PROBLEMS OF MATERIAL SUPPLIES IN STEEL PRODUCTION

21 September 1948

CONTENTS

Page

INTRODUCTION--Brig. Gen. Jonathan L. Holman..... 1

SPEAKER--Dr. Donald M. Fraser, Chief Geologist, Bethlehem Steel Company..... 1

GENERAL DISCUSSION:..... 10

Publication No. L 49-16

THE INDUSTRIAL COLLEGE OF THE ARMED FORCES

WASHINGTON, D. C.

RESTRICTED

PROBLEMS OF MATERIAL SUPPLIES IN STEEL PRODUCTION

21 September 1948

GENERAL HOLMAN: With even the most vivid imagination, it would be very difficult to think of the United States without its tremendous steel resources. But do we really appreciate the important contributions that this basic industry has made during both peace and wartime? What are some of its problems, particularly the long-range ones? In our study of the mobilization of the economic resources of the United States, the question of steel will come up time and time again. You will meet it in economic potential, in allocations, priorities, and in production.

The Bethlehem Steel Company is well known to you as one of the Nation's and the world's foremost steel producers. This morning we are very fortunate in having with us Dr. Donald M. Fraser, chief geologist of that organization, who will speak to us concerning some of the problems of the steel industry and some of its long-range plans.

I take great pleasure in introducing to you Dr. Donald M. Fraser.

DR. FRASER: Gentlemen, this reminds me a little of some of the experiences I had a few years ago when I was an instructor--and later they made the mistake of passing me as far as associate professor--at Lehigh University. I think in those days I often felt that the students didn't study as hard as I had when I was a student, but I realized that they had a poorer professor so I was easy on them.

This morning I will try to tell you something about the present sources of supply of the Bethlehem Steel Company and outline the places that we look toward for future supplies, some of the problems connected with procuring those supplies in peacetime, and the different types of problems to be faced in the event of war.

The iron ore supplies at the present time are procured from the Lake Superior district, in many cases from our own properties in that area; in other cases from properties owned jointly with other steel companies. In addition, we have a mine in the Cornwell district of Pennsylvania. Other ores are purchased from Lake Superior mines and from New Jersey and New York properties. So much for the domestic supply. We will come back a little later to discussing some of the problems involved in obtaining supplies for the future.

RESTRICTED

I want first to outline present sources. Regarding the foreign sources, we operate mines at the present time in Chile; some of our supplies are being sent in from Cuba; we are developing a property in Venezuela; and we are interested, without owning properties, in several other foreign countries.

Now with respect to some of the problems of iron production, I believe all of you are aware of the information that has been receiving rather wide circulation regarding the depletion of direct shipping ore of the Lake Superior district. That question can be debated rather vigorously, depending upon the attitude of the person, assuming one or the other of two basic principles.

One is that some of the large pits are being worked out. Unquestionably that is true. The other is that there are reserves which have not yet been opened up. That is also true. So I won't attempt to tell you that the direct shipping ore of the Lake Superior district is present in quantities sufficient to cause no worry, but there still are many millions of tons. The reserves on the Mesabi Range are quoted at something around eight billion tons. Remember that is not ore (direct shipping ore) for some has to be treated in terms of extensive beneficiation.

For future supplies, we are going to resort to the taconites. The taconites are the primary deposits from which the higher-grade ores have been derived. They are rocks made up of iron ore and silicate in the form usually of chert. Those particles are mixed together in rather fine size so that it is difficult to separate them. The rock in itself in many cases is very dense and hard. It has to be ground very fine. The iron ore has to be separated from the silica magnetically and agglomerated in some way, because such fine material cannot be used in the blast furnace.

It sounds as though it should be an easy thing with the ability and technological advances of industry, but it is not. Furthermore, it is easy to increase the production of iron ore from an open pit by putting in additional shovels and mining more ore. It is not easy to increase the supply of iron ore if you are dependent on a very expensive and elaborate concentration plant. It is an important point in considering the development of future resources and the possibility of heeding to improve and enlarge the supplies in the event of an emergency. Such plants as I have been referring to--such as these concentration plants for the taconites--are being worked on by various companies at the present time. Pilot plants have been built and equipment is being developed to beneficiate ore of that type.

