and its deadliness was what made World War I unique. The Greeks and Spartans had each used crude methods of chemical warfare. For example, the Spartans burned wood soaked in pitch, which released noxious fumes, when laying siege. “Greek Fire” was another method of chemical warfare.¹ Other methods were to catapult rotting animal carcasses into besieged strongholds or to contaminate water supplies with dead animals. The fear of such barbarous means of warfare in the nineteenth century was enough to convene the Brussels Convention in 1874.

The Brussels Convention on the laws and customs of war prohibited (a) the employment of poison or poisoned weapons, and (b) the employment of arms, projectiles or material calculated to cause unnecessary suffering.² The convention coincided with the growth of the chemical industry, which later became an important factor in chemical warfare during World War I. By 1892, Germany already stored chlorine gas in cylinders for use in the dyestuffs industry.³ Phosgene, a poisonous gas used during the Great War,

1. Greek Fire has only been described and its exact composition is unknown. What is known is that ancient Greek texts mention Greek Fire numerous times; therefore, making it unlikely it was a myth.

2. Stockholm International Peace Research Institute, vol. 4, *The Problem of Chemical and Biological Warfare* (New York: Humanities Press, 1971), 17.

3. F.L. Haber, *The Poisonous Cloud: Chemical Warfare in the First World War* (Oxford: Clarendon Press, 1986), 16.

was discovered in 1812 and used in making crystal violet, a staining compound still used today in microbiology for staining bacteria.⁴ “Mustard” gas (dichlorethylsulphide), discovered by Victor Meyer in 1886, became the most lethal and highly used poison gas during the Great War.⁵

As chemical innovations grew more complex during the nineteenth-century, world leaders again felt the need to reassure themselves that chemical warfare would not occur in the twentieth- century. European Delegates of The Hague Conference of 1899 agreed, “to abstain from the use of projectiles, the object of which is the diffusion of asphyxiating or deleterious gases.”⁶ However, Alfred Thayer Mahan, the American delegate, said, his country opposed stifling the “inventive genius of its citizens in providing the weapons of war,” thus the United States refused to sign the agreement.⁷ Another Hague Conference held in 1907 reaffirmed the decision of the 1899 conference. However, both conferences were a failure since neither one established methods to ensure compliance. The moral attitudes towards war at the time provided the topics for discussion as well as the rules for compliance. Those same moral attitudes would be important in shaping public opinion on chemical warfare during World War I and for years afterward.

4. Ibid.

5. Frank W. Weed, ed., *The Department of the United States Army in the World War*, vol. 14, *Medical Aspects of Gas Warfare* (Washington, D.C.: Government Printing Office, 1926), 512.

6. *Problem of Chemical and Biological Warfare*, 17.

7. Cook, *No Place to Run*, 40.

A brief history of gas warfare, before the United States became a belligerent in the Great War provides an idea of what the CWS faced in its efforts to conduct gas warfare. World War I, unlike previous wars, was a total war. To break the stalemate that almost immediately developed in the fighting between the Allies, principally Great Britain and France, and Germany, the Germans began to consider use of a new weapon, one that would break the stalemate.

The Germans attempted to use poison gas and lachrymating gas (tear gas) three times before getting the results they wanted. As early as October 1914, the Germans shelled the French with poison gas. The Germans' dispersal mechanism was faulty, and the French failed to even notice anything different. The Germans tried again on the Russians using tear gas, but the temperature was too low, so the gas failed to vaporize and had no effect. The next attempt was in March 1915 at Nieuport, France, against the French, where a new mixture of tear gas was used. The results were not impressive, but the French were aware of something unusual.⁸

The first effective gas attack of World War I occurred at the Second Battle of Ypres, more commonly called "Wipers," on April 22, 1915, and was a complete and total shock not only to the Allied combatants, but also to the rest of the world. The "Stinkpioneres" (German gas corps) released cylinders of chlorine gas during "Operation Disinfection" in the afternoon against the 45th Algerian Colonial Division and the 87th French Territorial Division.⁹ The chlorine gas was very effective and was such a surprise

8. Haber, *The Poisonous Cloud*, 25.

9. Cook, *No Place to Run*, 20.

success that the Germans were slow to exploit their advantage because they did not fully comprehend the disorder caused by the gas.

Though the Allies knew a gas attack was coming from a German soldier captured on a trench raid, this method of warfare was so new that none of the commanders could visualize how the attack would occur. The difficulty lay in devising a defensive measure for a completely new weapon, one for which there were no contingency plans. A parallel may be drawn from the Spanish conquest of the American Indians. The Spanish had a weapon, the horse, that no American Indian had ever seen. This new method of conducting war allowed the Spanish, numbering only a few hundred, to conquer thousands of Mezo American Indians in quick succession. The Allies, however, reacted more quickly than the unfortunate American Indian, and ingenuity on their part and an inflexible military doctrine on the part of the German army prevented a wholesale breakthrough at Ypres. The Germans only advanced as far as their battle plan dictated, diminishing the potential for a major break through. General Eric von Falkenhayn of the German Army admitted, "...the surprise was very great. Unfortunately we were not in a position to exploit it to the full."¹⁰

The Germans tried a chlorine gas attack again two days later on the Canadian line, but the Canadians were more prepared and held their positions. Field chemists identified the gas as chlorine and improvised a quick solution. As one Canadian put it frankly,

10. Ibid., 21.

“Piss on your handkerchiefs and tie them over your faces’, yells our lieutenant. There are some who do not make this precaution. They roll about gasping for breath.”¹¹

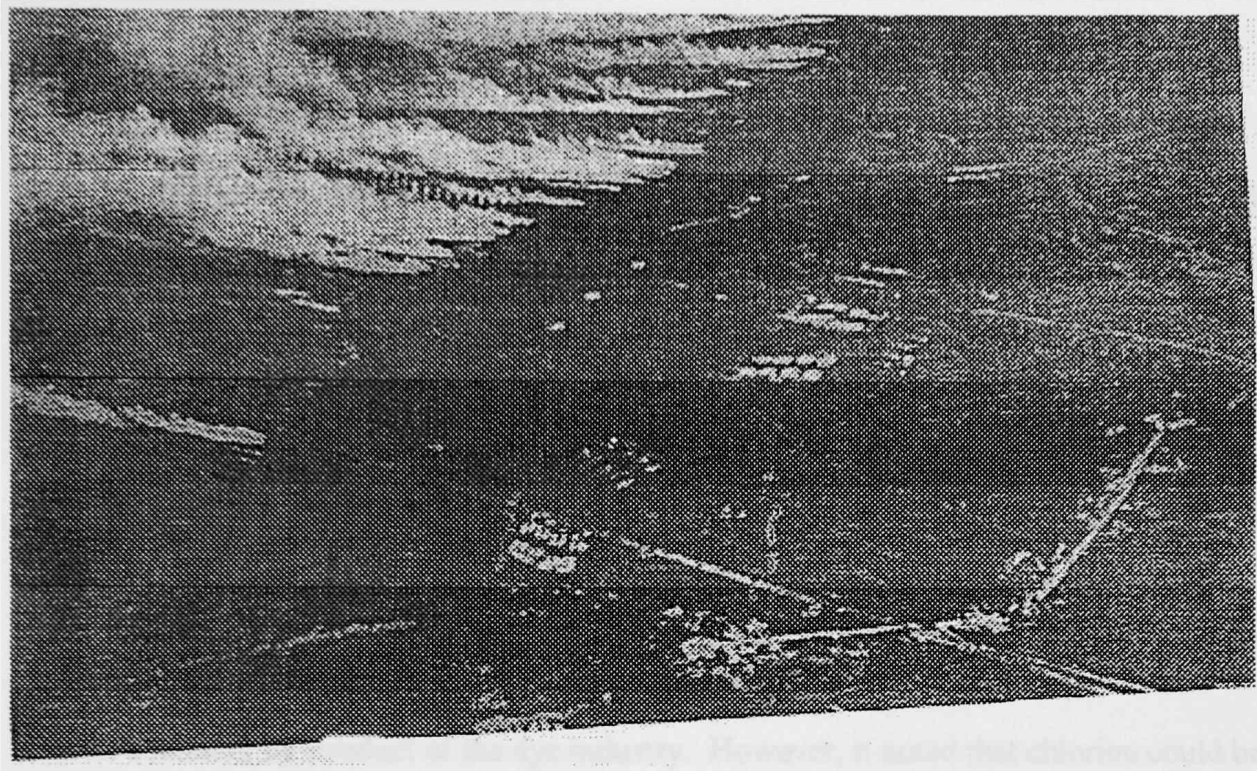


Figure 1. Aerial photograph of a poison gas cloud in France 1916.¹²

The first attempts at gas warfare in World War I were crude attempts as the early employment was more art than science. The temperature had to be just right, too high and the gas dissipated too rapidly and rose above the trench, too low and the gas failed to vaporize, and it remained in liquid form on the ground. If the wind was not in the right direction, the poison gas would blow back at the employer, and if the wind was too fast, the gas would dissipate too rapidly. In reality, chlorine was not a good choice of poison gas to use because it was too reactive; hence, it would react easily with the ammonia in

11. Ibid., 24.

12. George J. B. Fisher “Chemicals-How, When and Where?,” *Infantry Journal* no. 1, (January-February 1935), 31.

urine, thus being rendered harmless. The Germans used chlorine simply because of the large supply readily available.

The ideal gas had to be heavier than air, so that it would drop down in the trenches where the soldiers were. It should also be highly toxic, have a high vapor pressure, and have a high stability.¹³ *Scientific American* ran an experiment in May 1915 to determine how effective chlorine cylinders were for gas warfare. According to the article, for chlorine gas to be incapacitating it must be at a concentration of 1 part chlorine per 1,000 parts air. Its scientists calculated a wind of four miles per hour and a time of two minutes to empty a chlorine cylinder. To charge the lower three feet of air to a concentration of 1 part per 1,000 would take about one ton of compressed gas per mile of battle front. The article concluded that the method was highly feasible since chlorine was an abundant by-product of the dye industry. However, it noted that chlorine could be rendered ineffective without much effort. The author concluded, quite hopefully, that the preventive measures were too effective and gas warfare would soon prove to be ineffective.¹⁴

Early methods of protection were crude “muzzles,” similar to the facemasks dentists wear. For the emergency at Ypres, the French and British hired women to sew as

13. A high vapor pressure was needed so the gas could be used on cold days. If the air temperature were too cold, the gas would remain a liquid. Gas shells were produced in refrigerated factories, thereby keeping the gas a liquid and reducing the possibility of harm to munitions workers; when a shell exploded on the front the gas was in a liquid form and had to vaporize to be lethal.

14. “Chlorine Gas on the Battlefield,” *Scientific American* 113 (15 May 1915): 452.

many masks as they could, which were later treated with chemicals that reacted with the chlorine to render it harmless. Another suggested method of prevention was to place fans along the trenches to create a counter current to force the poison gas away from the trench.¹⁵ Since gas warfare was so new, almost anything was tried to gain the advantage. Eventually a respirator (gas mask) was designed and perfected that looked very similar to modern gas masks. Chemists now played a greater role in the defense of a country; whole new corps were formed in the armies of the warring nations, and new tactics were developed to deal with the implications of gas warfare.¹⁶

It was in this atmosphere that the War Department organized the Chemical Service Station in September 1917. This was the first recognition of chemistry as a separate branch of the military service anywhere in the world.¹⁷ The United States did not declare war on Germany until almost two years after the chlorine gas attack at Ypres. Much in the way of improvements in the effectiveness of chemical warfare had taken place in the previous two years, and the United States was far behind. The Allies and Germany developed many new gases and better methods of delivery, included the

15. "Dispersing Asphyxiating Gases," *Scientific American* 114 (31 July 1915): 93.

16. For information of chemical warfare services in other countries see: Tim Cook, *No Place to Run: The Canadian Corps and Gas Warfare in the First World War* (Toronto: UBC Press, 1999).; Ludwig Fritz Haber, *The Poisonous Cloud: Chemical Warfare in the First World War* (Oxford: Clarendon Press, 1986).; Albert Palazzo, *Seeking Victory on the Western Front: The British Army and Chemical Warfare in World War I* (London: University of Nebraska, 2000)., Donald Richter, *Chemical Soldiers: British Gas Warfare in World War I* (Lawrence: University of Kansas, 1992).

17. Amos A. Fries and Clarence J. West, *Chemical Warfare* (New York: McGraw-Hill book Company, Inc., 1921), 34.

artillery shell, mortar, and Livens projector.¹⁸

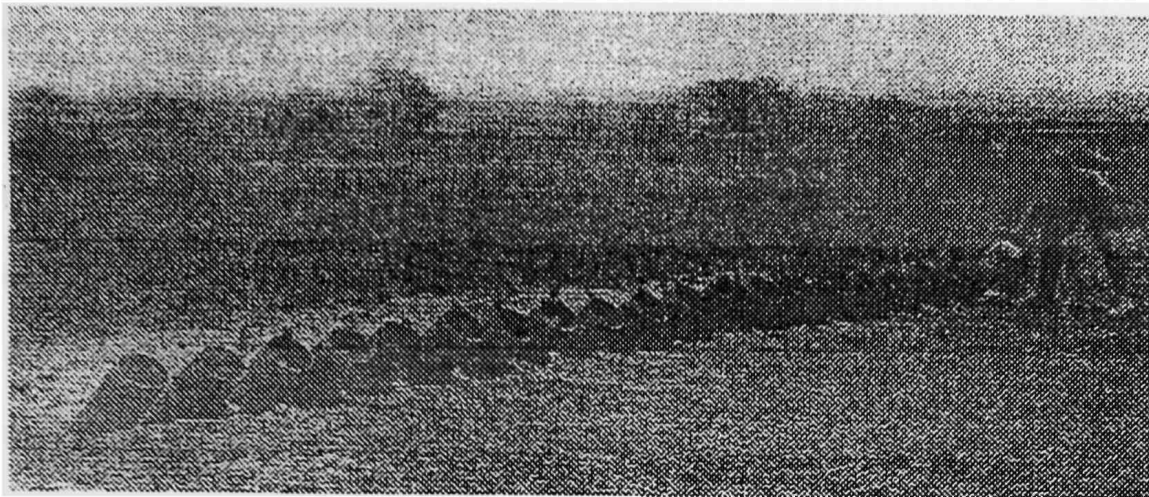


Figure 2. Battery of Livens projectors being readied for use.¹⁹

Woodrow Wilson felt that if the United States was to remain neutral, it had to be so in action as well as thought. Wilson's views reflected those of most Americans in the United States. In his "Second Inaugural Address," Wilson announced, "That national armaments should be limited to the necessities of national order and domestic safety...."²⁰ Repeatedly the military had its hands tied and preparation for war was nonexistent. The complete aversion to war severely hampered the United States

18. The Diggers, "The Livens Projector," (2001) <<http://www.diggers.be/E/activiteiten/Livens/welkom.htm>> Developed by British officer Lieutenant W. H. Livens, the Livens projector is a very specific type of mortar consisting of a short metal tube with a base plate and then buried at a forty-five degree angle in the ground. Close to thirty pounds of poison gas were placed in the cylinder on top of an explosive charge. The cylinders were then electrically connected together to form a battery. In March 1918, the British connected 5,549 projectors together and fired them simultaneously, flooding the target area with eighty-five tons of phosgene gas.

