894.6351/1-145 THRU 12-3146 -47-48-49

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : A-H - Mr. Gross

DATE: October 4, 1946

FROM : JK - Mr. Martin
- Mr. Hodge

SUBJECT: Assured Capacity -- Pig Iron

The assured capacity figure for Japanese production of pig iron as approved by {SWNCC 236/19}, was 500,000 metric tons annually, subject to a 10% upward or 20% downward adjustment for purposes of negotiation in the FEC. This figure was fixed by the Pauley recommendation, concurred in by State to reduce ~~pig~~ capacity to to 1,500,000 + then to 500,000 or as close thereto as the available supply of imported pig would permit. [at reasonable price]

SCAP's comments on the Pauley Comprehensive Report received by the War Department on September 26, 1946, contained a recommendation for retention of annual production of 1,500,000 metric tons of pig "until supply for importation is assured. High-grade ore should be obtainable from British Malay and the Philippines". He apparently accepts the 500,000 figure if or when imports are available.

At the last FEC meeting, the U.K. member moved that the minimum assured level for pig be placed at 800,000 metric tons on the ground that this amount of capacity would be necessary to process economically mined indigenous ore. This was seconded by the Soviet Representative, and approved by all other representatives except the U.S. Member who was obliged to reserve his position in view of his present instructions.

There is some basis of fact in the U. K. argument as to the amount of iron ore which Japan may be able to mine economically, ~~and that~~ (the proposal could therefore be accepted by the U.S. Member on that ~~basis,~~) ~~plus the additional fact that~~ it is improbable the other FEC countries ~~would~~ will ever accept the U. S. position. Authority to ~~do so~~ is therefore requested.

In addition — In view of the urgent need for action on this paper — accept a new figure not in excess of 800,000

JK:ClHodge:mw

POLITICAL ADVISER
APAN

vember 20, 1946

of the Japanese Empire.

ited States Political Adviser has the honor to enclose s of Report No. 50 dated October 31, 1946, entitled "Iron Metallurgy of the Japanese Empire", which was prepared by tural Resources Section, General Headquarters, Supreme Commander for the Allied Powers. The report is prefaced by a short but adequate summary.

Enclosures:

Four copies of
Report No. 50.

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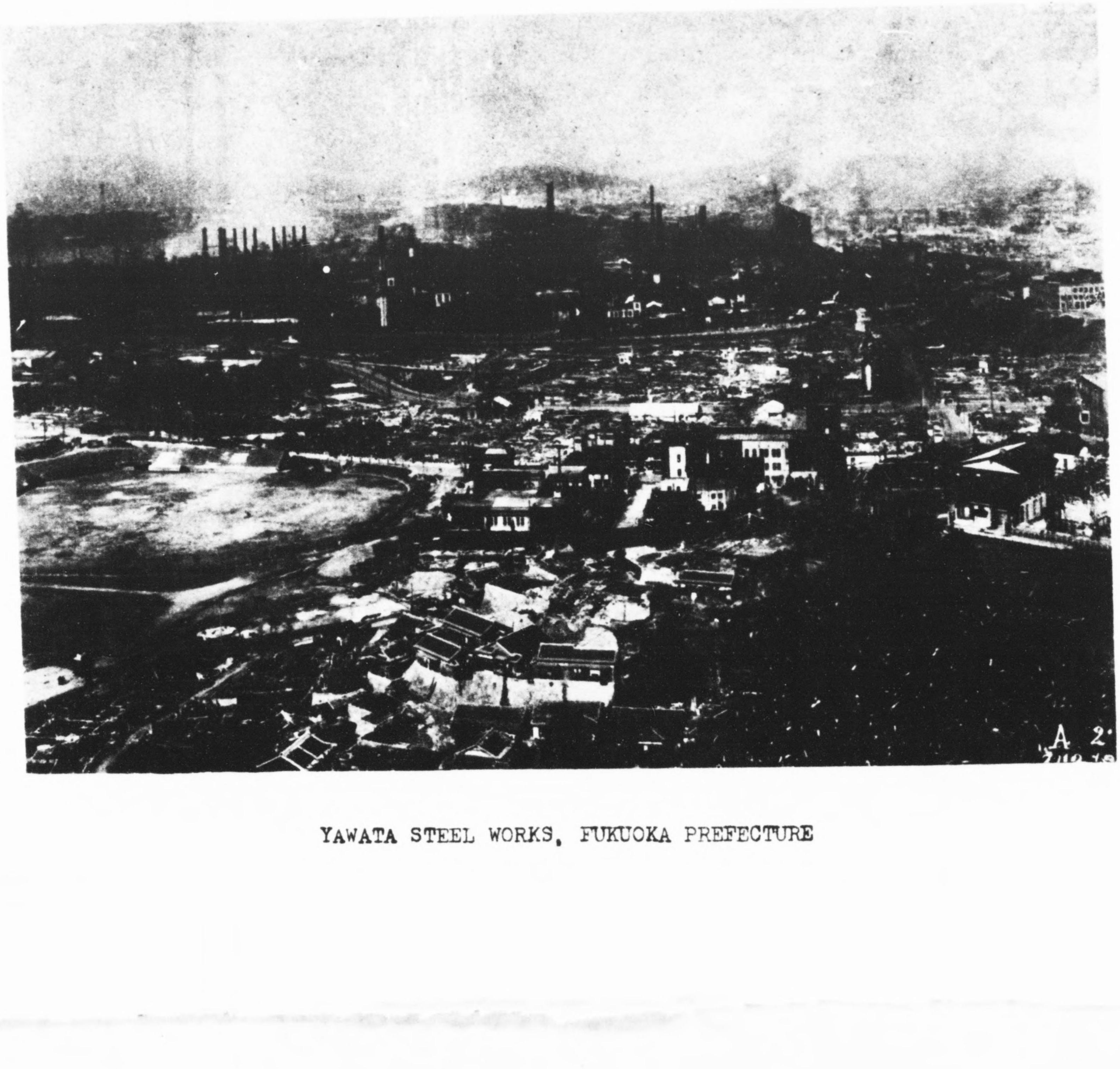
IRON AND STEEL METALLURGY OF THE JAPANESE EMPIRE

GENERAL HEADQUARTERS
SUPREME COMMANDER FOR THE ALLIED POWERS
NATURAL RESOURCES SECTION
REPORT NO 50
TOKYO 1946



YAWATA STEEL WORKS, FUKUOKA PREFECTURE

REPORT NUMBER 50

31 October 1946

IRON AND STEEL METALLURGY OF THE JAPANESE EMPIRE

GENERAL HEADQUARTERS
SUPREME COMMANDER FOR THE ALLIED POWERS
Natural Resources Section

NATURAL RESOURCES SECTION
REPORT NUMBER 50
31 October 1946

IRON AND STEEL METALLURGY OF THE JAPANESE EMPIRE

SUMMARY

1. Although deficient in raw materials for making iron and steel, Japan became one of the ranking steel producers of the world by building processing plants in the Home Islands and importing large quantities of coal, iron ore, scrap iron, pig iron, and semifinished steel. From a production of less than 2,000,000 metric tons of steel in 1931, the industry was expanded to approximately 8,000,000 tons in 1943, the year of peak production. After 1943 production declined and practically ceased with the end of hostilities in 1945. Since then left-over war stocks have been utilized to produce small amounts of domestic products.

2. Expansion also took place in the Japanese dominated countries of Korea and Manchuria with a combined production of an additional million tons of steel. These two countries and north China were important sources of raw materials, especially during 1941-44.

3. Equipment and methods were similar to those used in other steel producing countries. Six installations of major integrated steel plants in Japan accounted for about 90 percent of the production of pig iron and more than one-half of the production of steel. Many small units contributed the remainder with electric furnaces playing an important role.

NATURAL RESOURCES SECTION
REPORT NUMBER 50
31 October 1946

IRON AND STEEL METALLURGY OF THE JAPANESE EMPIRE

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NATURAL RESOURCES SECTION
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IRON AND STEEL METALLURGY OF THE JAPANESE EMPIRE

INTRODUCTION

A. General

1. Iron and steel are fundamentally important to industrial and military power. With steel production as a basic measure of industrial capacity to wage war, Japan s preparation for war manifested itself in the iron and steel industry in the early thirties when production increased each year and more than tripled in ten years, making Japan one of the ranking producers of the world.

2. Being deficient in raw materials for making iron and steel, Japan had to acquire the bulk of its iron ore and much of its coal, pig, and scrap iron from imports. Steel manufacture and fabrication, however, were reserved mostly for the Home Islands, making the industry vulnerable in wartime and basically unsound in peacetime. Before 1941 raw materials were gathered from world-wide sources, and the industry flourished. Plant capacities were steadily expanded and reached a maximum of 6,500,000 metric tons of pig iron and 7,700,000 metric tons of steel annually by 1945. Production increased from 1941 to 1943 when peak production was reached. Depleted stockpiles and lack of raw materials caused production to fall during the succeeding years.

3. Production from mines and plants in dominated Korea, Manchuria, and China augmented Home Island production, but toward the end of the war when this production was needed most by Japan, the lack of shipping prevented its full utilization.

4. China was important as a source of iron ore and coal. Some pig iron was produced in small plants during the late war years. Two large plants in Manchuria having combined capacities of 2,500,000 tons of pig iron and 1,000,000 tons of steel represented a major addition to Japanese production. Combined capacities of large plants in Korea added 730,000 metric tons of pig iron and 300,000 tons of steel so that by the end of the war the Japanese iron and steel empire had constructed capacity for producing 9,748,000 metric tons of pig iron and 9,000,000 tons of steel in large integrated plants. Many smaller plants scattered throughout the empire constituted approximately 2,000,000 tons of additional capacity.

This report was prepared by Mr. Theodore L. Johnston, Scientific Consultant, Mining and Geology Division.

5. In developing the iron and steel industry modern practices of other countries were closely studied and followed. German and American technical ability and equipment played a large part in the program. However, the Japanese had competent furnace technologists who were capable of obtaining proper equipment performance. They had facilities to build all types of equipment necessary for the industry. For the most part, the standard practices used consisted of producing pig iron from ore in blast furnaces and then refining pig iron into steel in open-hearth furnaces. Labor saving equipment for handling materials is not as evident as in the United States. The exigencies of war caused the adoption of many small scale and costly methods which are not used elsewhere except under extremely favorable circumstances.

6. Maximum production was reached in 1943 when 6,313,000 metric tons of pig iron and 8,783,000 metric tons of steel were produced in Japan, Korea, and Manchuria.

7. The industry declined after 1943 and practically ceased operations with the end of hostilities in 1945. Production since has been the manufacture of domestic peacetime products utilizing left-over war stocks. Peacetime production of pig iron and steel depends primarily on coal product on which has been considerably below normal since hostilities ceased

B. Resume of Japan's Iron and Steel Empire

1. Iron Ores

a. Production of pig iron depends on an adequate supply of iron ores and coal. While Japan produced some iron ore, most of the supply was imported. Imports from Korea were continuous and reached a maximum of 760,000 metric tons in 1941; Manchuria supplied minor amounts. The Dungun, Lankao, and Kemaman mines in British Malaya were the largest source of supply up to 1941. Three mines in the Philippines also contributed over 500,000 metric tons yearly during the seven years before 1941. After 1941 the Ryuen and Hainen mines in north China supplied the major part of imported ores. Over 80 percent of all ores used up to 1942 was imported.

b. Production from domestic mines increased as imports decreased and reached a maximum of approximately 4,368,000 metric tons in 1944. Of the total domestic iron ore produced during 1925-45, two principal mines accounted for approximately 70 percent; the Kuchan limonite mine in Hokkaido and the Kamaishi magnetite mine in northeastern Honshu. Other smaller deposits of magnetite, hematite, and limonite scattered over the islands accounted for the remainder. In addition to the tabulated tonnage appreciable amounts of iron bearing beach sands and pyrite calcines were used during the latter part of the war.

c. Imports and domestic production for 1925-45 are shown in Table 1. The fiscal year is from 1 April to 31 March.