DECLASSIFIED

In the case of ores which are on this continent, other than in the United States, we of course think in terms of iron ores of Canada and iron ores of Mexico. The iron ores of Mexico would be difficult to bring to our steel plants because of the great distance of railroad hauls, but they can be brought in of course by ship lines. We are importing ore from Chile; it could be imported from Mexico. But the reserves of Mexico are not large.

We return to Canada. The Steep Rock mines were developed in the recent war years. Some of you have heard about and some of you may have seen the recent articles in "Business Week" and some of the other journals referring to the iron ores of Labrador and Quebec, sources of iron ore for the future. We feel that there are a number of problems connected with mining iron ore in these northern latitudes. One, of course, is obvious. It will require 350 to 400 miles of new railroad to bring the ore from the site of the present prospects to the St. Lawrence River where it could be loaded on ships. The alternative would be to take it north to Ungava Bay where there is possibly, at best, a two-month shipping season. Of course, that would not be very satisfactory.

In addition to the matter of railroads, which may cost tens of millions of dollars--something to be considered--the iron will be mined from open pits. The country is frozen for many months of the year. We know from experience in the Lake Superior district that iron ores are mined which have sizable moisture content, and when mined and put on stockpiles, they freeze. In the Lake Superior region the frozen zone may be only a few feet thick. It thaws out in the spring. If, however, the district is one in which the period of sub-zero weather is longer, it will freeze these stockpiles to greater depth, and it may be that the stockpile is no better than leaving the ore in the ground where it is frozen. So there are problems of that kind, physical problems, connected with obtaining ore from the northern latitudes.

Now let me go to some of the other foreign properties which we are operating and speak of the reserves in those countries. We operated mines in Cuba for a number of years. The South Coast of Cuba was a source of high-grade iron ore up until a few years ago when the mines were depleted and the properties closed. We still own extensive reserves of what we term the Mayari ore in Cuba, but it is a type of ore which is found throughout the world in tropical regions, occurring as a residual product from the breakdown of basic rock. It is iron ore in which there are certain other metallic elements which in themselves are very valuable. However, when these ores are mixed with iron ore in such a manner that they are difficult to remove, they are not so desirable.

RESTRICTED

For example, those iron ores contain nickel, cobalt, and chromite. Nickel and chromite are two strategic metals, but if they can't be taken out of the ore--I was going to say economically--if they can't be taken out satisfactorily even, the ore is of no great value to us. The ores have been used in the past, but the steel produced from them has only a limited use. Therefore, it is far more satisfactory to hope to take the elements out and use them in their own fields.

Tests have been going on for years and a great deal of effort and money have been expended, by our company and others, in an effort to beneficiate those ores. It will, of course, be accomplished. It hasn't been done as yet. Those ores are found in other parts of the world, for example, in the Philippine Islands and West Africa. Some of the West Indies and other parts of the world contain them but they are not used at present. They are not to be considered as good reserves for the immediate future; more so for the remote future. So much for Cuban iron ore. We are therefore not obtaining the quantities we formerly obtained.

Venezuela, the next closest of our properties, is being developed at present. About 180 miles up the Orinoco River and some 30 to 35 miles south of that point, we have a property of the highest-grade iron ore that is being developed. That property will probably be in production within the next two years and we expect to be shipping sizable tonnages, on the order of two to three million tons per year--excellent ore. There are no special problems connected with it except the problem of getting it to the United States. As you all know, very shortly after the beginning of the past war, five of the eight ships that were being used for transporting ore were sunk and the others were of course discontinued from that service.

Chile has been a producer of ore for the Bethlehem Steel Company for many years. We have at the present time active plans to develop another ore body in that country. Again the problems of those associated with any new industrial operation or installation, a matter of planning a new plant, developing ports, a new railroad. The additional one is probably some concentration of the ore magnetically, but the ore bodies are, for the most part, direct shipping ores.

We are also very much interested in the reserves of ore in other South American countries, especially Brazil. Brazil has reserves of high-grade iron ore that are as extensive as those of any country of the world. The deposits are located some 350 to 400 miles inland from the coast. In time of emergency, of course, railroad haulage can be assigned to those commodities which it is most necessary to procure, but if the railroads are not in shape during peacetime, it is quite a

RESTRICTED

problem to put 350 to 400 miles of railroad into good working order in wartime. The problem in Brazil, therefore, is a physical one of railroad haulage.