19. Fisher "Chemicals-How, When and Where?," 33.

20. Arthur Roy Leonard, ed., *War Addresses of Woodrow Wilson* (Boston: Ginn & Company, 1918), 29.

effectiveness in preparation for not only chemical warfare, but also every other form as well. A large propaganda campaign ensued throughout the Great War to change public opinion in the United States, and the subject of gas warfare garnered special attention in the press. The general populace, showed a strong anti-war sentiment, as initially, many did not care who won the European War. However, once the Germans used gas as a weapon Americans began to take sides. Along with gas warfare, unrestricted submarine warfare and the Zimmerman telegram were vital to Wilson's decision to go to war. By the time the Americans entered into the Great War, sentiment rested heavily with the Allies.²¹

An explanation of the propaganda is necessary to fully understand why the United States lagged in the area of chemical warfare. After Ypres in April 1915, the public press wrote scathing articles on the Germans' use of chemical weapons. At the beginning of World War I, some critics thought that the war fought between gentlemen would be a good thing for Europe. After Ypres, attitudes towards the war and the Germans as "fair" or "sporting" or "gentleman- like" had reversed completely. The propaganda focused on words like "barbaric," "inhumane," and "savage" when referring to the Germans. Even though the United States was not in the war at the time of Ypres, this detail did not dim the amount of criticism of the "Huns."

Almost immediately after the gas attack at Ypres, the *New York Times* stated,

...employment of noxious gases to put an enemy out of fighting condition happens to be a very ancient device, and now it is a novel one chiefly because it had come to be considered too barbaric – a characteristic which now apparently

21. Gregory, *The Origins of American Intervention in the First World War*.

counts for nothing, or at least has nothing against it, in the eyes of those who find advantage in the revival of an old custom.²²

Many articles were detailed attempts at making the Germans look as inhuman as possible.

By doing this, the warring nations could find reason for its own retaliatory gas attacks. For example, an article submitted in the *New York Times* by British General Stuart Wortley exclaimed, “Our chief medical officer, who has had a very large experience of the habits of Africans and Asiatic natives tells us that in all his life he has never had to deal with such an example of scientific torture.” The article continues, “There are only two divisions in the world today, human beings and Germans, and the German knows it. Human beings have long ago sickened of him and everything connected with him, of all he does, says, thinks, or believes.”²³ Comparing Germans to Africans or Asiatics was a clear insult at the time, as Africans and Asiatics were seen as subhuman in many “white” countries.

Many articles described the gory details of how a gassed soldier died, further enhancing the propaganda. General John J. Pershing summed up the American attitude concerning gas warfare in his memoir, *My Experiences in the World War*. Pershing argued, Hague Convention “had created a feeling of security regarding such a possibility. Germany had subscribed to the agreement, and when her armies disregarded this pledge and became the first to use gas shells, the impression was that the Germans had now

22. “A Device Far From New,” *New York Times*, 27 April 1915, sec. A12.

23. “Describes Effects of Poison Gases,” *New York Times*, 22 June 1915, sec. A12.

thrown every consideration of humanity to the winds.”²⁴ By firmly establishing that what the Germans had done was wrong, and because of these actions they could be considered “less than human,” they could be treated in kind. The transition from abhorrence of chemical warfare to support of its use therefore became easy and logical.

One piece of propaganda suggested that Germany should get a taste of her own medicine, saying, “The Germans have given out that it is a rapid, painless death. The liars! No torture could be worse than to give them a dose of their own medicine.”²⁵ The argument that self-defense was a necessary evil allowed the Allies to use poison gas with a clear conscience. The Allies, however, did not want to betray their own population by using poison gas without first ensuring that their population was willing to accept the use of chemical warfare by their own troops.²⁶ This topic of acceptance is a major theme in the history of the CWS in the U. S. Army and is explored later in more detail. It is also interesting to note that President Wilson never said one public word about chemical warfare. The lack of a stance on chemical warfare by the U.S. commander in chief is just one reason the United States was so unprepared to make war using chemical weapons.

As early as May 1915, the U.S. Army’s Board of Ordnance and Fortifications received a recommendation stating, “...there may be found many suggestions in favor of

24. John J. Pershing, *My Experiences in the World War* (New York: Frederick A. Stokes Company, 1931), 165.

25. “Slow Torture, Says an Officer,” *New York Times*, 7 May 1915, sec. A3.

26. Cook, *No Place to Run*.

the asphyxiation process, mostly by the employment of gases contained in bombs to be thrown within the lines of the foe, with varying effects from peaceful slumber to instant death.”²⁷ Nothing more was done to investigate chemical warfare until it seemed war was imminent. Finally, Dr. Van H. Manning the Director of the Bureau of Mines contacted the War Department in February 1917. The Bureau of Mines had experience in keeping miners safe from noxious fumes; therefore, the bureau felt it could be of value in the study of the gas mask.²⁸

When the United States declared war on Germany on 6 April 1917, there were a few scattered observations on gas warfare in the various military branches but nothing close to an organized survey of chemical warfare. Even worse the War Department had not initiated any research on the subject.²⁹ Wholly unprepared for chemical warfare, the War Department divided the responsibilities among five agencies, including the Bureau of Mines (see Table 1).

Dividing the responsibilities increased the amount of confusion and did little good in finding a solution for waging chemical warfare. The Bureau of Mines, however, did overcome some obstacles. The Bureau, by the end of May 1917, obtained the aid of laboratories in twenty-one universities, three industrial companies, and three government

27. Fries and West, *Chemical Warfare*, 5.

28. Robert M. Yerkes, ed., *The New World of Science: Its Development During the War* (New York: Books for Libraries Press, 1948), 129.

29. Fries and West, *Chemical Warfare*, 31.

agencies with a total of one hundred eighteen chemists. The Bureau chose American University in Washington D.C. to coordinate the research of the combined institutions.³⁰

Table 1: Initial Organization for Preparation of Chemical Warfare.

AGENCY	RESPONSIBILITY
Bureau of Mines-----	Research on chemical agents
Medical Department-----	Provisions for defensive equipment
Ordnance Department---	Manufacture of chemical weapons
Corps of Engineers-----	Formation and training of units for chemical warfare
Signal Corps-----	Provision of gas alarms.

Source: Brooks E. Kleber and Dale Birdsell, *United States Army in World War II. The Chemical Warfare Service: Chemicals in Combat*, 1966.

General Pershing's staff saw an immediate need for action to deal with chemical warfare and appointed a board to make recommendations concerning gas warfare. By June 1917 the American Expeditionary Forces (AEF) board met and recommended assigning an officer to "create and handle" an AEF gas organization and "...provide him

30. Leo P. Brophy, Wyndam D. Miles, and Rexmond C. Cochrane *United States Army in World War II, The Chemical Warfare Service: From Laboratory to Field* (Washington, D.C.: Office of the Chief of Military History, 1959), 5.

with assistants, funds and authority.”³¹ This was a step in the right direction for the operation of an efficient organization. Both the British and the French began with makeshift organizations only to learn by bitter experience that more organization was needed to conduct chemical warfare effectively.³² On 15 July 1917, the AEF gave a preliminary outline for the establishment of a Gas Service.³³ Finally, one month later on 18 August 1917, the General Staff authorized a regiment of Gas and Flame troops, given the designation of the 30th Regiment of Engineers. Major Amos A. Fries was assigned Engineer in Charge of Gas and a few days later promoted to Colonel.³⁴

Amos Alfred Fries was born on 17 March 1873, graduated from the United States Military Academy, and served with distinction under then Captain John J. Pershing in the Philippines in 1901. Fries is of central importance in the history of the CWS because he became the leading proponent of chemical warfare after World War I. Promotion was rapid within the CWS, and Fries was not an exception. Fries went from Major to Brigadier General in a span of two years.

31. Brooks E. Kleber and Dale Birdsell, *United States Army in World War II. The Chemical Warfare Service: Chemicals in Combat* (Washington, D.C.: Office of the Chief of Military History, 1966), 16.

32. *United States Army in the World War, 1917-1919*, vol. 15, *Reports of the Commander-in-Chief, Staff Sections and Services* (Washington, D.C.: Center of Military History United States Army, 1988), 292.

33. *Ibid.*, 291.

34. *Ibid.*



35

Figure 3. Major General Amos A. Fries.

AEF General Order 31 issued on 3 September 1917, established the Gas Service to supervise chemical warfare activity.³⁶ Even though the existence of a central system for coordination solved many problems, Fries protested throughout his tenure that the director was supposed to coordinate the various activities but was given no authority to control policy, research, or production.³⁷ The Gas Service at this time was not an independent corps, as it had to rely on approval from other entities. Many in the military hierarchy did not like chemical warfare, viewing it simply as a necessary evil. For example, no appropriations were allotted to the Gas Service once created, making it necessary for the Gas Service to obtain all of its supplies from departments that handled similar materials. Similarly, the various departments grudgingly accepted orders, and when accepted, many departments did not care to follow up the orders for a new service

35. WWW.goordnance.apg.army.mil/HallofFame, (March 2004).

36. Brophy, Miles, and Cochrane, *From Laboratory to Field*, 10.

37. Fries and West, *Chemical Warfare*, 35.

that had no authority.³⁸ Likewise, the American commanders and troops in Europe had difficulty throughout the war with chemical warfare and prosecuted the war almost as if chemical warfare were irrelevant.³⁹

That the Gas Service was a separate service in the AEF is important to highlight because the equivalent in the National Army was not created until nearly ten months later. During World War I, the AEF functioned as a separate entity from the army in the United States. The AEF Gas Service was modeled after the French version, which along with the British, had the ability to teach from experience (see Table 2).

Along with the model for the Gas Service, the United States depended on the French and British for gas masks, gas shells, and training for gas warfare. The Gas Service felt a great sense of urgency because as of 17 August 1917, there were twelve thousand American troops within thirty miles of the front lines without gas masks.⁴⁰ This lack of preparedness early in the war was a common occurrence. The United States was wholly unprepared for war in April 1917, and it was not until the middle of 1918 that the Doughboys began to make a difference.

38. Ibid., 77.

39. Kleber and Birdsell, *Chemicals in Combat*, 4.

40. Fries and West, *Chemicals Warfare*, 73.

Table 2: Organization of the Gas Service as of September 1917.

BRANCH	DIRECTORS
Overseas-----	Brigadier General Amos A. Fries
Research-----	Colonel G. A. Burrell
Development-----	Colonel F. M. Dorsey
Gas Defense Production-----	Colonel Bradley Dewey
Gas Offense Production-----	Colonel William H. Walker
Medical-----	Colonel W. J. Lyster
Proving-----	Lieutenant Colonel W. S. Bacon
Administration-----	Brigadier General H.C. Newcomb
Gas and Flame-----	Colonel E. J. Atkisson

Source: Excerpt from Amos A. Fries and Clarence J. West, *Chemical Warfare*, 1921.

An ill-equipped advance guard of the AEF steamed to France in June 1917 with Major General William Sibert as their commander in chief. William Luther Sibert was born into an Alabama farm family in 1860, graduated in 1884 from West Point, and was

subsequently commissioned as an officer in the Corps of Engineers. Sibert gained distinction when appointed Chief Engineer of the Manila and Dagupan Railway. Upon returning to the United States, Sibert received an appointment as one of three assistants to Chief Engineer George W. Goethals of the Panama Canal. As Atlantic Division Engineer, Sibert was in charge of the Gatun Locks and Dam portion of the Panama Canal. After the canal was complete, Sibert was promoted brigadier general of the line in 1915 as an expression of the nation's gratitude. By 1917, Sibert had attained the rank of major general and was commander of the First Infantry Division, AEF France.⁴¹

Six months later in January 1918, General Sibert was relieved of his command of the First Division. Secretary of War Newton Baker told the newspapers not to speculate why Sibert was sent home, but one can infer that Sibert was a better engineer than divisional commander.⁴² Brigadier General James G. Harbord put it frankly, "Sibert depended too much on his staff and let his division decline in efficiency."⁴³ Sibert, however, later gained the favor of General Pershing when he named him the director of the Gas Service.

Sibert faced a daunting task as the Gas Service had to borrow almost all of its equipment from the Allies. In August 1917, there was no supplies coming from the

41. "General Sibert, Who Commands Our First Camp in France," *New York Times*, 1 July 1917, sec. VI, 8:1.

42. "General Sibert, Pershing Aid, Relieved of Duty and Assigned to Command Department at Home," *New York Times*, 3 January 1918, sec. A1.

43. Edward Coffman, *The War to End All Wars: The American Military Experience in World War I* (New York: Oxford University Press, 1968), 142.

United States. The French supplied most of the American equipment including artillery shells, mortars, and masks. The British accepted an order for 400,000 box type respirators but would only guarantee the United States the surplus after fully supplying the British Expeditionary Force. By November 1917, the United States had only produced a minimal 20,000 gas masks for her troops.⁴⁴ Also in November 1917 the United States agreed to fill ten percent of artillery shells with chloropicrin, and the French would trade phosgene shells in exchange for high explosive (HE) shells.⁴⁵ The initial problem of supply was not unique to the Gas Service, for instance, the AEF only produced four 75mm howitzers and a small amount of heavy naval guns mounted on rail cars by war's end.⁴⁶ Production did gear up near the war's end, and the United States increased the percentage of artillery shells filled for gas to thirty-five percent by January 1919.⁴⁷

A limited supply of chemical warfare materiel and less than enthusiastic support for gas warfare helped lead to the AEF's poor performance in that area during World War I. Officers were reluctant to use gas and the men initially had poor training and discipline when it came to protecting themselves from gas. Major General Robert L. Bullard summed up the American military's behavior towards gas warfare during the war by stating,

44. *Reports of the Commander-in-Chief, Staff Sections and Services*, 295.

45. *Ibid.*, 298.

46. John Ellis, *Eye Deep in Hell: Trench Warfare in World War I* (New York: Pantheon Books, 1976), 72.

47. *Reports of the Commander-in-Chief, Staff Sections and Services*, 298.

Gas is such an intangible thing that men are only with great difficulty made to guard themselves against it. A state of instruction adequate against the danger is extremely hard to obtain: ignorance, indeed, is the hardest thing in the world to struggle against. Our gas officers were almost hysterical in their efforts to teach and impress our new troops; but knowledge and real, efficient training came only after hard experience and after the hysteria of gas officers had ceased.⁴⁸

Hysteria is an accurate description of conditions in the Gas Service. In Fries' and West's *Chemical Warfare*, the authors state that an, "...Assistant Chief of Staff, G-3 of a certain American Corps refused to consider a recommendation to use gas at a certain point in the Battle of the Argonne unless the gas officer could state in writing that if gas was used it could not possibly result in a single American casualty."⁴⁹ Today this argument appears laughable as officers can make no guarantees that casualties from friendly fire will not happen even when every precaution is made taken.

With responsibilities mounting daily, a need for a more efficient Gas Service became evident. War Department General Order 62 on 28 June 1918 organized a Chemical Warfare Service in the National Army.⁵⁰ General Sibert was made Director of the CWS with General Fries keeping his place as director of the overseas activity. The organization of the CWS changed dramatically and is worth noting. Besides the addition of personnel, the major change occurred with the separation of the offense and defense branches⁵¹ (see Table 3).

48. Robert L. Bullard, *Personalities and Reminiscences of the War* (New York: Doubleday, Page & Company, 1925), 192-193.

49. Fries and West, *Chemical Warfare*, 90.

50. Brophy, Miles, and Cochrane, *From Laboratory to Field*, 13.

Table 3. Organization of the Chemical Warfare Service as of October 19, 1918.

Branch	Directors
Director-----	Major General William Sibert
Overseas-----	Brigadier General Amos Fries
Ordnance Office-----	Lt. Colonel C. B. Thimmel
British Military Mission-----	Major J. H. Brightmon
Assistant Director-----	Colonel H. C. Newcomb
Office of Administration-----	Major W. W. Porter
Relations Section-----	Colonel M. T. Bogert
Personnel Section-----	Major F. E. Breithart
Contracts and Patents Section-----	Captain W. K. Jackson
Finance Section-----	Major C. C. Coombs
Requirement and Progress Section-----	Captain S. M. Cadwell
Confidential Information Section-----	Major S. P. Mullikin
Transportation Section-----	Captain H. B. Sharkey
Training Section-----	Lt. Colonel G. N. Lewis
Procurement Section-----	Lt. Colonel W. J. Noonan

Source: Excerpted from Fries and West, *Chemical Warfare*, 1921.