2. Coal and Coke

a. Japan is comparatively rich in coal deposits and produced a large tonnage each year. Normally about 10 percent of the coal production is used by the iron and steel industry, but during the war more than 15 percent was consumed for that purpose. Domestic coal was mixed with imported coal to produce suitable coke for blast furnace use. Domestic coal alone yields structurally inferior coke and its wider use during the end of the war contributed to decreased pig iron production. Imported coals came from Manchuria, China, Korea, Formosa, French Indo-China, Canada, England, India, and South Sakalin.

b. Of the total coal allotted to the iron and steel industry, about 60 percent was used to make coke and the remainder for generating electric energy and gas for heating and other processing.

c. The extent of the coal industry and its relation to coke for iron and steel making is illustrated in the tabulation of imports and domestic production in Table 2.

d. Imported and domestic coal were blended to produce better coke than could be made from domestic coal alone. The average yield of coke was 60 percent of the coal.

e. All coke ovens are the vertical slot type and essentially the same as the Koppers standard oven used in the United States. By rearranging the flue systems the Japanese claimed better temperature distribution and easier construction, and renamed the systems Kuroda, Ohno, and others, according to the designer.

3. Pig Iron

a. Japan also imported large amounts of pig iron, principally from Korea (Kenjiho and Seishin), Manchuria (Showa and Penshihu), and British India as shown in Table 3.

b. Approximately 95 percent of the home production was from large type blast furnaces. During the war considerable effort was made to augment blast furnace production by the use of small blast furnaces, rotary kilns, electric furnaces and charcoal furnaces.

4. Scrap Iron

a. Modern steel making practice in most countries consists of refining pig iron with scrap iron in open-hearth furnaces. The proportions of pig iron and scrap used in these furnaces depend on the supply of scrap and usually range within 10 percent of being one-half each. The practice in Japan varied from 65 percent scrap and 35 percent pit iron prior to the war to 30 percent scrap and 70 percent pig iron during the latter part of the war when imports were cut off and stockpiles depleted. Lack of imported scrap and use of inferior domestic scrap contributed to decreased steel production and inferior steel during the latter years of the war.

b. Scrap iron imports and domestic production are listed in Table 4. Domestic scrap iron consisted of market scrap and self-generated scrap from iron and steel works. Of the scrap imports during 1925-45, 67 percent came from the United States; 9,384,000 metric tons or 58 percent was shipped during 1934-40, inclusive.

c. In addition to major raw materials, manganese ore and fluorite were imported. However, Japan is self-sufficient in good quality limestone, dolomite, and fire-clay and used large quantities of each in the iron and steel industry.

5. Steel

a. Scrap and pig iron were used in about equal quantities to make steel. All ordinary carbon steel, with the exception of 4.7 percent which was made in Thomas basic converters, was made in open-hearth furnaces. The production of alloy steel in electric furnaces increased considerably during the war years and amounted to approximately 25 percent of the total production in 1943, the year of peak production.

b. Most of the ordinary carbon steel was produced in the large integrated plants where molten pig iron from blast furnaces was refined with scrap in open-hearth furnaces. In some cases cast pig from blast furnaces was used cold with scrap iron as the open-hearth charge.

c. Of all the Japanese steel output about 5.8 percent was used for castings, 3.8 percent for forgings, and 90.4 percent for rolled production.

d. In addition to domestic production steel ingots, billets slabs, and sheet bars were imported from Germany, United States, Great Britain, Belgium, and Korea. A summary of domestic steel production and steel imports for 1925-45 is listed in Table 5.

e. Annual domestic production plus imports of iron ore, scrap iron, pig iron, and steel are shown graphically in Figure 1.

f. The location, with number of units and annual capacities, of major iron and steel plants in Japan, Korea, and Manchuria are shown on the accompanying map.

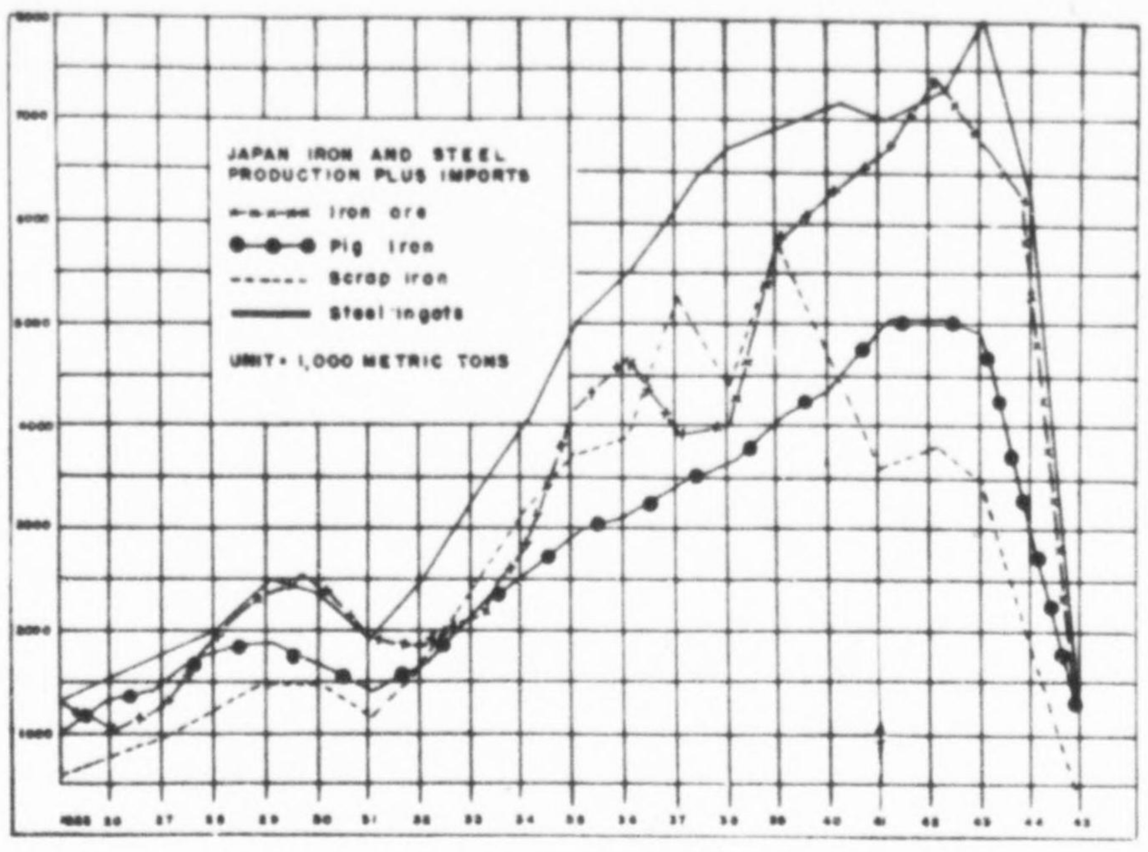

Figure 1

IRON AND STEEL METALLURGY OF JAPAN PROPER

A. General

1. All of Japan's major iron and steel plants are seaboard plants, the majority of them being on the southeast coast of Honshu and the northern tip of Kyushu (Figure 2). Only two plants, Kamaishi and Muroran, are situated near iron mines. More than 90 percent of the major plants are in five districts. Yawata, the "Pittsburgh of Japan", ranks first with 37.5 percent of the pig iron capacity and 32.3 percent of the steel capacity. Distribution of capacities in districts is shown in Table 6.

2. With Yawata (Figure 3) as a nucleus the Japan Iron Manufacturing Company (Nippon Seitetsu KK) was formed in 1934 by consolidating several important companies including two in Korea. Similarly, but on a smaller scale, the Japan Steel Tube Company (Nippon Kokan KK) (Figure 4) which was founded in 1912 grew to a dominant position. Between the two, 89.3 percent of the pig iron and 65.7 percent of the steel capacities of the Home Islands were controlled as shown in Table 7.