One part of this district is serviced by a narrow-gauge railroad which we feel is inadequate because sufficient tonnages could not be hauled over that railroad to justify the expense of putting in a mining operation. The other railroad is a broad gauge on which a great deal of money would have to be expended. It is a government-owned railroad. That leads us to the next problem, and that is the political one.

I am completely out of my depth in discussing politics in connection with Brazil, but nevertheless the situation is such that American capital has not been encouraged to enter and develop the natural resources. The Brazilians have nationalized most of their resources, and I think that in recent years, the last two or three, there has been a tendency to improve the attitude toward the introduction of American funds, with control on the part of the people putting up the money. Nobody wants to go in and invest 50 to 100 million dollars in a country where he is not assured of control of his operation.

But the reserves of Brazil are large, several billions of tons, much of which is high-grade direct-shipping, lump ore. The reserves in certain districts, I am sure, have been exaggerated, but nevertheless Brazil has a large tonnage. The problems there are twofold, physical and political--or financial, whatever branch that falls into.

At the present time we are investigating the ore reserves of West Africa. There are some known deposits that are being developed now. In Liberia, the Bomi Hills deposit is being developed by a gentleman named Mr. Christy and the William H. Muller Company of Holland. The property is about 40 miles from the coast. It will use the new docks installed by the United States Government and will probably be in production within a few years.

I mentioned a moment ago the Conakry deposit of the nickel-chrome bearing type of iron in West Africa. That is a large future supply. We are looking around in other West African countries, such as Nigeria, the Gold Coast, French Guinea, and other French colonies.

The problems again are the same as we encounter in other places. We have done some exploration in one property in Nigeria, four hundred miles up the Niger river, at the junction of the Niger and the Benue rivers, but the Niger accommodates even barges only a few months a year. So there are physical problems of getting the ore out.

RESTRICTED

In addition, there is a beneficiation problem. This particular deposit, although it may contain up to one to two hundred million tons in the two or three hills in the district, is low grade and therefore of no value to us or anybody for many years. It might possibly be a future reserve. It could not be developed in an emergency within any limited period of time. As you can see, the problem is one of transportation down the river, mining equipment, shipping, and all that. We all recognize, of course, that in the case of such a deposit and in the case of our other foreign deposits, the problem is one of bringing ore in to the Eastern Seaboard.

Before I leave iron and mention a couple of other things--just to give a little background of our uses--I would like to say that we will probably use about 17 to 18 million tons of iron ore this year, of which about 25 to 30 percent will be brought in from these foreign properties--not all our own. That is, we will bring in ore from Chile; we are getting ore from North Africa; and we are getting ore from Sweden. But those sources of supply were cut off from us during the last war and we, of course, can foresee great difficulties in shipping ore in from remote parts of the world in the future.

The result is, of course, that we would like to have our supplies within the country. The development work that is being done on the taconites is one answer. The other answer is that as the Canadian ores are developed--and they will be, maybe not immediately but in the future years--they will provide another source of supply. But we foresee that we will always have need for and will wish to bring in ores from foreign ports. Our policy, insofar as I know it, therefore, is to work in that direction. So we have to recognize the problems of obtaining ore from foreign countries and try to solve them. Some of them are more readily solved than others.

Now if we turn to scrap, about which I know nothing--get that down first--I can say that we are using about 250,000 tons per month of scrap, most of which comes from this country. There was considerable publicity, within limited circles, given to the deal that Bethlehem made--I was going to say with, but I don't know who it was with--to obtain scrap from China. We have received very little. Certainly less than 10 percent of our scrap comes from abroad. It is the impression in some circles that quite a bit of scrap is coming in from Europe and North Africa. Certainly we are not receiving much, a little, but not much. The supplies of scrap can be increased, of course, by bringing it in from foreign locations.

RESTRICTED

I had a man in the office a couple of weeks ago who was talking about the procurement of scrap from the Philippines. He said the problems of bringing in scrap are threefold: (1) shipping, (2) transportation within the island, and (3) the know-how of handling it. All three of these are real problems. It would seem that we will not be getting scrap from the Philippines. So the scrap market remains tight as the price of scrap remains high. We could use a great deal more than we are getting. The situation could be improved by bringing in scrap from foreign countries, but to establish an organization for the procurement of scrap and the necessary equipment is more of a problem than to get along without the scrap. For that reason, it has not been done.