The responsibilities of conducting chemical warfare had grown enormously since April 1917 when the five separate agencies split duties. In September 1918, *Scientific American* listed twenty-one different chemicals the Germans had used in cloud, artillery

shells, and hand grenades.⁵² The ability to identify the gases used by the Central Powers, make the necessary precautions, and attack in kind demanded such a complex organization. In reality, the War Department realized the importance of an independent gas corps whether or not staff or field officers acknowledged the importance of the CWS. There was a constant battle between the many sides to see which could develop the next poisonous gas to nullify the other's method of protection. By the closing of the war the CWS was ready to conduct chemical warfare; however, the Armistice on 11 November 1918 occurred before any significant CWS operations were mounted.

Following the armistice the American Army, including the CWS, quickly demobilized. When the war ended, the CWS had authorization for 4,066 commissioned officers and 44,615 enlisted men, comprising two gas regiments with eighteen companies each. But by war's end, seven companies were fully mobilized with another twenty-six companies scheduled for mobilization by 1 January 1919.⁵³ By 30 January 1919, the CWS was on the receiving end of a ninety-seven percent reduction in personnel.⁵⁴ One must remember that the CWS was an institution born out of necessity and not well liked within the military or political spheres. Officers wanted written guarantees that fratricide would not occur from gas, and the public always disliked the idea of chemical warfare.

52. H. E. Howe, "The Service of the Chemist: A Department Devoted to Progress in the Field of Applied Chemistry," *Scientific American* (21 September 1918): 228.

53. House, *Final Report of General John J. Pershing, Commander-in-Chief*, 66th Cong., 2nd sess., 1919. H. Doc. 626. General Fries and in *Reports of the Commander-in-Chief, Staff and Service Sections* state that three regiments were authorized, however, in Pershing's final report he only showed two regiments authorized.

54. Brophy, Miles, and Cochrane, *From Laboratory to Field*, 24.

Without military or popular support, the CWS looked as if it would disappear. However, General Fries held strong beliefs about the future of chemical warfare and persuaded powerful friends in Congress to stop the blood letting. Two of Fries' most influential supporters were Congressman Julius Kahn, chairman of the House Military Affairs Committee, and Senator George Chamberlain, chairman of the Senate Military Affairs Committee. In July of 1919, Congress gave the Army a "restraining order" included in the passage of the Army appropriations bill, and the CWS was given a year to convince Congress of the need for a separate CWS.⁵⁵ The National Defense Act of 1920 guaranteed the existence of the CWS as a separate corps within the army.⁵⁶

55. "Entity of Chemical Service Preserved," *Infantry Journal*, 12, July 1919, 1569.

56. *United States Statutes at Large 66th Congress 1919-1921*, vol. 41, part 1, Public Laws (Washington, D.C.: Government Printing Office, 1921).

CHAPTER III

AN UNCERTAIN FUTURE

After the war, the CWS had an image problem to contend with if it wanted to survive as an independent corps within the army. Attitudes after the Great War reverted back to anti-war or isolationist positions. World War I caused great pain and suffering. As a result, the American populace did not want anything more to do with Europe and its problems; they just wanted their troops home as fast as possible.

Two questions arose within the military and political leadership. First, how could the CWS remain as a separate corps within the army? Second, was the CWS concerned about being absorbed by the engineering corps? When examining the CWS from September 1917 to the late 1920s, General Fries is easily the most striking and significant figure. Fries became very outspoken and did not waver in his beliefs concerning the position of the CWS in the military. He touted the CWS at every opportunity by writing in military, chemical and industrial journals, and giving speeches. General Sibert, the chief of the CWS, also continued to fight for the chemical service but not as noticeably as Fries.

The discussion over the engineering corps' absorption of CWS arose first. Both the British and French versions of the CWS were part of their respective engineering corps and were of substantial importance. However, absorption would have meant a loss of relative rank for the leadership of the CWS. Sibert, Fries, and other high ranking officers would have been forced to answer to the ranking general in the engineering corps rather than directly to the Chief of Staff. The engineering corps also held widespread

antipathy for the CWS. Chief of Staff General Peyton C. March reported, "...the department (engineering corps) was opposed to the use of poisonous gas and believed chemical warfare should be abolished."¹ The engineering corps along with the military and political leaders wanted the CWS, if it existed at all, to have the sole duties of training troops in case of gas attack and the development of gas defense measures such as the gas mask.

The next problem for Fries and the CWS was the uncertainty of its continued existence at all. To address this question, the most pressing problem the CWS had was its image as an inhumane killer. CWS leaders recognized this problem, and Fries immediately embarked on a deliberate campaign to change that image. On 17 February 1919 the *New York Times* reprinted one of Fries' articles from the *Chemical and Metallurgical Engineering*, which described the "Use of poison gas as... 'the most humane method of fighting if both sides are prepared [and]... is destined to have permanent place in warfare.'"² Notice the messages Fries tried to convey to his readers. Gas warfare was a humane way of fighting, better than artillery and bullets, and the importance of preparedness. Fries played upon both themes of humanity and preparedness. No one wanted a repeat of April 1915 at Ypres where the Allies were caught unprepared, and if chemical warfare was seen as more humane, then so much the better.

The Office of the Surgeon General compiled statistics on battle casualties after World War I. Fries and the CWS used those statistics to make two influential arguments

1. "March Opposes Staff Bill," *New York Times*, 9 August 1919, A9.

2 "Up Holds Gas Warfare," *New York Times*, 17 February 1919, A5.

about the humaneness of chemical warfare and its viability. Numbers vary some from source to source, and Fries used slightly different numbers as his campaign progressed. However, Fries' numbers did not change significantly over the years so there is no reason to believe he misled anyone or changed the statistics to fit his needs. It was probably the case where more research was done so some numbers did change slightly. For this paper, statistics from *The Medical Department of the United States Army in the World War*, Vol. 14, *Medical Aspects of Gas Warfare* are used to maintain consistency.³

The logic behind the “chemical warfare as humane” and “viable” arguments read like this: there were 224,089 American casualties from battle in World War I with 70,552, or 34.49 percent resulting from gas (see Table 3). Fries and his colleagues argued that because one third of American casualties resulted from gas, the military needed to prepare for such a weapon. They stressed that the AEF was credited with having horrible gas discipline during World War I and the numbers of gas casualties were much higher than those of France, Great Britain and Germany; therefore, if the American army had been better prepared, casualties would have been lower.

Out of the 70,522 casualties 1,222 deaths were a result of poison gas, or an overall percentage of 1.73. “Mustard” gas, the most common and lethal gas, was responsible for 27,711 casualties with a death rate of 2.16 percent. When looking at the statistics, poison gas was more likely to injure a soldier than to kill one. Fries used variations of these numbers numerous times, and this argument eventually persuaded General March,

3. H. L. Gilchrist, “Statistical Consideration of Gas Casualties,” in *The Medical Department of the United States Army in the World War*, Vol. 14, *Medical Aspects of Gas Warfare* (Washington D.C.: Government Printing Office, 1926), 273.

previously one of the CWS' most outspoken opponents, to eventually concede to the logic of gas as a "humane" weapon, see Table 4.⁴

Table 4: Absolute numbers, deaths, and case mortality rates.

Gas to which exposed	Number of admissions	Deaths	%
Not Stated	33,587	546	1.63
Chlorine	1,843	7	.38
Mustard	27,711	599	2.16
Phosgene	6,834	66	.97
Arsine	577	3	.52
Total	70,522	1,221	1.73

Source: Excerpted from H. L. Gilchrist, "Statistical Consideration of Gas Casualties," 1926.

During the spring and into the summer of 1919, the army was not wholly concerned with the CWS. Debates over demobilization, the future size of the army and mandatory universal peacetime service all concerned the military and politicians for some months. During this time, Fries found allies in Congressman Julius Kahn, the chairman of the House Military Affairs Committee and Senator George Chamberlain, the chairman of the Senate Military Affairs Committee.

4. "Finds Gas Humane in War," *New York Times*, 26 November 1919, A6. Notice this is after the CWS was given a year to prove its worth to Congress

Julius Kahn immigrated to the United States from Germany in 1868. The people of California elected Kahn to the state assembly in 1892 as a Republican and in 1898 to Congress. The Republican Party appointed Kahn to the military affairs committee in 1905 where he became a “pioneering advocate of improving the military.” Kahn helped draft the National Defense Act of 1916 and the Selective Draft Bill, and was a leader in the development of the National Defense Act of 1920.⁵ Kahn’s service clearly shows that he was an advocate for a prepared military.

Senator George Chamberlain, born in Mississippi, earned a law degree from Washington and Lee University before moving to Oregon. As a Democrat in Oregon he ran on a Populist platform and was elected Governor in 1902. In 1909, he became a senator. Chamberlain became chairman of the Senate Committee on Military Affairs in 1912 where he attempted to enact universal peacetime military service during his tenure. After World War I, Chamberlain again initiated a bill on universal peacetime service, which was promptly killed. This had the side effect of starting a debate on the preparedness of the post-World War I army, an influential argument for the retention of the CWS.⁶ Thanks to Fries’ vigorous campaigning in the public sector with help from Chamberlain and Kahn on the political side, Congress gave the army a “restraining” order for one year to give the CWS time to prove its value as a separate corps.⁷

5. Herbert. F. Margulies, “Julius Kahn,” *American National Biography*, vol. 12, ed. John A. Garraty and Mark C. Carnes (Oxford University Press: New York, 1999), 339.

6. Daniel R. Beamer, “George E. Chamberlain,” *Ibid.*, 632,.

7. Congress, House, *Appropriations Bill*, 66th Cong., 1st sess., H. R. 5227, *Congressional Record*, 58, pt. 3, (1 July 1919): H2199.

Soon after Wilson signed the Army Appropriations bill into law, Congress began to debate the March-Baker, bill or Senate bill 2715, in early August 1919. This bill eventually became known as the National Defense Act of 1920, which in reality is an amended version of the National Defense Act of 1916. It ultimately decided the fate of the CWS. Senator James W Wadsworth Jr. introduced the Senate bill on August 4, 1919. The section concerning the CWS read

The bill as enclosed provides a peace-time establishment of 510,000 men and in effect makes permanent the organization which has developed in the War Department, except that it abolishes the Chemical Warfare Service... The work appropriate to be done by the Chemical Warfare Service in peace time ought, in my judgment, to be carried on in the Engineer Department, and should consist to such research and preparation as would enable our Army always to defend itself against the aggressive use of chemical weapons and to overmatch any adversary in offensive operations should they begin against us.⁸

This was just the beginning of a long fight for the independence of the CWS. The House and Senate subsequently broke into their respective committees and separately discussed the new National Defense Act.

Discussions of Senate Bill 2715 illicit heated debate. The intense remarks once directed at Germany were now aimed at the CWS. Editorials in the *New York Times* voiced the opinions of both sides of chemical warfare. One editorial condemning the use of gas warfare stated, "Poison gas, the greatest horror in a war of horrors, should be condemned to the limbo of things unspeakable."⁹ However, another writer, wrote, "Now the army engineers are most excellent men...but they are not in position to continue the

8. Congress, Senate, Senator Wadsworth of New York, *Senate Bill 2715*, 66th Cong., 2nd sess., *Congressional Record*, 59, pt. 8, (12 August 1919): H2199.

9. "Banish Poison Gas," *New York Times*, 28 June 1919, A8.

endless research upon which the efficiency of chemical warfare depends.”¹⁰ The public took great interest in the future of chemical warfare as demonstrated by the amount of coverage that the *New York Times* devoted to this subject. In the almost one year from between the issuance of the restraining order by Congress and the passage of the National Defense Act of 1920, the *New York Times* included no less than twenty articles on the CWS and the National Defense Act of 1920.

Fries employed other allies besides the military affairs committee and the papers to insure the continuation of the CWS. With the absence of competition from the once dominant German chemical companies, American firms looked to secure their share of the market. Part of that market share involved the CWS because of the chemical weapons it produced. A major advocate of chemical warfare was the American Chemical Society, which echoed Fries’ arguments about preparation and the “humanity” of gas warfare. Dr. Charles H. Herty, president of the American Chemical Society, voiced Fries’ arguments exactly at the Chemical Industries Show in New York City.¹¹ Fries saw an ally in the chemical industries, not only because of the similarities in work but also because the lobbyists’ influence.

Fries kept up his public relations campaign on behalf of the CWS and changed tactics somewhat to give the CWS a more friendly appearance. Fries tried to find useful peacetime purposes for gas warfare ranging from tear gas for police work and riot control, to killing rats, snakes, worms, and insects for pest control, to uses in the chemical

10. “Future of Chemical Warfare,” *New York Times*, 3 December 1919, A14.

11. “Calls Bomb Problem One For Chemists,” *New York Times*, 21 September 1920, A21.

industry.¹² He also advocated it as a method to “humanely” kill farmed fur bearing animals and later extended this idea to humans as well, as evidenced by the first gas chamber built in Nevada.¹³

On May 29, 1920 the House approved its conference report on the National Defense Act of 1920 with an amended Section 2. The amended version read, “Composition of the Regular Army: The Regular Army of the United States shall consist of the Infantry, the Cavalry...the Chemical Warfare Service....”¹⁴ The House then sent their version to the Senate for final approval. The Senate approved the version and on June 5, 1920, President Wilson signed the National Defense Act of 1920 into law with the retention of the Chemical Warfare Service as a separate corps. Fries and the CWS won an important victory with the passage of the act; the CWS now had greater control of its own destiny. However, the CWS’s independence did not come easy. Fries, along with Sibert and their colleagues, literally sold the CWS to the military, Congress, and the

12. The chemical industry maintained extensive ties with the CWS. At the outbreak of war, Germany supplied large amounts of precursors (basic compounds used as building blocks to make other chemicals) to the United States. As a result of the blockade of Germany the chemical industry in the United States grew rapidly during the war and they wanted to protect their investment after the war.

13. “Nevada To Use Gas to Execute Criminal,” *New York Times*, 10 April 1920, se, II,8. Nevada wanted to outlaw capital punishment or find a humane way of executing prisoners. If no humane way could be found, then capital punishment would be abolished. As a way of insuring capital punishment’s abolishment, one state assemblyman suggested the use of poison gas as a “humane” way of execution. Thinking this method would have no chance of passage, the result would be the abolishment of capital punishment in the state of Nevada. However, the bill passed, and as a result the “Humane Death Bill” was signed into law in April 1920 making Nevada the first state to use poison gas for execution.

14. Congress, House, *Army-Reorganization-Conference Report*, 66th Cong., 2nd sess., H. R. 12775, *Congressional Record*, 59, pt. 8, (29 May 1920): H7893.

public. By firmly establishing the CWS in the army, Fries broke the army's customs and regulations by trying to sell the CWS to professional propagandists, chemical societies, and other Chiefs of Services. There is evidence that Fries had links with the major chemical companies of the day, and he contributed to their journals to some degree.

The good news lasted for only a short while because the Military Appropriations bill passed along with the National Defense Act of 1920 limited the CWS. If Fries was to have an independent CWS, Congress was not going to give money to develop offensive capabilities. No chemical warfare officers were authorized for Division Staffs; no CWS troops could be assigned to troops of the Regular Army for training; no army officers could be detailed to attend chemical warfare school; and no gas ammunition could be employed for training or target practice.¹⁵ The Assistant Chief of Staff G-3 wrote, "It [CWS] is not intended to proceed with this work. The research or experimental work...is to be merely such as may be necessary or desirable in connection with the Engineer's School. No funds or special personnel for chemical warfare will be authorized."¹⁶ Even though the CWS remained independent, the military limited its actions by its interpretation of the appropriations bill.

