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Under Military Rule to Guard the Secret, the 800 Men in This Group Were Prisoners in the Methyl Poison Gas Stockade Near Cleveland from Aug. 1 to Nov. 11, 1918. On the Left Is Major Gen. William L. Sibert, in Command of Chemical Warfare Service; on the Right, Colonel F. M. Dorsey, Chief of the Development Division of That Service.

OUR SUPER-POISON GAS

First Story of Compound 72 Times Deadlier Than "Mustard," Manufactured Secretly by the Thousands of Tons

It had the fragrance of geranium blossoms. It was an oily amber liquid, highly explosive, and bursting into flame with water. It was the American super-poison gas, deadly by contact or by inhalation of the smallest detectable portion. A drop on the hand would cause intolerable agony and death after a few hours. It was called methyl (partly because that name did not describe it) and it was the climax of this country's achievement in the lethal arts.

The signing of the armistice spared the enemy any first-hand acquaintance with the terrors of methyl. Major Gen. W. L. Sibert, in command of the Chemical Warfare Service, had directed that 3,000 tons of it, in shell and drums, be in readiness on the battlefield March 1, 1919. Ten tons a day were being produced in an eleven-acre plant near Cleveland, Ohio, and the plant was two months ahead of its schedule when Foch crossed No Man's Land to offer terms to a beaten foe. It is estimated that ten tons of methyl is one ton more than enough to depopulate Manhattan Island; and so it is not difficult to guess what would have happened had Hindenburg and his cohorts persisted until Spring.

Two days after the armistice was signed workmen began dismantling the big plant. They scrapped the complicated and expensive apparatus, every piece of which had been specially planned and manufactured for the production of the most terrible instrument of manslaughter ever conceived. On Feb. 1 the work of demolition was complete. There remained no trace of that scattering array of barracks and laboratories which had been a cradle of death. But the formulas, processes, and personnel were painstakingly set down for the records at Washington against the contingency of another war.

There did remain, however, tons and tons of methyl. What was to be done with it, now that there was no longer any active occasion for exterminating Germans? Cleveland did not want the deadly stuff dumped into Lake Erie, and there seemed no practicable method of neutralizing its deadliness chemically. Almost enough was on hand to destroy the entire people of the United States, and some safe way must be found to dispose of it.

The ocean was selected as its catch-basin. Difficulties were met in transporting the stuff from Cleveland to the ocean. Handling such quantities was perilous. So it was put into big iron containers, for it does not react on iron, and those containers were loaded into freight cars. Then there was assembled the most extraordinary train probably that ever traversed American railroad tracks. It moved under an armed guard and on a special schedule. No railroad employe rode on it except the engine driver. The train moved slowly, so that two days were consumed in the journey from Cleveland to the Edgewood Arsenal near Baltimore. And then the iron containers were stowed gently in a ship and taken fifty miles to sea, where they were lowered over the side into water three miles deep.

Rust will eat pinholes into those containers, and there will be a minute and gradual intermixture of water with their fatal contents. In such circumstances there is no flame, but a slow chemical reaction which produces two nontoxic compounds. Experts do not believe even that fish will perish from the presence on the ocean bed of this vast quantity of poison. When the salt water of the Atlantic embraced the last of those iron tanks, finis was written to a chapter in American war effort which, until now, has been a secret scrupulously guarded.

Compare this secret new compound with "mustard," which the chemists dubbed "king of poison gases." Mustard was first used by the Germans, with terrific effect, at Ypres, July 20, 1917. Thereafter its use became general, and afforded such marked tactical advantage to the enemy that retaliation by the Allies became imperative as a matter of self-preservation. American chemists devised a formula one-fourth more toxic than that used by the Germans. The gas, known to chemists as dichlorethyl sulphide, is now the common property of the combatant nations. The processes by which it is made are generally known. It is a sweetish liquid, both in taste and smell, about as volatile as turpentine. In contact with the skin its presence is at first not noted. Then there begins the burning and swelling which prompted its nickname among the Tommies. It spreads through the tissues, and on reaching the lungs breaks them down, setting up what is called "chemical" pneumonia, usually fatal.

Methyl is somewhat more volatile, and is comparable in that regard with benzol. Instead of being inoffensive at first contact, it sets up an acute and almost unendurable pain. It does not spread through the tissues, but poisons the blood and attacks first the kidneys, then the heart and lungs. It hardens the cell tissues of the lungs, and causes simultaneously strangulation and a heart affection which speedily produces violent death. If taken into the lungs by inhalation in any perceptible quantity it kills almost instantly. It is estimated to be seventy-two times deadlier than mustard.

