

AMERICAN OFFICERS IN GERMAN CHEMICAL PLANTS

THE DYESTUFF PLANTS AND THEIR WAR ACTIVITIES

By THEODORE W. SILL, Major, C. W. S., U. S. A.

During the month of February 1919, I had the opportunity, as a member of the Inter-Allied Commission, of visiting most of the principal plants in the various occupied areas of Germany which were devoted to the manufacture of dyestuffs, medicinal products, and standard chemicals.

Before going through these various plants one has many ideas, developed from newspaper reports and other sources of information, concerning Germany's war-time conditions, which are considerably changed after observing actual conditions. We had often heard of the great destruction resulting from air raids, of the lack of workers and great labor unrest, of the run-down conditions of the plants—and, in short, one was quite prepared to find them in a disordered state through the lack of operating personnel. However, one discovers very soon that the contrary is quite true. To-day finds these great German plants, probably the greatest of the potential possibilities for war material production, in splendid condition, with a large, highly-trained force of employees, and, moreover, with additional opportunities for increasing their production by utilizing the extra equipment added for war materials production.

Owing to the great foresight and efficiency of the German pre-war system, that is, efficiency from a military standpoint in particular, all of their man power was registered and so classified that when the call to battle came they kept a large proportion of their trained workmen within these plants. Consequently, they still have the majority of them ready to take part in a new battle for commercial supremacy.

At the present time the plants are operating at about 10 per cent of their productive capacity for peace-time products, but nevertheless they are keeping most of their labor to avoid their becoming mixed up in agitation or possible Bolshevism which may be nourished by lack of employment. Most of these men are utilized in cleaning up the plants every day. Consequently, one finds the plants in quite perfect condition. The only apparent handicap they have at present is the lack of oil and greases for lubrication of machinery, which, however, they have partially overcome by using artificial substitutes.

The important point is that the American people, in particular, should realize that this important portion of Germany's industries is not crippled but intact and ready to operate, and is consequently a dangerous factor in the struggle for commercial supremacy and also as a potential source of war material production unless properly controlled. Moreover, I do not think the German people, as a whole, realize completely the magnitude of their defeat; they count upon the Americans in particular very soon forgetting the horrors of the war, resuming their trade with them, utilizing their products, and allowing their industry to thrive once more. At present the only things they lack are raw materials and coal for the opera-

tion of the plants, which fortunately the Allies can control, unless the peace terms are lenient enough to allow them to operate on full scale as before. Let us hope that the American people and consumers of chemicals and dyestuffs will back up the American manufacturer so that this previous condition cannot be restored.

It was our good fortune to pass through the devastated sections of France and some in Belgium on our way to Germany. One cannot see this terrible destruction of land, factories, and cities, so complete and terrible that neither word nor picture can describe adequately, without being impressed by the contrast you see upon entering Germany, where all is serene, quiet, clean, and orderly, and scarcely any sign of destruction such as has been visited on the French.

Arriving in Cologne, we made our headquarters there while making a tour of investigation through the plant of the Farbenfabriken vorm. Friedrich Bayer and Company at Leverkusen, and also the plant of Weiler-ter-Meer at Uerdingen on the Rhine.

The plant of the Bayer Company stands out preeminently as the best and most modern of German chemical plants. It is a veritable city in itself, well laid out, with excellently constructed streets and brick buildings. Their office building and recreation buildings for the employees are luxurious palaces. This plant has expanded considerably during the war, and, despite the contrary assertions of its directors, was widely engaged in the manufacture of war products, particularly poison gases. We had the opportunity of meeting Dr. Duisberg, the chief director, and, incidentally, one of the ex-Kaiser's right-hand men in the development of the war. Many will remember him from his visit to this country at the time of the Chemical Congress in 1912. Incidentally, he hopes *to be over here again very soon to see his "old-time friends."*

The plant of Weiler-ter-Meer at Uerdingen is also an excellent development, kept up in very good condition. Despite the high cost of living in war times, this concern was able to erect within the last year a large, expensively-equipped recreation building for their men, and is apparently in good condition, just marking time while awaiting resumption of activities and thankful that the Belgians are there to protect them from the Bolsheviki across the river.

Of all the men whom we met in the various plants in Germany, the head of this plant was the most cordial and open in all his dealings with us. It was, of course, a difficult and humiliating position for men to be in, and in many cases we encountered sullen indifference, particularly among the plant directors, but among the lower classes of foremen and workmen there does seem to be a general recognition of the fact that the war has been lost and also that the cause was wrong to start with. Of course a good deal of this is propaganda and an effort to pass responsibility on to a government which has been discredited and broken up, but I believe that there is really a large number of the poorer class of Germans who have now come to realize the wrong done by Germany in this war.