Fries began to seek additional funding from any source. He continued to keep the CWS in the spotlight, and by doing so garnered much needed public attention. The CWS

15. Frederick J. Brown, *Chemical Warfare: A Study in Restraints* (Princeton: Princeton University Press, 1968), 89.

16. Memorandum For the Chief of Staff, War Plans Division, 23 December 1921, National Archives United States, College Park, Maryland, file 436, Record Group 165.8. From here on out the National Archives will be cited as NA and Record Group will be cited as RG.

maintained a large research and testing facility at Edgewood Arsenal in Maryland, which needed projects to prove its worth and keep its doors open. In February 1920 the CWS hit upon a novel way to keep funding for Edgewood Arsenal and continue offensive research on chemical warfare as well. For years Fries had espoused the usefulness and the necessity of the CWS during peacetime and now the CWS had the opportunity to prove itself. In the *Army and Navy Journal*, Fries announced the sale of chloropicrin for the eradication of the corn weevil in the state of Florida.¹⁷ Fries developed a close relationship with the Department of Agriculture in an attempt to gain popularity with the general public and to obtain more funds for the CWS.¹⁸ However, the initial experiments were short lived, and in the summer of 1921 President Warren Harding had other things in mind for the CWS. Secretary of State Charles E. Hughes, at the request of Great Britain, began organizing for the Washington Conference on Arms Limitations in July 1921.¹⁹ At the conference a discussion on the legality of chemical warfare caused Fries to cut short the experiments and spend his energies preparing a defense for the continuation of chemical warfare.

In October 1921, Fries wrote a memorandum for the War Plans Division, General Staff. The memorandum, "Gas in Warfare," provided instructions for the delegates at the Washington Conference on the position of the United States concerning chemical warfare. The memorandum stressed that there was no guarantee that chemical warfare

17. "Chemicals Sold For Killing Weevils," *Army and Navy Journal* 59 (12 February 1921), 668.

18. This topic is discussed in depth in Chapter 4.

19. Alder, *The Uncertain Giant*, 63.

would not continue in the future since poisonous gases were easily made from readily available materials. The only limitation the United States delegation should consider was the use of poison gas against cities and noncombatants in exactly the same "...manner as the use of airplane bombs, high explosive shells, or other weapons."²⁰ In closing, Fries quoted Mahan at the Hague Conference in 1899 where he said, "I represent a people that is animated by a lively desire to make warfare more humane, but which may nevertheless find itself forced to wage war, therefore, it is a question of not depriving itself through hastily adopted resolutions of means of which it could later avail itself with good results."²¹ That passage eerily echoes Fries' earlier beliefs. Fries argued that complete restriction of chemical warfare was next to impossible, and Fries gave three examples of chemicals Germany possessed "legally" under the Treaty of Versailles. By simply combining the "legal" chemicals together in a specific manner, they produced "mustard" gas an obvious breach of the Treaty of Versailles.²² Lieutenant General Robert Bullard wrote as well against the United States leading the world in disarmament²³ and even Vice Admiral William S. Sims took up the arguments of gas as "humane" and a "viable" weapon.²⁴

20. Memorandum For the Assistant Chief of Staff, War Plans Division, General Staff, 17 October 1921, NA, RG 166.1.

21. Ibid.

22. Ibid.

23. Robert Bullard, "The U. S. Should Not Lead in Disarmament-Because!," *Infantry Journal* 18: 6 (June 1921), 436.

24. William Sims, "Poison Gases in War," *New York Times*, 4 July 1922, A12.

The Washington Conference on Arms Limitations, held in the winter of 1921 and 1922, very nearly outlawed chemical warfare worldwide. The leaders of the United States pursued a policy based on public opinion, one not fond of chemical warfare.²⁵ Article V of the Arms Limitations Treaty addressed provisions for chemical warfare and submarines. Concerning chemical warfare, it read

The use in war of asphyxiating, poisonous or other gases, and all analogous liquids, materials or devices, having been justly condemned by the general opinion of the civilized world and a prohibition of such use having been declared in Treaties to which a majority of the civilized Powers are parties.

The Signatory Powers, 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.²⁶

The U.S. Senate ratified the Washington Treaty in March 1922, and for a few months it looked as if the CWS had been extinguished. Secretary of War John W. Weeks, in July 1922, issued orders to the CWS stating

In order that the United States may carry out the provisions contained in Article V of the treaty in relation to the use of submarines and noxious gases in warfare, signed Feb. 6, 1922... The investigation, development, procurement, manufacture, or supply of poisonous gases for the present will be limited strictly to the amount necessary for the research and development of gas defense appliances.

The filling of all projectiles and containers with poisonous gas will be discontinued, except for the limited number needed in perfecting gas defense appliances....Provision is made for chemical warfare personnel as instructors in defensive chemical warfare at general service schools and at certain special service schools.²⁷

25. Brown, *Chemical Warfare*, 72.

26. Memorandum for the Chief of Staff, 24 July 1923, NA, RG 171.1.

In reality, Fries' dream of the CWS as an important branch in the military seemed to be crumbling. The CWS now would become a backwater institution that would not be in the forefront of developing new weapons or seen as a needed institution because its role as a gas mask and smoke bomb maker was now clearly defined.

Even with the American ratification, the treaty did not bind the United States because France took issue with the submarine provision and stalled ratification. The conference treaty was only binding when all attending countries ratified all articles within the treaty. France never ratified the treaty because of the provisions limiting submarines. With hope still for the CWS, Fries worked very hard to try to amend the mission statement of the CWS and to involve the CWS within the military.

Fries attempted in February 1923 to obtain formal approval for research into war gases for defensive purposes, as well as a more inclusive training doctrine. Fries stated, "In order to properly develop gas defense appliances it is necessary to examine and investigate the various types of offensive gases and appliances, against which defensive measures may be taken."²⁸ Fries tried persuasion by following with, "No offensive toxic gas apparatus or materials will be manufactured for storage as a *reserve* or for *issue* to troops without specific authority in each case from the War Department."²⁹ However, Adjutant General Robert Davis politely denied both training and research when he stated

27. "U. S. Army Bans Gas with Limitations," *Army and Navy Journal* 60 (15 July 1922), 1115.

28. Confidential Instructions as to the Interpretation of G.O. 24, 1922 and G.O. 26, 1922, 5 February 1923, NA, RG 171.1.

The reason why...are not amended as indicated above is that publicity is not desired in these matters. Officers to whom these instructions are necessarily communicated in order that the Army may be properly trained in Chemical Warfare will, therefore, be cautioned that any instructions in connection herewith should not be given any publicity.³⁰

That statement clearly demonstrated the feeling within the military about the CWS. The military and Congress allowed public opinion to decide the fate of the CWS and while the CWS continued to exist, it was to do so quietly.

By late July 1923, with still no ratification from France on the Washington Conference, Fries took the opportunity to write a lengthy memorandum to Chief of Staff John J. Pershing. Fries kept to the argument that preparedness was the best defense in war and that there was no guarantee that gas would not be used in the future. Fries also questioned the wording at the Washington Conference as being excessively vague because if taken literally the Treaty meant no chemicals whatsoever may be used in war. In the memorandum Fries quoted Mr. Sarraut, a representative of France during the Washington Conference, who said, "The reports of experts have established the impossibility of exercising an effective supervision over the production of gases which may be seen as weapons of war and hence the impossibility of preventing or limiting production."³¹

Fries then continued with information pertaining to a chemical warfare commission from Great Britain that visited the United States to exchange information on

29. Ibid.

30. Ibid.

31. "Memorandum for the Chief of Staff," 24 July 1923, NA, RG 175.2.

chemical warfare. Quoting a British colonel from an engineering journal, he stated, "Chemical warfare has come to stay. It is inconceivable that the light barriers of mutual consent or of edict can effectively close the road I speak of....Until war ceases, we must be prepared. Apathy is suicidal. Prejudice is a crime."³² Fries then illuminated the chemical warfare policies of the other nations who signed. Italy had created a separate chemical warfare service in January 1922 by order of Mussolini, since no penalties were provided for the enforcement of the treaty; the Japanese had imported large numbers of German chemists and sent numerous students to Germany to study chemistry, all this after the treaty was signed; and France maintained two full battalions of chemical warfare troops stationed at the German-French border in the case of war. Of the five signatories the United States acted alone in accordance with the treaty.³³

The Washington Conference in reality attempted to bring some peace and stability to the world after World War I. The conference was a resounding success in terms of limiting a naval arms race, and the United States should be commended for seeking a more peaceful world. The American people as a whole were disillusioned with war, and the conference was seen as a way to ease tensions among the populace. In reality, the other signatories were willing to say one thing to ease world fears, but they had their own populace to worry about. Under no circumstances would France disarm with a weakened but unbeaten Germany on its borders.³⁴

32. Ibid.

33. Ibid

With the Washington Conference over and the CWS still in a state of limbo, another arms limitations conference convened at Geneva in May 1925, the Conference for the Control of the International Trade in Arms, Munitions, and Implements of War. The Conference convened with forty-four countries under the aegis of the League of Nations to restrict private arms trade similar to the convention held at St. Germain in September of 1919, which the United States did not ratify.³⁵ The United States sent a delegation consisting of Representative Theodore Burton, Ambassador Hugh Gibson, Admiral Andrew Long, Allen Dulles and General Colden L'H Ruggles.³⁶

The title alone suggests that the Conference never intended gas to be included in the discussions. Only after urgings by the State Department were discussions over prohibition of gas included.³⁷ President Calvin Coolidge even offered to hold a special conference in Washington D.C. to prohibit the use of poison gas.³⁸ The request for the inclusion of gas provisions stated, "In connection with the definition of categories, or wherever in the convention it might be considered most appropriate, the Department would desire to see an article inserted absolutely prohibiting international trade in

34. Thomas H. Buckley, *American Foreign and National Security Policies, 1914-1945*, (Knoxville: University of Tennessee Press, 1987).

35. Brown, *Chemical Warfare*, 98. The Treaty of St. Germain finalized the terms of surrender for the Austro-Hungarian Empire, which were very harsh. The treaty effectively destroyed the once powerful empire.

36. American Delegation to the International Conference on the Traffic in Arms Held at Geneva May 4 to June 17, 1925, 16 December 1925, RG 165.1

37. Brown, *Chemical Warfare*, 98.

38. *Ibid.*, 124.

asphyxiating, poisonous or other gases for use in war.”³⁹ The War Department then became upset at the way the State Department handled the conference, more or less because the War Department felt excluded from the process of formulating policy.

With chemical warfare now tabled for discussion, the United States suggested a wording for the ban similar to that of the Washington Conference. Since the wording at the Washington Conference had already been agreed to by the most powerful countries in the world, it would have no problem passing at Geneva, or so the United States thought. The countries agreed on limitations that replicated the poison gas ban declared at the Washington Conference on Arms Limitation stating, “The use in war of asphyxiating, poisonous or other gases, and all analogous liquids, materials or devices, has been justly condemned by the general opinion of the civilized world and a prohibition of such has been declared in treaties to which a majority of the civilized Powers are parties.”⁴⁰ This statement on non-proliferation became known as the Geneva Gas Protocol. However, the protocol was non-binding, did not apply in war to non-signatories, and again had no sanction for non-compliance.

The protocol went up for Senate approval and failed. Apparently, the Gas Protocol did not get the preferential treatment to insure passage, as did Article V of the Washington Conference. The Department of State thought that with animosity towards chemical warfare still present in public and in the Senate, the protocol did not need insurance. However, the Senate ignored the protocol out of anger at the State Department

39. Memorandum for the Adjutant General, 2 July 1925, NA, RG 175.2.

40. Ibid.

because the delegation lacked Senate representation. As a result the first open debate on the Treaty was pigeonholed until December 1926.⁴¹

After the Geneva Conference, propagandists went to work and the Senate had time to think of chemical warfare in rational terms. The various chemical societies and industries began a campaign in the press highlighting the distress the ban would cause the chemical industry. It was well known that chemical factories could easily be converted to make poison gas. Some even had the ability to make either dyestuffs or poison gas without conversion but with a simple substitution of chemicals.⁴² The chemical industries felt that any chemically advanced nation could produce war gases secretly; therefore, a ban on gases was illogical and dangerous.

Just before open debate on the Treaty, Fries wrote a memorandum to the assistant chief of staff outlining the reasons for rejecting the Geneva Gas Protocol. The memo included all of the usual arguments about how the United States could not trust other countries to follow the treaty, how gas was a humane weapon, and how gas was an effective weapon and easily made since most ingredients were of commercial value as well.⁴³ Another memorandum, by Major General Geo. V. Strong, addressed the subject of ratification and suggested a rather frank reason for non-ratification. "It [Gas Protocol] is a piece of pacifistic bunk which would be totally disregarded in the event of a serious

41. Brown, *Chemical Warfare*, 103.

42. Memorandum to the Adjutant General, 30 June 1926, NA, RG 175.2.

43. Memorandum for the Assistant Chief of Staff, WPD, 9 December 1926, NA, RG 165.1.

war.”⁴⁴ The memo then followed the usual arguments of humanity and national defense. The Senate rejected the Geneva Gas Protocol on the grounds of preparedness, rather than an acceptance of chemical warfare. The rejection marked a shift in policy in the legislative branches of the government that would only be challenged in later years by the executive branch of the government.

The League of Nations convened conferences on arms limitations all the way through 1932. The United States’ position on chemical warfare gradually changed in relation to the rest of the world. The United States reverted back to the position taken by Mahan at the Hague Conference in 1899, deeming it inappropriate to limit the advancement of scientific discovery. Even though the United States established a position favoring the retention of war gases, it met with increased criticism from a variety of sources. The debates about chemical warfare continued unabated as before. In 1927 the League of Nations held a Preparatory Disarmament Conference where the United States and other nations presented their views on chemical warfare. The *New York Times* stated, “...it is generally agreed in Geneva that with the exception of Moscow in returning the League’s invitation the League has never received so negative a document.”⁴⁵ The document applied to the conclusions reached by the Mixed Commission at the Preparatory Conference, to which the United States refused to send representatives. At issue with the Americans was the proposed accords to limit gas manufacture as a means

44. Memorandum for General Smith, 9 December 1926, NA, RG 175.4.

45. “America Rejects League Arms Plan,” *New York Times*, 18 March 1927, A4.

to curbing the output of poison gases, making training for chemical warfare criminal, using budgets as a criterion for comparing armaments, and various other agreements.

A year later another preparatory conference met in Brussels to discuss the safety of civilian populations in the face of a gas attack.⁴⁶ A familiar dialogue emanated from the Belgian Conference. The various chemical industry lobbyist groups responded, including one called the National Association for Chemical Defense, which was formed "...to attempt in a conservative manner to bring about a more sane reaction on the part of the general public toward the use of gas."⁴⁷ After the Brussels' Conference ended, the National Association for Chemical Defense stated their intention to develop a "...sane perspective of the problem [protecting civilians in case of chemical attack]."⁴⁸

The Institute of Chemistry of the American Chemical Society began its annual four-week long conference at the end of July 1928 and featured many speakers favorable to continuing the production of war gases as well as demonstrations of the benefits of war gases. Dr. W. Lee Lewis, the inventor of "Lewisite," a war gas stronger than "mustard" gas, spoke at the closing conference of the American Chemical Society Institute. Dr. Lewis described the great advances science made for the world and how, "Science does make war less adventuresome, less romantic and more deadly. It is, therefore,

46. "Red Cross To Seek War-Gas Shelter," *New York Times*, 19 January 1928, A11.

47. "Urges Retention of Gas As Weapon," *New York Times*, 15 July 1928, sec. III, 2.

