

The Chemists' Peace: How the Chemical Warfare Service Adapted to the End of the Great War

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Chemical weapons earned a terrible reputation during World War I, and U.S. policymakers worked to end chemical warfare and repurpose the organizations that supported it once the war was over. In spite of their uniquely unpopular field of war-craft, and the austerity of the post-war military budget, the U.S. Army Chemical Warfare Service managed to continue operating under the National Defense Act of 1920 and gradually expanded its role in national defense. This paper will examine the Chemical Warfare Service during World War I and provide an overview of its transition to a peacetime organization amid a hostile political climate in the 1920s.

The first successful gas attack of World War I happened 100 years ago, on April 22, 1915. After extensive preparations, the German Army released chlorine gas from thousands of storage cylinders near Ypres on the Western Front. The prevailing breeze carried the chlorine west where it devastated the British, Canadian, French, and Algerian soldiers who were caught in the gas cloud. Without protective masks of any kind, the choking soldiers dropped their weapons and equipment and ran from the front lines trying to escape the poison air. A British news cable reported that "Some got away in time;" but "among those who escaped, nearly all cough and spit blood . . . The dead were turned black at once."

In the aftermath, all the First World War belligerents made preparations to wage gas warfare even as Germany was vilified by the international press and world leaders. The advent of chemical weapons made necessary the creation of new military, scientific, and manufacturing institutions in order to support chemical warfare on the battlefield.

When the United States declared war in 1917, the chemical war was in full-swing and poison gas was a pervasive feature of the fighting in Europe. It is astonishing, then, that military preparations for chemical warfare waited until the last minute. There was no attempt in the United States to prepare for chemical weapons before November 1916, when the Secretary of War Newton Baker assigned the Army Surgeon General William Gorgas responsibility for designing and developing gas masks. Under Gorgas, the Medical Department began some preliminary research but allowed the project to languish before a mask could be designed. In February 1917, the Bureau of Mines, a civilian agency in the Department of the Interior, began its own crash-gas investigation project in an attempt to make the country ready, but it was far too late. By the declaration of war two months later, neither a single gas mask nor any other piece of chemical warfare equipment had been manufactured for the Army.

All U.S. soldiers preparing to serve in France in 1918 needed to know what to do in the event of a gas attack. The importance, scope, and urgency of this task necessitated that the gas training responsibilities of the Surgeon General's Office be reassigned to the Corps of Engineers in late 1917. The Corps of Engineers established the Chemical Service Section, also known simply as the Gas Service, and staffed it with chemists and engineers who were expected to bring speed and expertise to the assignment. The officers who conducted the training nevertheless lacked resources and support. They attempted to set up chemical warfare training facilities at the cantonments where the American Expeditionary Force was assembling across the United States, but they were plagued by shortages of equipment and lacked up-

to-date instructional manuals. Moreover, the officers of the Chemical Service Section themselves had only limited experience with chemical weapons. In practice, the chemical warfare training that a soldier on his way to France would undergo consisted of a mere hour or two of gas defense lectures and a demonstration of how to wear a gas mask, if masks were available.

Deficient training and equipment combined with the relatively large numbers of gas casualties suffered by the American Expeditionary Force helped secure chemical warfare's reputation for having been one of the most terrible aspects of World War I. The U.S. Army Surgeon General reported that the American Expeditionary Force sustained more than seventy thousand poison-gas casualties in the war—nearly 30 percent of the total U.S. casualties in World War I and a higher percentage of chemical warfare casualties than any other nation's army. Poison gas was also a weapon that was associated with America's German enemies. Germany had been the first nation to use poison gas effectively during the war, and that fact had been prominently featured in U.S. propaganda. In a speech he gave at a patriotic event in Portsmouth, Ohio, on June 20, 1918, Governor James M. Cox said, "Germany violated her solemn compact with other nations never to use poisonous gas in warfare," adding that "the shame of that nation will not soon be forgotten." People who believed that Germany's use of poison gas constituted a criminal act were likely to support ending the future use of chemical weapons once the war was over.

