

ORDNANCE PRODUCTION IN WORLD WAR II

20 November 1946

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GENERAL MCKINLEY:

Gentlemen, I am going to give this speaker a rather long introduction because I think his background is very interesting.

Our speaker today is General Alfred B. Quinton, Jr., and you all probably remember having seen him in the foreground at the Aberdeen show that we all enjoyed so much.

General Quinton was educated at Cornell University, where he received his degree of Civil Engineering in 1912. In 1921 he received the degree of Master of Science in Mechanical Engineering from the Massachusetts Institute of Technology. In 1930 he received the degree of Master of Business Administration from Harvard University.

On 4 January 1916 General Quinton was detailed with the Ordnance Department and has served in Ordnance continuously since that time.

He is no stranger to The Industrial College of the Armed Forces for during the period from 1930 to 1934 he was an instructor at the Army Industrial College, as the present institution was then known.

From 1938 to 1941 he served as Chief of the District Control Division, Office of the Chief of Ordnance, and supervised the first educational order program authorized by Congress, and actively guided and directed the tremendous expansion of Ordnance District Offices from a purely planning status to an actively operating decentralized procurement organization.

Subsequent to this position, he became Assistant to the Chief, Industrial Service, Office Chief of Ordnance, and Assistant Director of Production, Office of the Under Secretary of War.

In 1942 he was appointed Chief of the Detroit Ordnance District and as such was responsible for the tremendous volume of procurement and production emanating from this most important Ordnance District. He continued as Chief of the Detroit Ordnance District until he received his present assignment as Commanding General, Aberdeen Proving Ground.

His subject today is Ordnance Production in World War II.

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I take great pleasure in introducing General Quinton.

GENERAL QUINTON:

Thank you, General McKinley. I am glad to be here. I think this is one of the grandest educational institutions of the country. It is unique in that I think it is the only one, with possible exception of some graduate courses in the universities, where you are permitted the freedom of thinking and even the freedom of expression that you have here. To me this is one of the big things about this college. I was very much interested to note during the war how many of the high places in both the Army and the Navy were filled by graduates of the Industrial College. The school has certainly done me a lot of good, and I am sure that all of you will carry away from it a proper appreciation of your opportunities here.

I have read over your courses and know approximately what you have studied already this year so I will try not to duplicate anything. Further, I know what you are to get in the future and I will try not to go into that.

First, I want to take up the Industrial Mobilization Plan. You are familiar with the fact that there were mobilization plans developed in 1932, 1937 and 1939, Industrial Mobilization Plans built out of studies made in this College. I was an instructor here for four years during which period much of the basic work was done by the students. Those studies were passed on to other people who molded them into a balanced picture to form the so-called Industrial Mobilization Plan. That none of the mobilization plans were adopted as such at the start of the War was no fault of the authors, but I am convinced that a faster start with less confusion would have resulted had the Plan been followed to a major degree.

I am going to devote my talk to Ordnance today. I undoubtedly have a natural prejudice in claiming that a fine job was done by that Department during the War. The Ordnance Department has a background established by wonderfully clear thinkers and doers. That Department has been very fortunate in having had such outstanding Chiefs as General Crozier, General Williams, General Wesson and General Campbell. They realized the important part that industry plays in war production. They were exponents of the idea that we would use the industry of our country without molesting it or modifying it. It was industry which produced Ordnance materiel and not the technical services. And remember this-- successful industry makes a war waging possible. We had a hard time in this war for various reasons. Just consider in the first place that there was no peacetime ammunition business in the country. There were a few powder companies. The only specialized Ordnance work that was done was accomplished in our old-line arsenals. That represented five or six percent of our whole Ordnance effort, and while the arsenals performed exceptionally well their limited capacity has to be recognized.