48. "Warns of War Gas Treaty," *New York Times*, 15 July 1928, A15.

fundamentally an ally of peace.”⁴⁹ The debates on poison gas at this time gathered enough intensity that the *New York Times* published a story about the Daughters of the American Revolution having expelled a member for “...conducting herself in a way calculated to disturb the harmony and injure the good name.” The dismissed member, Mary P. MacFarland, stated in her defense that the Daughters of the American Revolution “Have been credulous agents of hysterical professional propagandists and of certain army officers who would keep the people under military espionage and control, and who induced these women, in defiance of public opinion, [to] actually advocate the continued use of poison gas.”⁵⁰ An informed supporter of chemical warfare wrote a “Letter to the Editor,” which highlighted the fact that no binding treaty existed that abolished chemical warfare. Because no guarantee existed, the United States should begin training in “offensive” chemical warfare.⁵¹ The issue of chemical warfare still remained black and white to the parties that cared about chemical warfare. To be associated with the support of poison gas as of 1928 was still considered to be in bad taste to some. On the other hand if people did not support chemical warfare, they were labeled Communists, pacifists or “traitors to the country which gave them birth.”⁵²

49. “Chemists Disagree On Future Of War,” *New York Times*, 19 August 1928, A23.

50. “D. A. R. Expels Jersey Critic of ‘Blacklist’; She Charges It Champions Use of Poison Gas,” *New York Times*, 12 November 1928, A1.

51. J. Enrique Zanetti, “We Must Teach Chemical Attack,” *New York Times* 30 November 1929 sec. III, 2.

52. “Calls Pacifists ‘Traitors,’” *New York Times*, 8 January 1929, A30.

Chemical warfare remained a heated topic in the United States and would continue to do so for years to come.

With the United States' position on chemical warfare well established, one final major attempt at limiting chemical warfare came to fruition with the Disarmament Conference of 1932. Assistant Chief of Staff, Brigadier General Geo. S. Simonds wrote a memorandum for the Preparation Conference, which met in 1931 and early 1932, and detailed two officers from the Air Corps and the CWS to go because, "So far as the interests of the United States are concerned the two subjects which may cause the greatest amount of controversy are aviation and gas."⁵³ In 1931 the State Department agreed fully with the War Department and the chairman of the United States' delegation on the Preparatory Commission who concluded the early discussions with, "I hope the Commission will agree with me as to the difficulty, if not the impossibility, of our reaching a thoroughly sound agreement at this time, and of the need for mature scientific study."⁵⁴ The United States delegation's rejection sounded sarcastic in its remarks but it was soon to eat its words in the near future.

The CWS deemed Article 39 adopted by the Preparatory Conference, in early 1932 to be hostile to American national defense. Article 39 restated the Geneva Gas Protocol of 1925, but it also linked bacteriological warfare with chemical warfare. This link caused problems because bacteriological warfare was still theoretical. With regard to Article 39, the CWS laid down three criteria for chemical warfare weapons as follows:

53. Memorandum for the Chief of Staff, 29 January 1931, NA, RG 165.1.

54. Ibid.

(1) Whether they are the most specifically offensive in character; (2) Whether they are the most efficacious against national defense; and (3) Whether they are the most threatening to civilians.⁵⁵ A memorandum from the Office of Chief CWS enclosed an analysis of the meetings and stated the CWS' position on chemical warfare:

“As the resolution stands, it contains an element of extreme danger to our national defense. . . I am therefore of the opinion that qualitative disarmament as it pertains to chemical warfare is futile in achieving any practical results, and contains a real menace to the security of the United States.”⁵⁶

According to the memorandum of the three criterion above, only on the third did the committee reach a definite conclusion. The committee did not reach a conclusion on the first two criterion because of differing opinions. The conclusion reached on the third criterion read, “The characteristic of gas employed in chemical warfare is that when once it has been released it is no longer under the control of those employing it.”⁵⁷ The War Department took objection to the statement and voiced its position by stating, “There is no recorded case in the history of gas operations in the World War where any civilian was killed or injured by gas released on or along the battle front. . . . In this connection, it must not be forgotten that during the war nearly 125,000 tons of gas were used and yet who ever heard of any non-combatant being gassed?”⁵⁸

55. Memorandum for the Assistant Chief of Staff, War Plans Division, 27 June 1932, NA, RG 175.2.

56. Memorandum For the Adjutant General, 13 September 1932, RG 175.2.

57. Ibid.

58. Ibid.

The War Department's analysis reasoned that the conclusion of the Special Committee was misleading and contrary to the facts. The analysis also stated that no record existed of a civilian being gassed; so the only acceptable prohibition would place limits on the use of war gases against cities and non-combatants. The United States favored the current status quo on chemical warfare at the time, one of a general prohibition without controls or limitations on its ability to prepare its military in case of war.

The War Department could not sway the State Department for long and by February 1932 the State Department advocated a much stricter abolition of war gases. President Herbert Hoover grew tired of the "oratorical futilities"⁵⁹ and instructed Ambassador Hugh Gibson, chairman of the United States delegation, to advocate the "total abolition of war gases," effectively reversing the State Departments' earlier position.⁶⁰ At the Geneva Conference in July 1932, some European powers in attendance wanted a more effective treaty on prohibition, one with penalties if broken. The State Department fell in line, and desired a simple universal abolition of "chemical warfare whose potentialities threaten our civilization," as the easiest way for agreement at the conference. The conference convened in July 1932 with a British draft called the MacDonald Plan, a comprehensive disarmament proposal that prohibited chemical, biological, and incendiary warfare.⁶¹ The MacDonald Plan reflected the War

59. Herbert Hoover, *The Memoirs of Herbert Hoover*, vol. 2, (New York: The MacMillan Company, 1952). 357.

60. Memorandum For General Simonds 30 March 1934, NA, RG 165.1.

Department's worst fears about the prohibition of all chemical weapons including lachrymators and all preparations were "prohibited in time of peace as in time of war," with specifics on manufacturing and import and export.⁶² The State Department advised Ambassador Hugh R. Wilson,

That the U.S. cannot be placed in position of blocking or refusing in principle to accept the move, agreeable to every other power, to prohibit training and preparation for chemical warfare in peacetime. Its position is simply that as a practical matter such a prohibition could not be drawn up sufficiently clearly to permit distinction between preparations for offensive use or for defense against it.⁶³

The conference agreed to the MacDonald Plan and newly elected President Franklin D. Roosevelt signed the MacDonald Plan in May 1933. In reality, the Macdonald Plan did little more than ease tensions with Japan and in Europe. A War Department memorandum on the Geneva Conference of 1932, stated the State Department's position as, "President supports British plan which provides for inquiry to establish facts of violation, but penalties are not included in the plan."⁶⁴ The MacDonald Plan was not a treaty and did not need ratification by the Senate; it was merely a moral obligation undertaken by President Roosevelt. The MacDonald Plan, just as the Washington Conference and Geneva 1925, allowed the United States to take the favorable public position of prohibition of chemical warfare and at the same time keep

61. Brown, *Chemical Warfare*, 119. The draft was presented by English Prime Minister James Ramsey MacDonald, hence the name the MacDonald Plan.

62. Memorandum For the Adjutant General, 13 September 1932, NA, RG 175.2.

63. Memorandum For General Simonds, 30 March 1934, NA, RG 165.1.

64. Ibid.

the treaties weak and unenforceable. The War Department stance did not change since it did not consider itself party to any treaty that prohibited or restricted the use of chemical warfare. The State Department, on the other hand, kept to the superficial policies of prohibiting chemical warfare as it had since the end of World War I.⁶⁵

The disputes throughout the years after the Great War centered on one of policy. Was the CWS to remain a separate branch? The CWS felt it had unique troops, weapons, training, and services to offer to the military; therefore, it should remain a separate corps. The CWS especially felt that training of troops in “offensive” and “defensive” chemical warfare merited special attention. Because of a limited amount of money and a negative attitude about the CWS, only “defensive” training continued throughout the 1920s. With an unaccepting attitude in the military, General Fries, as chief of the CWS, quite literally kept the CWS alive after World War I. Fries’ ability to be a salesman for the CWS, powerful contacts in Congress and the chemical lobbyists produced bearable conditions for the CWS until attitudes in the military changed in the early 1930s.

65. Brown, *Chemical Warfare*, 123.

CHAPTER IV

THE CWS AND ITS PUBLIC RELATIONS CAMPAIGN TO GAIN PUBLIC SUPPORT

During the lean years after World War I, the CWS looked for ways to contribute to society and possibly change public perception of chemical warfare. The CWS hit upon the novel idea of establishing a relationship with the Department of Agriculture to gain public favor. The relationship that developed proved of great importance. The CWS, Department of Agriculture, and the Bureau of Entomology in conjunction with the Federal Government embarked on a campaign to aid the agricultural industry.

The CWS was a new addition to the arsenal used to kill insects as the Department of Agriculture was created very early in U.S. history and the Bureau of Entomology had been established in 1854 when Townsend Glover became the first federally funded entomologist in the United States.¹ The Morrill Act of 1862, which allowed the sale of public lands to build agricultural schools and the Hatch Act of 1887, which funded state agricultural experiment stations, highlight the importance placed on the study of insects, their effects on crops, and aiding farmers in eradicating those pests. Glover knew natural predators could control insects, but that method was slower, more labor intensive, and more difficult than applying poisons.

The need for pest eradication, while always genuine, became more important when farmers began practicing monoculture, the planting and harvesting of a single crop.

1. Whorton, *Before Silent Spring*, 9.

Farmers realized early on that the market valued certain agricultural crops over others, and to increase their profits farmers began growing monoculture crops. This practice increased the density of a product over a certain area, which meant that if there were a disease or insect infestation outbreak, the potential for significant damage was great. An example of this rapid spread was the Colorado potato beetle. This beetle is a native to Colorado but did not feed on potatoes originally. Once potatoes were planted in increased numbers, the beetle switched food sources and began to feed on the potato.² This “new” pest marched virtually uninhibited to the East Coast in the mid nineteenth-century then made its way to Ireland where there were no natural predators, and it could reproduce and destroy without interruption. This same story was repeated in the cotton industry in the early twentieth- century, and the CWS saw an opportunity to gain favor with the general public.

The seemingly incurable scourges of plant disease and pests that wrought destruction to crops and brought bankruptcy to farmers were what the biologist, entomologist, and agriculturalist fought in the mid-nineteenth century. In an act of desperation, one Missouri governor proclaimed a day of public prayer and fasting “...For the interposition of Divine Providence to relieve the calamities caused by the devastation of the Rocky Mountain locust.”³ Divine Providence would wait a few years and then emerge in the form of inorganic pesticides.

2. Whorton, *Before Silent Spring*, 18.

3. Ibid., 6.

Divine Providence manifested itself in the form of an accident. The story goes that a farmer in 1867 tossed out his powdered Paris Green (Paris Green was a common paint); the dust spread onto to his infected potato plants, and a few weeks later the farmer had found the “cure.” Paris Green contained copper arsenate or in more familiar terms, “arsenic.” This discovery led to a flurry of activity to produce other arsenic based poisons to be applied to other plants, not just the potato. London Purple soon followed as an alternative. The most effective of all the arsenic poisons to be discovered was lead arsenate.⁴ F.C. Moulton in 1889 introduced lead arsenate as a potential poison to combat an outbreak of gypsy moths. Lead arsenate worked wonders, and it became the most successful insecticide until the introduction of DDT after World War II.⁵

If one were to use appropriations in the early 1920s to gauge how effectively an organization is supported, one would reach the conclusion that the CWS still lacked the support it needed to operate efficiently, while the Bureau of Entomology was apparently well liked by the Department of Agriculture. This difference in appropriations between the two organizations is not surprising. The anti-war attitude reflected directly on the amount of appropriations the military received after the Great War. In terms of the Department on Agriculture, and the Bureau of Entomology in particular, there was money to be made in agriculture; so, the government invested in protecting it. Fries saw the disparity between the two organizations and began to link the CWS directly to the

4. Ibid., 24.

5. Ibid.

Department of Agriculture. This alliance coincided with the near hysteria that developed in the cotton industry over the spread of the boll weevil.

For fiscal year 1921, appropriations for the CWS amounted to \$1.5 million and after 1922 the CWS' appropriations were cut dramatically. For fiscal year 1922, the CWS had appropriations for roughly \$2.3 million. For fiscal year 1923, Congress set operating costs at \$930,000.⁶ Several factors caused this decline in appropriations: the general anti-war attitude, a new president, and the Republicans gaining control of Congress. The Republicans were intent on maintaining peace without the League of Nations. President Warren Harding's administration and the Republicans wanted severely restricted militaries as a measure to insure world peace.⁷ The appropriations for the CWS continued to decline until 1926. Granted, a general anti-military attitude prevailed in the United States after World War I, but the cuts were much deeper in the CWS than other departments. For instance, the cavalry, determined to be obsolete after World War I, still, in 1925, had an operating budget of \$8 million.⁸

The Department of Agriculture and the Bureau of Entomology were not handicapped by such limited funds. The Department of Agriculture in 1922 had an

6. Department of Commerce, Bureau of Foreign and Domestic Commerce, *Statistical Abstract of the United States* (Washington D.C.: Government Printing Office, 1924), 593. Note, in the *Statistical Abstract* the earliest breakdown within departmental appropriation is 1923, which has a comparison for 1922. Before 1922, only departmental appropriations are available. For example, the appropriations for the CWS and the Bureau of Entomology are not given, just appropriations for the Department of Agriculture or War as a whole.

7. Alder, *The Uncertain Giant, 1921-1924*: 61.

8. "Urges Gas Warfare Study," *New York Times*, 1 October 1925, A26.

operating budget close to \$143 million while the Bureau of Entomology in 1922 had a budget of \$1.65 million. Appropriations would continue to grow for the Department of Agriculture and the Bureau of Entomology for years after the boll weevil scare of the 1920s. Clearly the agricultural industry had the public and political support that Fries looked for in recreating the image of the CWS. Fries looked at the problems his organization was facing along with the agricultural industry. He knew both were highly visible in national newspapers and saw a potential match to change the image of the CWS.

During and after World War I, farming provided the potential to make large amounts of money. With the majority of Europe's men at war in the trenches, the United States picked up the slack and began exporting large quantities of food and other agricultural products to Europe. The bonanza even lasted for a number of years after the Great War while Europe tried to reorganize and rebuild. One of the crops that was highly profitable was cotton. Cotton was used in a number of war implements such as tents, uniforms and ammunition. In Texas, from 1905 to 1920, the number of acres planted for cotton rose steadily from 6.9 million acres to 12.6 million acres, respectively.⁹ The interesting statistic comes from the value of cotton when compared to the number of bales of cotton produced on a given acreage. A prime example 1915 and 1916. In 1915 there were 11.9 million acres of cotton planted in the state of Texas, which produced 3.2 million bales at a value of \$177.8 million at 6.6 cents a pound. In just one year, 1916,

9. Department of Commerce, Bureau of Foreign and Domestic Commerce, *Statistical Abstract of the United States* (Washington, D.C.: Government Printing Office, 1919), 163.

there were fewer acres planted, 10.5 million, which produced 3.7 million bales of cotton worth \$309.8 million at 11.4 cents a pound¹⁰ These statistics were for Texas, but the trend continued throughout the Cotton Belt and agriculture as a whole.

The boll weevil had made its way to Texas by 1892, and by the early 1920s had spread to the rest of the Cotton Belt.¹¹ The boll weevil reached such epidemic proportions that in 1917 the Department of Agriculture along with Texas state authorities conducted an experiment where they swept “. . . Every inch of the 10,000 acres as closely as a scrupulous housewife sweeps the kitchen floor. No fewer than 800 employed negroes, together with volunteer farmers and members of their families were assembled, camps established, and the clean up was begun. . . .”¹² This was obviously a very time consuming and laborious method of controlling the boll weevil. After the cleaning, all the cotton stalks were burned, and cotton was not planted, produced, or transported in the area for three years. However, insuring that ever farmer abided by the quarantine was next to impossible and the quarantine eventually failed with the reinfestation of the boll weevil. However, the experiment was important only because it demonstrated the extreme methods taken to contain the boll weevil but also important because *army*

10. Department of Commerce, Bureau of Foreign and Domestic Commerce, *Statistical Abstract of the United States*. Ed. Edward Whitney (Washington, D.C., Government Printing Office, 1920), 156, 582.