Manganese supplies are very critical. Now I must modify that. We are not short of manganese, but it is critical when we examine the present sources and consider what may develop in the future. We are obtaining manganese at the present time from Russia, from the Gold Coast in West Africa, from South Africa, Rhodesia, and India. Most of the manganese is from foreign sources. If Russia should cut off its shipments of manganese, we would be embarrassed. It is high-grade manganese with which we can mix lower-grade manganese from other sources to supply our needs.

I would say that probably there is something like two million tons of manganese ores used yearly, and we use about 300,000 tons per year. We have a party in West Africa looking over some manganese sources. We find that in trying to obtain manganese at the present time transportation is a serious problem within the countries where it originates. I believe that the supplies from India and South Africa could have been materially increased if they had not had railroad haulage difficulties within the countries themselves. So much for the present sources abroad.

Within our own country, we obtain manganese from the Batesville district in Arkansas and for some time obtained manganese from Butte, Montana. There are small producers in the districts of Virginia and West Virginia. But the total tonnage of domestic manganese is very small.

In the event of an emergency--war--and we needed to increase the supplies of manganese within this country, we could turn to several potential sources from which manganese could be produced and others which contain sizable tonnages of low-grade manganese for which there is no known process for procuring the manganese.

RESTRICTED

Briefly, the outstanding deposits from which manganese could be produced in this country are: the Aroostock County, Maine, deposit which runs about eight to ten percent manganese in material which is very difficult to treat on a commercial scale so far as I know; Chamberlain, South Dakota, where there are large supplies that can be beneficiated at considerable cost; the gangue material at Butte, Montana; and the Arkansas manganese deposits. There are sizable tonnages of manganese in the United States, but they are not being worked to any extent because in some cases the processes have not been developed; in other cases, it is not economical to work the deposits.

If we turn to chromite, our present uses of chromite are in the form of ferrochrome, which we purchase, and in the form of refractory chromite which is used as refractory patching material in the furnaces. We purchase most of our refractory chrome. During the war chrome was obtained from Cuba--and still is--from South Africa, from Turkey, from New Caledonia, and some small supplies were produced in the United States.

Regarding future sources, we will look to Cuba for a long time to supply considerable quantities of refractory chrome. We know that in this country there are some fair reserves of chrome-bearing rocks in Montana, the Stillwater complex. Plants were put in at two places during the war and a small production resulted. Those plants, I believe, could be run again, and chromite could be produced from those sources in an emergency. The sources other than those which can be worked on a large scale only in an emergency are chiefly foreign.

During the war the problem of treating chrome ores was extensively studied. In some cases the problem is one of composition of the raw ore. Chromite, for example, often contains iron, silica and alumina. It may contain lime and a few other things. Depending on the use, one or all of those things are usually detrimental. So if it is going to be used for metallurgical grade, it has to be treated one way; for chemical grade another; and for refractory grade still another. The sources of supply for the future would in part certainly be Cuba, which is close enough that we would be able to use its resources.

Nickel ores are rather widely distributed, but the source of supply is chiefly from the International Nickel properties in Canada. In addition, small quantities of nickel were produced in the Nicaro plant in Cuba during the war years. That plant was installed in the latter part of the war, and for one or two years following, nickel was produced there. The plant was designed to use the iron ore--to which I referred as being extensively found in Cuba--for the extraction

of the nickel. The ore lies as a blanket, sometimes covering many square miles, directly over serpentine rocks from which it was derived by decomposition and leaching. For their plant feed they used the lower part of the ore zone and the upper part of the serpentine. That was fed to their furnaces, and, in turn, through to their leaching baths, and the nickel was extracted, a process which offered considerable difficulty and which, I believe, was found to be uneconomical in post-war years. That type of process, however, probably can be improved and the source of nickel could be developed. Of course, nickel supplies from Canada have usually satisfied the market in the United States.

The future sources of nickel are widespread because of the widespread nature of this type of ore, the nickel bearing iron ores, such as are found in Cuba, Conakry, the Philippines, India, and other places.

In general, for our raw material supplies for the future, we hope to continue our investigations in foreign countries with regard to supplies for our East Coast plants. We look to the Lake Superior district to supply our needs for our interior plants and in an emergency that district may have to supply our East Coast plants.

We feel that the reserves of the Lake Superior district, with treatment of the taconites, are sufficient to supply the steel industry for many decades. The grade of rock containing the ore--which we could not now consider or that can be worked--will go lower and lower as time passes because as the need for ore increases, the price will be higher and improvements in treatment processes will enable us to work lower-grade materials. We feel, therefore, that there is a problem but that it can be met.

