ADDRESS BY

MAJOR GENERAL AMOS A. FRIES

CHIEF OF THE CHEMICAL WARFARE SERVICE

AT THE

OPENING EXERCISES

ARMY INDUSTRIAL COLLEGE

SEPTEMBER 1,1925.

Address before the Army Industrial College
2.50 p.m. September 1st, 1925.

Major General Amos A. Fries, Chief of the
Chemical Warfare Service.

Only a month or so ago the daily papers were greatly concerned over the trial of "evolution" at Dayton, Tennessee. If we could bring some of the fundamentalists here, we could show them a very fine example of evolution. This college has many ancestors - each differing from the others. By ancestor is meant a contributing cause of existance.

In the Dark Ages of national preparedness, early in 1916, we find evidences of the first realization of the part that industry plays in war. The Committee on Industrial Preparedness of the Navy Consulting Board undoubtedly led to the creation of the Council of National Defense, with its Advisory Commission. Next was born the General Munitions Board which in turn begat the War Industries Board. Some of the other begats of the time were the Food Administration, the Fuel Administration, the Shipping Board, and the Aircraft Production Board.

All of these Boards, Administrations and Commissions, were belated attempts to do that which, in large part, should have been done long before. Following the Armistice, all Boards and Administrations organized before and during the war ceased to function. They left behind them, however, a full realization of the necessity of including industry in War Plans. It is that realization that has caused the organization of this school.

The ordinary civilian regards the Army as a vast, completely coordinated unit, with all parts working with definite missions and without friction. There exists a vague impression that this miracle is accomplished by that deadly weapon "Military Orders". "Their's not to reason why - their's but to do and die". On the contrary, no whirlpool has more eddies than the Army has differences of opinion. It is well that some difference does exist. Motionless water is stagnant - dead. We must remember that the fresh stream is the one that is always in motion, and that "only the game fish swim upstream".

One of the most important functions of this school is to train men to think and to act, to stir up the stagnant water of petrified minds, but stir it so that all effort shall be coordinated. If that is done our objective will be reached in a fraction of the time otherwise necessary.

The objective, of course, is complete war plans. It is a comparatively simple matter to draw up plans for the mobilization of men. It is comparatively easy to plan for their rationing, equipment, movement, and hospitalization, if the materials are ready. But note again that this all assumes that anything and everything is available to supply all needs; from men to brass buttons - from railroads to steamships.

It is the function of this school to teach you to appreciate the difficulties of procurement, (the father of supply) and to assist you in the formulation of methods whereby the country and the fighting forces both benefit in peace or war.

The lesson of the World War was costly but well learned. That an army marches on its belly is as true now as in the days of Napoleon, but it is no longer true that an Army can "live on the country". The thousands of items entering into the supply of a modern army necessitate painstaking, continuous research and study of the sources of supply, methods of manufacture, availability of material, substitution of materials, power, transportation, labor and finance.

The battlefield today is not only the land occupied by our fighting forces but the whole country from boundry to boundry. Disaster may strike us thousands of miles from the cannons' roar.

Industry must be mobilized. It is a line of defense even more important to success than the olive drab line. It must be re-inforced and strengthened and its progress watched as carefully as a field army's progress is watched.

The deepest hell would not be deep enough for a man who, without plans for supply, would be responsible for thrusting a field army into combat.

It is easy to form a mental picture of procurement and supply as an orderly, coordinated, movement of materials from their sources to manufacturing points; thence to assembly points; thence to depots and to the troops. It is not easy to

understand the vast amount of detail and effort necessary to obtain that orderly movement of materials.

If one man were responsible for the supply of the army his first act would be to segregate related items into groups and assign each group of items to various individuals for procurement and supply. That has already been done.

If these groups of items were entirely unlike and if the production or manufacture of each group did not include any of the materials entering into the production or manufacture of any other group, there would be no such need of supervision of procurement by Departments. We find, however, that every group of items for its production needs coal, power, labor, money, transportation, steel, rubber, copper, and hundreds of other items. These things must, if the supply is not unlimited, be apportioned to the supply branches in accordance with the need of the armies for the items supplied by the branches. Here, then, is the first great problem to be solved. It includes for its solution determination of priority, stimulation of production, allocation of producing facilities and assembly points, allocation of facilities to branches, and dozens of similar matters. It is a complex problem and not easy of solution, nor can it ever remain long unchanged.

At the beginning of the World War each branch went into the markets and obtained what it could get regardless of price and often in competition with other branches. Each branch placed contracts at places most convenient for its own purposes, regardless of the load of supply or distribution placed on any particular district.

Since that day we have made great strides. The standardization of specifications, the alteration of specifications to make them fit commercial products, where practicable, the allocation of facilities to branches to avoid conflict in procurement and to avoid overloading a district, are a few of the things that make for coordinated effort.

A definite enumeration of requirements of all materials entering into the manufacture and production of items of supply is the first step to be taken in the solution of our problem. The bill of materials for any item when compared with materials available or to be produced is, in itself, a revelation of the need of careful continuous planning.