11. Harry A. Mount, “Getting Along With the Boll Weevil: Abandoning Hope of Suppressing this Pest, the South Considers the Problem of Its Control,” *Scientific American*, February 1923, 94.

12. “Killing the Pink Cotton Bollworm,” *New York Times*, 2 March 1919, sec. IV, 10.

airplanes and pilots were used in mapping the ten thousand acres in Texas. These flights laid the foundation for the army's cooperation with the Department of Agriculture.¹³

Despite these efforts, the boll weevil infected 66,682 square miles in 1921 alone and had been more active and destructive in the previous two years than of any other time in the thirty years it had been in the United States.¹⁴ This high infestation level was directly related to the increased density of cotton plants. The high density of monoculture, especially in the boom period after the Great War, was more than enough to enable the boll weevil to wreak havoc on the American cotton industry. Farmers were in such dire straits that Governor James McLeod of South Carolina called for Divine Intervention by declaring a day of fasting and of praying "for deliverance from the ravages of the boll weevil."¹⁵ Farmers had turned "his blessing into a curse and made a Frankenstein out of his own creation."¹⁶

Cotton producers were in a panic. Not only was the price severely depressed from a few years earlier, but the boll weevil also threatened to destroy what little potential profit the farmers had. By 1919 the price of a pound of cotton skyrocketed to 35 cents; however, by 1922 the price dropped back down to the pre-war rate of 6 cents a pound. Farmers had good reason to panic, since the price of cotton had fallen 6 fold and the boll weevil ate any profits the farmer might have seen. There was, of course, a

13. Ibid.

14. Mount, "Getting Along with the Boll Weevil," 94.

15. "The Fight for Cotton," *New York Times* 10 June 1923, sec. II, pg. 4.

16. "\$700,000,000 Loss From Boll Weevil," *New York Times* 16 November 1921, A8.

natural method of killing the boll weevil. For two decades entomologists had urged farmers to burn their cotton stalks at the end of each season, but farmers had resisted because of the extra labor and delayed benefit.¹⁷ The ease of poisoning attracted the farmers' attention, and a chemical culture readily established itself in the farmer's method of dealing with pests. Not only was poisoning a labor saver, it also had relatively immediate effects.

In 1906, with the development of a potent insecticide, calcium arsenate, the cotton industry began to apply the insecticide heavily.¹⁸ Various methods of disbursal of the calcium arsenate soon developed. One could dust the plants by hand, use an aqueous solution, or use a horse drawn buggy to spray the plants. All of the methods were time consuming and used large amounts of calcium arsenate. The CWS began experiments using planes filled with a simulated poison gas and spreading gas from the air in early 1921.¹⁹ Soon after this, it started using poison gas on cotton plants to kill the boll weevil.²⁰ The CWS cut experimentation short when it had to organize its defense at the Washington Conference on Arms Limitations in the winter of 1921, but resumed its efforts soon after it ended.

17. Russell. *War and Nature*, 20.

18. Whorton, *Before Silent Spring*, 24.

19. "Chemical Warfare in the Air," *Army and Navy Journal* 59 (19 February 1921), 686.

20. "Army to 'Gas' the Boll Weevil in Cotton Fields of the South," *New York Times*, 29 January 1921, A1.

After narrowly escaping with its life, the CWS continued, if not more forcefully, its crusade to change public opinion by trying to apply what it had learned on the battlefield to everyday life. The CWS, still under enormous pressure to perform and prove its usefulness, kept up its public exposure and took on any task, no matter how trivial. For instance, Fries told a group of chemists in the late summer of 1922, "One of the ways in which the ravages of war are going to be offset is by making use in peace of the knowledge of those poisonous compounds gained in the war; insect and animal extermination is one of these." Reasons existed for not only gaining public support but also for acquiring appropriations in order to do "offensive" research since the military did not allow it. The relationship that developed with the Department of Agriculture was in part a ruse to allow for an "offensive" research and development program. In the same article Fries makes his point very clear: "The length of time it will take for such control will depend in large measure upon the funds available for increasing our knowledge of poisoning compounds and applying them to the solving of the problem of the boll weevil."²¹ Experts estimated that the cotton industry had lost around \$1 billion²² and some reports went as high as almost \$2 billion in the preceding six to seven years.²³ Pressure mounted to find a method to control the ravages of the boll weevil and save the cotton industry from complete ruin.

21. "To Use Poison Gas on Boll-Weevil," *New York Times*, 13 September 1922, A31.

22. Congress, Senate, Senator Wright of Louisiana, 67th Cong., 4th sess., *Congressional Record* 64, pt. 2 (16 January 1923),: 1849.

23. "Gas For The Boll Weevil," *New York Times*, 14 September 1922, A20.

With the CWS intact in 1922, Fries began an ambitious project of aiding the Bureau of Entomology in eradicating the boll weevil and other pests. Fries had an ally in the Bureau of Entomology chief L.O. Howard, an opportunist who saw an alliance with the CWS as a chance to gain national exposure.²⁴ Howard seized upon the military language that had been so prevalent in the news and applied the terms to entomology. By using words like “struggle,” “war,” and “termination,” and applying the implements of warfare such as the airplane and chemical warfare, Howard raised the status of entomology. As Howard stated, “Humans and insects face a death grapple for the mastery of the Earth, with the conditions favoring the insects.”²⁵ He was instilling a sense of fear into the populace, a fear that would increase the entomologist’s status as the sole protector against the enemy insect. The *New York Times* declared “L.O. Howard commander in chief of the American army engaged in warfare with insects.”²⁶ That article reaffirmed Howard as the protector of civilization against the insects. That strong rhetoric did not go unnoticed by the public and was reprinted by the major media sources. As a result of the attention, Howard began to see a rise in public interest in controlling the insects’ rise.

The CWS did not have problems in finding projects to demonstrate its ability to help the public. Soon chemical warfare and entomology found themselves in the press no matter what the outcome of their experiments. For example, the army used poison gas to

24. Russell, *War and Nature*, 13.

25. “Humans Face Insect War,” *New York Times*, 20 June 1926, A17.

26. “The St. Patrick of the Insect Realm,” *New York Times*, 8 March 1925, sec. IV, 7.

fight mosquitoes in Atlantic City, New Jersey to prevent malaria.²⁷ This was a good opportunity for the CWS to present itself as “humane.” A week later an article appeared in the *New York Times* on the success J.A. Laprince had in helping control the mosquito in Panama during the construction of the Panama Canal.²⁸ A casual reader might assume that using gas on mosquitoes actually worked, but there is no mention of the use of poison gas in the article on Laprince. Whether the experiments were a success or not did not matter; Fries had achieved his goal of getting a story to the public about a more humane CWS.

Fries kept working to find anything to demonstrate the CWS’s skills and sway the public. Some of the work was a useful excuse to develop “offensive” capabilities while other remained part of the public relations campaign. One of the failed experiments, but a good one for public relations, was an attempt to use poison gas to cure diseases of the lungs. Someone in the CWS noticed that during the war, people who worked in the manufacture of chlorine gas at Edgewood Arsenal suffered no lost time due to influenza or pneumonia, while workers elsewhere at the arsenal had an illness rate of twenty percent.²⁹ The CWS along with the Medical Department began experiments and came to the conclusion that giving low concentrations of chlorine, “mustard,” and the new more powerful gas Lewisite was advantageous in preventing colds and pneumonia. A

27. “Use Poison Gases to Fight Mosquito,” *New York Times*, 9 February 1923, A18.

28. “War on Mosquitos Cuts Down Malaria,” *New York Times*, 16 February 1923, A30.

29. “Army Chemists Use Poison Gases on Disease; Grip, Pnuemonia, Paresis Said to Be Cured,” *New York Times*, 2 May 1923, A1.

professor at the University of Arkansas, during a mild flu epidemic, subjected three hundred students to mild concentrations of chlorine for five minutes a day for a few days. As a result the test group saw an infection rate of only ten percent during the epidemic. The article then suggested, "According to army officers, there is almost no limit to the practical application of the use of the so-called poison gases in combating medicine."³⁰ This was an exciting statement to say the least, but it was one that would later prove futile. The voluntary gassing and testing went on for a couple of years, and the *New York Times* ran more stories on the success of poison gas in fighting flu epidemics. Poison gas was deemed the "Antidote for Influenza"³¹ in one article, and another claimed administration of chlorine gas cured whooping cough (pertussis) one hundred percent.³²

Another experiment that failed miserably but is striking to note because of its hilarity and the lack of merit is the endeavor by the CWS to poison Texas rattlesnakes in the summer of 1923 near San Marcos. The press release said, "Mustard gas, phosgene and chlorine, deadly accompaniments of war, will be turned upon large dens of rattlesnakes...."³³ If the pretense for the joining of forces with the Department of Agriculture was to continue further chemical experiments, one can only wonder how this

30. Ibid.

31. "Poison Gas Fumes Now Aid Medicine," *New York Times*, 27 May 1923, sec. VIII, 2.

32. "Pertussis Can Be Cured," *New York Times*, 28 August 1924, A16. By 1924 questions on the effectiveness on the poison gas treatments began to arise. The *New York Times* had to correct itself in one instance because the United States Health Department said treatments had ceased while the New York State Health Department continued the treatments.

33. "To Gas Texas Rattlers," *New York Times*, 28 May 1923, A2.

experiment related to chemical warfare, for it was solely a public relations stunt. As the author of the follow up article said, "The monster was completely enveloped in a cloud of gas. He quietly changed his course and crawled behind some rocks. 'That was enough to kill a regiment' said a Chemical Warfare Officer in surprise, after the snake failed to show signs of being seriously affected."³⁴ The CWS was looking for anything to increase public awareness of its ability to perform a public service. The rattlesnake turned out to be a defiant foe, but the CWS applied itself and made national news once again with its futile attempt at benefiting humans.

In 1923, Thomas Edison made front-page news by suggesting a project, not initiated by the CWS, where the CWS could provide their expertise in killing animals in a "humane" way. A businessman approached Edison about using electricity to kill fur-bearing animals.³⁵ Edison directed the businessman to the CWS who were happy to oblige in developing a more "humane" method of killing animals. Edison suggested a device with "Some means for using poison gas in connection with the trapping of wild animals, to the end that animals caught in traps would be instantly killed instead of lingering for hours in torture."³⁶ The article was a continuation of the public relations

34. "Rattlesnake Hard to Gas," *New York Times* 16 December 1923, sec. X, pg. 2.

35. At the time Thomas Edison and George Westinghouse were involved in a public relations battle over the safety of the different types of electrical currents both used. Edison claimed Westinghouse's alternating current (AC) was dangerous because of the high voltage used. Edison claimed his direct current (DC) was safer because of the lower voltage. Edison deflected the businessman away from him because he did not want his DC to be associated with killing anything. Edison even employed a scientist to kill animals with AC and the first electric chair used AC generators to kill the unfortunate or get "Westinghoused" as Edison called it.

campaign to sway the public, as had been the attempt to kill rattlesnakes in Texas and mosquitoes in New Jersey.

Not all of the CWS' attempts to better human life met with failure. The CWS had experience delivering chemical weapons and covering the most area efficiently. The most successful experiment conducted in conjunction with the Bureau of Entomology was the development of crop dusting to eradicate the boll weevil and later adapted to other agricultural crops as well. The experiments with controlling the boll weevil continued after a delayed start in the summer of 1921. The most current methods for applying calcium arsenate, the most effective poison for the boll weevil, to cotton plants during the early 1920s were slow and inefficient. The airplane was an obvious means of delivering poisons expediently and over a large area. Before 1922 discussions had taken place concerning the airplane dropping explosives and poison gases on noncombatants and cities. The United States had a policy of not using the airplane as a weapon against noncombatants or cities, but the continued development of the airplane as a war machine resonated in the public sector.³⁷

In 1923 Congress took up the idea and gave the Department of Agriculture "\$60,000 for developing the use of the airplane as a means of distributing insecticides for the control of the boll weevil."³⁸ The topic of new methods of spreading insecticides

36. "Edison's Suggestion to Use Poison Gas in Trapping Animals Taken Up by the Army," *New York Times*, 23 November 1923, A1.

37. Brown, *Chemical Warfare*, 62.

38. Congress, Senate, Clerk speaking on the Distribution of Boll Weevil Insecticides, S.Doc. 332, 67th Cong., 4th sess., *Congressional Record* 64, pt. 5 (28 February 1923), 4876.

garnered much support in the Cotton Belt states. Senator William J. Harris of Georgia was the most vocal supporter of developing the airplane. Harris authored an amendment the next year giving another \$100,000 “for the extermination and prevention of the cotton-boll weevil.”³⁹ The CWS was eventually directly specified to receive appropriations to aid the fight on the boll weevil. By 1924 \$25,000 was given to the CWS “for the cooperation with the Agricultural Department in trying to destroy or control the boll weevil,”⁴⁰ and in 1925 Congress appropriated another \$25,000 for the CWS as well for the completion of experiments relating to the extermination of the boll weevil.

Despite granting these funds, there was concern in Congress about appropriating money for the cooperation between the Department of Agriculture and the CWS. Congressman Eugene Black of Texas, a state hit hard by the boll weevil, objected on logical grounds. Black, like many people, did not see how the CWS could aid the Department of Agriculture and retorted, “Just how this warfare is to be conducted, whether by dropping a charge of T.N.T upon his defenseless head or filling his eyes with tear gas, I do not know....The House ought to reject this motion without a single dissenting vote.”⁴¹ Black’s logic was not unfounded, but the appropriations were for

39. Congress, Senate, Senator Harris of Georgia speaking on the Extermination of Cotton Boll Weevil, H.B. 722, 68th Cong. 1st sess., *Congressional Record* 65, pt 5 (18 March 1924), 4399.

40. Congress, House, Representative Buchanan of Texas, 68th Cong. 2nd sess., *Congressional Record* 66 pt. 3 (4 February 1925), 3016.

41. Congress, House, Representative Black of Texas, Amendment 17, 68th Cong. 2nd sess., *Congressional Record* 66, pt 3 (4 February 1925), 3016.

devising a better means of delivery along with trying, "To evolve a remedy out of chemicals or gases to control or destroy the boll weevil."⁴² The CWS needed this legislation to actively pursue chemical research.

The CWS had a large research and production facility at Edgewood, Maryland, and Fries could not allow that large facility to be mothballed. The \$60,000 in 1923 allowed for the use of only three airplanes to experiment with dusting cotton. Congress deemed the experiments a success and then added more money for continued development. The limiting factor when dusting crops by airplane was the amount of insecticide an airplane could carry. In 1924 the crop duster in development had a carrying capacity of six hundred pounds of calcium arsenate. This was still much more efficient than the traditional methods of spraying or dusting. With the three airplanes that were appropriated, the experimenters could spray over one hundred thousand acres in a matter of two weeks.⁴³ Not only was the speed incredible, but also it was more efficient by using less insecticide, and as a by-product of aerial spraying, the dust became electrically charged, which increased the amount of insecticide that adhered to the plant.⁴⁴

The CWS and the Department of Agriculture had overwhelming success in developing crop dusting. After only three years of experimentation with crop dusting, the U.S. government supplied army planes and pilots to a private contractor to test the

42. Congress, House, Congressman Buchanan of Texas, Amendment 17, 68th Cong. 2nd sess., *Congressional Record* 66, pt 3 (4 February 1925), 3017.