For the foreign properties, some of which we may not even know about at present, we feel again that with the recognition of the problems as being physical and political, we can solve the physical ones and we hope to solve the political ones. We also feel that our foreign sources of supply--maybe I shouldn't use the word "assured"--but at least there is reasonable expectations of solving the various problems as the demand for those ores is more apparent or become more imperative. We hope we are not making the mistake of being too optimistic. We certainly aren't approaching it with the feeling that there are no problems. We have parties in the field at the present time, as other companies have--I am not attempting to state that we are more forward than other companies. All companies, I think, in the steel industry are very aggressive regarding procurement of supplies for the future. We hope and feel that we won't be too far behind in case of an emergency. I thank you.

RESTRICTED

MR. BUTTS: Gentlemen, as we did yesterday, we will have our seminar for the technical questions, but we will continue for general questions that are associated with the remarks that have been made by Dr. Fraser. We are open for our question period now.

QUESTION: We hear a lot about reserves, could you tell us about the mechanics, say in Brazil, of establishing a reserve of iron ore, how you arrive at the figure and what areas would be included in that reserve?

DR. FRASER: Yes, The area in which the iron ores exist is rather large. That is, it would be measured in terms of several hundred square miles. Now to determine the reserves of a district accurately requires rather extensive exploration. Diamond drilling is one method of getting down into the earth and finding how deep those ores extend. That has not been done in most places in Brazil.

What has been done--you can actually map and measure the surface distribution of the different grades of ore. In many cases, fortunately, these high-grade masses of iron ore stand in relief. They will form mountains and you get a pretty good idea of the volume by actual arithmetical computation of the height and area.

Then, of course, from understanding the geology of the deposit--I smile to myself because some of you may realize that if you get two geologists together you are always sure of one thing, they won't agree on the origin of the deposit and probably won't agree on many other things either--but provided you do have a little geological background, you have some idea of the nature of the deposit.

Was it formed by surface weathering? In which case it can't go very deep. Was it formed by ascending solutions, that is, igneous sources? In which case they may go deep. You do have that. You can assume, therefore, with some justification that the deposit goes down to a depth perhaps equal to the distance that it rises above the surface. There is no reason for that assumption except geological background. On that basis you may be able to compute the approximate tonnage.

Another way of doing it is to say that for each 10 feet of depth we are assured of such and such a tonnage, in which case you can make your own assumption as to the depth. If you want to assume 100 feet, fine; or 1,000 feet, fine, but it is on the basis of measuring the area of distribution and then saying what it is for each 10 feet.

RESTRICTED

In the case of Brazil, we have a pretty good idea that those deposits do extend for a few hundred feet into the earth's surface. They may stand up several hundred feet. You measure the distribution in these mountain faces. Many times you can actually see the ore for several hundred feet, and it is just pure arithmetic.

If the property can be diamond drilled, it is usually by making several holes across a section here, several holes across a section here, something like that, (indicating) and then you measure the surface of each section, the surface of this section and the one next to it, average that. You know the distance between. It is just a mathematical process. If we know the volume and height, and if it is dense, hard, we use a factor of 10 cubic feet per ton and get the tonnage.

QUESTION: Prior to World War II there was extensive mining and production of manganese in Egypt. That production has fallen off terrifically. Can you give us a reason for that?

DR. FRASER: No. I don't know. I don't know enough about the Egyptian manganese deposits. I might beat around the bush on that, but I don't know. That is the simplest way. I can say this: In several cases, such as our deposits in Virginia and West Virginia, the manganese occurs in scattered, small deposits. Now it is possible that those may have been worked out or that—again on the basis of economics—the better deposits have been worked out and only the poorer ones remain. Therefore production is cut down. I don't know that to be true, but there is a good chance that it is. Usually that explains such a situation. Manganese is a mineral that is very widely distributed. It is very abundant in the earth's surface, but unfortunately, it didn't arrange to be concentrated in a few large deposits.

QUESTION: Sir, you mentioned that a future source of chromites could be Cuba. You made the further comment that it was basically for refractory purposes. Would you comment about the resources of metallurgical chromite?