After spending a few days in Coblenz, the American headquarters, where we had the opportunity of seeing the American flag proudly waving over the great German fortress of Ehrenbreitstein, we journeyed up the Rhine to Mayence, the headquarters of the French area. Within this area we were privileged to visit the Kalle plant at Biebrich. Very little war work had been done at this place, and the plant was probably the poorest of all we saw, being old, dirty, and in a run-down condition.

At Hoechst-on-the-Main we went through the great plant of Meister Lucius und Brüning, who were pioneers in the development of German poison gases, and had done considerable work in all kinds of war materials. They, too, had a large, very fine plant, well laid out, and in good operating condition, extending for many acres along the river. They are quite progressive and have developed on a large scale.

A little later we went up to the greatest of all plants, the Badische Anilin und Soda Fabrik at Ludwigshafen. This plant employs about 16,000 men, and covers many acres of ground. They have the plant for dyestuffs, intermediates, etc., at Ludwigshafen and a little further up the river, at Oppau, is located the plant for the Haber process. Considerable work on war products was done at Ludwigshafen, but they also were able to make dyestuffs on an appreciable scale during the war. At the present time they have a large stock on hand ready to turn loose on the markets when permission is granted. They, too, had done considerable work on poison gases and explosive intermediates, but not to an extent which would at all interfere with their resumption of dyestuff manufacture on a large scale.

At Oppau we saw what is probably the most phenomenal scientific development up to date, namely, the practical realization on an operating basis of the Haber process for ammonia production. The buildings are all quite new and well constructed, and the vast amount of detail has been studiously and carefully worked out on a practical operating basis producing upward of 100,000 tons of ammonia per year. This plant was a large factor in enabling Germany to stay in the war as long as she did, by means of producing large quantities of nitrates. The Germans have also another plant, a duplicate of this, which they are operating in the unoccupied area of Germany, so that it is really a great practical possibility at the present time.

Incidentally, it came to our attention that Haber, to whom Germany owes so much of her development in chemical products in warfare, had never attained a higher rank than Captain in the German chemical warfare service, despite the responsibility and immensity of his job.

Looking at our inspection of the German plants from a general viewpoint, it is my opinion that, considering the advantage gained in America by the last four years of experience in chemical manufacturing and the lessons learned by our equipment manufacturers, the German plants at the present time from an equipment standpoint and general layout are not superior to the existing American development, their ad-

vantage being that they have an experienced and long-trained personnel schooled and willing to carry on the laborious details; but if our people here at home will encourage our new, rapidly growing industries, there is no reason why our own personnel cannot equal or, in fact, surpass that of the Germans.

