THE STEEL INDUSTRY IN WAR PRODUCTION

17 January 1955

1339

CONTENTS

Publication No. L55-83

INDUSTRIAL COLLEGE OF THE ARMED FORCES

Washington, D. C.

1340

Mr. Max Don Howell, Executive Vice President of the American Iron and Steel Institute, was born in Lockhaven, Pennsylvania, 18 October 1887. He received his A.B. degree at the University of Michigan, School of Business Administration, 1912. After graduation from college, he was associated for a number of years with the American Telephone and Telegraph Company. In 1930 he became vice president of the Chemical Bank and Trust Company, New York City. In 1937 he joined the United States Steel Corporation, Pittsburgh, Pennsylvania, as vice president and later assistant to the president. In 1950 he was moved to New York as vice president and treasurer of the United States Steel Corporation. Mr. Howell was elected executive director of the American Iron and Steel Institute, New York, in May 1952; and the next year became Executive Vice President and head of that organization. This is his first lecture at the Industrial College.

THE STEEL INDUSTRY IN WAR PRODUCTION

17 January 1955

GENERAL NIBLO: During our course on Economic Mobilization we realize that we must consider many factors. The most basic factor of them all is the ability of the American steel industry to meet our requirements during a national emergency.

Many of us have grown accustomed to expecting the spectacular, if not the impossible, from our steel industry. We realize that it produces perhaps 85 percent of the processed material consumed by American industry during their manufacture. During the past 10 years the American Iron and Steel Institute has been most cooperative in contributing time, materials, and personnel to our Department of Defense, as well as other Government agencies, to assist them in developing the most effective plan for the maximum utilization of our steel production during an emergency.

To bring us up to date and timely information on this subject, we have as our next speaker Mr. Howell, Executive Vice President of the American Iron and Steel Institute.

Mr. Howell, it is a pleasure to welcome you to our Industrial College faculty of guest speakers and present you to this year's class.

MR. HOWELL: Gentlemen and lady: It is both a privilege and a pleasure to have this opportunity to address the Industrial College of the Armed Forces. The subject which Admiral Hague suggested, "The Steel Industry in War Production," Is one that obviously has many ramifications. It must, therefore, be considered not only from the standpoint of the historical requirements of past wars, but also looking toward what we may expect in the next war if and when it comes.

At the outset I would like to make a few assumptions that seem to me to be reasonable to assist in both defining and limiting the scope of this talk.

First, we have no means of determining accurately how long we may be required to maintain a state of preparedness which involves what has been termed "instant retaliation."

Second, this state of "instant retaliation" is obviously a constantly changing one. And it bids fair to continue as such. In the nine years since the end of World War II, it has progressed from long-range, fast, heavy bombers to jet interceptors and jet bombers, to long-range guided missiles and combinations of all those missiles in a wide variety of forms. You know better than we in the steel industry that a status quo in the development of war materiel is not in sight.

Third, one of the weapons much relied upon by our enemies has been an expected economic collapse in the United States. Such a collapse would, they believe, discredit our international leadership with the free nations and render their citizens, as well as our own, more receptive to the doctrine of State supremacy over freedom of the individual.

Our enemies recognize the importance of economic strength. In support of this assumption, I quote a prominent Russian general who is reported to have said: "The coming world war will be a fight to the finish, but we are not ready for such a final test. The army and government know only too well that a war now would be won by the United States. All our plans and calculations take into account our present economic inferiority. We must have time to catch up with and surpass our enemies."

Fourth, and last, we must face the possibility that war may be precipitated accidentally at any time although not planned by a potential enemy.

Granting the preceding assumptions, the essential contributions of the steel industry to war mobilization would seem to fall into four major categories, as follows:

First, to impart to the armed services a working familiarity with the most modern technical procedures for producing all types of steel products as they may be currently needed for defense weapons.

Second, to maintain adequate reserve capacity so that even in the event that some plants might be rendered temporarily inoperable, there would remain a sufficiently large number of plants with a capacity adequate to provide for the military needs of war.

Third, to develop and maintain adequate resources and supplies of the critical and strategic raw materials which are necessary to operate the industry, and produce those types of steel which are of vital necessity.

Fourth, during the undetermined preparedness period, to maintain the industry in a sound economic and financial position, in order that the plants of each company may be modern and properly maintained and that the employee organization may be efficient and well trained.

Assuming that the preceding four statements are sound and necessary, it is evident that in order to make them operable, there must be an interchange of information between the military and the steel industry. This interchange must be of such a nature as to keep both parties constantly up to date concerning their problems of vital mutual interest. Moreover, the people in both the military and civilian components of the Government should make it their business to take advantage of the technical knowledge and skill contained within the steel industry, so that not only are our weapons of superior character, but our procurement policies are simplified and streamlined to the point that a minimum amount of manpower may be utilized in so-called "office assignments."

I should like at this point to cite a few examples from our experiences during World War II. And I hope that no one will feel that there is any criticism of any individuals or of any branch of the service in what I am going to say.

The steel industry constructed facilities for the manufacture of armor plate, heavy forgings, heavy tubular products, new open-hearth and electric-furnace steelmaking facilities, new blast furnaces and coke ovens, with all attendant auxiliary equipment.

The annual capacity of the industry to produce steel was increased by nearly 15 million tons of ingots. It should be noted that this increased ingot capacity was not necessary for the war effort as such, but was requested by the Government in order to maintain our national economy on an efficient basis.

Moreover, it should be noted that some of the alleged shortages in war materials which were laid at the door of the steel industry were not due to lack of steel-producing facilities, but rather to

steel-fabricating facilities, the need for which was not anticipated by the military sufficiently in advance of their actual requirement. To some extent this was due to unfamiliarity on the part of military personnel with the distinctions between steel ingot production, the rolling and finishing of steel products, and their fabrication.

For example, in the middle of 1940 certain members of the steel industry recognized that there was developing a shortage of heavy plate-producing facilities (which in the event of war would be most critical). They sent representatives to Washington to discuss the situation with the Ordnance Departments of the Army and Navy. After a thorough investigation the Army's decision was, "When the Army wants steel, it will take it."

It was difficult to explain to the head of the Department that rolling mill equipment designed to produce automotive sheets was not the type of equipment that could produce protective deck and belt armor and tank armor plate, and that forging presses designed for peacetime needs were wholly inadequate for production of the heavy forgings required for war equipment. Fortunately, in this case the Navy understood the need, and sponsored a project, which later became the Homestead Plant, comprising a heavy-gage, wide-plate mill, heavy-forging presses, together with blast furnaces, open-hearth furnaces, and other supporting facilities.

Another example was the failure of the military authorities to follow the developments in welding techniques which occurred in the late 1930's, primarily in the production of Navy destroyers. Those welding techniques had been developed to the point where welding, properly executed, was held by experts to be superior to riveting. When the expansion of the Army's tank program was undertaken, representatives of the steel industry endeavored to persuade members of the Army that a welded tank would prove more efficient than a riveted tank. Due to unfamiliarity with current welding methods, the advice was not taken. Considerable time and money were spent in building facilities for the production of riveted armored tanks. As soon as these tanks were put into service, it was found that the development of high-velocity missiles had rendered them obsolete, and lethal to the operators. The whole program was changed over to welded tanks almost overnight.

It has been said that this country has never gone to war with a military policy that adequately met the security requirements of the

Nation. In the past there has been sufficient time to provide the necessary organization of men and material to meet the emergency before the full force of the enemy fell on our shoulders. We cannot safely count on any such period of grace in a future war. The machinery for mobilization of industry for war must be provided well in advance of the emergency or it may be too late.

Here I think it may be appropriate to discuss with you for a few minutes the technical organization of the American Iron and Steel Institute. From my conversations this morning I think that some of you are familiar with it, but I have to assume that some of you are not familiar with it; otherwise this is going to be a duplication of effort. I want to explain to you what the American Iron and Steel Institute is, how it functions, and to suggest possible uses that you might make of it.

The work of the Technical Division of the Institute is supervised by our Committee on Manufacturing Problems, which is comprised of 26 vice presidents in charge of operations of both large and small steel companies. Two of the members of the committee are Canadians, who provide liaison with the Canadian industry.

On a similar organizational level is the General Technical Committee. This is composed of chief metallurgists of 28 steel companies. One of those members is a Canadian. That committee is equipped to handle almost any type of metallurgical problem in the entire area of steel production.

Matching it in the field of research is our Committee on General Research, which has 22 directors of research of large and small steel companies. Again, one of them is a Canadian.

Working directly under the Committee on Manufacturing Problems are technical committees, which cover blast furnace practice, coke oven practice, electric-furnace steelmaking, open-hearth steelmaking, refractories, protective coatings, and shipping methods.

Working under the General Technical Committee are technical committees which deal with the several individual steel products.