Only second in importance to the needs of the armies is the welfare of industry. War orders must be placed where industry can bear the load. Civilian needs in war remain nearly the same as in peace and to fill those needs industry is working near

capacity. A war order, therefore, constitutes an overload for any industry.

Painstaking, persistent, and continuous research and development in times of peace will lesson the severity of the effects of the war overload. It is only through such research and development that procurement planning can be made effective.

A comprehensive view of war looking backward from the firing line, shows us the battle line of olive drab; back of that battle line we find the supply line; back of the supply line is your procurement line. By procurement we mean the manufacture of special articles or the purchase of standard articles wherever they may be found. Back of your procurement line are your national industries that manufacture or produce every sort of supply needed in peace, gathering the raw materials throughout the world. Back of that national production line is the research line - the fundamental line from which all the rest spring.

Even in the time of the Romans, two thousand years ago, supply was essential. We read of Hasdrubal, the brother of the great leader Hannibal, sons of the great Hamilcar of Carthage, waging relentless war against Rome. Hasdrubal when his brother was carrying on his great campaigns in Italy crossed from Africa into Spain, travelled through southern Spain and France, then crossed the Alps into Northern Italy. His army was made up of Spaniards, Carthaginians, Moors, and even slaves of other races. He armed them where he could.

We read of his taking many of them unarmed with him into battle there to wait until their comrades fell to take their arms, or to get the arms of captured Romans. Hasdrubal's supply line did not exist. Research and production were unknown to him. The modern olive drab line requires a thousand pounds of supply to every one pound the Roman soldier required. Every resource of the nation becomes involved.

War is production and action; peace is research and development. In your study of problems of industrial preparedness, you must never forget that fact. As Washington said "In time of peace, prepare for war". He meant that research must be carried on in new methods, research into the development of supplies of materials needed in any war whether new or old, and research in training.

Your accumulation of supplies in peace is just sufficient for peace uses and to stand the first shock of war until the overload of production can be taken care of. For sixteen years, Hannibal maintained himself in Italy fifty or one hundred miles from Rome.

The World War lasted four and one-half years. In all probability any world war of the future will last but a fraction of the four and one-half years of the World War. Very little that was discovered by research on entirely original lines came into use in the World War; even poison gases, so-called, had all been known for years before the World War started. Some of them, like chlorine in particular, had been manufactured on a huge scale for commercial use. Phosgene, the deadliest and most widely used of the gases, had been discovered and manufactured to make dyes and medicines.

Mustard gas had been known for over thirty years. Its method of manufacture was known to the Germans with their highly developed chemical industry and manufacture of synthetic indigo on a large scale, they were able to quickly develop the manufacture of mustard gas. Not having a basic industry in chemicals, we were unable to manufacture mustard gas until we had developed an entirely new process, and a vitally important year of war went by in the meantime.

Chloracetophenone, the tear gas so-widely popular today in police departments throughout the nation for capturing criminals, stopping jail breaks, quelling civil disturbances, and similar unlawful gatherings, was known to the chemist before the war broke out. One of our own chemists of Johns Hopkins University, Baltimore, took a sample to the War Department in August, 1917. By January, 1918, it was felt important enough to be used in war. By early fall of '18 contracts for many tons had been let for use by both the army and the navy. The contracts were never fulfilled, notwithstanding they were in force for nearly six months after the war closed. The manufacture of chloracetophenone had not been developed and chemical knowledge was too slight to permit the successful making up of large quantities of the gas. It was not until more than two years after the war ended that the Chemical Warfare Service in its research laboratories at Edgewood Arsenal succeeded in developing an entirely successful method for its manufacture.

That is the situation that will confront you. You will always meet with problems as hard as that or harder. The Line of the Army will always be in numbers greater than the supply departments; that is for the reason that there is no national business in soldiers comparable to the national business in supply and production, therefore, the preponderance of your officers in particular, will be identified more or less all their lives with the Line. The tendency will always be to give the supply departments, and particularly the technical research departments less than the importance of their subjects demand. Research in highly scientific

subjects is difficult for any man to understand; it is particularly difficult for the man to understand whose whole idea of fighting is action at the front.

I speak of this problem as one who has faced it for eight long years, and who is still facing it. I do not want to discourage anybody, but I want to warn you that you have got to wage a continual fight if you are to keep research and development in peace up to the point necessary for reasonable preparedness. No excuse that you can give, if war breaks, will absolve you for not supplying the needs of the army at the front.

Let me cite an example. When suddenly put in charge of the Chemical Warfare Service in France with 12,000 soldiers within twenty miles of the front lines and no masks, I made it my first duty within twenty-four hours to order 100,000 British masks. In trying to get these masks, we pestered the Medical Department, which was charged with the purchase of these masks, so much that they said to us: "Here, getting these masks is now our business. You put in your requisition and it has been approved by the General Staff. It is now up to us and you have got to leave it up to us". I said: "That is all right; but if we don't get those masks I know whose head is coming off, and I am going direct to the British and follow up the masks until we get them". Not many weeks elapsed until the Medical Department said: "Fine business. Go after the masks. We don't want to be bothered with your supply items."