43. Oliver I. Snapp, "Airplane Dusting of Peach Orchards," *Journal of Economic Entomology* 19 (26 June 1924) : 253.

44. "Airplane Sprayer Covers 5,000 Acres with Poison" *New York Times*, 24 August 1924, sec. III, 8.

feasibility of crop dusting on a large scale for business. In 1925 the Huff-Deland Company had contracts for fifty thousand acres and two hundred thousand peach trees. The experiment found that “500-700 acres per hour could be dusted with half the amount of calcium arsenate needed for ground sprayers.” The experiment was such a success that Congress appropriated another \$250,000 to the project to develop better airplanes for the purpose of spreading insecticides.⁴⁵ The method of crop dusting eventually succeeded and is a viable method of spreading insecticides to this day.

By 1926 substantial gains were made in the development of crop dusting. So much so that Congress did not renew appropriations for the CWS’ part in the development of crop dusting. The volume of propaganda in the newspapers began to ebb, and the CWS saw its first increase in appropriations, almost \$300,000 or 7 percent of its budget from 1925.⁴⁶ The Geneva Gas Protocol of 1925 failed ratification in 1926, and attitudes, privately, began to change in favor of the CWS.⁴⁷ Arms limitations talks continued after the Geneva Conference in 1925 and on into 1932. By this time the United States reversed its attitude on gas warfare. The United States did not favor limiting chemical companies, prohibiting training, or research and development. Once the United States felt that preparedness in case of another war was an important enough

45. Congress, House, Representative Wilson of Louisiana speaking on New England Farming Conditions, 69th Cong 1st sess., *Congressional Record* 67 pt. 3 (30 January 1926), 3062.

46. Department of Commerce, Bureau of Foreign and Domestic Commerce, *Statistical Abstract of the United States* (Washington, D.C.: Government Printing Office, 1927), 164.

47. Brown, *Chemical Warfare*, 121.

reason to retain the CWS, the CWS became less visible. High visibility could now possibly hurt the CWS' newly acquired position in the military. Public resentment of chemical warfare never lessened; it simply receded from the spotlight.

Dr. L.O. Howard retired from the Bureau of Entomology in 1927, and Brigadier General Fries retired from the CWS soon afterwards in 1929. The CWS kept its alliance alive with the Department of Agriculture well after Howard retired. Army officers offered their services to the Hawaiian Pineapples Grower's Association in 1928 in an effort to check the invasion of nematodes. Pineapple growers previously used chlorine and potassium cyanide with little or no results. The CWS office in the Hawaii Department let the Department of Agriculture experiment with chloropicrin for the killing of the nematodes. Early experiments showed that the chloropicrin killed the nematodes but also, as a bonus, stimulated the plants growth. With these results, the CWS and the Department of Agriculture agreed to large scale testing with results computed from the weight of the harvest fruit.⁴⁸

Did Fries and the CWS accomplish anything? Many of the projects attempted by the CWS were failures, had limited success, or were not practical for military application. The CWS' involvement in crop dusting was not extensive but garnered them a few hundred thousand dollars on top of their military appropriations. The goal behind some of the more outrageous projects was a simple public relations move to increase the visibility of the CWS and change its image from a horrible killer to one that could be of help in peacetime. The public was not persuaded, but the CWS had involved itself with

48. "To Use Chloropicrin on Pineapple Pests," *New York Times*, 23 December 1928, sec. III, pg. 6.

numerous projects, some with the support of Congress. The CWS may not have been able to convince the public of its “humane” side, but the CWS managed to continue as an entity.

In that respect the CWS and Fries accomplished the most important goal, finding enough appropriations to continue operations and research even if that meant under the guise of developing better pesticides and methods of applying those pesticides for the agricultural industry. Fries had an undying conviction as to the necessity of the CWS. Fries felt that even if chemical warfare were outlawed, in a time of war those treaties would be ignored, and he wanted the United States to be prepared.

In Dr. Howard Fries found an accomplice in “fighting the war on insects.” Howard maintained the shared belief that insects would and could do great harm to not only farmers, but also the human population as a whole. At first glance the combination of the CWS along with the Department of Agriculture may seem odd; however, both were involved in finding better methods of killing their “enemies” whether they were humans or agricultural pests. A similar working relationship in Germany led to even greater destruction in World War II. The Germans developed an insecticide called Zyklon-B that was used extensively in gas chambers at the death camps. Another chemist working for the German equivalent of the Department of Agriculture developed the base compound for Sarin, Tiburon, and VX gas, all many more times deadly than anything developed during World War I. The fear that the CWS could produce deadly results was proven in Germany. The critics of the CWS were right in wanting to abolish chemical warfare, and Fries was right in wanting to keep the military actively researching so the military would not be surprised. By allying the CWS with the Department of

Agriculture, Fries was able to lessen the amount of criticism and actively keep the military prepared for unforeseen circumstances.

CHAPTER V

ADVANCEMENT OF CHEMICAL WARFARE IN MILITARY DOCTRINE

After the Geneva Conference of 1925, the CWS' ability to speak more freely and to interact with the other service branches increased. The service was able to direct its energies to refining weapons and tactics, worry less about its place in the world and the U.S. Army. However, the move to a more "offensive" oriented CWS developed slowly for two reasons, the United States did not have much money because of the Great Depression and because of the hostility of the executive branch. Not until the late 1930s with the onset of another world war, did "offensive" training get much needed emphasis. Until then the CWS breathed slightly easier with the consent of the War Department, especially after the Geneva Conference of 1932. After years of hammering away about preparedness, the military and the legislative branches finally agreed with the CWS.

In terms of money and materiel, the CWS still lacked the support needed to properly train and equip the U.S. military. From the late 1920s to the early 1930s appropriations averaged \$1.2 million for the fiscal year, except for 1934 when Congress budgeted the CWS only \$800,000.¹ The CWS did obtain more money from Congress through indirect means such as the development of the crop duster, but never more than ten percent of its appropriations. By 1927 only 109,149 gas masks existed, and none were manufactured after 1921, for an active army of 165,000 and a planned mobilization

1. Department of Commerce, Bureau of Foreign and Domestic Commerce, *Statistical Abstract of the United States* (Washington, D.C.: Government Printing Office, 1938), 176.

force of 500,000. The War Department did not allow any reserves of chemical weapons to be stocked, and no toxic shells had been filled since 1922.² Change did come to the CWS only through active measures by its personnel, and then only gradually (see Table 5).

Table 5: Appropriations for the CWS during the 1930s.

Year	Appropriations in millions of dollars
1930	1.3
1931	1.2
1932	1.2
1933	1.2
1934	0.817
1935	1.2
1936	1.3
1937	1.4

Source: Department of Commerce, Bureau of Foreign and Domestic Commerce, *Statistical Abstract of the United States*, 1930-1940.

Articles in various military journals revealed the change in attitude. With a more accepting attitude in the War Department, military journals gradually published more articles covering CWS topics after the Geneva Conference in 1925. With the CWS finally having entered a “favorable” status within the military, other branches began discussions on incorporating chemical warfare procedures into their own doctrine. Even though a more open attitude about chemical warfare prevailed, some writers still chose to

2. Brown, *Chemical Warfare*, 134.

keep their names anonymous. In 1928 in the *Infantry Journal* “Captain X” described the training given at the first Field Officer’s Course at the Chemical Warfare School.

Captain X was critical of past army attitudes towards chemical warfare training.

However, he described the instructors and the new course in a favorable light. The school used demonstrations and “hands on” activities to hammer home their point without the scientific jargon. In the older methods of accepted training, the men were taught how to put on a mask, locate the wind, and take the precautions they needed to take to stay alive. Many authors felt a more realistic concept of chemical warfare training. Captain X felt the CWS would play “an important part in any future struggle between major powers.”³ The course was such a success that a year later Secretary of War Dwight F. Davis ordered the continuation of the course at Edgewood Arsenal, Maryland.

The design behind the course was two fold: First, it was to give instruction to company and battalion line and staff officers who traditionally did not receive any further training than what an enlisted man received in chemical warfare training. The second motive was to change the attitude of those commanders by demonstrating the capabilities of the CWS and how it could be a good addition to the various weapons the commanders had at their disposal. The CWS tried to influence those midlevel officers who later on would possibly be promoted and carry that positive attitude into the higher echelons of

3. Captain X, “A Course in Chemical Warfare,” *Infantry Journal* 33: 5 (November 1928), 459.



(Figure 4. Chemical protective suit as of 1935).⁵

the military. The course worked, and the army eventually required company officers to take and pass the course.⁴

Gradually a better model of gas warfare training evolved when units practiced with tear gas on each other as mock poison gas. Stories abound of the success of tear gas when used in conjunction with maneuvers and mock skirmishes. The men in training wore their masks while they marched, fired their rifles and artillery, adding an element of reality to the course. The training even incorporated airplanes loaded with red aniline dye as a substitute for “mustard” gas to

simulate an attack from the air.⁶

By 1929, the first CWS officer contributed to the *Infantry Journal* with a publication of “Possibilities in Chemical Warfare.”⁷ The author listed possibilities for

4. Walter C. Baker, “The Broad View of Chemical Warfare,” *Bulletin on Chemical Warfare* 25: 4 (October 1939), 142.

6. Captain X, “A Course in Chemical Warfare,” 460.

5. Alden H. Waitt, “Chemical Security-Part II,” *Infantry Journal* 42: 5 (September-October 1935), 427

improvement in gas warfare and emphasized where the service was lacking. At the time, there was not effective protection from “mustard” gas. Current masks enabled the wearer to breath during a “mustard” gas attack, but no adequate means of protection existed for the vesicant action of “mustard” gas.⁸ Lieutenant Robert E. Sadtler made an early plea for a protective suit against persistent gases, something similar to the Nuclear, Biological and Chemical (NBC) suit currently worn by the U.S. military.

1929 proved to be a big year for the CWS. General Fries’ four-year term as chief of the CWS ran out and Colonel H. L. Gilchrist, chief of the medical division of the CWS, replaced him. Fries’ replacement was a result of a policy of general rotation and Fries’ rank reverted back to colonel unless he decided to retire, which he did as a major general in 1929.

Born in Waterloo, Iowa in 1870, Gilchrist attended Western Reserve University Medical School and graduated in 1894. Gilchrist entered the Army in 1898 as a surgeon, was sent to Manila in 1900, and then came back to the United States and worked on the prevention of typhoid fever. Gilchrist and six other volunteers took the first experimental vaccination for the prevention of typhoid fever in 1910. He served with the medical department during World War I and then went to Poland to rid that country of typhus. Gilchrist contributed to the Medical Department’s study on the effects of war gases

7. Robert E. Sadtler “Possibilities in Chemical Warfare,” *Infantry Journal* 34: 1 (January 1929), 75.

8. Ibid. A vesicant is a substance that causes blisters. “Mustard” gas in the liquid form could penetrate clothing and cause casualties because of severe blistering. Oils to be rubbed on the skin and paraffin soaked clothing were used, but when “mustard” gas was used in high concentration the clothing proved in adequate.

during the Great War and later joined the CWS. On May 8, 1929, Colonel Harry L. Gilchrist was promoted to major general and with the confirmation of the U.S. Senate assumed command of the CWS.⁹

Gilchrist's first annual report in November 1929 discussed the importance of the CWS and its place within the military. Gilchrist stayed the course Fries had set, and he actively argued the "humanity" argument on behalf of chemical warfare, partly because Gilchrist authored the official study conducted by the Medical Department on casualties inflicted by chemical warfare in World War I. Gilchrist continued to push the CWS and initiated some minor victories for the CWS. The CWS received authorization for the establishment of field laboratories for each of the field armies immediately after Gilchrist's nomination. During Gilchrist's nomination speech he also discussed future possibilities in chemical warfare, including the development of smoke screens by the CWS.¹⁰

Authors in the respective military journals also began to seriously consider the effectiveness of smoke screens. Illustrated articles flourished showing airplanes, tanks, mortars, artillery, grenades, and smoke candles laying their respective smoke screens. The CWS conducted studies and developed theories demonstrating the effectiveness and theories of smoke screen. At the Chemical Warfare School, the CWS conducted a study where the target was masked in smoke, then fired upon and the hits tallied. Next, the shooters were blanketed in smoke, fired at a target and the hits tallied. The results

9. "Gilchrist's Nomination Confirmed," *New York Times*, 9 May 1929, A33.

10. "Plans Artillery to Fire Tear Gas," *New York Times*, 17 November 1929, sec. II, 1.

pointed to the fact that if the enemy was covered in smoke, he was three times less likely to hit his target than if the target were screened.¹¹ The efficiency of the methods of laying a smoke screen were analyzed and artillery was deemed an inefficient way to lay a smoke screen. The CWS developed the smoke pot or candle, which emitted smoke much more efficiently than artillery shells. Cavalry officers wrote about how to incorporate smoke screens into their respective tactics, as well as the infantry, and even the navy. Because of the static fighting done in World War I in the trenches, many viewed smoke screens, (see Figure 5) as a way to conceal movement, therefore allowing more freedom to move on the battlefield.



Figure 5. A demonstration of a smoke screen at Edgewood Arsenal.¹²

11. L. M. Grener, "Chemical Mortars in Cavalry Operations," *Cavalry Journal*, 41: 171 (May-June 1932), 21.

12. Haig Shekerjian, "Chemical Weapons in Cavalry Operations," *Cavalry Journal* 38: 155 (April 1929), 215.

The cavalry especially showed an early interest in chemical warfare and the incorporation of tactics from the CWS. This may have resulted from the fact that the mounted cavalry saw itself as becoming obsolete and needed a way to inject new ideas and life into the branch. Also the cavalry did not see chemical warfare combat in World War I, so an interest evolved with developing adequate doctrine to insure its viability during a chemical attack. For example, the *Cavalry Journal* came to the conclusion that, "In reviewing the authorized doctrine of the cavalry and the chemical warfare service, there appear to be many cases where the weapons of the chemical warfare service may be of such value to the cavalry that nothing other can do the job and aid in mission accomplishment nearly so well."¹³ The article described the various weapons in the CWS armament and how they might potentially be incorporated for use with cavalry. The same article noted that, "Chemical warfare troops at present are Army troops. They may be attached to any subordinate units."¹⁴ The cavalry looked at incorporating the CWS' 4.2-inch mortar for its use. This mortar had increased range, which the cavalry desired since it moved fast and easily out ranged protection from its own older mortars.¹⁵ Officers wrote about the best way to pack smoke and tear gas candles on their animals and about the number of packs needed to lay a concentrated smoke screen.¹⁶ The cavalry also liked

13. G. A. Moore, "Chemical Warfare Weapons and Cavalry," *Cavalry Journal* 37: 152 (April 1927), 347.

14. Ibid.

15. Grener, "The Use of Chemical Mortars in Cavalry Operations," 20.

16. J. B. Fisher, "Chemicals-For and Against the Cavalry," *Cavalry Journal* 41: 174 (November-December 1932), 11.

the idea of smoke because of their high mobility and any method developed that enabled them to conceal themselves became attractive.

Authors in military journals also discussed the best way to employ tear gas in a riot situation. The National Guard took much interest in this topic because of their work in suppressing riots around the country. The French first developed tear gas in 1915, and it became a point of controversy about who actually attacked first with chemical weapons during World War I. The Germans knew of the French development and used that as propaganda for their attack at Ypres in 1915. Lachrymators, or tear gas, received different attention than poison gases at the various arms limitations talks, since it is non-lethal. The military and the police saw its benefit in controlling crowds, spoiling robberies, and aiding in hostage situations.