Now before you can produce or before you can do much of anything you have to organize for the job. From a satisfactory peacetime organization the Department had both a planned transition and wartime organization. Without covering the complete organization it suffices to mention those elements which pertain to the quite thorough decentralization of Ordnance business. Decentralization started within the Ordnance Office. Outside of Washington General Campbell established eight separate research and development groups where the assigned research programs could be carried on with greater dispatch. Proper coordination and supervision of the work of these groups was accomplished by a relatively small staff in the Office of the Chief of Ordnance. In addition, there were established five separate Field Service Control Centers, and about five outside branches of the Industrial Service of the Office of the Chief of Ordnance were charged with the responsibility for design and preparation of specifications. These last offices had a very close tie in with the materiel divisions of the Industrial Service, Office of the Chief of Ordnance. The outside office of the Industrial Service of the greatest magnitude and responsibility was the Office of the Chief of Ordnance in Detroit. That office was not only responsible for engineering pertaining to both combat and wheeled vehicles, the latter having been transferred from the Quartermaster Corps to the Ordnance, but also performed the duty of apportioning the requirements to the thirteen Ordnance Districts. There were two large Ordnance establishments in Detroit; namely, the one about which I have just spoken, and the other the Detroit Ordnance District of which I was Chief. My office was responsible after the receipt of requirements for finding the sources of production, placing contracts, furnishing production follow-up assistance, inspection and acceptance of payment for materiel. I cannot go very far into the matter of requirements today, but a word or two about furnishing automotive parts is worthy of mention. It was in this field that a successful attempt was made to set up a more or less automatic production requirement control. This was accomplished through timely reporting of stock levels in all Ordnance depots to the Office of the Chief of Ordnance, Detroit. These data followed to the District offices. Apportionment of scheduled productions was changed upward or downward to maintain as stable a level as practicable.

You gentlemen have probably heard of and know something of the District system. We have thirteen Districts varying in size from Birmingham, Alabama, with 100 million dollars worth of work in wartime, to Detroit where we have 12 billion dollars on the books. All Districts are located in prominent industrial cities. At the instance of General Hughes, Chief of Ordnance, the Army Ordnance Association was asked to appoint a board of civilian experts in District operations to study the war operations, anticipate peacetime duties of a District, and to make recommendations as to the latter. Such a board was formed under the chairmanship of Mr. Frank Bell of Pittsburgh and upon receiving a copy of the board's report the other day, it was extremely gratifying to note that no significant changes in our District set-up were recommended.

In other words, the Ordnance District System has withstood the test of two wars and an intervening peacetime operation. The Board did make worthwhile suggestions pertaining to the betterment of peacetime operations of the Districts. The members of this Board knew their job --they knew what they were talking about and, although there is always some evolution in practices over an extended period we of Ordnance feel that we can go right along with our peacetime District planning, training and ample preparation for World War III if we ever have one -- God forbid.

I do not like to quote statistics but I must give you a few figures to illustrate the size of the Ordnance production job--so here they are. As late as July, after VE-day, Ordnance still had four thousand prime contractors turning out Ordnance material and 16 thousand prime contracts were active under the administration of the District offices. These contracts in cost totaled over 17 billion dollars. In fact, in July 1945 we delivered over 500 million dollars worth of goods and in April preceding VE-day the Ordnance Districts delivered over one billion dollars worth of material. To accomplish this gigantic task there were approximately 30 thousand people still employed on District work on VE-day. These figures should permit you to form a clearer concept of the gigantic task performed by the Ordnance Districts.

Having heard the figures of tremendous production volume I am sure you are curious as to the manner in which we got Government plants and industry started for the war effort. You were all aware that prior to World War II there was essentially no munitions business in the United States except that conducted in our old-line arsenals which, even through expansion, turned out a very small percentage of ordnance requirements. In fact, there was a stigma attached to industrial concerns engaged partially in general munitions manufacture. Foreseeing the entrance of our country in the World War conflict, a program was started in 1940 to build that type of war plant which essentially did not exist in anything like an adequate capacity. I refer particularly to plants for the manufacture of propellants, high explosives, bag loading plants, and ammunition assembly plants. Industry could not be expected to finance projects of this sort so it became an obligation of the Government, and about three billion dollars were spent for the erection and equipping of 73 plants. The speed with which these plants went into operation was phenomenal. I cannot go into the details of procedure involving the Ordnance Department, the Quartermaster Corps and later the Corps of Engineers, the ramifications of selecting operators, the approval of plant sites and similar problems of procedure. However, I suggest that these procedures are a matter of record and should constitute a valuable study for the students of this college.

The Ordnance Department could not dilute its management personnel to provide for the operation of these new plants and hence it was both necessary and logical that we turn to industrial management. I use this word "management" advisedly because that was the basis on which we stake the success of our operation. Does it seem at all anomalous to you that a soap manufacturer and a soft drink manufacturer, as examples of many,

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could enter a new product field, namely munitions, and make a good job of it? Management obtained from such sources succeeded in every instance.