DR. FRASER: Some metallurgical chrome is obtained from Cuba, but most of the reserves that I know of in Cuba are of the refractory type. Chromite of metallurgical grade comes from South Africa, from Rhodesia, and some from Turkey. Some of the chromite from New Caledonia is metallurgical. That from Russia definitely is metallurgical. Unfortunately, Russian manganese is some of the highest-grade manganese in the world, and Russia has some of the largest deposits. But the other countries I mentioned would cover most of the big sources of supply.

DESTRICTED

QUESTION: Dr. Fraser, does your company anticipate any great problems in obtaining supplies of high-grade coking coals?

DR. FRASER: Oh, I slipped up on coking coals completely, didn't I? Probably because subconsciously I don't know much about them so I was going to pass them up. Actually I did get together a few notes on coals.

We, of coures, handle coal supplies. We have rather extensive holdings of coal, as all steel companies do, in Virginia and Pennsylvania We can divide the coals into three types--low volatile, neutral, and high volatile, depending on the volatile content. For low-volatile coals the content is, say, 26 and down; neutral, 26 to 30; and high volatile, above 30. Those coals are mixed to form proper coke. Proper coke has properties on which I am not well-informed, but you don't want it to expand too much because if it does, it will break the coke oven--among other things.

Some of the problems of coal for the future are, of course, the impurities. There are tremendous supplies of coal in this country. Everybody knows that. Why then are we worried about coking coals? Because we do not want too much ash. Ash in a coking coal merely adds impurities to the final mix which have to be slagged off. We do not want too much sulphur. This is a very serious disadvantage in the blast furnace. Don't ask me about the metallurgy of these things. I don't know much about that, but I do know what we are supposed to furnish. We do not want coals with high sulphur content.

Therefore, when we get down to the known areas of coals having the proper physical and chemical characteristics, we find they are not large. They are not large in terms of the total volume of coal. In other words, we can see that something is going to have to be done about this coal. So in several of our mines within recent years we have installed completely mechanized equipment so that the coal can be washed, thereby removing some of the ash and, in some cases, some of the sulphur.

We are carrying on research work at the present time on beneficiation of coals. We hope that in a few years we will be able to use coals that are not now satisfactory. Always remember that when we set specifications on, for example, coal, manganese, chrome, and iron ores, we are saying that is what we would like to have. But you can use, in most cases, something considerably different. That is poor practice, it is true, and as long as the better grade materials are available we will use them. If it is possible to beneficiate coals and other minerals we want to do so.

RESTRICTED

I have not mentioned limestone at all, but most of our domestic limestone is used in several forms, dolomite, calcite, some of it for the open hearth; some of it for the blast furnace; some for the basic open hearth; some for the acid. If we want calcite, we want calcite; we don't want it to be a dolomitic limestone.

Another point that enters into the consideration of limestone is the fact that we want these properties as close to our plants as possible. In recent years the country has been developing golf courses, local airplane fields, farms, and residential districts. Some of the gentlemen farmers coming out from Philadelphia have caused us a little embarrassment. It may happen that some property we would like to get for a limestone quarry is owned by someone who has no interest in selling within a reasonable amount. For that reason, in the case of limestones, we have to look ahead many, many years beyond the immediate need.

QUESTION: Dr. Fraser, did you experience any great difficulty in keeping a constant supply of ore coming from foreign sources to your East coast during the war?

DR. FRASER: Yes, we did. We had considerable trouble. Five of the eight ore ships that were servicing Cuba and Chile were sunk, and from then on, no more iron ores came in.

I went down to Cuba just before the bombing of Pearl Harbor and stayed there during that winter in search for chrome ores. I was around over the island quite a bit. It was amazing how quickly it became apparent after the submarine warfare started that very few ships were getting out of Cuba. It was just a surprising thing. We found crews or partial crews of a ship--or two or three ships--waiting in every port we went into because their ships had been sunk. Ships were loaded with chrome, with sugar, and with many other things. However, since we had trouble getting out the chrome ore and the manganese from the South coast and those two things were needed more than the iron ore, they were convoyed into the Atlantic Coast ports.

To continue, in order to satisfy the iron ore requirements, therefore, we had to go to the extent of shipping iron ores from the Lakes down to lower lake ports and then by rail into our east coast plants to a much greater extent than is normally done. Of course, in peacetime that is largely a matter of economics. You don't want to do that because it's costing money. But in wartime you are not only taking up your railroads but you are using manpower to an extent that you would like to avoid. For that reason, any disruption of supplies from foreign sources immediately puts an additional burden on the interior sources which many times is very difficult to meet. So we did experience considerable difficulty.