The processes of manufacturing the two poisons differ radically. It is not permissible even now to tell what basis is used for methyl, but its manufacture from the raw material requires but a short time. The equipment is elaborate. No fear is felt that experimenters will be able to make such a gas. That the United States came to know of such a poison was due, in the first place, to an accident. Years ago a student of chemistry, then living in another country, happened upon a combination which almost cost him his life. It was a compound never made before, or at least never recorded. Subsequently he came to this country, and when the question of poison gases came to the fore he recalled his narrow escape and imparted the information to the Government. The production of methyl resulted.

Not one worker died from poisoning. In large measure this was due to the precautions enforced by Captain George A.

Plummer, a physician from the Mayo Institute, whose work was the care of lives in an institution dedicated to the destruction of life. But, in addition to those precautions, a mask and suit of clothing was devised which afforded protection against methyl. Defensive work went hand in hand with the offensive work. None of the gas masks invented to save lives from mustard gas and the other poisons was effective against methyl. Is is a certainty that even now should it ever become necessary to use this poison in warfare, the enemy would be a long time in finding a way to protect himself. But the workers themselves were equipped with a uniform and face covering which afforded safety.

The work went ahead with remarkable rapidity. An entire plant was supplied with an equipment such as had never been used before. To complete the plant required three months. The speed accomplished was due to the fact that the biggest industries in the United States fitted for that kind of work put themselves behind Uncle Sam in his war effort.

Colonel F. M. Dorsey, formerly chemical engineer of the National Lamp Works of the General Electric Company, a graduate of Ohio State University in 1908, and a man who added courage and tremendous driving energy to his specialized technical ability, became chief of the development division under General Sibert. The General Electric Company permitted him to give all his time to the work. M. W. Allen and Mr. Batchelor of the National Carbon Company, F. S. Terry and B. G. Tremaine, General Managers of the National Lamp Works, and J. E. Randall, its consulting engineer, offered their facilities and met all the expenses involved, under an agreement to be reimbursed later at the convenience of the War Deparment. This was to save the time which would have been consumed in waiting for appropriations. Time was as precious as poison gas in those days; and to the efforts of these men can be credited much of the success of the development division of the service.

Captain W. H. McAdams, a graduate of the University of Kentucky, 1913, became Colonel Dorsey's executive assistant and right-hand man. Other executives and experts were recruited from the largest and most successful industrial establishments in the United States. The companies put into the war work assigned to them not only the superb technical equipment of their employes, but also their own tremendous resources.

In the production of mustard and other poison gases known to the public some complaint was made of delays. No such complaint could have been made about methyl, even if the public had known anything about it. This compound is known to the Chemical Warfare Service also as G-34. The preliminary experimental work with it was done by the Research Division at the American University, Washington. When General Sibert on July 12 last told Colonel Dorsey to make ready to manufacture the poison, it had been produced by a laboratory process of five steps. Subsequently the fourth and fifth steps were revised. But the immediate problem was the design and layout of a full-scale equipment for quantity production. Some of the raw materials required were of an unusual nature for such work, and were difficult to procure. It was necessary to manufacture two of them in the plant itself. And it was necessary to assemble a new organization of exceptional calibre.

Colonel Dorsey set to work with that energy and lack of ceremony which had won him a name in the industrial world for getting things done. He took over on July 19 the abandoned plant of the Ben Hur Motor Company at Willoughby, Ohio, a suburb of Cleveland. On July 20 he installed Major James B. Conant of the Research Division there, with Lieut. Col. W. G. Wilcox in charge as Superintendent. On July 26 there was a guard on hand of twenty-five men, and work was under way. The plant was in such condition that it was necessary to grade the dirt floor, wire it for electricity, provide for sewage and water, install desks and chairs. The first of the laboratory equipment arrived in trunks, as personal baggage. Colonel Dorsey was in a hurry.

Space will not permit a detailed narrative here of all the obstacles overcome, of all the vexatious barriers to be hurdled in order to make this a record achievement in speed. The utmost secrecy surrounded the efforts. It was forbidden to officers and men to divulge the nature of the product or even the existence of the plant. Mail was censored. A Cleveland Post Office lock drawer was used, and letters were mailed and received there, for the very name of Willoughby was verboten in correspondence. Telegrams were sent through the headquarters at Nela Park. The experimental plant, as it was called, was conducted as an army post, and the men were not permitted to visit Cleveland. The work was hard and there was no recreation. But patriotic men and women of the neighborhood, who knew something was being done for the country but not what was being done, supplied the men with reading matter, a Victrola, fruit, and pies, and even a grand piano!