In each case the members of those committees are the men who are responsible in their own individual companies for quality and performance. We have both young and old, but in practically

every case each man has spent his entire business career in the steel industry or an allied industry. It is my personal conviction that in no other country has there been collected under the aegis of any industrial organization the wealth of skill and experience that is represented on those committees. They are not new committees. Some of them have been functioning since 1936.

I would like to cite a few of the accomplishments of those committees.

During World War II when shortages of the critical elements such as nickel, chromium and molybdenum developed, it was apparent to all that the necessary tonnages of alloy steels could not be produced to the standard steel compositions then current. Our Technical Committee on Alloy Steel developed within the course of a few weeks a group of steels, which were then known as "national emergency steels." Those steels were leaner in their content of the three critical elements than the standard steels, but in each case the hardenability pattern matched that of a standard steel. The theory of matching hardenability bands was at that time relatively new. Its development had been nurtured carefully by the metallurgists of the steel industry and the metallurgists of the automotive industry, out of which the theory originally came.

We were able to maintain alloy steel production at the high tonnages demanded and at the same time maintain both quality and performance. Many of those steels so completely superseded the standard steels of 1941 and 1942 that they in turn are now standard steels and the term "national emergency" has long been forgotten.

But before those national emergency steels had been fully developed, another crisis in alloying elements developed and an even leaner series of steels became necessary. These were developed within less than a week and were as successful as the original version. Once again, many of those steels are today standard steels.

Shortly after the shooting stopped in World War II, palm oil became scarce, largely because of economic pressures, not for any lack of the material itself. Our sources of supply in this commodity are limited. Palm oil comes largely from the Belgian Congo and Sumatra, lands which are distant in time of war and at the end of sea lanes which are vulnerable to submarine attack.

In view of the fact that our supplies of palm oil might be cut off in war because of enemy action, or virtually cut off in peacetime because of economic strangulation, our Committee on General Research pursued a program at the Armour Research Foundation in Chicago to find a substitute for that material, which is so vital in both the production of tin plate and the cold-rolling of steel. Within a relatively short period of time, two entirely different substitutes were developed. Both exhibit the same characteristics as palm oil in the use to which they are put in the steel industry. Both are economical and are in use today.

Our Committee on General Research also instituted three different research programs aimed at the recovery of manganese which is lost in open-hearth slags during the steelmaking process. As a result of those programs, a technically successful process has been developed at the United States Bureau of Mines Development Station at Pittsburgh. At the moment we do not claim that the process is economical. But if it ever becomes necessary to do so, we can retrieve substantial tonnage of manganese from open-hearth slags--at a price.

In an entirely different direction, our Technical Committee on Stainless Steel has worked diligently for several years in an effort to develop stainless steel compositions in which the major portion of the nickel is replaced by manganese. Some of that material was produced during World War II, and, for the use for which it was intended, served adequately. Now we are happy to say that the development has progressed to the point where two different chromium-manganese compositions can successfully replace two of the more popular grades of stainless steel which contain high percentages of nickel.

You know, too, that during World War II and later, the element columbium was in short supply, desperately so, as a matter of fact. Columbium is a most important element in the production of stainless steels which are used at high temperatures and in atomic energy production. Once again our Technical Committee on Stainless Steel was able, because of its knowledge, experience, and skill, to substitute tantalum or combinations of tantalum and columbium to maintain production without noticeable sacrifice in quality or performance.

These are but a few of the accomplishments of our technical committees in the field of conservation on the one hand, and maintenance of production on the other. I have purposely narrowed this portion of the discussion to a few of the accomplishments of our committees for purposes of emphasis. I have named but a few of them, but an accomplishment of a similar sort to those given above can be credited to almost every committee of the Institute.,

Now, in a broader field let us discuss for a moment some other outstanding accomplishments of the industry, for which our technical committees can take little or no credit.

First has been the vigorous and relentless pursuit of new sources of iron ores by members of the iron and steel industry. These searches have resulted in the development of new high-grade shipping ore areas in Venezuela, Peru, Liberia, and Labrador. As a matter of fact, we are receiving ores from three of those sources; and heavy shipments of Labrador ores will commence sometime this year. At the same time, our companies have sought out new sources of manganese ore and heavy tonnages have been received from Mexico, Chile, and Brazil.

Our development of a process to tap the taconite reserves of the Lake Superior region has been one of the outstanding feats of the industrial era. My colleague, Mr. Parker, has told me that in a talk which he gave in Baltimore in 1943 he predicted a solution to the taconite problem before the need for it had arisen. His audience laughed skeptically. The humorous statement which he made was: "Have faith in the technical and research men of the steel industry. When the problem arises they will solve it, if they have not anticipated it."

It is little more than 10 years since that statement was made, yet the investment in taconite beneficiation plants in the Lake Superior region is, as of this moment, nearly one billion dollars. It is expected that within the next 10 years we shall have capacity to produce something on the order of 35 to 40 million tons of iron-bearing pellets per year. Those pellets will contain from 62 to 68 percent iron, as compared with the 50 to 51 percent iron contained in present Lake Superior shipping ores.

This taconite development represents only half the problem. The plants which are presently being built handle only the magnetic type of taconite rock. Looming equally large for the future are the nonmagnetic types of rock, known as jasper, which cannot be economically beneficiated by magnetic methods. Much work is being done on flotation methods, and here I wish to predict that before the necessity for their use is on us, this problem also will be solved.

Our industry has developed coal-washing machinery which makes hitherto unusable coals available or improves substantially coals which previously were on the verge of being unsatisfactory. Some of these units have a capacity to handle 5,000 tons of coal in one day. There are many other projects of a similar sort going on, but it would consume too much time to talk about them all.

In the direct area of steelmaking, experimental and development work still continues on continuous casting. There is no question in my mind but that there will be many continuous casting plants in operation in this country within a very few years' time.

That is not to say that this process will successfully displace the conventional processes now in operation; it will supplement them. Experiments with the turbohearth still continue to show great promise, and, when these experiments are successfully concluded, an additional supplemental method of production will be ours.

Newest of the wonder processes is vacuum melting. It is a difficult and expensive procedure, but one which delivers a product and which is superior in some of its physical characteristics to anything now being manufactured by conventional means. There is no question of its place in the future. The materials which it will deliver will be vital in dynamic applications such as in aircraft, using the word in its broadest sense.

Our industry has adopted and is pursuing installation of hot extrusion plants at a rapid rate. This method of production permits the extrusion of solid bars, hollow tubes, and other forms of materials which could not be produced by any other method. Steels and sections which are completely unrollable can be and have been successfully extruded.

Our Committee on General Research supervises research work in many technical institutions. We have done much work in the physical chemistry of steelmaking; and out of that work has come a new theory of slags and a new understanding of what happens between slag and metal as the steelmaking process proceeds.

We do a great deal of work in the field of welding research, both practical and theoretical. At a state university we are endeavoring to develop new refractories for blast furnaces and open-hearth furnaces and to improve the science of geophysics. We are working constantly with the National Bureau of Standards to improve existing standards and develop new ones. At a research institute we have developed iron which is purer than any hitherto made, which we use largely in experimental work.

I do not want to overburden you with what we have done and are doing, but I cannot help calling to your attention the cooperative effort in which we are presently engaged with the Department of Defense in the simplification of Government specifications for steel.

A little over two years ago we were requested to supply professional assistance in a program which was aimed at simplifying Government specifications and cutting down their number. We have written three handbooks, which have been published, and have submitted 18 fundamental specifications for 18 steel products, which are presently being circulated among the military and civilian departments for approval. It is expected that these 18 specifications will replace many times that number of specifications now current.

We have published for the Steel Division of the Department of Commerce a manual entitled "Iron and Steel Industrial Defense Planning Manual," which stressed preattack planning in its broadest aspects. Secretary Weeks said in his letter of transmittal of this manual:

> "I believe it is of tremendous importance to national security for executives in each enterprise in iron and steel to study this highly vital manual. As a result they will be able to solve their defense problems more swiftly and wisely."

We have published too, at the suggestion of the Department of Defense, a manual which lists all auxiliary furnace equipment in basic open-hearth furnace plants. The primary reason for the publication of such a manual is "to render assistance in returning steel-producing facilities to production at the earliest possible time in

the event of destruction by air raid. Under those conditions a knowledge of plants with similar facilities to those destroyed will enable early restoration through the use of maintenance spares of similar dimensions and capacities from other plants."

That volume is a companion volume to one which gives complete performance and capacity characteristics of all the open-hearth shops in the United States by size and type of furnace. In order to implement that idea, the Committee on Manufacturing Problems has pursued a program of plant visits aimed toward familiarizing the entire group with the major mills in the industry. In case of an all-out attack, we would be ready to exchange personnel should that action ever become necessary.