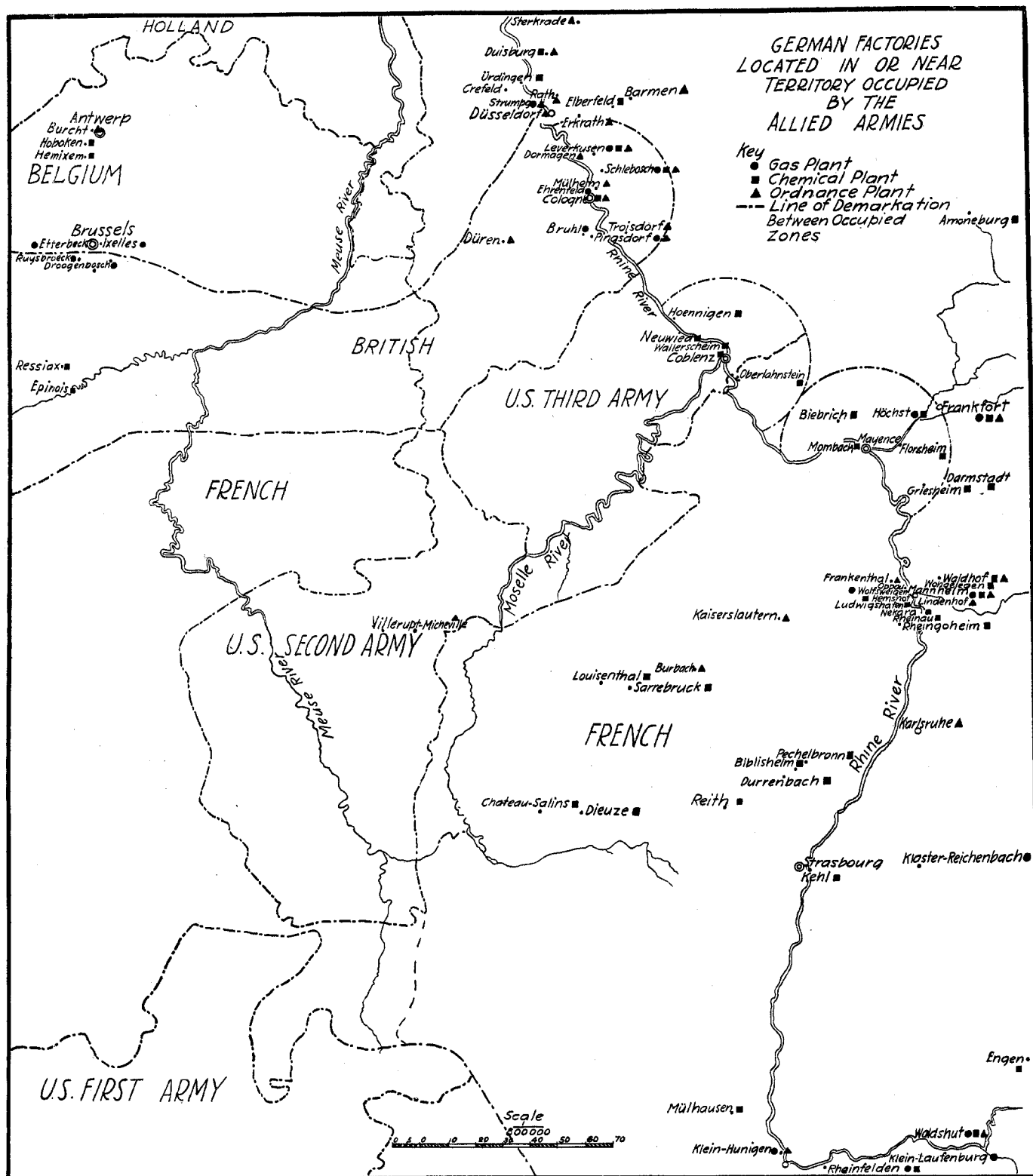
There are but few distinctive features to be observed which might advantageously be adopted in some American plants. For instance, (1) the Germans have a very clever method of building their water towers around the power house chimneys or stacks, thus utilizing the waste heat and keeping their water from freezing; (2) they have a method of distributing the pressure in the filter presses so that it is not only applied at the center by a large screw, as in most of our presses, but also horizontally along the sides of the press; (3) at one place we saw an excellent automatic nitration system, based upon the alternate filling and refilling of a small tank with a measured quantity of water, which in turn was connected with valves releasing definite amounts of acid and benzol; (4) the Germans have in practically all of their plants a very high grade of lead fittings, in which art they have advanced remarkably well; (5) in many cases it was also noted they used square flanges on the elbows for their high-pressure piping connections.

On the other hand, one notices considerable lack of conveying equipment, such as bucket elevators and belt conveyors through these plants, the probability being that they utilize man power much more than we do, and do not rely upon mechanical equipment so much. Moreover, despite the aggravated condition of transport during war times there were several instances where they made products in these various plants in successive steps, making one part at this plant, conveying it perhaps to a considerable distance up the Rhine to another plant, where it would be converted into an intermediate, and, perhaps, bring it back almost to its original starting point to be finished, and then carrying it over as far as Berlin, perhaps, to be put into shells. Despite the much-vaunted efficiency of German operations this seemed to be a glaring refutation of their claim, particularly in view of the fact that the type of apparatus was very simple and practically the same for all steps of the operation.

Although in most cases, particularly in connection with war problems, the Germans were quite liberal with information in answer to our questions, they did on many occasions fall back on Berlin as an alibi, emphasizing the fact that all plants were controlled by the War Minister in Berlin, that all papers were there, and that they were but pawns to do as he directed—the old government, now discredited, being to blame for all their war production.

Among the developments to be noted during the war in Germany, which are of special interest, was the production of synthetic rubber on a large scale and a practical basis. This was done at the Bayer plant in Leverkusen, and the production, though very expensive, was of material assistance in meeting their great shortage of rubber.

Another interesting phenomenon was their practical manufacture of washable paper cloth. This was



utilized in the manufacture of shirts and of various articles of clothing, as well as towels, tablecloths, etc. It was very successful, and was a considerable factor in meeting their shortage of linen, cotton, and such materials, aside from being exceptionally cheap.

At the present time in the occupied areas of Germany conditions are quiet and orderly, and the people are really thankful to have the Allied armies there to occupy those areas of Germany, as it means order and quiet in considerable contrast with what transpires

in other portions of Germany. The inhabitants have a fear that the Allies, particularly the French, are going to occupy the land permanently, but otherwise are quite satisfied. One sees store windows well filled with luxuries—optical goods, cameras, etc.—but the grocery stores are practically empty, and the quality of food is quite inferior. However, there are very few signs of any suffering, which has been so widely exaggerated in the press reports, but there is of course much inconvenience.