Gas is literally "poison," a method of killing that has been condemned for centuries as treacherous and cowardly, and the use of poisonous and suffocating gasses was seen by many members of the military as an un-soldierly method of warfare. General John J. Pershing, commander of the American Expeditionary Force in World War I, wrote in 1921 that chemical warfare was "abhorrent to civilization." U.S. Army Chief of Staff Peyton C. March was one of the most prominent opponents of the chemical warfare after the First World War. In his memoirs March called gas warfare "cruel," "savage," "repugnant," "barbarous," and he asserted that if the United States continued to work with such weapons, it "had much to answer for."

The Chemical Service Section was expanded and renamed the Chemical Warfare Service a few months prior to the Armistice, and its officers saw the post-war rising tide of anti-gas sentiment as a threat on many levels. They were proud of the work they had accomplished during the First World War, and they objected to inferences that the United States should be apologetic about its chemical warfare activities. While they recognized that soldiers in the American Expeditionary Force had had terrible experiences with poison gas weapons, they argued that the lesson to be learned was that thorough preparations for chemical warfare should be made before the next war could occur. The Chemical Warfare Service's transition to a peacetime military organization after World War I represents a critical turning point in the history of chemical warfare, when U.S. chemical warriors had to confront widespread negative views about chemical weapons in the United States to defend their mission and adequately prepare the country for a future chemical war.

Chemical Warfare Service officers fundamentally disagreed with those who characterized chemical weapons as barbaric. For these chemical warfare experts poison gas represented an advanced tool of national defense, and they considered its detractors misinformed. Earl J. Atkisson, the commander of

the U.S. chemical warfare regiment in France during World War I, believed that opposition to chemical weapons reflected a “natural but sentimental tendency of people to attach all the terrible aspects of war to its latest phases of development.” Atkisson wrote that “war is abhorrent to the individual, yet he accepts blowing men to pieces with high explosive, mowing men down with machine guns, and even sinking a battleship in mid-ocean with its thousand or fifteen hundred men being carried to certain death. He has grown accustomed to these things and tacitly admits their necessity. However, to burn the skin of a man outrages all his civilized instincts.”

General Amos Fries, the chief of the Chemical Warfare Service, acted to establish an extensive network of informed partners, inside and outside of the military, who worked to influence public policy with regard to chemical weapons. Through his efforts the Chemical Warfare Service countered claims that poison gas was barbaric and uncivilized by advertising chemical weapons as advanced, necessary for national defense, and humane.

Fries lamented in 1919 that, “There is a popular notion that gas warfare is the most horrible method of warfare ever invented, and that it will be abolished because it is so horrible,” adding “and yet it is not horrible.” Fries and his fellow officers articulated a pro-gas position, based on the assertion that the effects of poison gasses on the body were far less grotesque and traumatic than the wounds caused by bullets, artillery shells, and explosives, and they claimed that chemical weapons were as humane as, if not more humane than, conventional weapons.

World War I and the Chemical Warfare Service’s post-war struggle coincided with the evolution of chemistry in in the United States from a strictly academic pursuit to a profession with a voice in national policy. Scientists and researchers who had been part of the war effort believed that they should continue to play an important role in national defense after the war ended. “The problems of peace are inextricably entangled with those of war,” astrophysicist George Ellery Hale wrote in 1920, “and if scientific methods and the aid of scientific research were needed in overcoming the menace of the enemy they will be no less urgently needed during the turmoil of reconstruction and the future competitions of peace.”

Accordingly, businessmen and scientists who worked with the Chemical Warfare Service through the uncertain post-war period used several professional journals to spread their information and ideas. When the Department of War announced that it was urging Congress to discontinue the Chemical Warfare Service in August 1919, a mountain of opposition rose from these professional journals and the organizations that supported them. The next month the American Chemical Society held its annual meeting in Philadelphia, and it unanimously passed a resolution on behalf of its 13,500 members that protested the bill and supported the continuation of the Chemical Warfare Service.

Charles Holmes Herty’s *Journal of Industrial and Engineering Chemistry* had perhaps the closest working relationship with the Chemical Warfare Service through the 1920s. Herty was one of the most prominent chemists in the country, was president of the American Chemical Society and the Synthetic Organic Chemical Manufacturers Association, and frequently served as an expert policy advisor to various government agencies. Beginning in February 1919, he regularly featured contributions from the

Chemical Warfare Service published in a separate section of each issue of *Industrial and Engineering Chemistry*. Herty also personally lobbied for the Chemical Warfare Service to be maintained as a permanent part of the national defense establishment because, as he wrote to a colleague, if the gas warfare organization was disbanded it would be “a direct slam at the technical organizations of this country.”