For many years the Institute has published periodically a Directory of Iron and Steel Works of the United States and Canada, which lists the location, the primary equipment, the products and capacities of each individual plant of the iron and steel industry. From the Directory an expert can develop information concerning mills which can be converted from peacetime to wartime production--for example, those mills which can be converted from the production of sheets to light and intermediate plates for shipbuilding.

There are other examples of useful work by Institute committees. For example, there is the watchfulness and forward thinking of our Committee on Iron and Steel Scrap. Scrap, the material which is so essential to the production of steel, is one of the keys to avoiding defeat in any future way. You must keep scrap in mind at all times if you are sincerely interested in protecting this country and preparing it for all-out defense.

A scrap crisis, such as we had in World War II, could be vital in the next struggle. Yet the fact is that our Government has been permitting more and more scrap to be exported from this country recently. It may turn out to be a repetition of history.

Every ton of scrap which is retained in this country is a protection against a critical shortage in a war emergency. If we are to remain prepared for all-out production of steel, it is advisable that we conserve within our shores the monthly marginal scrap tonnages which become so cumulative if they are exported and lost forever.

With the construction of nonintegrated steelmaking facilities in foreign countries, the demand for scrap has increased. Unless

these countries provide additional blast-furnace facilities, they will lack the metallics to operate their steelmaking facilities at capacity without the importation of foreign scrap. This country is the only major country with a scrap reserve. When it is realized that merely by increasing the scrap charge, the normal production of steel can be increased by approximately 5 to 7 percent, which at capacity operations would amount to some 6 to 8 million tons of steel ingots, the importance of an adequate scrap reserve in the country is self-evident.

I have told you a little about what the Institute does. It may also be helpful to tell you a few things that the Institute does not do.

It has no power to dictate or direct the activities of its members. It has nothing to do with iron and steel prices. It has nothing whatever to do with the sale of steel or the distribution of orders. It has no connection with collective-bargaining negotiations. These and many other matters are all for the individual companies to resolve in their own respective ways.

The Institute is purely a voluntary organization, depending heavily on the cooperation of its members. Fortunately, there is a high spirit of cooperation in this industry. This means that the Institute is able to do useful things for the steel industry as a whole.

The Institute provides a meeting place and mechanisms to facilitate discussion and interchange of information on common industry-wide problems. This we do through the committees, through our general meeting and regional meetings, and through our publications.

Incidentally, I would like to tell you a little story here about Dr. Kettering. It is an old story, about the time that Lindbergh flew the Atlantic. He was busy with a problem in the laboratory. One of his assistants came in and said, "Lindbergh has landed in Paris." Dr. Kettering absent-mindedly said, "Oh, is that so?" He said, "Yes. He flew the Atlantic nonstop." Dr. Kettering said, "That's fine." His assistant still felt he had not registered and he said, "He did it alone." Dr. Kettering said, "That's fine. Tell him to try it with a committee." There is a moral in that story. From the way you laughed, I know that you have all served on committees.

Committees don't start functioning when they are organized. There is the matter of individualities, personalities, egos, differences

of opinion. And there is the shakedown period. That is quite a considerable period sometimes before a committee really begins to function.

In the Institute we have gone through that shakedown period. Replacement of our committees comes every two years or something like that. So our committees now are organized to really do a job. As new members come in, they get in line.

Now, that means a lot in a period of emergency. I expect that all of you have been through World War II. You know that we had a shakedown period here in Washington that lasted nearly two years before we got a War Production Board that really functioned as far as the steel industry was concerned. That was partly due to the fault of the steel industry. So there is a value to having committees that are going concerns.

The Institute has about 55 committees. In 1954 we had about 260 committee meetings. On these committees are over 600 men of the iron and steel companies.

In addition to our technical committees, we have committees on public relations, statistics, industrial relations, commercial research, pig iron, foreign trade, iron and steel scrap, and numerous other activities.

The men on these Institute committees are experts in their fields. They know their way around in this highly complex steel industry. They know how to work together with other committee members. They know each other's problems. They are hard-working, conscientious individuals.

It is my sincere belief that consideration might well be given to the desirability of utilizing the Institute committees in the prompt and effective mobilization of the steel industry in a war emergency, thereby eliminating duplication of effort, and unnecessary delays which have been experienced in the past.

It seems obvious to me that the war effort would benefit by such a move. The Institute committees would not have to spend valuable time getting background knowledge about the steel industry.

Given an understanding of the requirements and problems of the military forces, I know they would function with initiative and ingenuity.

The Armed Forces are faced with a constantly changing set of requirements for steel products for war purposes. The steel industry is constantly improving and changing its facilities to meet the requirements of its peacetime customers. To the extent that the Armed Forces can maintain coordination with the developments of industry, the problem of war mobilization will have a practical solution, expeditiously and economically.

Frequently the question is raised as to whether the steel industry in the United States might be knocked out quickly by enemy bombing. We have prepared a few slides which show the location of the principal steel-producing plants in this country. They will be helpful in our consideration of the vulnerability of the steel industry.

In the iron and steel industry, plant locations depend heavily upon the location of raw materials and the availability of cheap transportation for hauling them. Few people know that nearly four tons of raw materials have to be assembled in order to make a ton of finished steel products. That figure does not include water, air, natural gas, and other items which are used in large quantities.

For each ton of finished steel shipped, over 3,000 pounds of iron ore are used, on the average, as well as nearly 2,300 pounds of coal, over 500 pounds of purchased scrap, 900 pounds of limestone and other fluxes, 200 pounds of fuel oil, and smaller quantities of tar and pitch, manganese, alloying metals, and nonferrous metals. Therefore, it must be obvious that accessibility of raw materials is of utmost importance in the choice of location for a large steelmaking plant.

In addition to raw materials and the adequacy of transportation facilities, other factors include the nearness of large steel-consuming markets, the availability of huge quantities of fresh water, the labor supply, and the availability of large tracts of land.

But still the steel industry is not inflexibly confined to one or a few fixed locations. This is a big country and there are numerous good locations for steel plants. Over the years the steel industry has gradually gone into new locations. It has been dispersing. This

will be borne out by the following charts. They indicate a wide dispersion and a consequent substantial measure of safety.

Chart 1, page 16. --This chart is a map of the entire United States, showing the major sources of the steel industry's raw materials in this country and the principal areas where steelmaking plants are located.

The circles show the major areas for steelmaking. The symbol which is the outline of a factory is the artist's way of indicating that finished steel is produced in that state. The shaded areas--diagonal lines--indicate coking coal deposits. The solid black areas indicate iron ore reserves.

Chart 2, page 17. --This chart is a closeup map of the eastern seaboard. It shows the area in which we have about 17. 6 million tons of steel capacity, or about 14 percent of the national total, which exceeds 125 million tons. The larger plants are at Bethlehem, Steelton, Fairless Hills, and Sparrows Point.

It is hard to imagine that this area would be completely bombed out of business; but if it were knocked out, there would remain over 108 million tons of capacity in other parts of this country.

There are other, smaller plants in this area. They are not indicated on the chart. The same thing is true in all the charts which you will see. Only the larger plants are indicated.

Chart 3, page 18. --This chart shows a large section of the United States, including western New York State, western Pennsylvania with the exclusion of Allegheny County, most of Ohio, and West Virginia.

About 41. 8 million tons of capacity are in this area. That is equal to 33. 3 percent of the national total. However, you will note that the centers are generally some distance from one another. It is about 175 miles from Lackawanna, New York, to Cleveland. It is about 160 miles from Johnstown to Lackawanna. It is about 120 miles from Lorain, Ohio, to Weirton, West Virginia. Obviously, it would be almost impossible to bomb and destroy all the plants shown on this map, excepting by numerous attacks.