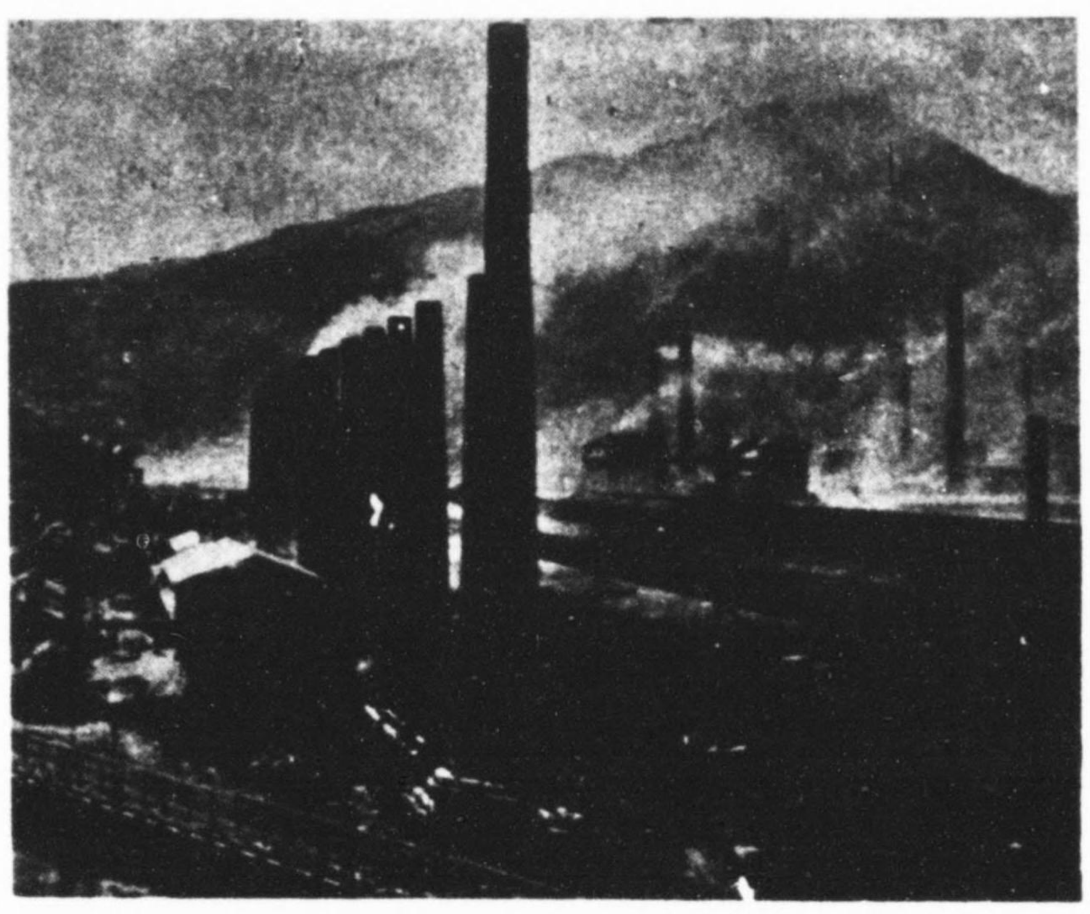

Figure 3. - Yawata Steel Works

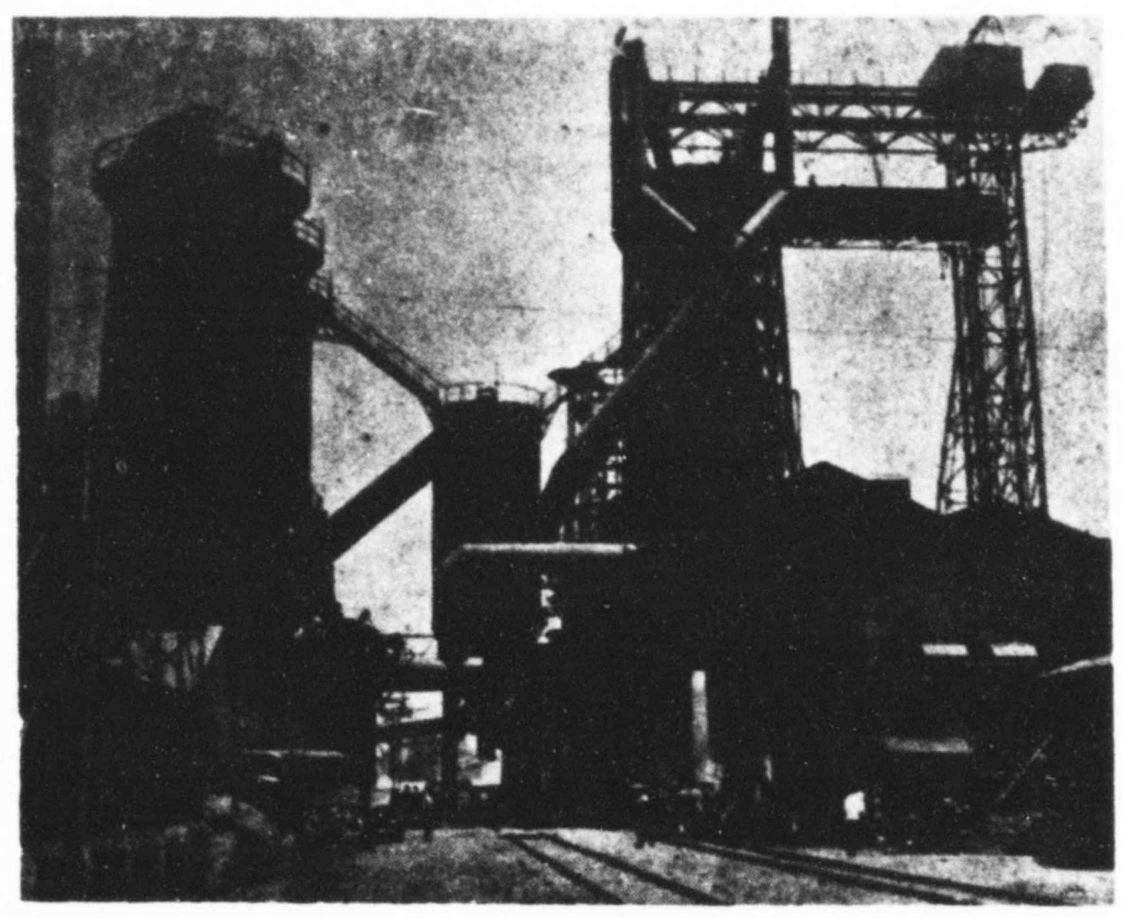

Figure 4. - Blast Furnace at Kawasaki Plant

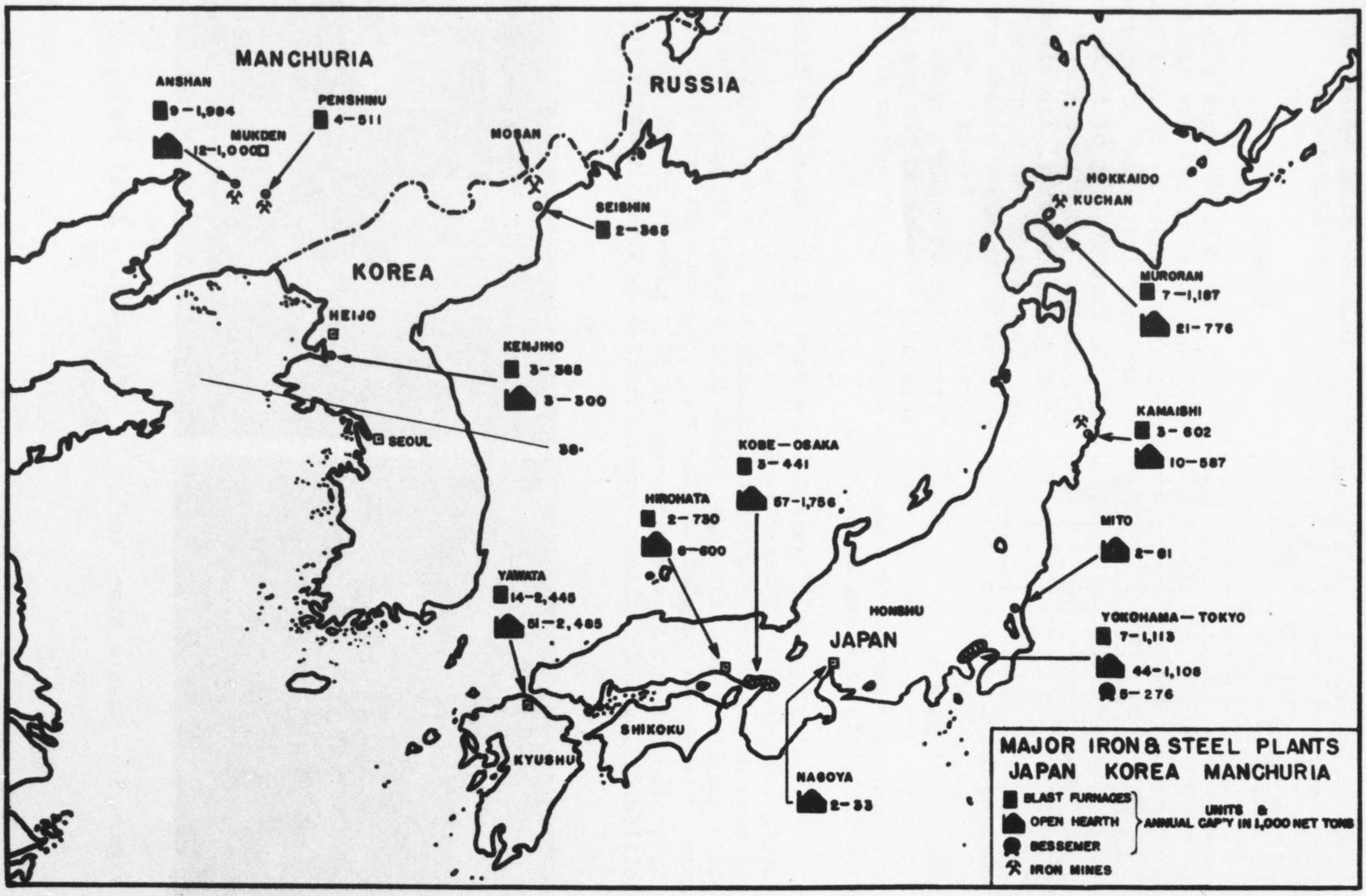
MANCHURIA
ANSHAN
9-1,984
12-1,000
MUKDEN
PENSHINU
4-511
RUSSIA
MOSAN
SEISHIN
2-365
KOREA
HEIJO
KENJIHO
3-365
3-300
SEOUL
38°
HOKKAIDO
KUCHAN
MURORAN
7-1,187
21-776
KAMAISHI
3-602
10-587
KOBE—OSAKA
3-441
57-1,756
HIROHATA
2-730
6-600
MITO
2-61
YAWATA
14-2,445
51-2,465
HONSHU
JAPAN
YOKOHAMA—TOKYO
7-1,113
44-1,108
5-276
SHIKOKU
KYUSHU
NAGOYA
2-33
MAJOR IRON & STEEL PLANTS
JAPAN KOREA MANCHURIA
BLAST FURNACES
OPEN HEARTH
BESSEMER
UNITS & ANNUAL CAP'Y IN 1,000 NET TONS
IRON MINES

Figure 2

Figure 5. - Blast Furnace at Kamaishi Hit by U S Navy Shell

3. Bombing and naval bombardment damaged about 20 percent of the iron and steel equipment in Japan. The main steel works at Yawata escaped with only slight damage to one of the coke ovens although the town was severely bombed. Two plants in Osaka were practically destroyed. The Kawasaki and Tsurumi plants near Yokohama suffered direct hits on open hearths, and four blast furnaces were put out of commission. The entire Kamaishi plant suffered damage from Navy guns (Figure 5). Muroran and Wanishi were also shelled but damage was slight. Fear of being bombed caused the workers to abandon their jobs, creating another handicap to the industry.

B. Major Pig Iron Production

1. Approximately 94 percent of the pig iron of Japan was produced in blast furnaces of 200 metric tons or more daily rated capacity. The remainder was produced in small blast furnaces, rotary kilns, brick kilns, and electric furnaces.

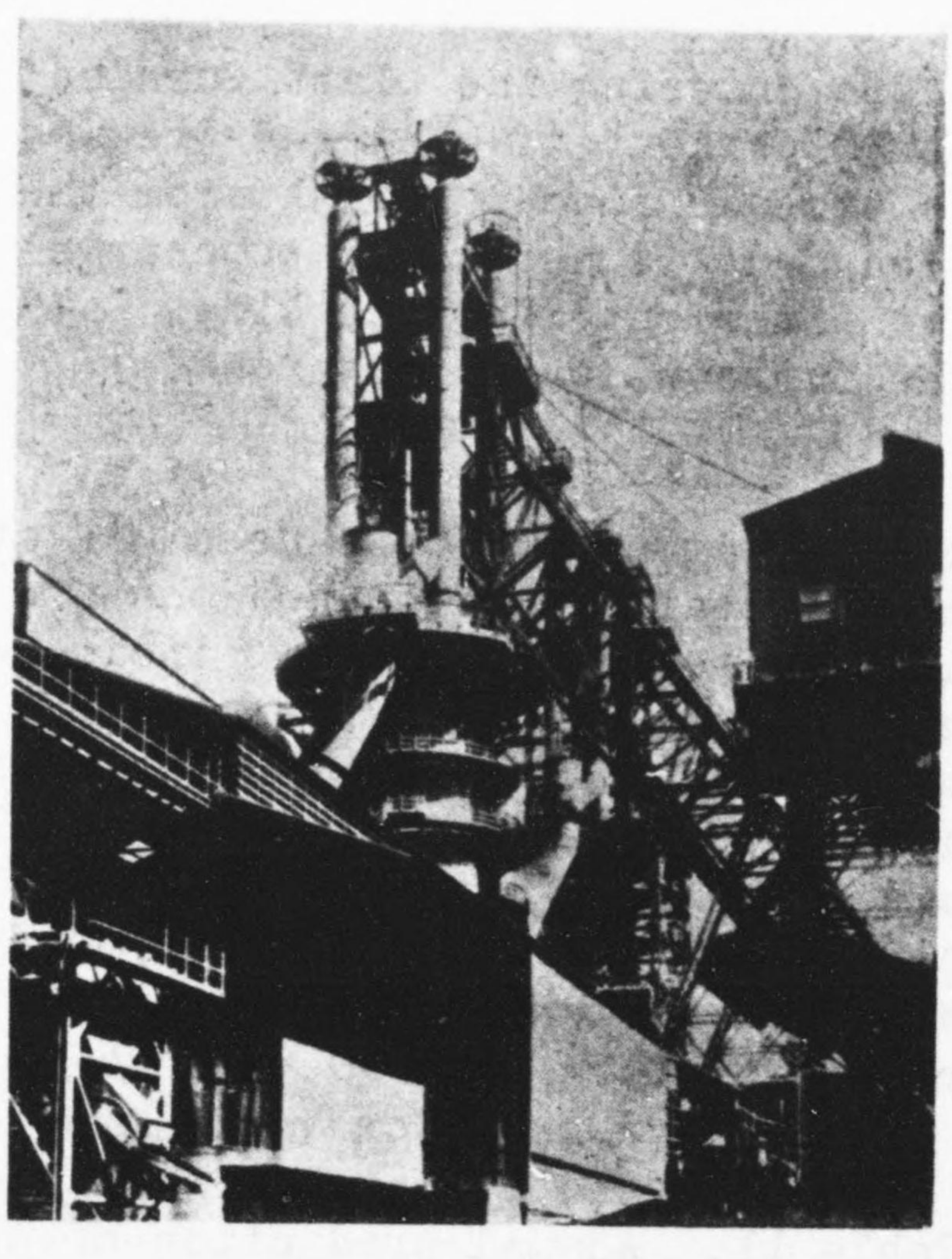

Figure 6. - Blast Furnace at Yawata

2. Expansion of the industry from 15 stacks, with a rated daily capacity of 3,800 metric tons in 1930-36, to a rated daily capacity of 17,850 metric tons in 1944 was accomplished by erecting new furnaces (Figure 6) and rebuilding old ones. A summary of the blast furnace installations, rated capacities, and the condition of each furnace one year after the end of hostilities is shown in Table 8. After August 1945 many of the blast furnaces were banked and have been banked since then in expectation of resumption of operations. A study of the effects of extended periods of banking is being made and is of interest to American furnace operators who have experienced only short banking periods.