Klaxon horns were installed and an alarm system agreed upon, and the men in the plant worked always with their masks in the "alert" position. A fire and gas brigade was organized and alarms were given at intervals, sometimes "for cause." But none of the men was lost from poisoning. The only death at the exprimental station was from influenza.

The methyl was packed partly in 155-millimeter shells, each carrying about ten pounds of the liquid, and partly in drums carrying from 350 to 400 pounds to be dropped from airplanes. It is estimated that fifty of these drums, judiciously dropped about Manhattan Island, would kill its population.

In this connection it is pertinent to reveal some facts, until now not known to the public, about the manufacture of mustard gas. The chlorhydrin process for making this poison was unsuited to quantity production, and it was not until February, 1918, that an English professor's discovery of a new method was cabled to America. The cablegram anticipated by just two days a discovery of the same reaction at George Washington University in Washington, where experimental tests were under way.

In March a small experimental station was established at Taft Avenue and East 131st Street in Cleveland, with Colonel Dorsey (then Mr. Dorsey of the National Lamp Works) as technical director. The little two-story office building of the Great Lakes Refining Company became, in August, the offense section of the Development Division, with Colonel Dorsey in charge. It was connected with a large single-story structure suitable for plant operations.

This plant, within six miles of the Cleveland public square, was in a congested district, and great precautions were necessary to avoid gassing the neighbors, who did not suspect the deadly material being prepared within. But few outsiders ever became aware of the nature of the work being done in East 131st Street, and no serious trouble was caused by it. The second-story room was converted into a control and research laboratory, and was equipped with ten well-ventilated hoods and all the other necessary equipment. The rapid assembly of the materials was made possible through the co-operation of Cleveland manufacturing concerns, whose attitude throughout the war has been thus expressed: "If we have it, the Government can have it; if we haven't, we'll get it."

At this plant no barracks nor mess hall was provided, and the men ate and slept wherever they could in the neighborhood. As each arrived, he was told what was being done and its importance was explained to him; and the officers in charge report that the workers performed eagerly and thoroughly the tasks assigned to them, although often they were tedious and hazardous.

The results at this plant were immediately transmitted to the Edgewood Arsenal (Hastings-on-Hudson) plant, to the National Aniline and Chemical Company plant at Buffalo, and to the Dow Chemical Company at Midland, Mich. At each of these places mustard gas was made in quantities. Nela Park, so named from the initial letters of the National Electric Lamp Association, forerunner of the National Lamp Works, was the hub from which these spokes radiated. At Nela Park investigations were made of two other poison gases, before the methyl work was undertaken, but the War Department stopped the other inquiries before they were completed. The main result of the 131st Street plant was the development of mustard; the main result at Willoughby was the production of the death-dealing methyl.

It may be seen with what caution and energy the United States set about meeting German ingenuity in cruelty and destruction, and how successfully American chemists surpassed the enemy chemists. The visible death-dealing evidence of their technical skill has been destroyed. France and England and Italy are continuing their chemical warfare services unimpaired. The United States has disbanded her personnel and dismantled her plants.

To the Chemical Warfare Service was assigned the Bureau of Mines. Dr. W. K. Lewis, representing the bureau, went to Cleveland on April 28, 1917, to enlist the aid of the National Carbon Company and the National Lamp Works of the General Electric Company. At that time mustard gas was the main goal, and electric power was required to make chlorine and graphite for the electrodes. Moreover, expert knowledge about charcoal was required on the defensive side of the work, in devising gas masks and other protective apparatus. For example, tests at Nela Park proved that cocoanut hulls were the best raw material for making absorbent charcoal, and so that material became the standard. The plant of the Great Lakes Refining Company in Cleveland was taken over for mustard gas research, and its personnel of 35 was increased to 175 officers and enlisted men. That was a microscopic but typical example of the methods adopted to meet the greatest emergency in America's military history.

Mess Hall in the Plant Where the Methyl Gas Was Made; the Workers Slept in Hastily Constructed Barracks in the Stockade.

Poison Gas Worker Armored Against Injury With Mask and Suit of Special Material.