CHART 1

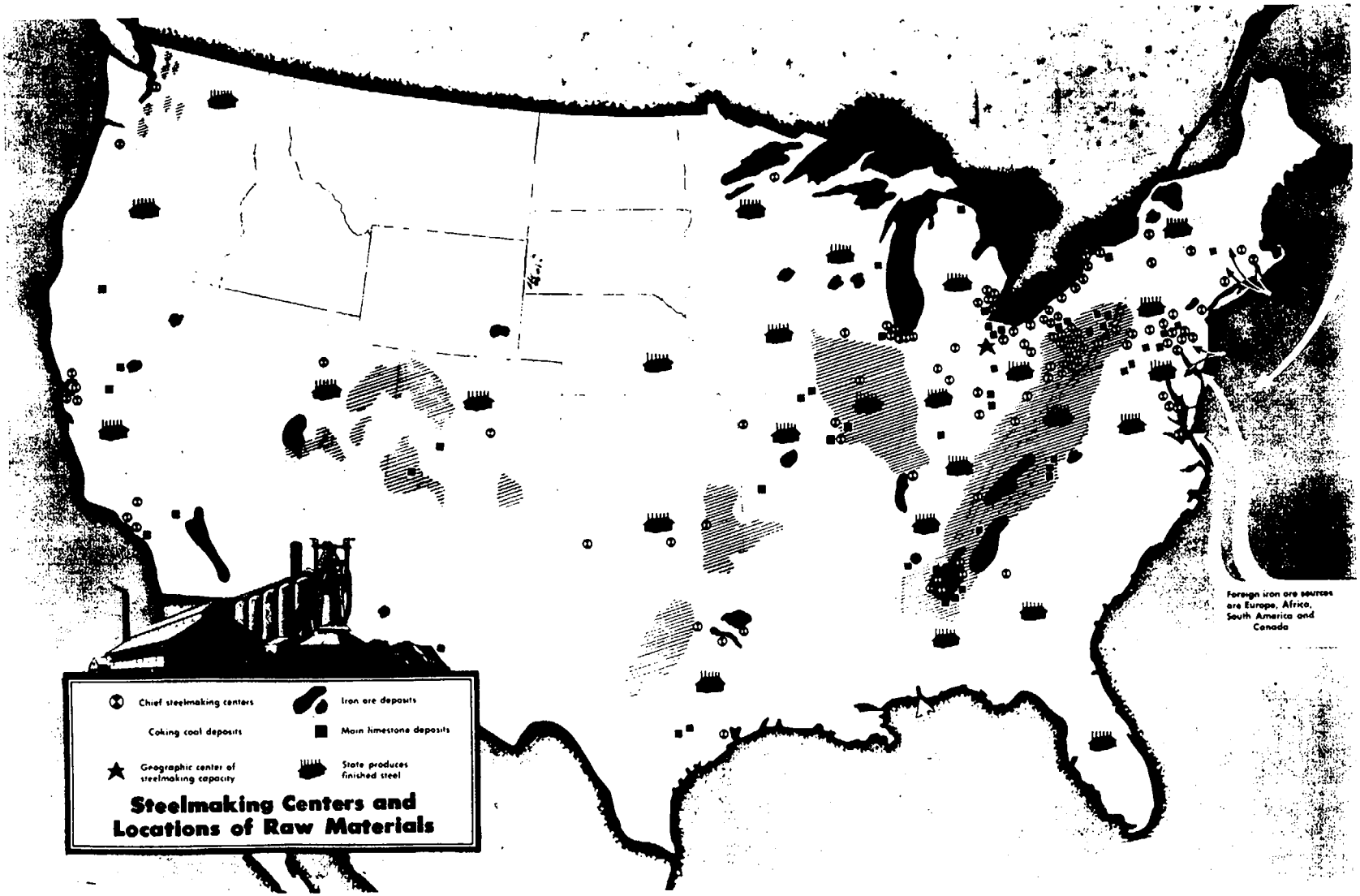

Chief steelmaking centers
Iron ore deposits
Coking coal deposits
Main limestone deposits
Geographic center of steelmaking capacity
State produces finished steel
Steelmaking Centers and Locations of Raw Materials
Foreign iron ore sources are Europe, Africa, South America and Canada

CHART 2

TOTAL ANNUAL CAPACITY IN THIS AREA
17,580,590 Tons
(14% of National Total)

At Bethlehem, Pa.	3,214,000 tons
At Steelton, Pa.	1,356,000 tons
At Fairless Hills, Pa.	2,200,000 tons
At Sparrows Point, Md.	6,200,000 tons
At Other Plants	4,610,590 tons

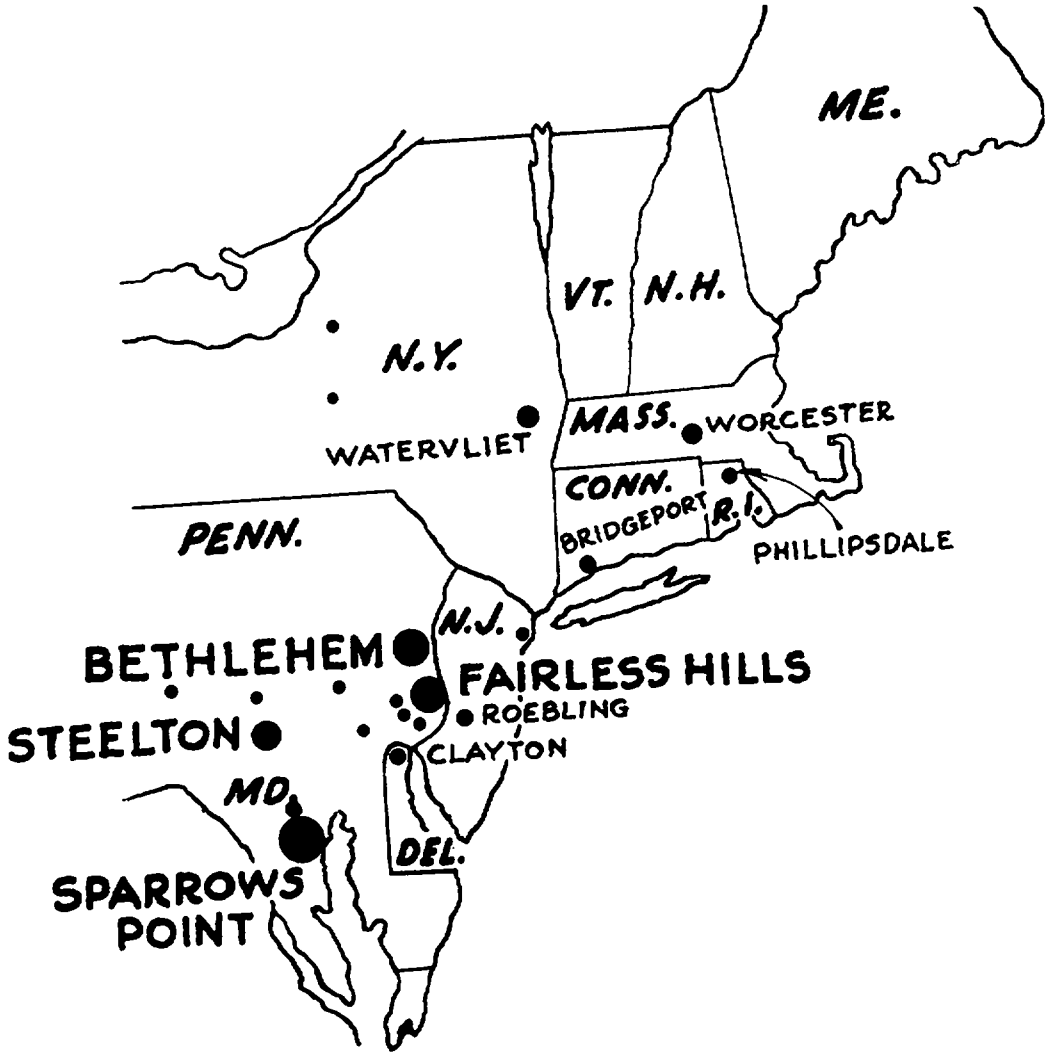


CHART 3

TOTAL ANNUAL CAPACITY IN THIS AREA
(Excluding Allegheny County, Pa.)
41,840,030 Tons
(33.3% of National Total)

At Lackawanna, N. Y.	5,100,000 tons
At Johnstown, Pa.	2,355,000 tons
At Weirton, West Va.	2,600,000 tons
At Youngstown, O.	6,261,000 tons
At Steubenville, O.	2,130,000 tons
At Cleveland and Lorain	6,241,000 tons
At Other Plants	17,153,030 tons

Chart 4, page 20.--This chart is a closeup of Allegheny County, which was excluded from the previous map. Obviously, one or two H-bombs would do great damage in this area. These plants are all located within a circle with a radius of 25 miles. If all the plants of the steel industry in Allegheny County were knocked out, about 11.2 percent of the national capacity would be affected. However, we would still have 111 or 112 million tons of capacity in other areas, and that would be well over twice the estimated annual capacity of the second-largest steel-producing nation, Soviet Russia.

Chart 5, page 21.--This chart shows 28.4 percent of the national steelmaking capacity, located in Illinois, Indiana, and Michigan, plus one plant in Ohio and one plant in Minnesota.

One or two bombs could not wipe out this entire area, but one or two bombs in the vicinity of Gary and Indiana Harbor or South Chicago would knock out considerable capacity, as the figures show on the chart. However, even if Gary, Indiana Harbor, South Chicago, and East Chicago were completely knocked out, there would still be over 13 million tons of capacity left in this area.

Chart 6, page 22.--This chart shows the steel-producing plants in the South. They are far removed from steel plants in other geographical areas. Here in this part of the South are over 7 million tons of steel capacity, or about 5.6 percent of the national total.