3. Production of pig iron and rated capacity of blast furnaces are normally the same; however, under perfect conditions production exceeds rated capacity. Annual rated capacity is daily rated capacity multiplied by 365. A year by year comparison of production and capacity shows that plant expansion exceeded the supply of raw materials. Up to 1937 full capacity was utilized, but from then on over-expansion increased, and blast furnace efficiency decreased to below the normal efficiency of 85 percent as shown in Table 9.

4. Operation of blast furnaces was complicated by the variety of ores smelted. The principal difficulty was due to the excessive amount of fine-sized ore used, especially during the latter part of the war when low-grade domestic ores were largely substituted for high-grade imported ores. Domestic, soft limonite was used extensively and was supplemented by lesser amounts of pyrite calcines and iron beach sands all of which were sintered before charging to the blast furnaces. Fine ore is mixed with fine coke (coke breeze) and limestone and the mixture ignited and heated until semi-fusion takes place. The sintering operation is performed in special machines of various designs but based on the same principle and yielding similar products. The Dwight and Lloyd type is a continuous machine of large capacity, while the Greenawalt and A I B types are batch machines of smaller capacities. The Japanese preferred the batch type because of its simple design and operation. Table 10 lists the installations of sintering machines in Japan.

5. Normally 20 percent of the ore entering the blast furnace was sintered, but during 1944 as much as 60 percent of sintered ore was used at some plants. Despite efforts to exclude fine material from the burden, the demand for pig iron production made it necessary to charge all ores possible, resulting in excessive fines entering the blast furnace and forming accretions within the furnace, which retarded smelting.

6 When good coke was available the amount of coke used was at a ratio of one to one. As imports of coking coal decreased and the use of domestic coal and ores increased, the coke to pig iron ratio increased to as high as 1.6 to 1. All blast furnace plants maintain by-product coke ovens. Many other coke ovens were located at gas works and chemical plants. Coke used in blast furnaces was first screened to eliminate all under ½-inch in size. A typical analysis of lump coke used in blast furnaces showed 18 percent ash, 80 percent fixed carbon, 1 percent volatile matter, and had the following physical characteristics; 41 percent porosity, specific gravity 1.8, 1.5 percent moisture, and 90 percent lump by crushing test. The undersize (coke breeze) was used for various other purposes including sintering. Details of coke ovens situated at principal blast furnace plants are shown in Table 11. Annual production of pig iron by major plants is detailed in Table 12. A flow scheme of a typical integrated steel plant is shown in Figure 7.

FLOW SCHEME OF TYPICAL INTEGRATED STEEL PLANT IN JAPAN

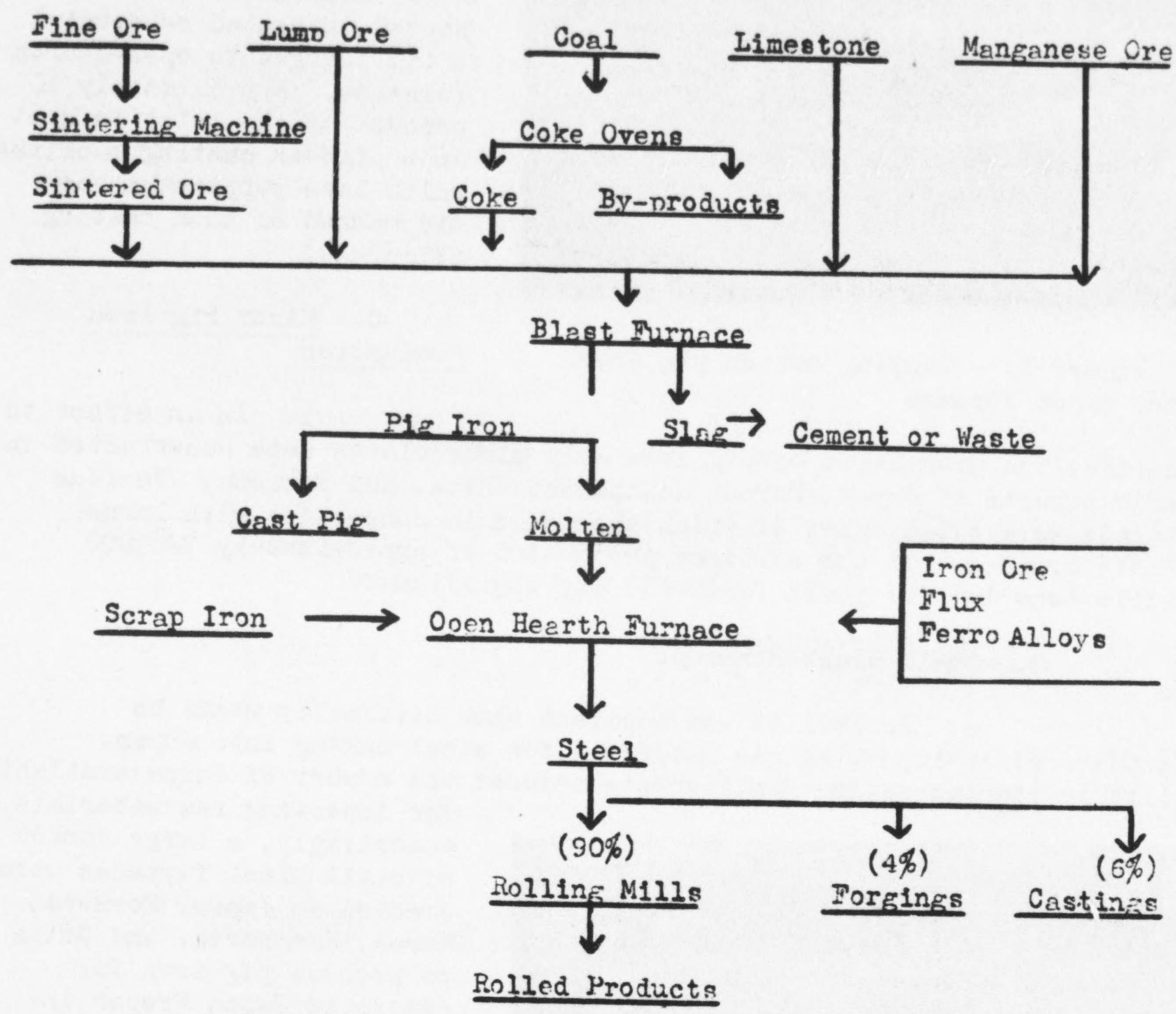

Figure 7

7. Limestone was used in the blast furnace burden in the ratio of 0.63 limestone to 1.0 pig iron. The lime of the limestone fluxes the silica in the ore, yielding a slag which is normally at a ratio of 1.2 lime (CaO) to 1.0 silica (SiO_2). Sufficient manganese ore is added to the burden to yield pig iron with 1.5 percent manganese.

Figure 8. - Tapping molten pig iron from Blast Furnace

8. Normally, molten pig iron (hot metal) is tapped from the blast furnace (Figure 8) into ladles and conveyed to the steel department where it is stored in heated reservoirs until charged to open-hearth furnaces. Approximately 10 percent of the total is cast into pigs in casting machines which have supplanted the old method of sand casting (Figure 9).

C. Minor Pig Iron Production

1. In an effort to increase the production of pig iron many minor plants were constructed in various parts of Japan, Korea, Manchuria, China, and Formosa. Various methods were tried, none of which succeeded in comparison with large blast furnaces, but the combined production of approximately 725,000 metric tons in five years (1940-45) was significant.

2. Small Blast Furnaces

a. In 1941 it was apparent that difficulty would be encountered in importing raw materials for steel making into Japan. Military transportation requirements reduced the number of ships available for importing raw materials. Accordingly, a large number of small blast furnaces were erected in Japan, Formosa, Korea, Manchuria, and China to produce pig iron for export to Japan Proper instead of ore and coal. These furnaces were of standard 20 metric tons per day capacity and were built of simple materials requiring a short construction period. Usually they were situated near iron mines and erected in groups with hot stoves and beehive coke ovens in connection.

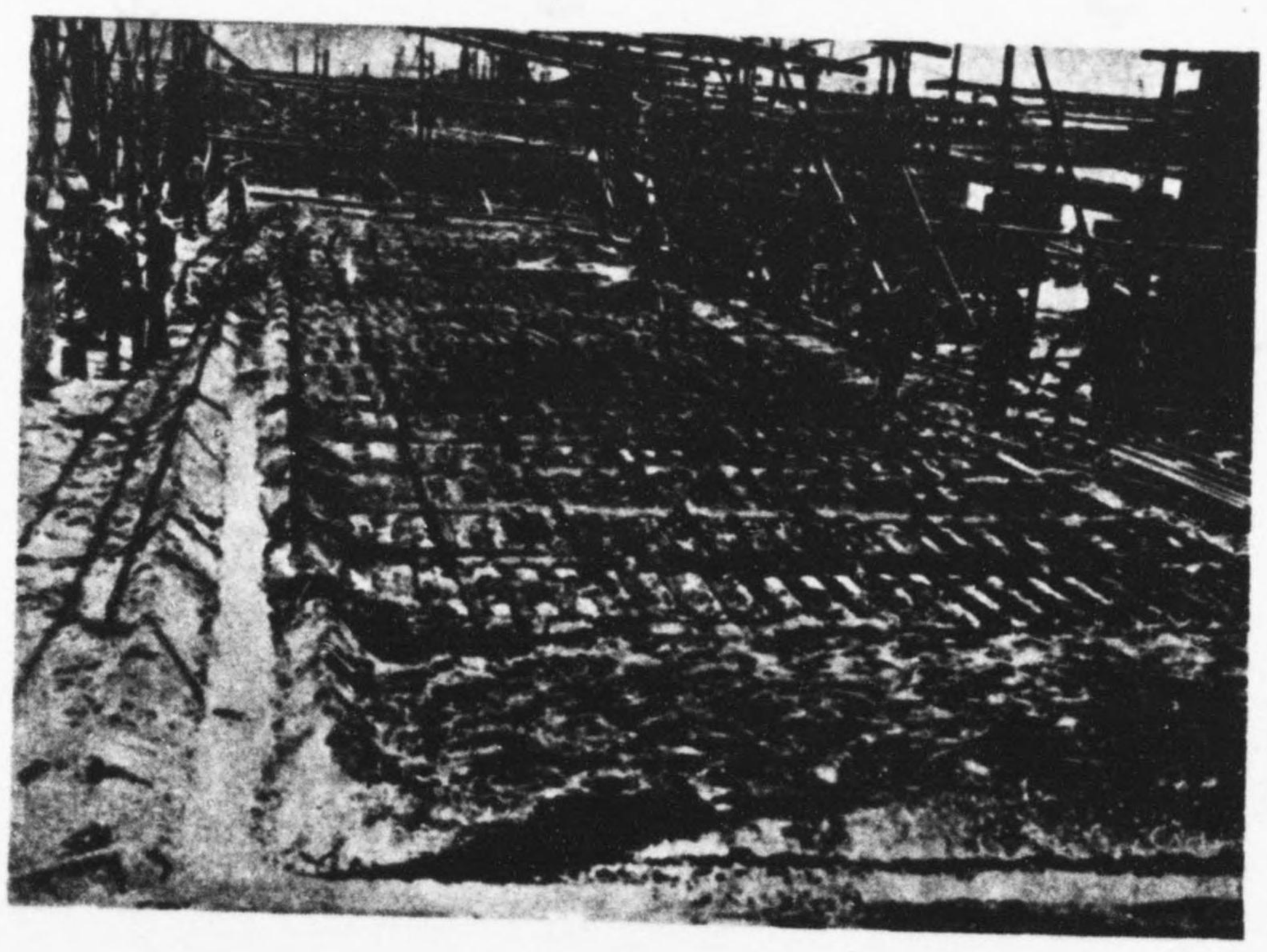

Figure 9. - Sand Casting Pig Iron

b. Plans were to erect 197 of these furnaces with a capacity of 1,000,000 metric tons of pig iron per annum. A total of 151 were constructed, of which 113 operated and produced 110,000 metric tons of pig iron in 1943, 281,000 metric tons in 1944, and 12,000 metric tons in 1945.