To strengthen good relations with Congress, the Chemical Warfare Service hosted events at Edgewood Arsenal for members of the House and Senate. In March 1921, for example, the Chemical Warfare Service welcomed a group of Congressmen for a tour of Edgewood Arsenal. “I was very much impressed with Edgewood Arsenal,” Senator Irvine Lenroot said after the visit; “I shall favor the continuance of research and development work in this branch of military service.” The Chemical Warfare Service also organized Capitol Hill events and demonstrations. In May that same year the Chemical Warfare Service and the National Research Council set up chemical weapons exhibits for public view in the House Caucus Room. The members of Congress were reported to be “practically unanimous in commending the chemical exhibit.”

The Chemical Warfare Service also worked to promote the idea that chemical weapons had useful peacetime applications. Its researchers developed insecticides, medicines, industrial processes, and law enforcement tools throughout the 1920s. The Chemical Warfare Service worked to develop tear gas grenades and other non-lethal devices for use against large mobs and criminals barricaded in hideouts, but it did so initially under restriction. In February 1919 the Department of War expressly forbade the Chemical Warfare Service from providing any military or civilian law enforcement personnel with any type of chemical weapon, because of concern that gas would badly harm or kill its victims. In October 1919, General Leonard Wood led Fifteen hundred soldiers from the 6th U.S. Army Division to suppress a steelworkers’ strike in Gary, Indiana, and he requested that the soldiers be supplied with various gas grenades. In response, the Department of War reaffirmed that they did not want any chemical weapons used “against mobs composed of inhabitants of the United States.”

The officers of the Chemical Warfare Service worked to convince the Department of War to rescind proscriptions against tear gas, while they continued to design and test various crowd control equipment, and they organized public-relations events to publicize their development of safe and effective tear gas devices. In August 1921 a group of Washington, DC-area girl scouts were invited to visit Edgewood Arsenal from their nearby retreat, Camp Bradley. The day’s activities culminated in an event where the group of approximately sixty girls (one of whom was Fries’ daughter Elizabeth) was exposed to tear gas. “The girls found that the name ‘tear gas’ was no misnomer as all cried copiously for a few seconds when the gas was released,” the *Washington Post* reported. “They greatly enjoyed the trip and put it down as one of the red red-letter events of the camp.” In September 1921 the Department of War relented, and revoked prior orders that prohibited the use of non-lethal gasses on civilians.

While continuing to strengthen their relationships with the chemical industry and Congress, the members of the Chemical Warfare Service also sought to build support for their work among other organizations within the military. In 1921, Chemical Warfare Service officer Earl J. Atkisson wrote a memorandum suggesting that the Chemical Warfare Service and U.S. Army Ordnance Department

collaborate together on a variety of projects. Atkisson proposed that the Ordnance Department provide the Chemical Warfare Service with various pieces of military equipment for use in chemical warfare research including every type of shell in use so that chemical-filled shells could be developed for every model of gun. He also pledged to test chemical weapons in airplane bombs, and requested delivery of combustion engines used in different service vehicles so they could be tested to determine how well they worked in poison gas clouds. This marked the beginning of an extensive research collaboration that lasted through the 1930s.

One of the firmest alliances the Chemical Warfare Service was able to establish with another military organization was forged with the burgeoning Army Air Service. Air warfare represented a relatively new type of war in much the same way chemical warfare did during the same time period, and the two services had much in common. The Chemical Warfare Service and the Army Air Service both lobbied persistently to conduct tests on decommissioned naval craft, and in 1921 the Navy arranged for them to test airplane bombs filled with phosphorous, tear gas, and other chemical weapons in a mock-assault on the battleship USS *Alabama*. Fries was a prominent witness for the defense during the court martial of General William "Billy" Mitchell in 1925, and, after Mitchell was forced from the service, the Chemical Warfare Service and the Army Air Service continued to collaborate on projects of mutual interest through the interwar period. In May that same year, the Air Service asked the Chemical Warfare Service to design and supply them with gas masks to protect airplane pilots from chemical weapons.