This is an important and rapidly growing area in the steel industry. Back in 1940 it accounted for only 4 percent of a much smaller total national capacity.

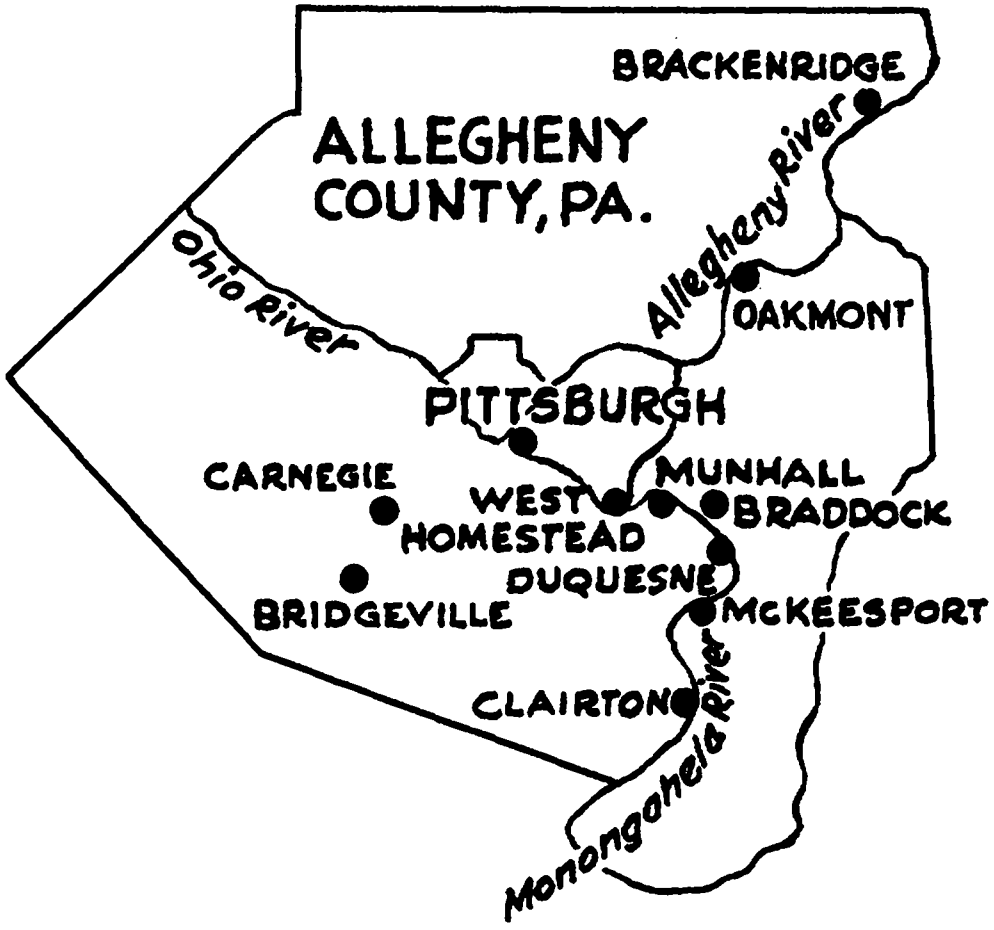
There is another point I would like you to notice as far as the Alabama capacity is concerned. The need for transportation is at a minimum here. We are practically on top of their ore and coking coal.

Chart 7, page 23.--This chart shows over 5.6 million tons of steel capacity in Texas, Missouri, Colorado, and Utah. I don't have to try to prove that these plants are far from one another. It is self-evident when we look at the map.

Chart 8, page 24.--The final chart shows the steel plants on the west coast, in California, Oregon, and Washington. Here we have over 3.6 million tons of capacity, or about 2.9 percent of the national total. This is another rapidly growing area.

CHART 4

TOTAL ANNUAL CAPACITY IN THIS AREA
14,128,600 Tons
(11.2% of National Total)
Allegheny County, Pa.



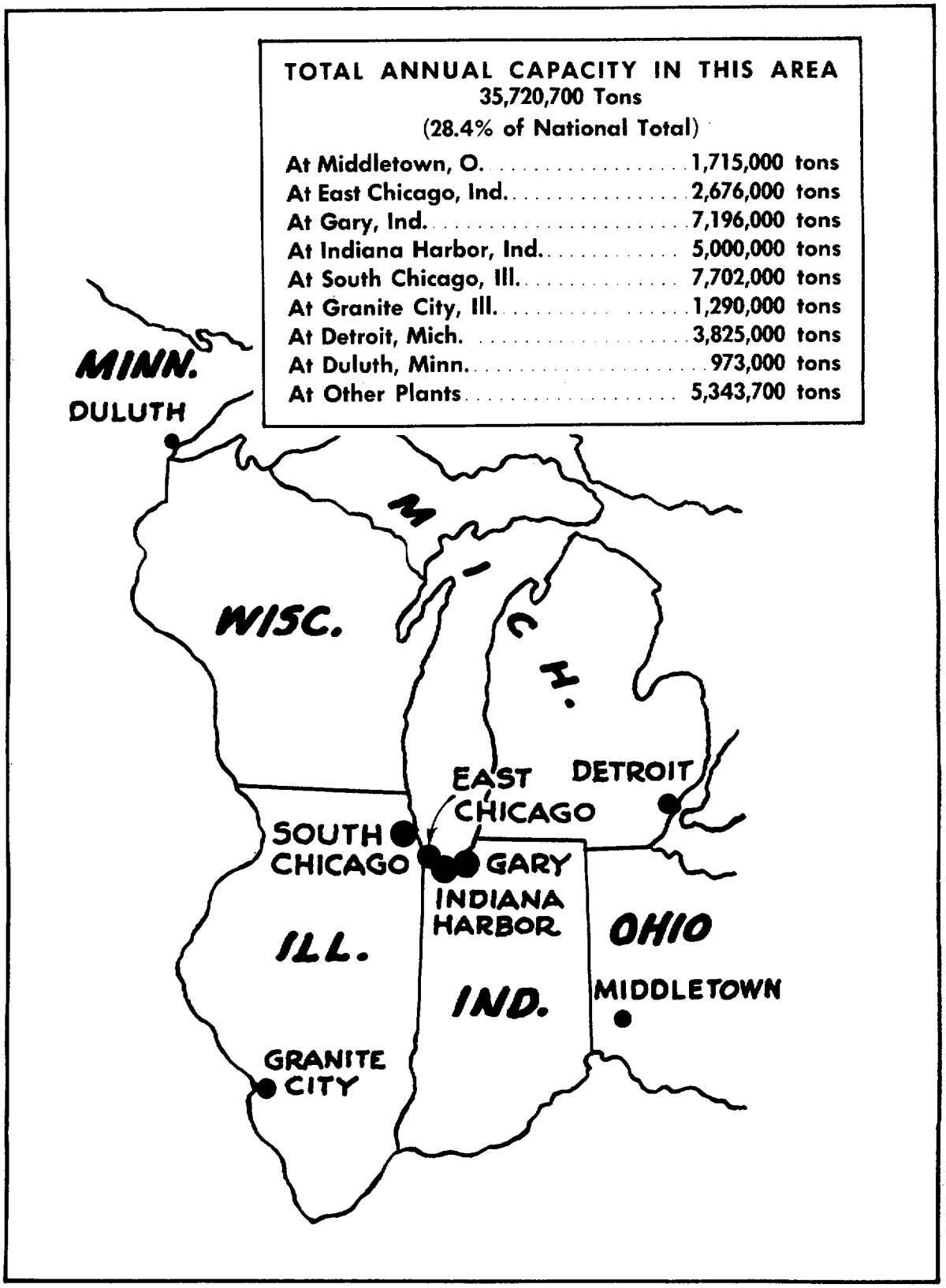

TOTAL ANNUAL CAPACITY IN THIS AREA
35,720,700 Tons
(28.4% of National Total)
At Middletown, O. 1,715,000 tons
At East Chicago, Ind. 2,676,000 tons
At Gary, Ind. 7,196,000 tons
At Indiana Harbor, Ind. 5,000,000 tons
At South Chicago, Ill. 7,702,000 tons
At Granite City, Ill. 1,290,000 tons
At Detroit, Mich. 3,825,000 tons
At Duluth, Minn. 973,000 tons
At Other Plants 5,343,700 tons
MINN.
DULUTH
WISC.
MICH.
EAST CHICAGO
DETROIT
SOUTH CHICAGO
GARY
INDIANA HARBOR
ILL.
IND.
OHIO
MIDDLETOWN
GRANITE CITY

CHART 6

TOTAL ANNUAL CAPACITY IN THIS AREA
7,044,020 Tons
(5.6% of National Total)