RESTRICTED

QUESTION: Would you develop, please, the Venezuelan situation a little bit more? In other words, you say in about two years you will be ready to ship ore from Venezuela. What are the particular problems? And would you also touch on the shipping situation, what is the capacity of a ship today and what is expected to be the capacity in the future in order to handle the ore?

DR. FRASER: The property in Venezuela is about 35 miles from the Orinoco River. That requires 35 miles of railroad, plus the sidings and so forth. The railroad has to be standard gauge, well constructed, well ballasted. It takes a long time to build such a railroad. The mining equipment that goes in is very heavy. It takes quite a while to get delivery even though you have several years in which to plan.

The loading plant at the port at the end of the railroad is another extensive development. A full-scale powerhouse has to be put in, a complete village built, and a cantilever for the loading of the ore. The Orinoco River has a range from high to low water at the point of about 40 feet, which is a little problem because from this cantilever, this great arm that extends out, you load the ore. The ore is brought down from the mine by railroad, dumped into a large bin with a belt underneath and about 10 loading pockets or gates so that you can load several barges from this without depleting the supply. It goes out--say here are the bins--if you can follow my hands--the river is flowing this way. You load into these pockets. All of this is done by belt conveyor which comes out over this great arm and dumps down into these barges. The barges haul the ore down the Orinoco River up to Paria Bay, which is on the South Shore of the Paria Peninsula. This is a peninsula which extends out towards Trinidad in the northern part of South America where we have a transfer station.

This thing is complicated. You can get some idea of the expense and the problem involved when you realize that in developing one of these properties, it is necessary to have a railroad, a loading station, at the river, a barge line with tugs to carry that ore to the transfer station, unloading facilities at the transfer station, the ore put on a stock pile and the big ships brought in--to get to another part of your question--which carry 25,000 tons. We also must have harbors of roughly 40 feet draft which limits the places you can take these ships and usually means we develop our own harbors wherever we develop an iron ore property. Those ships are brought in; they are loaded with the ore; and the ore is hauled to Sparrows Point, Baltimore. That is the process by which we get that ore.

RESTRICTED

The development was started before the war; but during the war it was closed completely. One shipload of supplies which had power-house equipment, refrigerators, a number of things for the houses, a lot of electrical equipment--quite an extensive shipment--was sunk and after that all shipments were stopped. Since the war we have been progressing as rapidly as possible, but a number of things have interfered with quick development. So the properties of that type are slow in development. Does that answer your question about shipping?

QUESTIONER: Yes, sir.

DR. FRASER: Now regarding the ships, we are proud of these ships. We built them ourselves. They are fast ships. They carry 25,000 tons. The turn-around time is quite short from Venezuela. We expect to bring in, as I say, between two and three million tons. We will bring in pretty close to three million tons this year from Chile, a much longer haul. We have a loading device in Chile that enables us to load our ships in record time. We have loaded a 25,000 ton ship with iron ore in less than an hour quite a number of times.

I was down there last fall, just about a year ago; I saw one of these ships brought in to the berth and loaded. It is very common to bring them in and load them in not much more than an hour. One of the things that is interesting about the ship loading there is that the loading installation was put in during World War I and is still a marvel throughout the world.

When I was in London, one of the things the iron ore people there asked was, "Is your loading dock in Chile still operating?" Major Campbell, who was, I think, in charge of allocations during the war, said, "I suppose now you have it developed so that when those 25,000 ton ships get to Baltimore you have a rotating dump that picks the ship up and dumps it." I told him that was something we would be working on now that he had mentioned the idea to us.

Some of you may know Major Campbell. I think he has been in this country many times in connection with supplies. He is quite a typical Britisher with his dry humor. He was telling me that in the office in which he was they were handling the allocations of iron ores during the war, bringing in, of course, many foreign ores. They had a young lady in the office. One day a tough voice called up and said, "Is this the foreign ores division?" This little girl real quick said, "No, we are all British here."

QUESTION: Dr. Fraser, how much state-side labor do you have to provide in an installation in Venezuela in getting it constructed and for operating it, and how much can you get from the local territory?