The National Guard focused much attention on tear gas, as their mission involved acting as the protector of major cities during crises. The Guard developed a doctrine for the incorporation of their own gas squads in riot situations. Each squad consisted of four riflemen armed with shotguns or pistols, and four gasmen who carried their weapons slung. All squad members carried gas masks as well. Each gasman carried four lachrymatory candles, two lachrymatory grenades, and one smoke candle. Since the gasman carried his weapon slung, his protection depended on the riflemen in the squad. While developing techniques of riot control, someone noticed in the Guard that gas

grenades should be bowled or bounced into the mob. The idea was that a bouncing gas grenade was much more difficult to catch and throw back at the Guardsmen.¹⁷

As discussed earlier, the development of the airplane piqued the interest of the CWS in 1921. Under exaggerated pretenses the CWS and the Department of Agriculture developed a crop duster that worked extremely well and spawned a new method used to spread pesticides efficiently. With a good crop duster developed and the security of the CWS guaranteed, the Air Corps and the CWS began to develop chemical warfare applications for the airplane. The ability to very rapidly and accurately place large concentrations of gas or smoke made the airplane highly attractive. By 1935 the gas bomb carried by the airplane contained fifty percent of its weight in gas producing material, while the chemical artillery shell contained only twelve percent of its weight in gas producing material.¹⁸ The gas bomb made it possible to quickly and accurately deliver a high concentration of gas.

The tactics developed for the airplane in the 1930s consisted mainly of pursuing an enemy, in delaying actions, or denying an area to the enemy. The airplane could either carry bombs or be fitted with gas canisters to spray an area much like a crop duster. When delaying or denying an area to the enemy, the plane used gas canisters to saturate the targeted area, not unlike the use of "Agent Orange" in the Vietnam War. A gas with a

17. Alfred de Roulet, "Regimental Gas Detachments in the National Guard," *Infantry Journal* 34: 6 (November-December 1932), 413.

18. "Bacterial and Chemical Warfare," *Bulletin of Chemical Warfare* 21: 1 (January 1935), 12.

high persistence, like “mustard” gas, was ideal since the gas would remain in some areas for a week, thereby making it potentially harmful for an enemy to pass.¹⁹

When attacking with sprayers, the airplane did not need to encounter troops directly but could spray the gas up wind from the troops and allow the spray to drift over the enemy. When an airplane approached, troops on the ground could not tell if the plane were attacking with bombs, machine guns, or chemical spray; therefore troops logically took cover in wooded areas, which afforded good protection from bombs and bullets but was the worst protection against gas since the air currents were lessened in the woods, therefore concentrating the gas.²⁰

The CWS closely observed the Italians and their use of chemical warfare in the Abyssinian War. The lack of an Ethiopian air force or anti-aircraft weaponry rendered the Italian airplanes very useful. The Italian Air Force covered the flanks of the Italian infantry by spraying the area with “mustard” gas. The Italian air corps gassed all important bridges, valleys and mountains to make movements by the Ethiopians very difficult. In a speech at the League of Nations, Emperor Haile Selassie of Ethiopia described the chemical attacks. “Special sprayers were installed on board aircraft so they could vaporize over vast areas of territory a fine, death-dealing rain. Groups of nine, fifteen, or eighteen aircraft followed one another so that the fog issuing from them

19. Alden H. Waitt, “Chemical Security: Part I, Methods of Chemical Attack and Chemical Intelligence,” *Infantry Journal*, XLII: 4 (July-August 1935), 300.

20. Alden H. Waitt, “Chemical Security: Part III, Protection against Air-Chemical Attack,” *Infantry Journal* 42: 6 (November-December 1935), 522.

formed a continuous sheet."²¹ The importance of the airplane forced the CWS to design a special school in conjunction with the Air Corps to work out tactics.²² By 1939 an airplane loaded with chemical sprayers had the capacity to cover an area 250 yards wide and 800 yards long and render the area untenable to unprotected troops.²³ The CWS officers feared the airplane as an effective method of delivery, which in turn generated discussions on the most effective anti-aircraft methods, see Figure 6.

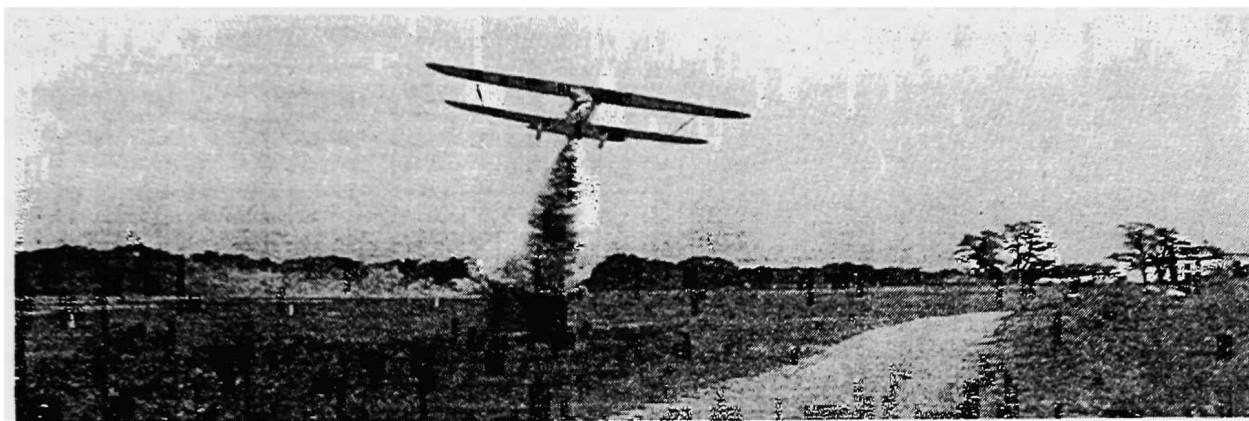


Figure 6. A "hedgehopper" demonstrating a chemical attack.²⁴

21. G. H. Brett, "Chemicals and Aircraft," *Bulletin of Chemical Warfare* 22, no. 4, (October 1936), 152.

22. Ibid.

23. Augustin M. Prentiss, "Chemical Support of the Infantry," *Infantry Journal* 46: 4 (July-August 1939), 345.

24. Waitt, "Chemical Security: Part III, Protection against Air-Chemical Attack," 524.

Another mechanical delivery device that received attention was the chemical tank, see Figure 7. The tank could carry up to 1,000 pounds of non-persistent²⁵ lethal gas and could so completely saturate an area that the gas would displace the oxygen making it necessary to have gas masks with an oxygen supply.²⁶ To reach the concentration levels of one tank 90 155-mm.-howitzer artillery shells would be needed, or 106 4.2 inch mortar shells, or 36 Livens projector shells. In terms of weight the tank carried the equivalent of 10,000 pounds of 155-mm. howitzer ammunition, the equivalent of 4,000 pounds of 4.2 inch chemical mortar ammunition, or 7,700 pounds of Livens-projector ammunition.²⁷ The chemical tank realized an obvious increase in efficiency and effectiveness in close infantry support.

The CWS sat on the sidelines too long in the 1920s because of prevalent attitudes in the public, Congress, and the military. The CWS dared not lay idle because of the possibility of developing new gases or techniques of delivery that could render the current method of protection obsolete in one attack just as at Ypres in 1915. The development of the 4.2 inch rifled mortar provided increases in distance and saturation from the old 4-inch mortar. The CWS developed improved protective outerwear that provided better protection against the vesicant actions of "mustard" or Lewisite gas than

25. Non-persistent gas has the characteristic of dissipating rapidly, allowing supporting troops to follow close behind. For the support of infantry one did not apply a persistent gas like "mustard" gas because the attacking infantry would have to move through the saturated area and receive exposure from their own gas.

26. Augustin M. Prentiss, "Chemical Support of the Infantry," 345.

27. Ibid.

World War I clothing. Both the plane and the tank saw huge increases in effectiveness post-World War I. Obvious gains in design and technology allowed for the improvements and the CWS adopted much of that knowledge. The CWS did not lag behind in adapting the plane and the tank into the most current chemical warfare doctrine.

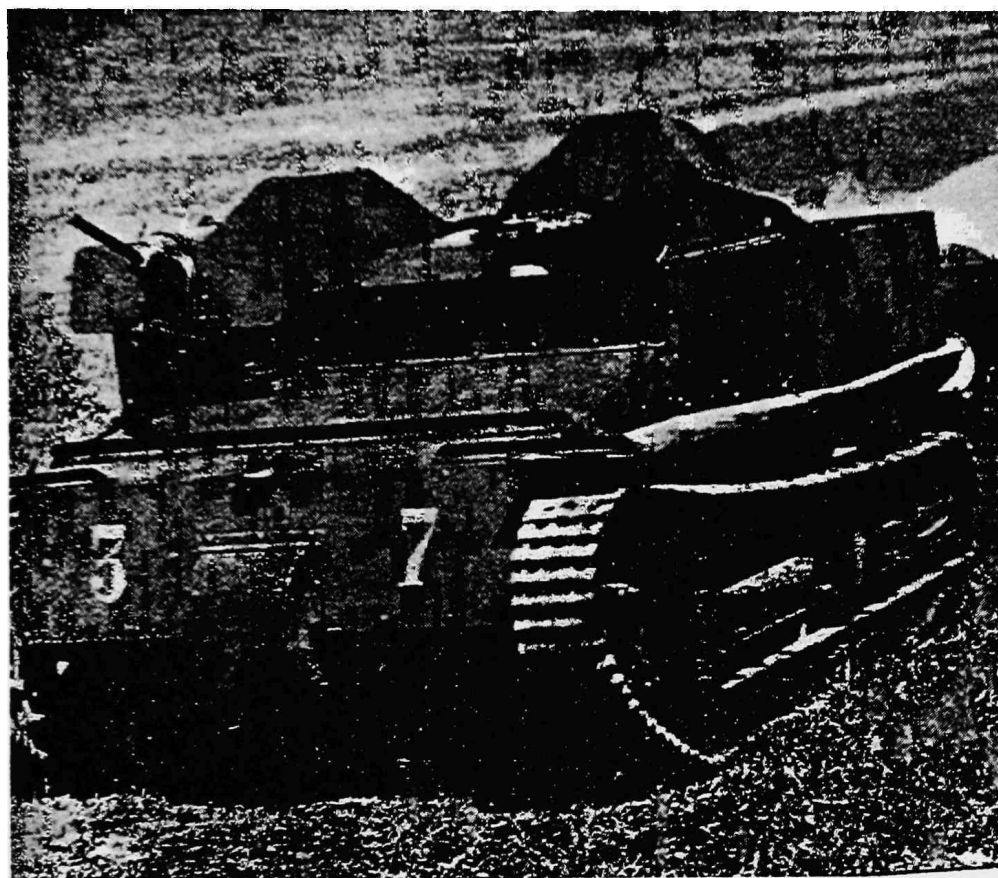


Figure 7. Chemical tank, 1939.²⁸

By the end of the 1930s the CWS began to resemble the branch the United States Congress designated in the National Defense Act of 1920. Officers now received chemical warfare training, and CWS personnel were assigned to each field army to run chemical laboratories for immediate testing of chemicals on the battlefield. The CWS

28. Augustin M. Prentiss, "Chemical Support of the Infantry," 347.

supporters also participated in the various military journals, shared ideas and fostered new developments, and acted and behaved as any other military entity. At the end of the 1930s, the CWS finally realized Fries' dream of an independent and fully integrated corps.

CHAPTER VI

CONCLUSION

President Wilson's utopian dream of a world without war and the American population's anti-war feelings severely inhibited Fries' goal of insuring the viability of the CWS. Fries was a realist and could not fathom the next war absent of chemical weapons much less an absence of war all together. He also saw how unprepared the United States was at the outbreak of war in Europe and even two and a half years later when the United States declared war. He learned a valuable lesson about the importance of preparedness during World War I and did not want to see the United States make the same mistake again. Furthermore, the American military during World War I displayed poor gas discipline and suffered a much higher percentage of casualties from gas than England, France, and Germany.¹ Fries fully appreciated that the high casualty rate as unnecessary and easily remedied. Congress and the military felt differently and acted to rid the world of chemical warfare with the Washington Conference on Arms Limitations, then again at Geneva in 1925, and again at Geneva at 1932.

The idea of a world without the threat of chemical weapons appealed to many and received wide support. Fries, however, argued that while the idea of abolishing the threat of chemical warfare was appealing, in reality it was inconceivable just as was the elimination of war. No one wished to assume the responsibility to conduct inspections

1. "Gas as a Weapon," *Bulletin on Chemical Warfare* 24, no. 1, (January 1938),

24. England, France and Germany saw a combined percentage of casualties from gas of five percent, six times less than that of the United States.

because of the implications should a nation violate the treaty: another possible war. Those in favor of military preparedness argued the poor logic in accepting a treaty that sanctioned oneself without guarantees from others.

The CWS was confronted with the staunchly supported but illogical ideals. Nevertheless, Fries managed to keep the CWS funded as best possible and to train the U.S. army as well as permitted by the War Department. Fries managed to keep the CWS funded in a variety of creative ways involving the Department of Agriculture in numerous instances. However, training took a back seat for many years until attitudes gradually changed in Congress and the military after the Geneva Conference in 1925. Still, the CWS made no new gas masks and did not stockpile chemical weapons in case of war. They were, however, allowed to develop some new weapons and use nontoxic chemicals in testing those weapons. The CWS made great strides in conjunction with the Air Corps in developing the airplane for chemical warfare. The CWS left no advancement in technology unresearched, and within the restraints of available resources sought to make their organization a more deadly weapon in the arsenal of the U.S. military.

What is the end result of Fries' work and the CWS some sixty years later? On the surface there is not much to show for the CWS's twenty years of work during the interwar years. The CWS spent much of its time trying to persuade anybody who would listen of its importance and finding enough funds with which to operate. The 1935-1936 Abyssinian War failed to open many eyes outside the CWS to the potential effectiveness of chemical warfare against an unprotected soldier. That war should have alerted

American military leaders because the U.S. soldier was not much better off than the Ethiopians when it came to protection. The number of active soldiers still outnumbered the amount of masks in storage, and for troops to safely pass through an area contaminated with “mustard” gas, soldiers had to wear special clothing. So, on the surface the CWS did not accomplish much. However, since the United States saw no chemical combat during World War II, Fries’ argument about the continuation of chemical warfare in the next war seemed to be nullified.

Despite this, the CWS did accomplish much in that it kept alive discussions about chemical warfare and preserved a more active stance in case of chemical warfare. The fact that the United States had a CWS and the ability to produce large amounts of chemical weapons and materiel possibly kept the Axis Powers from initiating chemical warfare in World War II. The Germans had an active chemical warfare program with stockpiles of a new kind of poison gas, nerve gases, which the United States did not investigate until they acquired the knowledge from captured German stores.²

If the U.S. leadership and populace had had its way in 1920, the CWS would have been absorbed by the Engineering Corps and disappeared because of hostile attitudes. Fries’ tireless efforts at generating an awareness of the problems with regulating chemical warfare production and following “gentleman’s rules” during war ensured the continuing existence of the CWS. The possibility existed for a continuation of chemical warfare in

2. Antony Beevor, *The Fall of Berlin 1945* (New York: Viking Penguin, 2002), 376. The Russians first encountered stores of Sarin and Tiburin at Spandau during their assault on Berlin. Sarin and Tiburin are vesicants and are lethal enough to kill when contacting the skin alone. With a dearth of protective suits, it was very fortunate the Germans never resorted to their use.

future wars, and Fries tried to make sure that people understood that possibility. Not until 1926 were Congress and the military persuaded about preparing for potential future conflicts, but the executive branch of the U.S. government never showed sympathy for such a public outcast. The CWS never received the funding needed to operate fully or fulfill the role set for it in the National Defense Act of 1920. If a chemical war had broken out involving the United States, the American military would have been in dire straits for months. Even with that harsh reality, Fries and the CWS did manage to keep the discussion on preparation alive and fostered discussions of the importance of chemical warfare throughout the inter-war period.

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