At Ensley, Ala.	1,770,000 tons
At Fairfield, Ala.	2,227,000 tons
At Atlanta, Ga.	300,000 tons
At Ashland, Ky.	900,000 tons
At Newport, Ky.	708,500 tons
At Other Plants	1,138,520 tons

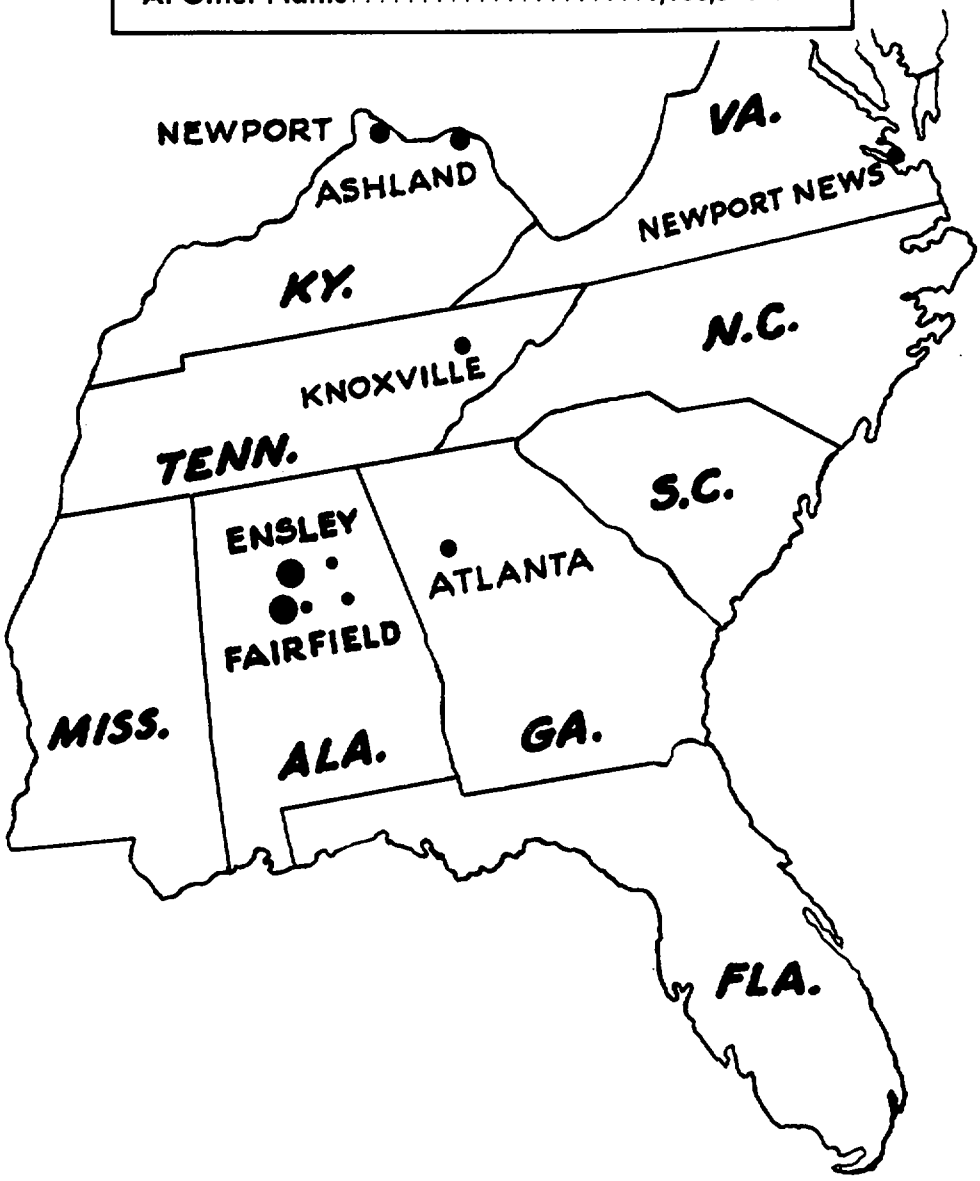


CHART 7

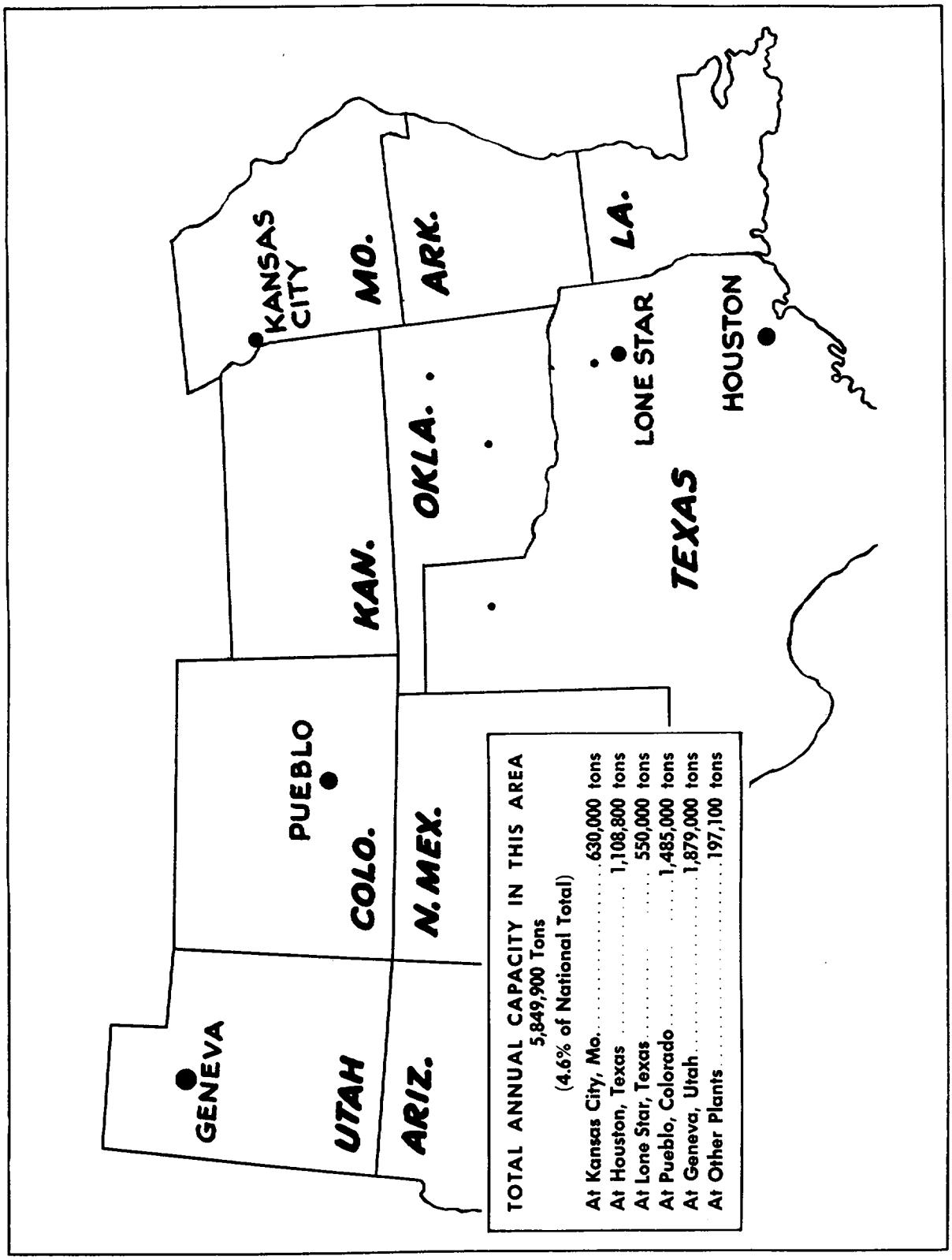
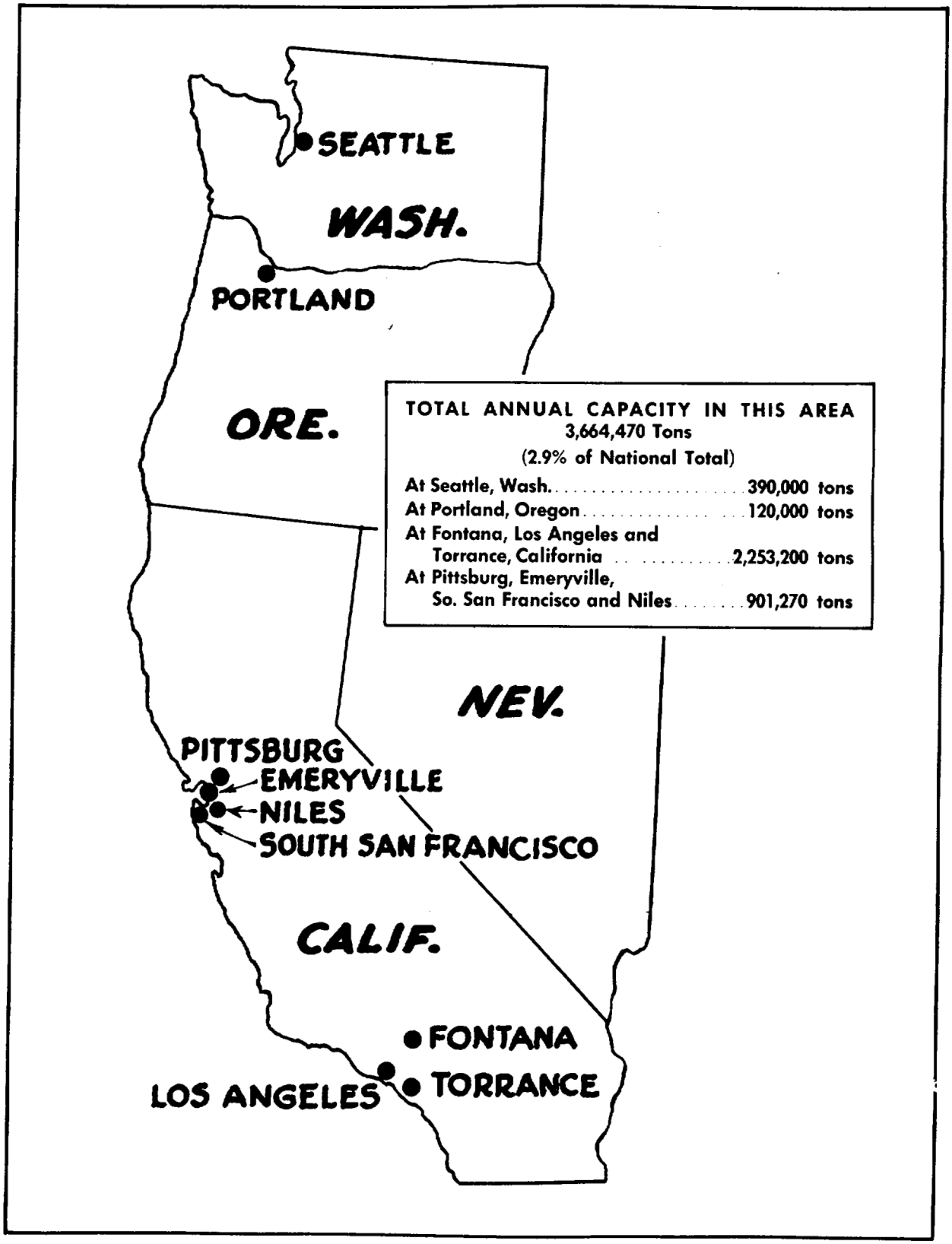