c. Operation of these furnaces encountered many difficulties, such as too small blast, inadequate hot stoves, failure of Korean anthracite as a substitute for coke, shortage of furnace technologists, and shortage of raw materials.

d. The pig iron made in these furnaces was of poor quality. High in phosphorous and silicon, it was unfit for steel making and was used in castings only. At the end of hostilities in 1945 a large part of the production was piled at the producing plants and at wharves waiting for shipment so that the benefit derived from the venture was less than the effort expended. A summary of the small blast furnace construction and production follows:

SMALL BLAST FURNACES

Location	Number of Furnaces			Production (metric tons)			
	Planned	Erected	Operated	1943	1944	1945	Total
Japan	21	17	17	30,600	10,400	ND	41,000
Korea	80	59	39	31,471	95,133	12,562	139,166
Formosa	6	6	6	4,244	12,133	ND	16,377
Mongolia	17	14	8	7,407	16,687	ND	24,094
North China	53	43	35	33,268	138,272	ND	171,540
Central China	20	12	8	3,763	8,541	ND	12,304
TOTAL	197	151	113	110,753	281,166	12,562	404,481

ND: No data available

3. Rotary Kilns (Sponge Iron)

a. Probably the most successful substitute for pig iron was the production of sponge iron (Luppe) in rotary kilns (Figure 10). For many years Japan had studied and investigated methods for recovering iron from soft limonite ores and iron beach sands. The French Bassett and the American Thornhill-Anderson methods were both tried and discarded. Finally in 1938 the German Krupp-Wren process was adopted and eight plants were erected in Japan, one in Korea, and one in Manchuria. This process consists of heating a mixture of iron ore and coal in a rotary kiln and producing iron pellets mixed with slag. The iron pellets are cleaned of slag and used as melting stock to make steel. The process is adaptable to low-grade ores and coals, but costs are high and the product is generally

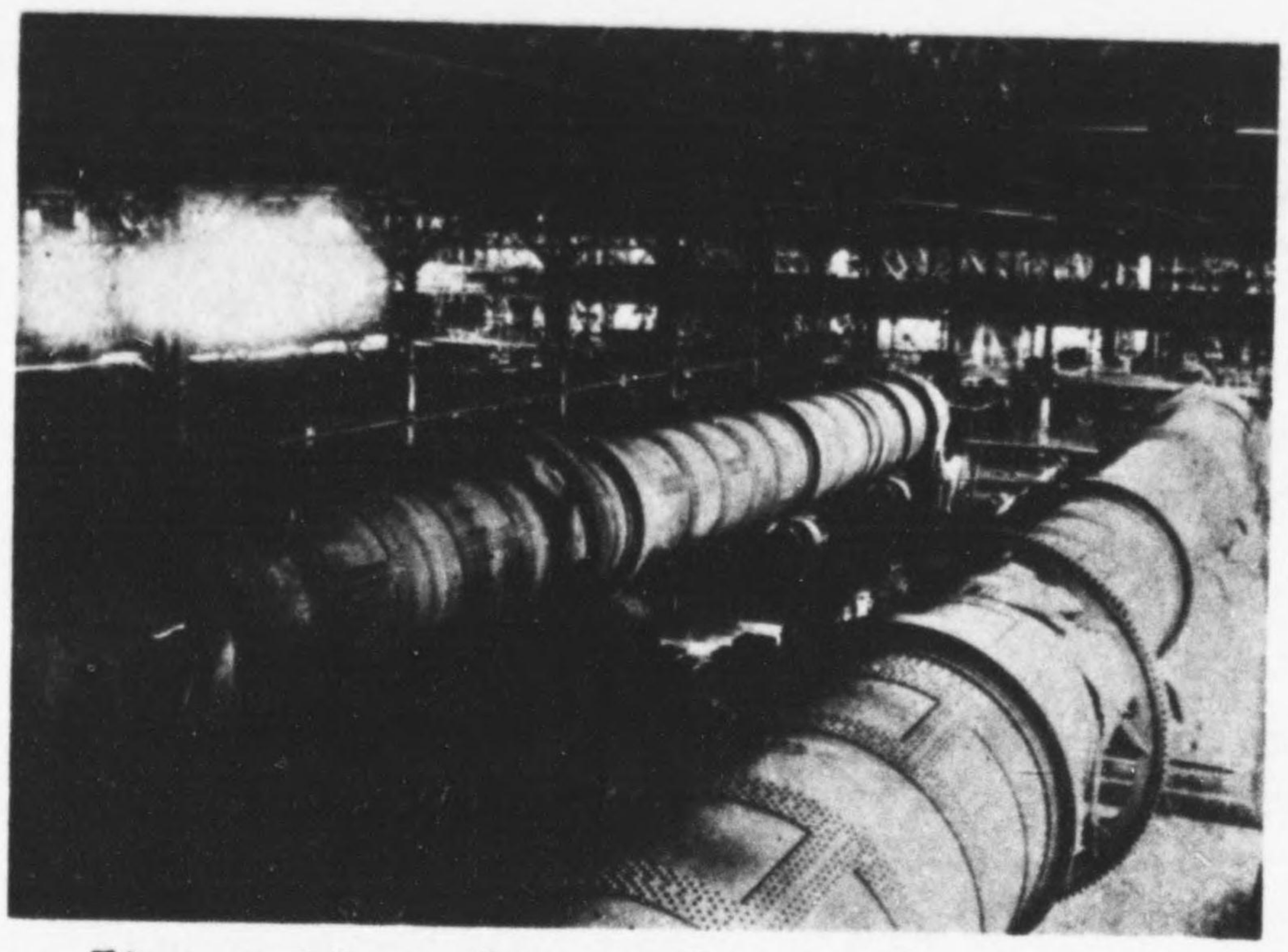

Figure 10. - Rotary Kilns of Sponge Iron Plant

inferior to pig iron made in blast furnaces. Rotary kilns similar to those used in the cement industry are used for sponge iron.

b. Three small and 16 large rotary kilns were installed in the eight plants erected in Japan. All of these plants used anthracite coal for reducing the ore and subbituminous coal for firing the kilns. Ores used were mostly low-grade local limonite. Iron beach sands were tried but discontinued because of their titanium content.

c. Typical operation of rotary kilns consisted of charging a mixture of 100 parts iron ore, 55 parts anthracite coal, and 10 parts limestone into the kiln at 3 metric tons per hour. As the charge passed through the kiln, the reaction between the anthracite coal and iron yielded metallic iron and semifluid slag at a temperature of 1350° C in the discharge end of the kiln. The kiln product was quenched with water on leaving the kiln, then ground in a ball mill, screened, and magnetically treated to recover the iron pellets (Luppe) from the slag. The finished product, 80 percent smaller than 1/8-inch, was then melted with scrap iron and refined into steel in electric arc furnaces. It was seldom used in open-hearth furnaces.

d. Kiln operation was often interrupted by the formation of rings of accretions within the kiln near the firing end, by excessive wear on the brick lining, and by warping of the kiln.

e. Beginning in 1939 production increased to almost 100,000 metric tons in 1944 although rated capacity was not reached. Although cost per metric ton of product was high, this was partially offset in several cases by the recovery of nickel and chromium in the ore.

f. Data and information regarding rotary kiln plants are shown in Table 13; annual production is listed in Table 14.

4. Brick Kilns (Sponge Iron)

a. Sponge iron was also made in brick kilns by the Hagenas or Sagger method in which fine-sized ore is mixed with about six percent lime, formed into cakes and placed in fire clay containers with coal or coke. The containers (saggers) were piled in brick kilns and heated to about 1250° C for 24 to 30 hours, during which time the iron ore was reduced to metallic iron. When cooled the iron cakes were removed and used as melting stock for making steel. The use of the method on low-grade Japanese ores resulted in a poor-grade iron which was used with scrap iron in making steel in electric furnaces.

b. Production was so erratic and the product so unsatisfactory that complete records were not kept. It is estimated that the total amount of iron produced by this method did not exceed 10,000 metric tons. This method has had considerable application in Sweden where high-grade ores and charcoal were used and premium-grade iron produced.

5. Others

a. Various methods of making iron in electric furnaces were used, and although the amount produced was not large, the methods further illustrate the desperate attempts made to obtain more iron.

b. Notable is the high frequency electric (Kikuchi) method in which a high-frequency current is passed through a mixture of iron ore, coal, and limestone which produces pig iron in ten minutes. The process is a batch method and yields only small amounts per batch. However, the investment is small and the method adaptable to Japanese industrial conditions The product is a bar of crude pig iron which is converted into steel in electric arc furnaces. It has been found that low-frequency current will serve as well except that it takes 30 minutes instead of 10 minutes for the reaction, and the carbon content of the resultant iron is higher.

c. Five plants used this method in Japan. Their total production up to the end of hostilities was approximately 65,000 metric tons.

d. Another type of electric furnace employed, called the "open furnace", consisted of an open crucible or hearth in which a charge of ore and coal was smelted by the heat generated from the arc of three electrodes immersed in the charge. Production was small and operations difficult.

D. <u>Steel</u>

1. Considering 1943 steel production as characteristic of Japanese practice, the records show that about 86 percent was ordinary carbon steel and the remainder alloy steel. Most of the ordinary carbon steel was made in open-hearth furnaces and Bessemer converters while the major part of the alloy steels was made in electric arc furnaces. Japan is equipped and able to make all types of steel ingot in sizes to 150 metric tons. The latest developments in equipment and techniques of other countries were closely studied and applied wherever possible in Japan.

2. Open-Hearth Furnaces

a. At the end of hostilities Japan had 193 open-hearth furnaces with a rated annual capacity of 7,426,000 metric tons of steel. Annual effective capacity is calculated at 680 heats per annum. These furnaces ranged in size from small ones with a capacity of 10 metric tons of steel per heat to large tilting furnaces with a capacity of 200 metric tons per heat. The Japan Iron Manufacturing Company, represented by its four large plants, controlled 67 furnaces with over 50 percent of the total capacity. Many small furnaces were operated by independent companies situated in the Osaka-Kobe area. Table 15 lists the open-hearth steel plants in Japan with number of furnaces and capacities.

b. Open-hearth steel making practice is similar to that used in the United States. Scrap iron is first charged to the furnace, followed in a short time by an equal amount of hot pig iron from the blast furnaces. Refining takes about six hours, during which time ore and fluxes are added as needed until the desired specifications are obtained. When finished the heat is tapped into ladles (Figure 11) followed by teeming into ingot molds. A typical example of steel from open-hearths shows C,0.11%; Mn, 0.4%; S,0.034%; P,0.024%; and Si,0.21%. Slag from the same operation shows SiO_2,12.1%; P_2O_5,3.24%; Fe,16.4%; Fe_2O_3,6.3%; Al_2O_3,1.1%; MnO,4.4%; CaO,45.0%; and MgO,8.9%. In the steel plants where hot metal is not available, cold pig iron is charged with scrap iron, thus prolonging the time of refining. Small plants use producer gas for heating open hearths, while in the large integrated plants coke oven gas is used.