Pertaining to the construction and operation of the 73 plants mentioned earlier and to additional war plants of many times that number, there were five basic means employed. I will enumerate these:

1. Private Ownership with No Government Interest.--Wherever possible contractors should be urged to use this plan for financing rather than to seek reimbursement from the government.

2. Private Ownership with Government Interest.--This plan utilizes the Emergency Plan Facility contract.

3. Government Ownership--War Department Construction Contract.--This plan is applicable to the construction of a new plant which will be constructed by a contractor for the government on a cost basis.

4. Government Ownership--Defense Plant Corporation Lease.--Under this plan the Defense Plant Corporation, a subsidiary of the Reconstruction Finance Corporation, purchases new emergency facilities and leases them to the contractor.

5. Government Ownership--Supply Contract.--Under this plan the government acquires ownership of the new emergency facilities pursuant to an article in the Supply Contract.

I wish to acknowledge with particular emphasis the part played by that subsidiary of the Reconstruction Finance Corporation called the Defense Plant Corporation, which was uniformly outstanding in the excellency of its assistance to not only the Ordnance Department but other agencies charged with producing materiel.

As a help to those both of our country and our allies, our Government took over, after Lend-Lease, many plants which our allies had financed and built prior to Pearl Harbor. We secured from the British through arrangement with defense plant corporations four machine gun plants and some powder and explosive facilities.

In respect to facilities I have so far dealt mainly with the erection of the physical plant. Now I will relate some of the problems involved in the equipping of such structures. The primary tools constituted machine tools. The machine tool industry of our country prior to the war did about 500 million dollars worth of business a year, and industry is to be congratulated for doubling its capacity through its own initiative and investment of its own capital. That is as far as industry could reasonably be expected to go without Government assistance. Expansion of old plants and construction of new plants for machine tool building went forward on a large scale. Still the backlog of orders was tremendous and a system of priorities had to be established. This business of priorities was based

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essentially upon projects and was formulated and controlled by the OPA and the War Production Board. Of course, every interested party felt that its needs should be supplied first, but all in all, the priority system worked exceptionally well under the circumstances.

In the peacetime planning of the Ordnance Districts, surveys were made of tools in use and lists of new tools required to supplement, install or modify tools we prepared. Considering the specialized nature of Ordnance products it was considered that not over 20 percent of tools in work in peacetime could be adapted to Ordnance production, but it was most gratifying to find that production was in full swing with an industry such as the automotive having through improvisation and redesign put 70 to 80 percent of their peacetime tools to work on specialized munitions production.

However, even though the machine tool industry did its part in increasing capacity and the Government financing of expansion of machine tool building capacity and the top utilization of peacetime tools for industry, there was still a hazardous void which had to be filled. The success of this latter undertaking can be attributed almost exclusively to the work of so-called machine tool panels. These panels were set up in every Ordnance District and the membership consisted of industrial machine tool brokers of both new and used tools. They knew production. They knew the location of many machines not utilized in war work. They worked without salary. Combining these qualifications and attributes these panels worked untiringly to assist manufacturers in tooling with old machines which they discovered, advising through improvisation the adoption of one type of machine to do the work of another type of machine. When we negotiated contracts and found a requirement list of tools which had to be installed before production could start we called in the panels and turned them loose. I can recall several instances where the contractors' initial tool list decreased in price from five million dollars to less than one million dollars through the acceptance of the gratuitous work of the panel.

With the starting of war production, qualified inspectors had to be ready to determine accurately that the things produced were in accordance with specifications. The Ordnance Department was far-sighted enough to procure, through Civil Service, prior to Pearl Harbor, a well qualified group of men who were trained at Government arsenals in time to be available for assignment to industrial plants. This force became the nucleus of the greatly expanded inspector force required when production came into full swing. Training courses for inspectors had to be established in practically all districts; these courses ranged from long courses for highly technical inspectors down to shorter courses for routine or less technical inspectors.

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While on the subject of training, it is well to mention that this activity was very wide in scope and very deep in the number of personnel trained to carry on the operation of Ordnance districts. We had training courses for typists, stenographers, contract negotiators, contract termination personnel for both Government and industrial executives and employees. The point that I wish to stress here is that qualified personnel for the heterogeneous types of operation had to be ready and trained before the actual operations started.

All of you are aware of the critical supply of many common-place war materials, and it was necessary to institute a system of control wherein the projects most important to the war effort received proper relative priorities in the flow of raw materials. This control was a gigantic task and it proceeded through various stages until the so-called Materials Control Plan was developed. It is suggested that a study of this plan would be of interest and value to you.