KANSAS CITY
MO.
ARK.
LA.
LONE STAR
HOUSTON
GENEVA
PUEBLO
UTAH
COLO.
KAN.
OKLA.
ARIZ.
N. MEX.
TEXAS
TOTAL ANNUAL CAPACITY IN THIS AREA
5,849,900 Tons
(4.6% of National Total)
At Kansas City, Mo. ..... 630,000 tons
At Houston, Texas ..... 1,108,800 tons
At Lone Star, Texas ..... 550,000 tons
At Pueblo, Colorado ..... 1,485,000 tons
At Geneva, Utah ..... 1,879,000 tons
At Other Plants ..... 197,100 tons

CHART 8


SEATTLE
WASH.
PORTLAND
ORE.
TOTAL ANNUAL CAPACITY IN THIS AREA
3,664,470 Tons
(2.9% of National Total)
At Seattle, Wash. 390,000 tons
At Portland, Oregon 120,000 tons
At Fontana, Los Angeles and Torrance, California 2,253,200 tons
At Pittsburg, Emeryville, So. San Francisco and Niles 901,270 tons
NEV.
PITTSBURG
EMERYVILLE
NILES
SOUTH SAN FRANCISCO
CALIF.
FONTANA
TORRANCE
LOS ANGELES

World War II brought a tremendous upward surge in western steel production, and an increase in the number and requirements of steel-consuming establishments.

To summarize this discussion, I should like to state very clearly that I am not attempting to overlook or minimize the damage that an enemy can do by using H-bombs and other modern methods of destruction from the air. It is a very serious problem. In one area an H-bomb might knock out 20 million tons of steel capacity in a distance of 25 miles.

On the other hand it seems that there is sometimes a tendency to overemphasize the danger, to assume that the entire steel industry can be quickly wiped out.

In addition it should be remembered that many of these steel plants are surrounded by highly developed industrial areas. The steel produced is largely fabricated in the plants located near these areas. If the steel plants were destroyed, many fabricating plants would also be destroyed. The country's capacity to consume steel would be reduced.

Obviously the key to our preparedness program is a recognition on the part of our military leaders that the United States is the productive heart of the free world. Our major objective should be, and I think is, to protect this industrial heart from destructive bombing--both at the beginning of and during a war emergency.

The entire steel industry is not going to be knocked out by 5, 10, or even 15 H-bombs. That is my purpose in showing you these charts.

So I believe we can be thankful that the industry, despite its intricate economics affecting plant locations, is considerably dispersed. Within the past 12 years large new plants have been built in Utah, Texas, California, and eastern Pennsylvania. It is not illogical to assume that further dispersal will take place gradually as the industry expands in the future.

Over 100 years ago an English statesman made the remark: "The resources created by peace are the means of war. In cherishing those resources we but accumulate the means." If that was

true over 100 years ago, it is even more true today with the high degree of technical development in steel-producing facilities.

Last summer an article appeared in one of our national magazines stating that, in the author's opinion, it was impossible to protect the United States against an enemy attack by airborne atomic bombers. The same author stated in 1941 that England could not survive the German bombing attacks.

Recently I saw the following statement regarding our present situation in world affairs: "The twilight of our evil yesterday merges into the night of our worse today. It is America's darkest hour." That fellow is a pessimist.

No one can deny that there is a possibility that this country may be bombed and suffer material losses; in the event of an enemy attack. However, the danger of listening to prophets of gloom at this time in our Nation's history can well be exemplified by quoting statements made by four prominent British statesmen over the past 150 years. This is to me very encouraging.

In 1790 William Pitt said: "There is scarcely anything around us but ruin and despair."

In 1849 Disraeli made the following statement: "In industry, commerce, and agriculture there is no hope whatever."

In 1852 the Duke of Wellington on his deathbed made the statement: "Thank God, I shall be spared from seeing the consummation of ruin that is gathering about us."

In 1868 Lord Shaftesbury is reputed to have said: "Nothing can save the British Empire."

There always have been "prophets of gloom" and I presume there always will be. As for the steel industry, we prefer the slogan of World War II: "Praise the Lord and pass the ammunition."

So that none of you may get the idea that I am one of those people that believe everything will work out all right if you ignore the danger signals and "just go fishing," let me say that I believe every person in these United States should be made to realize that never in history has freedom of the individual been in greater danger

than it is today. More human beings are in slavery today than ever before in the record of mankind. Many millions more have been deprived of their personal freedom, as we know it in the United States.

It is time every individual in this country took a solemn oath that he will resist to the bitter end any infringement of his personal independence. Part of this resolution requires that he divest himself of the idea that the Government must provide him with bed, board, and the comforts of life. Personal freedom is something that has involved struggle and sacrifice since the beginning of time.

With freedom goes the responsibility and the willingness for the individual to sacrifice personal comfort in order that such freedom may be secured to him and his children. If that spirit of Americanism, which our forefathers had, can be revived, no material enemy can overthrow us.

For many years Great Britain maintained world peace by virtue of control of the seas. This control resulted from having the most powerful and efficient navy in the world. It seems reasonable to believe that, at the present time, the power to maintain "peace through strength" lies in having not only command of the seas, but also command of the air.

To insure control of the air requires the most powerful and efficient air force of any country in the world--an air force with superior bombs and superior aircraft with which to deliver the bombs. As long as the world knows that the United States has this power, it should be reasonably safe from attack. Having such power, we should demonstrate to the rest of the world that this power will be used solely for the maintenance of peace, not only for ourselves, but for our allies.

If world peace through strength can be maintained by this country for a sufficient number of years, we may expect that the other free nations will develop economically to a point where they can assume their share of the burden of maintaining world peace. There are heartening indications that much progress is being made along these lines. Together with these developments, there is increased understanding on the part of the nations comprising the free world of the need for preventing wars of aggression. For the present these

burdens are primarily ours. That these burdens must be shared by Government, business, and the man in the street seems to me self-evident.

Today I have endeavored to demonstrate that the steel industry is ready to assume its share of the burden; and that, given the cooperation of the armed services, the steel industry is prepared, at all times, to meet the requirements of all-out war mobilization.