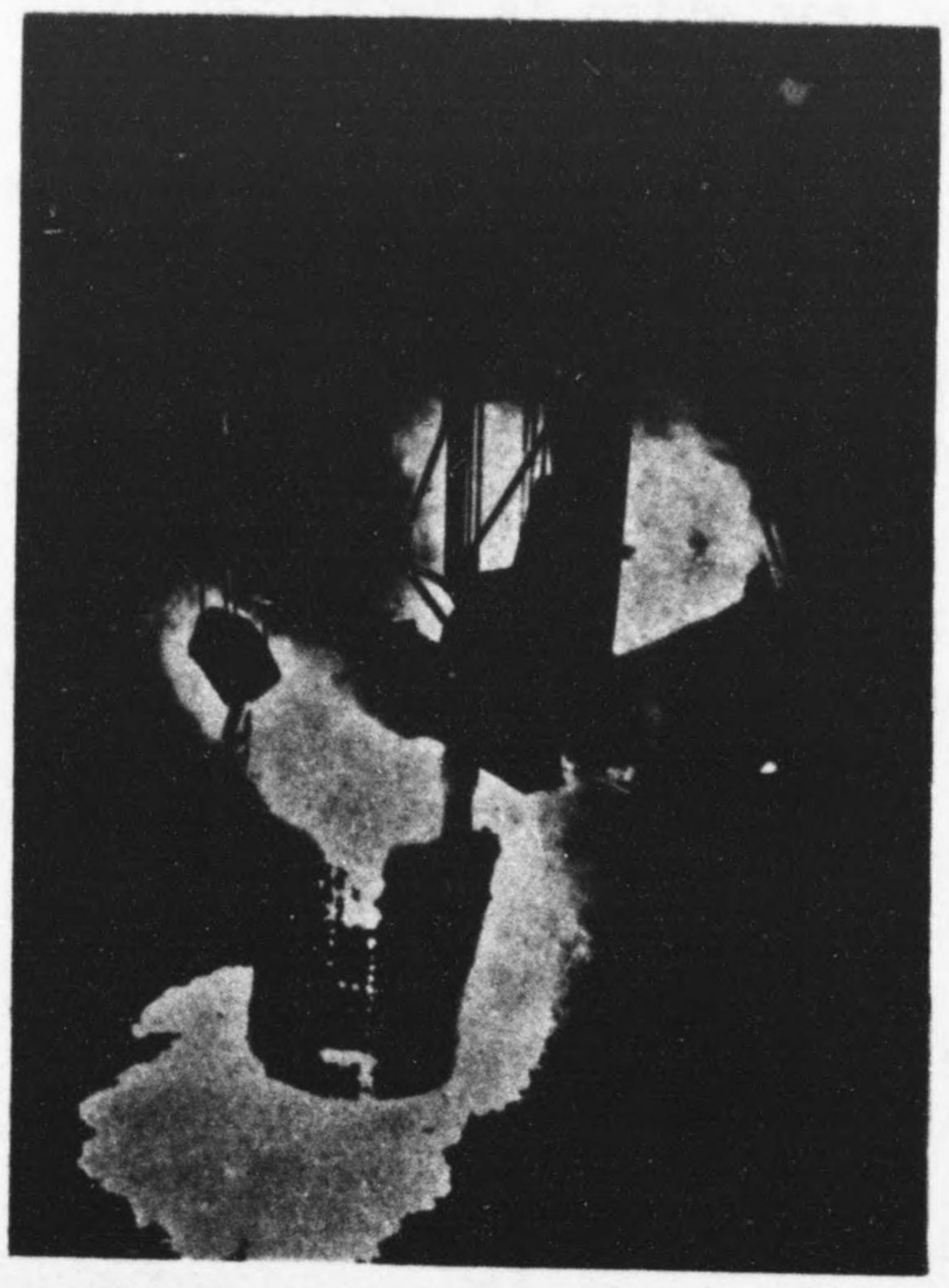

Figure 11. - Tapping Steel from Open-Hearth Furnace into Ladle

c. All major steel plants had mixers or reservoirs for storing hot pig iron from blast furnaces. In a few cases active mixers were used to refine partially the pig iron before charging to the open-hearths.

d. Annual production of steel ingots in major plants during 1926-44 is listed in Table 16.

3. Bessemer Converters (Thomas)

a. The installation of five 20-metric ton basic Bessemer converters (Figure 12) at the Kawasaki plant of the Japan Steel Tube Co is the only one of its kind in Japan. Three converters in Yawata were removed in

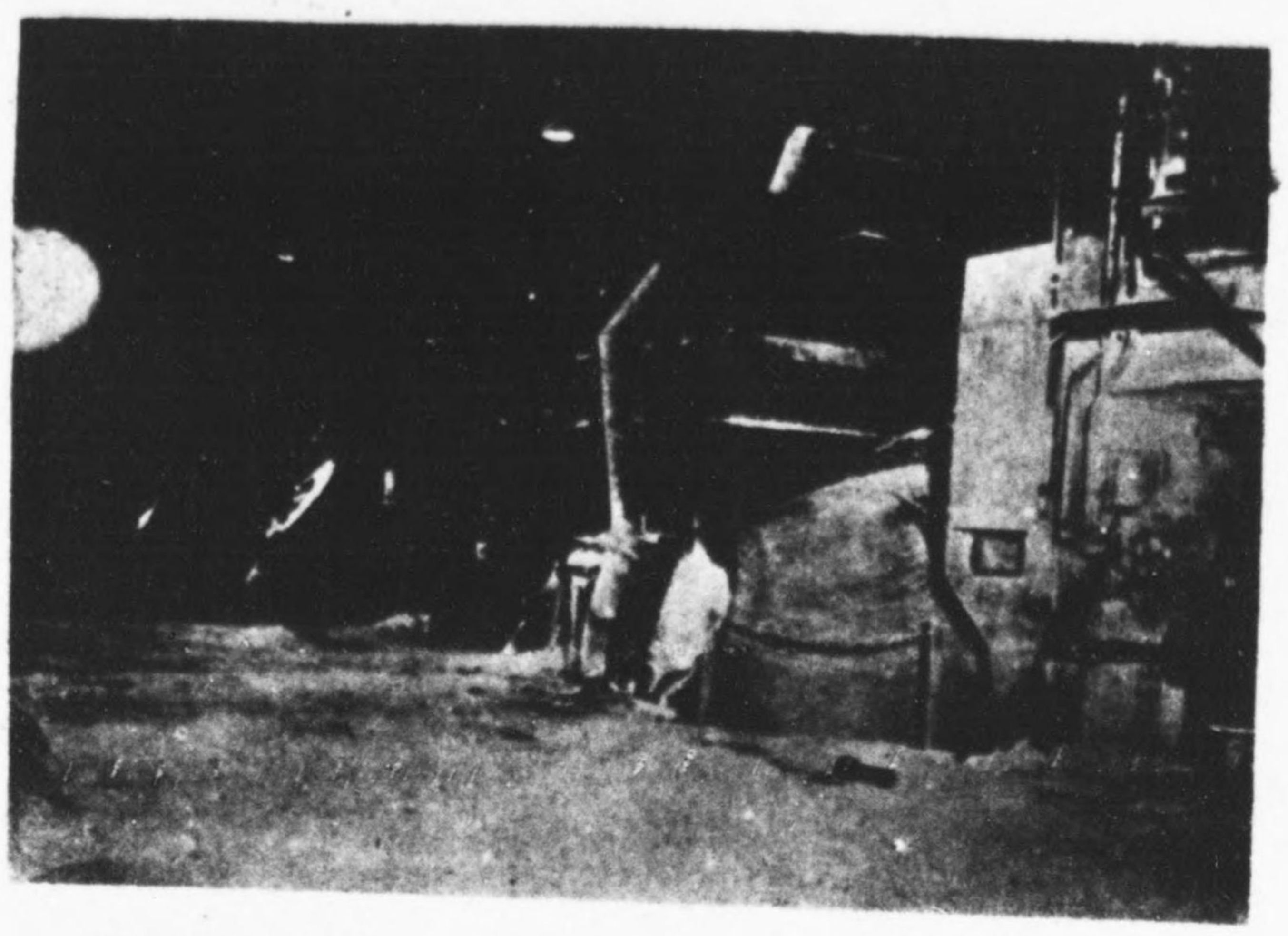

Figure 12. - Bessemer converters

1940. The basic converter process is common practice in Europe for converting high-phosphorous pig iron, made from high-phosphorous ores, to steel. Japanese practice was the same, but when high-phosphorous ores were not available, phosphate rock and open-hearth slag were added to ordinary ore to increase the phosphorous content in the pig iron to about two percent.

b. The Bessemer converter is a large pear-shaped vessel set on trunnions so that it can rotate through a half circle. The vessel is lined with a rammed mixture of dolomite and tar. Numerous small pipes pass through the bottom on one side and provide means of blowing air into the interior.

c. The converting operation consists of blowing air into molten pig iron. The oxygen of the in-blown air oxidizes the carbon, phosphorous, and silicon in the pig iron and generates heat in doing so. The basic lining plus some added lime serve to slag the oxidized elements. The blowing operation requires about 15 minutes and the burning condition of each element is detected by the color of the flame escaping through the spout. When the pig iron is converted to steel the air is stopped and the converter rotated so as to empty its contents into ladles. As the slag is poured off, 10 percent silica sand is added to it to increase the solubility of the phosphoric acid content. This slag contains about 17 percent water soluble phosphoric pentoxide and is a valuable fertilizer. After removal from the converter the slag is chilled, weathered, ground to fine powder, treated magnetically to remove iron and then bagged and marketed as fertilizer (Figure 13). Production of slag for use as fertilizer equaled about one-fourth of the production of converter steel as listed in Table 5 (previously mentioned) Steel made by this process is soft and is used for wire, thin plates, and forgings.

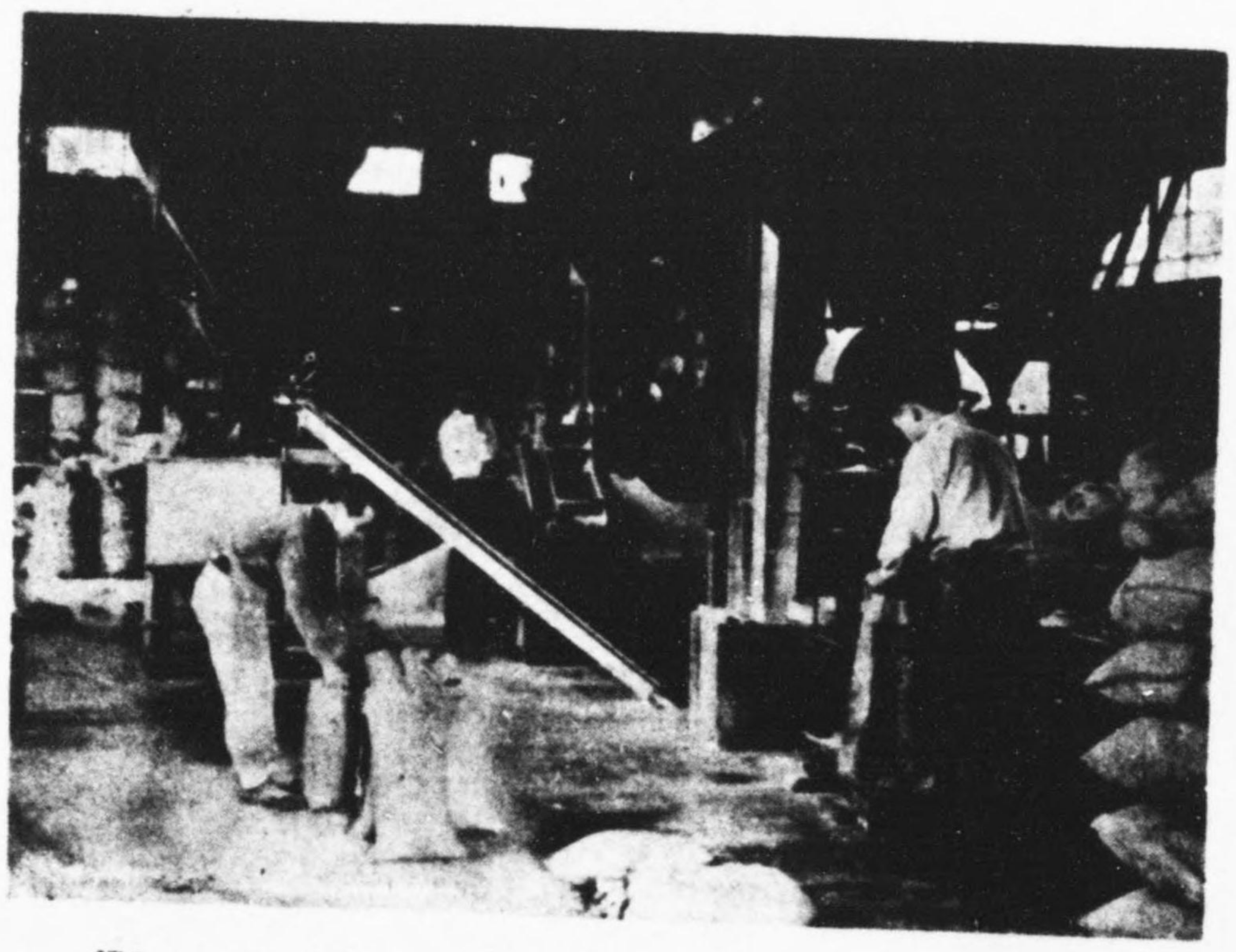

Figure 13. - Bagging Bessemer Slag for Fertilizer Market

4. Electric Furnaces

a. Japan used its cheap electricity extensively in the steel industry. Electric furnaces for making all types of steel were installed in small plants in many localities resulting in 350 companies owning 91 plants containing 441 electric furnaces. The Heroult arc, tilting furnace was the most common and was used in sizes from 1 to 20 metric tons capacity. Induction type furnaces were used for small operations requiring close control. The total capacity of all electric furnaces was estimated to be 2,000,000 metric tons in 1945.

b. Many small plants consisted of one or more electric furnaces in which scrap and pig iron were made into steel which was then cast into $\frac{1}{2}$-ton ingots. These ingots were reheated and rolled or forged into small marketable products in the same plant. In many cases electric furnaces were used for different purposes, in other words, as all-purpose furnaces.

c. In the expansion of the steel industry the increase in production of electric furnaces was outstanding. In 1935 less than four percent of the steel production was credited to electric furnaces; by 1940, it reached 12.4 percent and in 1945, 31.4 percent.