DR. FRASER: Well, the technical and head people in all technical branches and the administration are entirely Europeans or Americans. As the property progresses, however--and I take Chile as an example because we do have the experience of developing a property there and operating it for a number of years--you bring in more and more of the local personnel. For example, some of the mining engineers who have been trained, perhaps in this country, will work in.

In most of these places, there is a specific requirement that a certain percentage of local people be brought in, which, I think, in the long run is entirely satisfactory. The requirement sometimes is a bit awkward, but in most cases you have better relations if you are attempting to use the technically trained local people. Unfortunately, in most of the Latin American countries when a man has come to this country and has taken college work, technical training, and goes back, he is an outstanding man and he doesn't like to go out to a mining district and get his hands dirty. So there is that problem. They would all prefer to be in the main office in the capital city, or something of that sort.

But to run through the picture briefly, you start out with personnel, engineering draftsmen, everybody will be brought in from foreign sources. Then you gradually replace many of those people until eventually you may have, oh, 20 or 30 percent local people. But in most cases they are trained for the job and are adequate.

The same was true when we started in Venezuela. All of the operators of the bulldozers and engines--everything--had to be done by people who were imported. Now we have trained many Venezuelans. Unfortunately, because of their limited background, it takes a long time after they learn to run the machine for them to realize that it is supposed to be greased. That introduces quite a little problem when you are dealing with heavy equipment.

I was in Liberia when the Raymond Concrete Pile people were putting in a large dock at Monrovic in conjunction with the Navy; every operator of an engine, large truck, and bulldozer was an American. But that was a different setup. That is a contract job. They are in there for two or three years. They use their equipment very roughly; they know what they can do with it. They have maintenance people. It doesn't pay them to train local people. But when you go in for a long-time operation, you do train local people; you have to. That is the agreement, which is reasonable. We made no complaints. It is one of the problems that must be solved, however.

RESTRICTED

QUESTION: Could you give us a little more on the Cuban ore deposits? Have all of the direct shipping ores been moved out of Cuba? In other words, will further development await beneficiation processes?

DR. FRASER: We have looked over Cuba pretty thoroughly and, of course, may be embarassed, as we have been on occasion, by someone else finding something that we overlooked. But we operated there for many years and in the eastern part of the island not far from Guantanamo--between Guantanomo and Santiago--there are small deposits which are not large enough to develop at the present time. The biggest reserves are of the type of ore that requires beneficiation. I think I can say that there are no important deposits of iron ore in Cuba of the direct shipping type.

That will change. Ten years from now or twenty years from now, we don't know what we may be working, but under present conditions they aren't big enough to interest us. That is a thing that may gradually change. A few years ago deposits of 20 or 30 million tons were considered. It is getting now so we are thinking in terms of 50 or 100 million tons, because of two things, increased cost of developing a property and increased tonnage used.

QUESTION: Could you tell us what is being done toward the development of manganese resources in Brazil or elsewhere in the Western Hemisphere?

DR. FRASER: Yes. After I left Chile just a year ago, I spent the month of October in Brazil and spent several days looking over the one big manganese development which is run by the United States Steel Company there at Lafayette. They have produced something like three million tons in past years. I think they consider their reserves about equal to that.

In addition, there is a relatively new find called Saude, which is rather remote from any railroad. We looked that over. The surface distribution of the ore was rather impressive, but in a few tunnels that the Brazilian Mining Department had put in, the grade of ore seemed to become more highly siliceous and it didn't appear to be a promising deposit. It is, however, a reserve for the future of some tens of thousands of tons. Maybe I am a little optimistic there, but on that order certainly.

Now there are other reported occurrences of manganese in Brazil. The St. Joan Del Ray people, who own considerable acreage and developed and worked the St. Joan Del Ray gold mine in Brazil over a period of many years, own manganese deposits or lands and have the mineral rights where there are a number of manganese deposits in this same general Minas Geraes district which contains the iron ores. Some of those are being worked.

RESTRICTED

In that particular district there is a number of smaller deposits. Again with the local labor, those would be a source of supply in an emergency, but they are not being worked at the present time, with one or two exceptions. Actually, we saw one smaller body being developed in there, but many of them could be. The manganese ore to come out of Brazil could be increased considerably.

MR. BUTTS: I think in view of the afternoon's program, we should let our speaker have a little fresh air. We don't want him to come back and say, "I thought I had enough this morning."

We thank you so much, Dr. Fraser, and look forward to meeting you here this afternoon.

(8 November 1948--650)S

RESTRICTED