The Chemical Warfare Service also collaborated on projects with the Navy. In 1927, engineers from the two organizations began working on an effort to improve U.S. coastal defenses. The Chemical Warfare Service maintained that shore batteries, which were installed to defend major ports along the nation's coast and at overseas possessions like the Panama Canal and Manila Harbor in the Philippines, were vulnerable to chemical attack. These batteries were fortified so that they would be able to withstand heavy naval gunfire, but the human crews inside could be exposed to poison gas if it were used against them.

The Navy allowed the Chemical Warfare Service to conduct a field test at Fort Monroe, Virginia. Chemical Warfare Service officers hung chemically treated cloths and installed a ventilation system inside Battery De Russey at Fort Monroe, and the Navy fired a live shell at the battery to test the integrity of the system. The test demonstrated that the gas-proofing system was inadequate, but that result should not have been surprising. The heavy explosive shells that warships could fire at shore batteries should theoretically have been able to shake and shatter any cloth tarps or ventilator filters that the Chemical Warfare Service could install. Explosions that could rip apart ship armor would naturally render any structure vulnerable to a poison gas attack. The fact that the Department of War committed resources to the project demonstrates the strength of support the Chemical Warfare Service enjoyed within the military by the late 1920s. They were allowed to continue experimenting with methods of gas-proofing Battery De Russey through 1932.

In 1927 the Navy also requested that the Chemical Warfare Service begin developing a gas mask specifically designed for aviators, and they agreed to furnish 100 percent of the cost of development, an estimated \$7,500 dollars. In 1928 the Army and the Navy worked jointly with the Chemical Warfare

Service on the development of a rubber-like, pressurized full-body suit for aviators that would protect them from chemical clouds. The suit was designed with a gas mask face piece and a ventilation system that allowed breathable air to enter. The Chemical Warfare Service also considered whether or not the suit could be issued to ground troops in combat, to protect them from liquid agents like mustard gas and lewisite, but they concluded such a use would be impractical.

The officers in the Chemical Warfare Service appreciated a need to demonstrate that chemical weapons could, and would, be used in future wars. Consequently, they worked to be formally included in strategic and mobilization plans drafted throughout the 1920s. In 1927 the Army and Navy jointly conducted a series of war game exercises around Manila Bay that included simulated gas attacks, and, in the summer of 1928, the U.S. Army's War Plan Yellow was revised to include scenarios where chemical weapons would be deployed in response to a hypothetical Boxer-style rebellion in China.

As the Department of War considered the possibility that chemical weapons might be used in future wars, they gradually turned more attention to the issue of gas mask development and manufacturing. In 1926 a corporation called the Mine Safety Appliances Company in Pittsburgh, PA asked the Chemical Warfare Service for permission to "manufacture gas masks of the Navy and Army types for the governments of Brazil and Norway respectively." Chemical Warfare Service chief Fries endorsed this request, because he "believed that the more gas masks that are made in the U.S. for foreign governments, the more advanced will be the knowledge of gas mask manufacture in the United States." Permitting other nations to purchase gas masks in the United States was a good policy for the Chemical Warfare Service, since it would allow U.S. understanding of gas mask manufacture to advance at no cost, and the request was ultimately approved by the Adjutant General's Office.

However, there was a growing need for the Department of War to manufacture its own gas masks to replenish the national reserve. Storage methods used for gas masks were inadequate over long time periods, and the Chemical Warfare Service warned the Department of War repeatedly through the 1920s that, in their estimation, the number of useable masks in the national reserve was insufficient to protect the military in the event of a war. In 1928, Secretary of War Dwight Davis acted to remedy the situation with an order "to protect War Reserve depot stocks of the Chemical Warfare Service from deterioration and to include funds for this purpose in the estimate each year." Receiving Davis's authorization to maintain the gas mask reserve, and being promised the funds to do so, was an important validation of the work that Fries and the other officers of the Chemical Warfare Service had done to promote chemical warfare over the previous decade.

Through the 1920s, the Chemical Warfare Service gradually earned acceptance despite its controversial responsibilities. It achieved progressively more prominent roles in defense plans and operations, conducted scientific research in partnership with other military and civilian agencies, and obtained funds for its gas mask manufacturing program in the austere interwar years, even, it should be noted, as foreign policy makers worked to negotiate the Geneva Protocol and other international agreements designed to limit chemical warfare. The Chemical Warfare Service in the 1920s is a case-study in how a small, motivated group can successfully adapt to peace and execute its mission in a challenging post-war environment.