That "necessity is the mother of invention" is no better illustrated than in the design changes affected to ameliorate the critical materiel problem. The Ordnance Department alone was responsible for the following savings: Aluminum, 95 thousand tons; tungsten, 625 thousand tons; copper, 335 thousand tons; tin, six thousand tons; crude rubber, over 30 thousand tons. One change illustrates how a critical material was replaced; namely, in the manufacture of brass cartridge cases. The Ordnance Department went into a rather complete program from small arms to artillery shell cases to substitute steel for brass. This was not easy but it was accomplished --when copper became more plentiful a change back to brass cartridge cases was made.

You gentlemen are particularly interested in the problems of production but I would like to mention one phase of production which was conspicuous in its simplicity. I refer to the manufacture and availability of Government and manufacturers' gauges. In World War I the gauge business was a serious problem but I am happy to say that through the foresight, ingenuity and the memory of the old problem, it brought the expansion of this industry with the Government's assistance to that level which practically eliminated all worries about the availability of this important aid to manufacturing gauges.

I have touched on the problems of obtaining factories, tooling them, and procuring trained inspectors, and only one additional activity requires mention to make the production picture complete. This relates to the payment on contracts. During World War I contractors were justifiably critical of the undue length of time taken in the settlement of Government accounts. Ordnance peacetime planning took cognizance of this and plans were made and carried successfully into effect with the result that Ordnance districts, with the splendid cooperation of the Finance Department, paid accounts within eight to ten days after receipt of proper vouchers from the contractors. This period of payment was shorter than that normally found in the conduct of the business of industry.

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Successful Ordnance production during the war was a cooperative affair, and in closing my talk this morning I wish to give special commendation to the Civil Service Commission, the Finance Department, the War Production Board, the Reconstruction Finance Corporation and particularly that subsidiary of the latter, the Defense Plant Corporation.

General McKinley, this finishes my talk today. I thank you.

GENERAL MCKINLEY:

Before we go into the question period I might say that I was very much interested in what General Quinton said in giving credit to the speed with which vouchers were paid, and you might be interested to know of a study we made of the processing of vouchers in the last war at the Philadelphia Quartermaster Depot where we had a tremendous number of contracts. Sometimes we had 40 contractors making one item. We found that a large volume of invoices had to be in process at all times in order to get rapid payment. In the assembly line there we had 16 thousand invoices in process all the time. We worked on that, streamlined the procedure and got it down to 13 thousand. That will give you some idea of what the problem of paying vouchers and paying them properly amounted to.

Now we will have the questions.

A STUDENT OFFICER:

Will you please comment on how far production scheduling could be decentralized?

GENERAL QUINTON:

By scheduling do you mean on an order for particular items for delivery at certain times?

A STUDENT OFFICER:

Yes.

GENERAL QUINTON:

All of you gentlemen have an opportunity to read General Campbell's book. I think Mr. Nelson told you the story better than I can, but General Campbell explains it fully and well in his book. There was too much tightness in the control of schedules. When we got down to the allocation of materials and placed the scheduling at the level of the Technical Services it became easier. Until we got it into the Office of the Chief of Ordnance scheduling was not successful. The WPB had to give up something on that.

A STUDENT OFFICER:

In the demonstration at Aberdeen in October you spoke of the protection of industry from bombing during a future war, and you mentioned underground sites. Did you have any reaction from that?

GENERAL QUINTON:

Nothing specific has developed to my knowledge, but I am quite hopeful that some results will be forthcoming even though on a limited scale.

GENERAL MCKINLEY:

I can tell you one thing that is being done in our Industry Advisory Committees when we meet here and discuss the protection of our instruments, machine tools, electric power, etc. The subject of underground sites is on the agenda at each one of the meetings, and the data which has been brought to light, fragmentary as it is, is being put before these industrialists. From the conversation heard in these meetings, that seems to be the subject which they are going to talk about when they get back home. If those industrialists will talk about the possibilities of the use of underground sites I think it is helpful.

GENERAL QUINTON:

I think it is. I think that is a fine thing to do regardless of the thought of war.

GENERAL MCKINLEY:

I am recommending consideration of the subject from a purely economic point of view.

A STUDENT OFFICER:

General, did the Ordnance Department develop and manufacture the V.T. fuze?

GENERAL QUINTON:

That is right.

GENERAL MCKINLEY:

General Quinton, I want to express to you our many thanks for coming back to us. We want you to do that often. Thank you very much.