At the present time it is my understanding that the Allies occupying the various areas plan to keep a qualified corps of representatives to participate in the control of operations of the factories in their area. They will thus have command over the raw materials utilized and required, the methods of operation and the export of the materials produced. It is my strong conviction that America, too, despite the fact that there are no particularly large chemical plants in the area which the American army occupies, should, in consideration of being an ally and a much needed and valuable participant in the victory gained, also have representatives in each of these factories for a long period of time, to gain the valuable information which our Allies are obtaining. This information should be utilized by our Government for the disposal of the requirements of American manufacturers, so that our industries now just getting on their feet may have equal chance in competing in the world market.

EAST ORANGE
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CONDITION OF CHEMICAL PLANTS IN GERMANY

By FREDERICK POPP, Major, C. W. S., U. S. A.

If asked, any chemist or chemical engineer in the United States would say that he knew how much importance industrial Germany attaches to her chemical industry, but as a matter of fact, it is impossible for any one who has not been in Germany to realize her iron determination to regain the place she had before the war, or to realize the sacrifices that have been made towards accomplishing this.

On two occasions, immediately following the armistice, I was ordered to Germany for a purpose which involved investigating chemical plants in the occupied territory.

The physical condition of the chemical plants in the occupied territory is good. All the plants not in use have been shut down and cared for in such a way as to make them immediately available when the time comes when it is possible for them to resume. The machinery is in good repair.

Many new plants have been built for explosives and poison gas, and existing ones enlarged; all these plants have been designed and built with the idea of being modified to enable them to make peace-time products. This is one important element in this phase of German preparedness.

In one of the large chemical plants there is a building for the employees, containing restaurants, baths, gymnasiums, recreation rooms, etc., all as well conceived and as well built as any in the world. This was completed in the latter part of 1918.

Most of the personnel of these chemical factories is immediately available as soon as the plants can start up. Germany did not send her chemists and chemical workmen along with her cannon fodder. Most of these men not engaged in their pre-war occupation were used for making poison gases or explosives, and such as were not were used elsewhere than in the trenches.

At the present time most of these men are at the factories, some of them doing inconsequential work and employed ostensibly to keep them off the streets, but

really this is another phase of German preparedness.

While it is true that most of these plants are in a condition of comparative idleness, some of them not running over 10 per cent of their capacity, there exist in Germany and several neutral countries considerable stocks of German dyes available for immediate shipment.

It is well known that England and France forbid the entry of these dyes. Germany is looking to the United States with hungry eyes as her best market. She believed Bernstoff when he named us "idiotic Yankees." I have talked with managers and chemists in German chemical plants, many of whom have expressed the greatest contempt for our chemical industry, giving a variety of reasons for their contempt, the reasons ranging from the opinion that we were temperamentally unfitted for the chemical industry to saying that we had not the schools to turn out the chemists, or the brains to learn the necessary lessons.

I hope that Germany will again find her psychology is wrong—probably she will, but at the same time it is absolutely necessary that the American nation should know three things: First, the determination of Germany to get back her business. This is evidenced, in addition to the things I have seen, by the well-known financial arrangements that have been made for the purpose. Second, that Germany has the necessary plants and the necessary personnel to recover her former position if we permit her to do it. Third, the importance of chemical plants in the life of a nation. It is by this time pretty generally understood that chemical plants can be rapidly turned into plants for the manufacture of munitions and poisonous gases. Furthermore, the nation that is great chemically is also great commercially—a leader in world commerce.

It was with considerable astonishment that I learned after a 16 months' absence in France, associating with the A. E. F., that one of the large users of dyes in the United States said that he was looking forward to the time when he could get back to "good old German dyes." Now, this man was either stupid, mistaken, or something worse, for every chemist in this country knows that we are making at the present time as good dyes as Germany ever made. It is of course perfectly true that we are not making all the dyes that were made in Germany, but the American manufacturer has not yet had sufficient time. The industry is expanding, and expanding rapidly.

As soon as the American people realize the danger of allowing our chemical industry to be killed, and decide to give it the necessary protection to enable it to get on its feet, one of the important steps in national defense will have been taken.

I have had perhaps a unique experience in having visited the most important dye plants in the United States, England, France, Switzerland, and Germany, and as a result am able to say that if America is willing to do it, she cannot only hold her own in the chemical industry, but can lead the world. With proper protection for a comparatively short time, our chemical industry will be in such a position that it will fear competition of no other people.

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