Thank you.

CAPTAIN McCAFFREE: Before we start our question and answer period, I would like to introduce two of Mr. Howell's colleagues who have come down here with him. Mr. Charles Parker is Assistant Vice President of the American Iron and Steel Institute. This is Mr. Don James, to whom we are indebted for the charts, and who says that, although they have no titles, at the Institute he specializes in public relations.

MR. HOWELL: If I might say one word, the introduction of Mr. Parker was a little bit short. He is the technical end of the Institute. If you have any technical questions, I am going to pass them right over to him.

I didn't realize that my talk took nearly an hour. I am reminded of an old story about Woodrow Wilson. He was asked, when he was president of Princeton, to make a speech. He said, "How long do you want me to talk?" "Well," they said, "that is up to you." He said, "When do you want me to talk?" "Well, that is up to you." He said, "If you want me to talk for an hour, I can do it in two weeks. If you want me to talk for fifteen minutes, it will take me a month." Now, I worked more than two weeks on this speech. Gentlemen, I will now take your questions.

QUESTIONS: Mr. Howell, you brought out very clearly some of the problems in scrap in the industry and suggested that we might have a national policy on conserving scrap and keeping it at home. Do you suggest that we include steel scrap as one of the regular stockpile objectives, so as to keep it from being exported? Or how would you go about it?

MR. HOWELL: Let me say that I know what the problem is, but I don't know the answer. In fact it is a problem that is being very actively worked on, by both the industry and the Department of Commerce.

I think there is a combination of two or three things that have to be done. The industry will probably have to step up the amount of scrap that it carries in inventory. Stockpiling by the Government is not an ideal solution, because scrap, like some other materials, should be rotated. In other words you should be continuously using it. Otherwise, if you just put it on the ground, you might wake up and think you had a good tonnage of usable scrap and find that it has deteriorated to the point that it is of much less value than you thought. I think it is a problem you have to study. We did have the experience of the last war, of shipping a large amount to Japan that later on was used against us.

QUESTION: Could you give us some idea what the vacuum melting process might do toward alleviating the shortage of alloying metals?

MR. HOWELL: That is Mr. Parker's field.

MR. PARKER: I don't believe that the vacuum melting process as such has too much connection with relieving shortages. It is a method of producing a metal with superior characteristics to the metals which we have today.

Let me try to give you a concrete example. If we have a nickel-chromium-molybdenum steel in the 8600 series, which is commonly used in tanks, aircraft, guided missiles, and so on, produced by, first, the open-hearth process, the most common of our processes, we come out with a given level of tensile strength, yield strength, and fatigue strength, fatigue now being probably the most important property for the services that I have indicated. If we produce that same steel by the electric furnace process, then we gain somewhat in tensile strength, we gain a little more in yield strength, but we gain very little in fatigue strength.

Now, if we produce precisely the same chemical composition by the vacuum process, our gains in tensile strength and yield strength are almost nil, but our gain in fatigue strength is tremendous. It may be as much as 20 to 25 percent. We are not completely sure yet, because the process is relatively new. Now, that gain in fatigue strength is the thing we are looking for.

Remember, gentlemen, I am speaking now only of ferrous metals. I don't know what we might expect from this process in copper, for example, or even in aluminum, except that in copper we gain in electrical characteristics. However, I don't see it as doing much to conserve the alloying elements.

MR. HOWELL: I can assure you, gentlemen, that Mr. Parker knows what all those words mean, too.

QUESTION: I think you pointed out very clearly the need on the part of the military to understand the problems of the steel industry. Is there any mechanism whereby the steel industry itself might more thoroughly understand the problems of the military, not only the technical problems, but fiscal, political, and otherwise?

MR. HOWELL: I will say that the fiscal problem is one that I feel very keenly today, having participated in preparing the income-tax papers. But I don't know what you can do about that.

I think, as I outlined in my talk, there is much more flow of information between the Government and the industry since World War II than there ever was before. I think that a good job is being done.

COMMENT: In 1939 the Bureau of Supplies and Accounts, which administers the Navy's funds, asked Congress for 5 million dollars to boost the supply of strategic materials. That request was denied. In late 1940, after Hitler had overrun Europe, Congress very gladly gave us 35 million dollars to accomplish the same purpose. That is the thing that the question referred to. That is our problem.

MR. HOWELL: I appreciate that problem. I spent a good part of 1940 in Washington. At that time I was with the United States Steel Corporation. I know the problem which the Navy Ordnance and the Army Ordnance both have in connection with getting our legislature to awaken to the danger and the problem that is in Europe.

Strange to say, many of them at that time still felt that we were not going to war, that we were not going to be involved. I think the people in the industry are more than willing to help wherever the opportunity presents itself; and possibly they do a little bit more with their local people than you people appreciate.

QUESTION: You dwelt at some length on the fiscal difficulties that might be encountered by the steel industry. I wonder if you would comment on the vulnerability of the steel industry during an emergency in the critical raw materials, such as manganese, cobalt, and any other items.

MR. PARKER: Yes, We are certainly vulnerable in many respects. But that vulnerability might be alleviated by a study on the part of the military of the life of the equipment which we build and which you use. For example, during World War II we were building airplane engines which had a life of 200 hours on the block. Yet we were told that their combat life was something on the order of 10 hours.

Now, in order to save manganese or cobalt or any other element of that sort, we would have to cut down our test-tube life and use inferior material which is more closely geared to the actual life of that object. I see no other way to do the job, except, if one were immediately to start from scratch, and attempt to produce with carbon steel only, and move on to another ascending curve, that is, low alloy steel, where it was felt that it could be used, which would mean a completely different sort of thing. You would, of course, have to go in for more weight. You would have to substitute bulk for the inherent strength of alloyed steel. Whether or not that would work I feel nobody knows.

But in automotive equipment, in the new automobiles of 1954 and 1955, that has been done very satisfactorily. Whether or not it could be done with military equipment remains to be seen. But possibly it could be tried.

QUESTION: My question concerns mobilization. To what extent has ODM or the military given the steel industry its all-out mobilization requirements in terms of tonnage and types of products? And what mechanics can the steel industry go through to digest that information and apply it in its plants and planning?

MR. HOWELL: I don't think that the military services could forecast what their all-out mobilization requirements will be two years from now. We can tell you what it is today but with changing conditions and the development of new weapons, I don't think any man knows now. But take, for example, the developments that are

going on in connection with titanium. It is a new metal but one that is being rapidly brought to the point of satisfactory fabrication. In two years' time you may have a great use of titanium that you are today dependent on one of the alloyed steels for.

I don't think you can build a steel industry to meet a war emergency until you are closer to the war emergency than we think we are today. What we have to do is to be in a position that there is flexibility between the military and the industry, so that conversion can come rapidly, more rapidly than it did in the last situation.

I don't know if that is an answer to your question. Have you anything to add to that, Charlie?

MR. PARKER: Just a little. Some of our technical committees are informed from time to time from various Government sources of possible potentials for stainless steel, for example, and the quantities of nickle and chromium which may be required, or the possible maximum tonnage of armor-piercing shot, or shell steel, or things of that sort.

Now, these tonnage estimates, and the size estimates in the case of missiles, are given to us by individual departments, either of the Army or the Navy; but they are rarely, if ever, coordinated. I don't know that it would be possible for such coordination to exist. I kicked that problem around since 1943 and I still am not firmly of any opinion.

That is one thing there which is rather difficult. In considering nickel, for example, the Atomic Energy Commission calculates in terms of nickel what it is going to require in the light of an all-out war. That amounts to more nickel than it is possible to produce all over the world in one year. Along comes Chemical Warfare and turns in a similar figure. Along comes the Air Corps, and, speaking of jet engines alone, it gives us the same figure. So now we have a total requirement of three times the world's production of nickel. I don't know just who is going to figure out who is going to get what.

MR. HOWELL: I would like to say one thing following on what Mr. Parker said.

In the early stages of World War II, a program was developed in the War Production Board for the development of tubing in connection with airplanes. Based on the program which it had, if we had built the facilities to produce that tubing, we would have had three times as much tubing as we had facilities to produce airplanes. It was a lack of coordination. Sure, it would have been fine to have that amount of tubing if we had had the airplanes to put it in. But somebody had never thought of the fact that we couldn't build that many airplanes. Now, that is the coordination that somewhere we have to develop between what you would like to have and what you can get.

MR. BAUM: Mr. Howell, I see that our time has caught up with us. On behalf of the college, I thank you for a most interesting and instructive talk and a very interesting discussion period.

MR. HOWELL: It has been a great pleasure to be with this group. I want you all to feel that if you have any questions, we are always glad at the Institute to have you write to us or come to see us. We will do the best we can to answer your questions.

(4 Mar 1955---750)S/mss