5. Rolling Mills

a. Approximately 90 percent of the Japanese steel output was used for rolled products, four percent for forgings and six percent for castings. All types of rolling mills enabled Japan to produce practically any size of products from thin sheets to armor plate for battleships and from piano wire to heavy rails, structures, and tubes (Figure 14).

b. Japan was able to build rolling mill equipment but in order to take advantage of cheaper costs and to promote more rapid expansion, foreign equipment, chiefly from the United States and Germany, was imported.

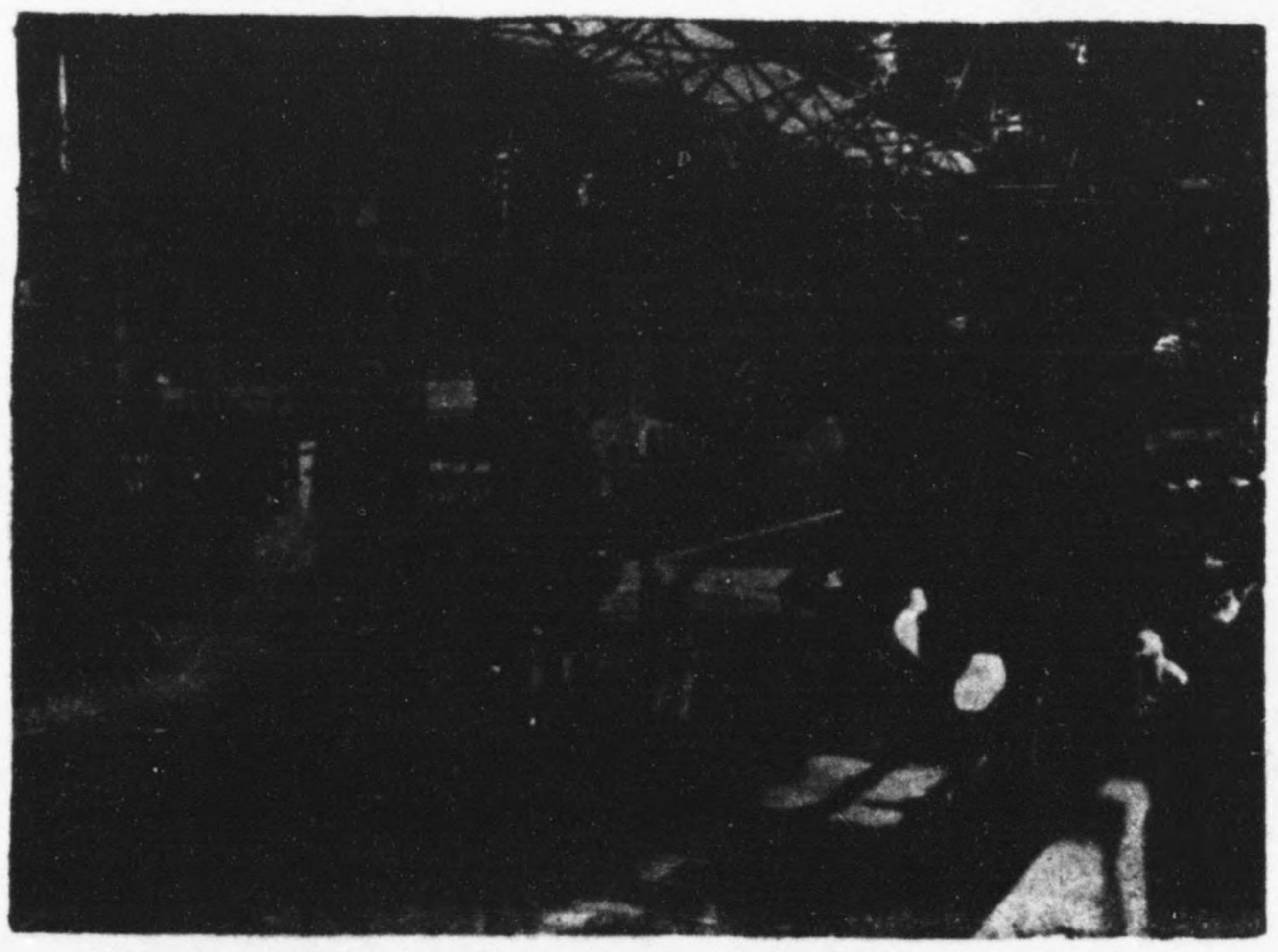

Figure 14. - Rolling Mill

c. Table 17 lists the principal rolling mills in Japan, their capacities, and types of products. Many small plants of minor capacity produced small rolled products which amounted to about 15 percent more than the tabulated list.

d. Table 18 shows the distribution of rolled steel products.

E. Major Iron and Steel Plants in Japan

1. The four large plants of the Japan Iron and Steel Company, Ltd, located at Yawata, Hirohata, Kamaishi, and Muroran, and the uwo plants of the Japan Steel Tube Company at Kawasaki and Tsurumi, represent the backbone of the Japan iron and steel industry. Many smaller companies grew to importance during the war but most of them were low capacity and largely dependent upon the major companies for stocks of iron and steel. A description of the principal iron and steel plants follows.

2. Yawata: Outstanding as the major iron and steel center in Japan is Yawata on the northern tip of the island of Kyushu. It started as a small foundry built under auspices of the Japanese Government in 1880. Its growth consisted of adding various small units from year to year until it reached its present size in 1945 when it contained equipment capable of producing about one-third of the total output of iron and steel in Japan. The Yawata works consist of three communities, Higashida, Fukuoka, and Tobata which contain 12 blast furnaces, 46 open-hearth furnaces, 13 electric furnaces, 7 blooming mills, and 21 miscellaneous rolling mills including the only heavy rail mill in Japan. All types of steel products are produced in the Yawata works.

3. Hirohata: This plant is the newest and most modern steel plant in Japan. Built during 1937-40, it was designed to produce large-size, heavy plate. Equipment consists of two 1,000-metric ton blast furnaces, six 150-metric ton open-hearth furnaces, and the largest continuous plate mill in Japan. The principal products of this plant were heavy armor and ship plate. Pig iron was supplied to small steel plants in the Osaka-Kobe district.

4. Kamaishi: The Kamaishi plant is situated on the northeast coast of Honshu near the Kamaishi iron mine. Like Yawata it was started in 1880 by the Japanese Government with a small furnace and gradually grew to a large integrated steel plant consisting of three blast furnaces, ten open-hearth furnaces, three electric furnaces, one blooming mill, six rolling mills, and miscellaneous equipment. Principal products were pig iron and semifinished steel. Shelling by the U S Navy damaged 70 percent of the blast furnaces, 60 percent of the sintering plant, 50 percent of the open-hearth furnaces, 60 percent of the coke ovens, and 40 percent of the power plant. Part of the damage has been repaired.

5. Wanishi: The Wanishi plant is situated near Muroran on the island of Hokkaido and received most of its ore from the Kuchan mine 50 miles away. It was started in 1909 with part English capital. Principal equipment consits of seven blast furnaces, five tilting type open-hearths one blooming mill, one continuous bar mill, and one wire rod mill. Pig iron is produced in excess of steel requirements; the surplus is sold to

the Japan Steel Works in Muroran. Pig iron, billets, wire rod, and wire are the principal products.

6. Kawasaki and Tsurumi: The Japan Steel Tube Company has a large plant at Kawasaki and a smaller plant at Tsurumi, both near Yokohama. The original Kawasaki Iron and Steel Works was started in 1913 at Kawasaki. It grew to its present size by merging with nine other companies. Principal equipment at Kawasaki consists of five blast furnaces, twelve open-hearths, five Bessemer converters, one blooming mill, three tube mills, one sheet bar mill, and three small rolling mills. Tsurumi has two blast furnaces, eight open-hearths, one slab and plate mill, and three plate and sheet mills. Principal products of Kawasaki are seamless tubes and pipes of all sizes, bars, rods, and fertilizer. Tsurumi produced plates and sheets of all sizes.

7. The Sumitomo Metal Company with its two plants in Osaka and one in Wakayama also ranks as one of the principal producers of steel. This company purchases pig iron and scrap and makes all types of steel in open-hearths and electric furnaces. Principal products are forgings and castings of specialty products.

F. Iron and Steel Associations

1. The Iron and Steel Control Association

a. The Iron and Steel Control Association of Japan was organized in 1941 as a government agency to regulate and control the iron and steel industry. Its mission was to obtain and distribûte raw materials and to distribute finished products, somewhat similar to the function of the War Production Board in the United States.

b. Membership consisted of representatives of the companies engaged in the various phases of production of iron and steel. Members had to be approved by the Minister of Munitions.

c. The Association regulated the steel industry in accordance with the general policy of the Ministry of Munitions. Commissions on transactions within the industry were collected by the Association. The Association was dissolved in January 1946.

2. The Japan Iron and Steel Council

a. The Japan Iron and Steel Council is an independent ornagization composed of representatives of the various companies comprising the iron and steel industry formed in February 1946 for the purpose of unifying and governing the industry. Membership consists of one member of each of the pig iron and steel manufacturers; raw iron and ferroalloy manufacturers each are represented by a group member. All members contribute to the expense of operating the Council on a sales basis. A president and executive committee of nine members are elected from the membership for a three-year term and act as the governing body. The executive committee has power over violators of control measures in that it may impose penal measures on violators in the nature of suspension or reduction of production.

b. The object of the Council is to regulate the iron and steel industry through adjustment of supply and demand, stabilization of prices, obtaining of raw materials, and dissemination of industrial information.

c. The Council is patterned after the Iron and Steel Control Association and in many respects is the same organization. It was sanctioned by SCAP and has its office in Tokyo.

3. The Iron and Steel Sales Control Company, Ltd

a. The Iron and Steel Council is not a corporation and can not handle money so the Iron and Steel Sales Control Company, Ltd was organized to deliver and distribute to consumers all iron and steel listed as "special articles" and "hoarded goods" or, in other words, iron and steel formerly possessed by the Japanese Army and Navy. The Sales Company is incorporated and capitalized at ¥ 5,000,000 by the Iron and Steel Council. Allocation, delivery, and distribution of "special" and "hoarded" iron and steel is done in the name of the Council, but paying and receiving money is done in the name of the Sales Company.