So to repeat. You will have to fight in peace for the necessary funds for research or production. You may be able to improvise soldiers in six months, but you cannot improvise the necessary supplies for war in six months, especially if you must depend on research and development. But, if you do not have the supplies, no matter who may have been to blame, you will have to bear the consequences.

The mask situation in the World War is so typical of what occurs when one is unprepared for war that I am going to recite a couple of instances more. War was declared on the 6th of April, 1917. Almost immediately, the question of masks was taken up and discussed by the Medical Department and within what may be considered a reasonable time, an organization was effected to start the manufacture of masks. Chemical Warfare had then been in progress two years. The British had developed the mask from a piece of white gauze dipped in some alkali solution through various stages up to the British gas mask, or as they called it the small box respirator.

It was a very efficient mask but highly uncomfortable to wear and very difficult to see through. Immediately, samples of British masks, and a little later, British trained officers were sent to America to help in the manufacture of these masks. However, it was not until the middle of March, 1918, almost a year after the declaration of war, that as many as 35,000 American made masks reached France. A quick examination of them revealed serious defects. The elastics were so tight as to cause severe headaches within a hour, and being incapable of adjustment, made the masks unwearable. In addition, the mouthpieces had been changed from the British standard and caused bleeding of the gums within an hour in 50% of the cases.

It was at once necessary to assemble a mask repair force in France. Fortunately, the Chemical Warfare Service had hired two British women highly trained in gas mask work and kept them on the payroll for three or four months without anything to do for just such an emergency. Now mark the point. Not only did it require the change of that first shipment of 35,000 masks but we had to go through 700,000 American made masks before change in manufacture and materials could be brought about all down the line. There were times just at the beginning of the Argonne offensive when we were shipping 15,000 altered masks to the front per day. We were only one day's supply ahead in this work, but to the everlasting credit of the two reserve Captains on the job, we stayed that one day ahead, and no American boy went to the front without an American gas mask if he needed it.

However, before we could get American made masks we had to purchase some 700,000 British masks. Indeed, it was not until August, 1918, that we were in a position to equip our fighting line with American made gas masks. It took us nearly 16 months to get gas masks under manufacture on a sufficient scale to meet our armies' needs, and it was not until two or three months afterwards that we had sufficient gas masks in France for the whole American army. The British had the gas mask fully developed before we went into the war. All we had to do was to copy that gas mask, and yet it took 16 long months, and had it not been for the British masks, American boys would have had to go into the front lines unprotected.

The Chemical Warfare Service in the fall of '17 realized that we must have a gas mask that was more comfortable, which gave clear vision, and was as strong and as nearly fool-proof as it could possibly be made. The principles on which the mask must be made were laid down in November, 1917. In the early part of May, 1918, the first hundred of the new type of gas masks were received in France for test. They were tested out in the month of May and approved as to design and in general as to all particulars. Just as the Armistice was being signed in November, development work on the new mask had reached the stage where large scale production was thought ready to begin.

Of course, the Armistice stopped all plants. About a year and a half later, the manufacture of new style masks was taken up. Plans were checked over and it was thought that the mask was all right. The first few hundreds were shipped out to the Infantry, Artillery and Cavalry Schools for test and were by them heartily approved. After a few thousand had been manufactured, the Chemical Warfare Service research people, themselves, in checking over every possible detail of the masks found that with a certain pull the rubberized cloth could be separated from the eyepieces in perhaps 25% of the masks that had been made up to that time. Instantly, manufacture had to be stopped while work was carried on day and night to develop an eyepiece clamp so as to overcome the weakness and production could again go forward.

This is typical of what difficulties will be encountered in war when we must produce something that has never before been produced on a large scale. The mask, itself, is comparatively simple when compared with some other technical questions which the Chemical Warfare Service and other technical services have continually to deal.

In the World War we raised and more or less well trained four million men. Except for food and clothing we never succeeded in equipping a tenth of that number. We fought the war with foreign cannon, foreign shells, foreign gases, and mostly with foreign rifles. No foreign friends can be expected to hold the battle line for eighteen months in the future until we get ready, nor have millions of shells and thousands of cannon ready to turn over to us. We will fight that next war with the materials we have on hand and those others whose production on a huge scale has been fully developed.

Your supply depends upon the needs of a complex machine which must be kept ever in tune with progress. Only through continuous research and development can this be accomplished and a basis for production established. Supply is the defense unit of today. Research and development cannot be improvised in war, or "spring up over night". They must be our first care. The Army Industrial College must spread that doctrine until not alone does the army see it, but until the whole nation sees it. Then, and then only, will we have the national defense policy proclaimed by President Coolidge in his inaugural address, March 4, 1925, when he said:

> "Our country represents nothing but peaceful intentions toward all the earth, but it ought not to fail to maintain such a military force as comports with the dignity and security of a great people. It ought to be a balanced force, intensely modern, capable of defense by sea and land, beneath the surface and in the air."