G. <u>Summary</u>

1 The iron and steel industry of Japan grew to large proportions under the stimulus of war preparations. This growth was made possible by the importation of large quantities of iron ore, coal, pig iron, and scrap iron. Japan lacks raw materials but built processing plants of sufficient capacity to produce about 8,000,000 metric tons of steel annually. Two companies operating six integrated plants produced practically all of the pig iron and more than one-half of the steel. Many small plants contributed the rest.

2. The industry reached its maximum production of approximately 8,000,000 metric tons of steel in 1943 after which production declined, owing to war interference. Since the end of hostilities in August 1945, the industry has been practically idle. Production has been limited by coal shortage and is confined to utilizing left-over war stocks.

IRON AND STEEL METALLURGY OF KOREA

A. Introduction

1. The iron and steel industry in Korea was built and controlled by Japan to supplement Home Island production. Iron ore, pig iron, and steel were exported to Japan with only a minor amount of finished steel retained for domestic consumption. Aside from a few minor plants the major part of the industry is situated in Russian-held territory north of latitude 38° N.

2. Records show that the first iron ore was mined at the Sanei mine in 1909. In 1918 the first pig iron and steel plant was erected in Kenjiho. Expansion of the industry was rapid after 1930, reaching peak production in 1944 when 3,387,000 metric tons of iron ore were consumed and 628,000 metric tons of pig iron and approximately 100,000 metric tons of steel ingots were produced. During 1925-45, Korea produced about 20,000,000 metric tons of iron ore, an amount approximately equal to the total iron ore produced in the Home Islands during the same period.

3. Korea has abundant anthracite and lignite coal but no coking coal. All coking coal has been imported, the major part coming from Manchuria and northern China.

4. The industry has remained practically idle since the shutdown at the end of hostilities, 15 August 1945, primarily because of the lack of coking coal since imports have been withheld and stockpiles depleted.

5. Information and data obtained from the Japan Iron and Steel Council, Japanese Nationals, and personal observation are noted in the following pages. Owing to disruption of the industry at the end of hostilities some important data were not available.

B. Iron Ore

1. Approximately 74 percent of the iron ore mined during 1925-45 came from five mines all north of latitude 38° N. Of these five, the Mosan mine, situated near the northeast Manchurian border, although not opened until 1936, soon became the most important producer. It is reported to have 200,000,000 metric tons of reserves. Mosan ore is a magnetite containing about 38 percent iron which is ground to 150-mesh and magnetically concentrated to 56 percent iron at the mine. Ore from the other mines is hematite or limonite.

2. Over 6,000,000 metric tons or 32 percent of the total iron ore produced was shipped to various points in Japan during 1925-45. Table No 19 lists the annual iron ore production and the exports to Japan during 1925-45. In addition to the tabulated experts, a total of 477,000 metric tons of ore were exported to Manchuria during 1943, 1944, and 1945.

3. Table No 20 lists the average analysis of iron ores from the five principal mines.

C. Coal

1. Korea has no coking coal and imported this material from China, Manchuria, and minor amounts from Japan. Anthracite coal occurs in the Heijo (Pyongyang) area while lignite (subbituminous) coal is found near the northeast coast in the Seishin (Chongjin) area. Although these domestic coals are noncoking. They are used in the steel industry for sponge iron production, reheating furnaces, and general utility purposes.

D. Pig Iron

1. During 1925-45, Korea smelted about 13,000,000 metric tons of ore and produced 4,852,933 metric tons of pig iron, of which 4,237,580 metric tons or 87 percent was produced at the Kenjiho plant situated about 50 miles south of Pyongyang (Heijo). Approximately 3,000,000 metric tons or 64 percent of the total was exported to Japan during this period. Of the remainder a small amount was shipped to Manchuria and the rest converted to steel. Exported pig iron was shipped to all the main steel plants in Japan except Kamaishi. About one-half was used for steel making and one-half for cast iron making.

2. The Kenjiho plant, with a pig iron capacity of 350,000 metric tons annually, was the principal producer, and the Seishin plant on the northeast coast was a close second after 1942 when it started two 500-metric ton blast furnaces and produced approximately 200,000 metric tons annually. Peak annual production of 557,000 metric tons was reached in 1944. Production of pig iron and exports to Japan for 1925-45 are listed in Table 21.

3. In an effort to increase the production of pig iron many small blast furnaces were erected in 1943 as an emergency measure. Plans were to erect 75 20-metric ton and five 50-metric ton furnaces with a total capacity of 1,750 metric tons of pig iron per day. Fifty-nine of these furnaces were actually erected, 39 of which were operated. The furnaces were the German band-type of simplest design and were provided with hot stoves which heated the air blast to 600° F. Beehive coke ovens were erected near the blast furnaces. Operations were often interrupted and were never so satisfactory as expected.

4. A list of the small furnace installations and the production for three years are shown in Table 22. This production is not included in the annual production data in Table 21.

5. In addition to small blast furnaces, rotary kilns, and high-frequency electric furnaces were also used. The Mitsubishi plant at Seishin with six large rotary kilns is one of the largest installations

for making "Luppe" or sponge iron in the Orient and produced approximately 50,000 metric tons annually during 1941-44.

6. The Joshin plant of the Japan High-Frequency Current Heavy Industry Company, Ltd was an important producer of raw iron, ferroalloys, and special steel.

7. The iron produced by these supplementary methods was not so high-grade as blast furnace pig iron, but approximately 170,000 metric tons produced in 1944, the peak year, were significant and appear to have justified the effort.

E. Steel

1. The principal steel plant and the only integrated plant in Korea is the Japan Iron and Steel Company works at Kenjiho, situated on tidewater about 50 miles south of Heijo. All other plants used electric furnaces and produced only small amounts of special steels, steel castings, and ferroalloys. The Japan Iron and Steel Company started erection of a steel plant in connection with its two blast furnaces at Seishin, but the installation was not completed before 15 August 1945.

2. Iron made by the high-frequency process or in rotary kilns was converted to steel in electric arc furnaces of the Heroult type.

3. Data on the Korean production of iron and steel for 1939-44 are listed in Table 23 and illustrate the extent of the industry during that period.

4. The accompanying map of Korea shows the locations of the most important mines and plants of the iron and steel industry. With the exception of a few small plants at Seoul, Fusan, and Inchon, practically all of the mines and plants are situated north of latitude 38°N.

5. Figure 15 shows graphically the production of iron ore and pig iron and iron ore exports.

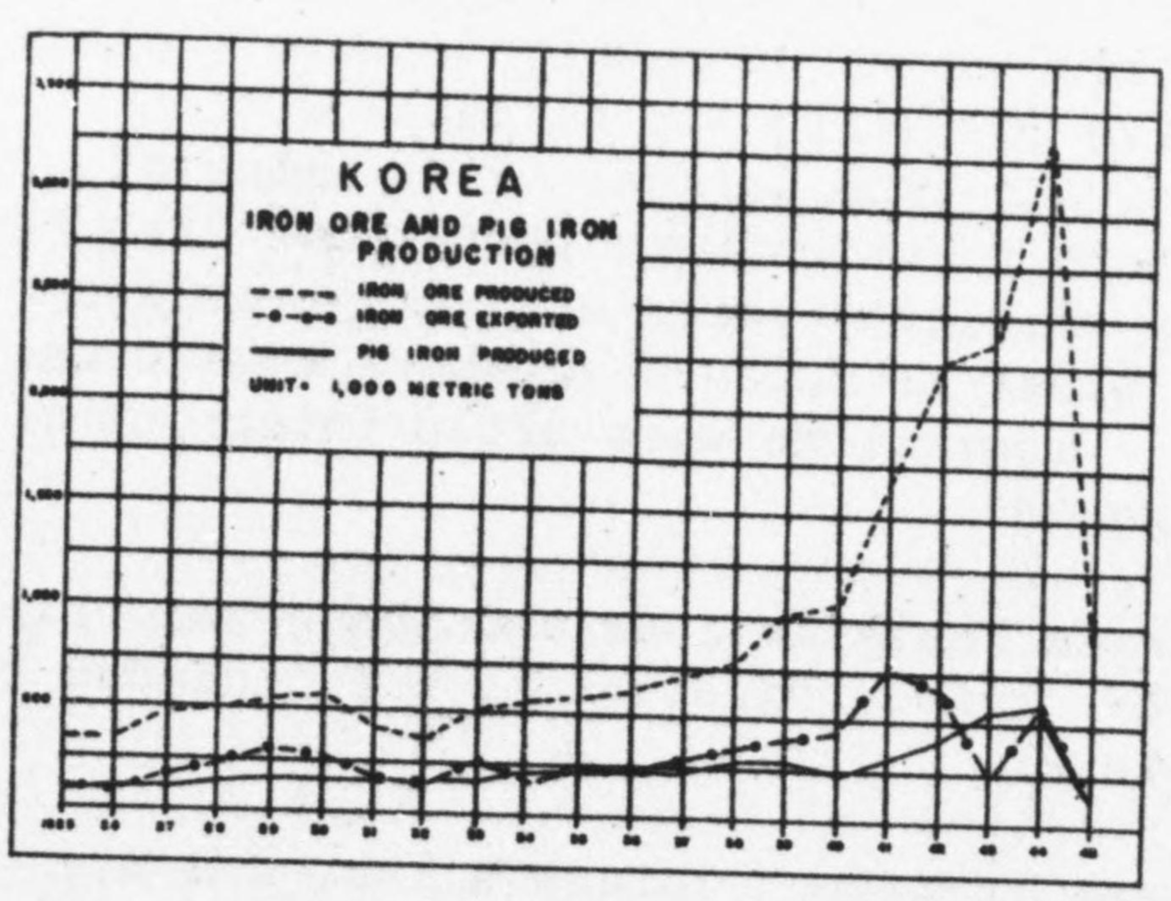

Figure 15

F. Iron and Steel Plants

1. Kenjiho Plant (Kyomipo)

a. Owned and operated since 1934 by the Japan Iron Manufacturing Company, Ltd, this plant contains three Greenawalt sintering pans with a total daily capacity of 240 metric tons of ore and three American type blast furnaces with a combined capacity of 1,000 metric tons of pig iron per day. Four batteries of 35 coke ovens, each containing 35 cells, have a daily capacity of 1,000 metric tons of coke. Three 50-ton basic open-hearth furnaces and a 200-ton mixer have a daily capacity of 400 metric tons of steel. A blooming mill, slab mill, and secondary mills have a daily capacity of 235 metric tons of heavy sections and 335 metric tons of plates, respectively.

b. Also included in the plant equipment are power units, a coal washing plant, a brick plant, and a coal-briquetting plant. A re-rolling mill and a sheet mill were under construction at the end of the recent war.

c. The coking coal came from northern China and Manchuria, a distance of 1,000 km. All iron ores came from nearby mines, distances varying from 70 to 237 km.

2. Seishin Plant (Chongjin)

a. This plant, also owned by the Japan Iron and Steel Company, Ltd, began operations in 1942. It contains two 500-metric ton German type blast furnaces and two batteries of 57 coke ovens with a daily capacity of 1,000 metric tons of pig iron and 1,240 metric tons of coke, respectively. Facilities for converting pig iron to steel were under construction at the end of the war.

b. Practically all of the coking coal for this plant came from Manchuria and all of the iron ore from the Mosan mine, 93 km north of the plant. The iron ore was concentrated at the mine and the concentrates shipped to the plant at Seishin where they were sintered in Greenawalt machines before charging to the blast furnace.

3. Seishin Plant (Sponge Iron)

a. This plant was owned by the Mitsubishi Mining Company, Ltd, and began operations in 1939. It contained six large rotary kilns for producing "Luppe" sponge iron by the Krupp-Renn process. Auxiliary equipment for storing and preparing materials for charging the kiln and for treating the kiln products were provided. Two electric furnaces with a capacity of seven metric tons each converted the Luppe to steel. Cast and alloy steels were the principal products, 85 percent of which was shipped to Japan. Two more kilns and a ferroalloy plant were under construction in 1945.

b. Iron ore came from the Mosan mine (Figure 16) and coal from the Kokurei mine (anthracite near Heijo) and Tooro (bituminous) in south Sakalin. No coking coal is necessary in this process. Lime and kaolin were obtained locally.

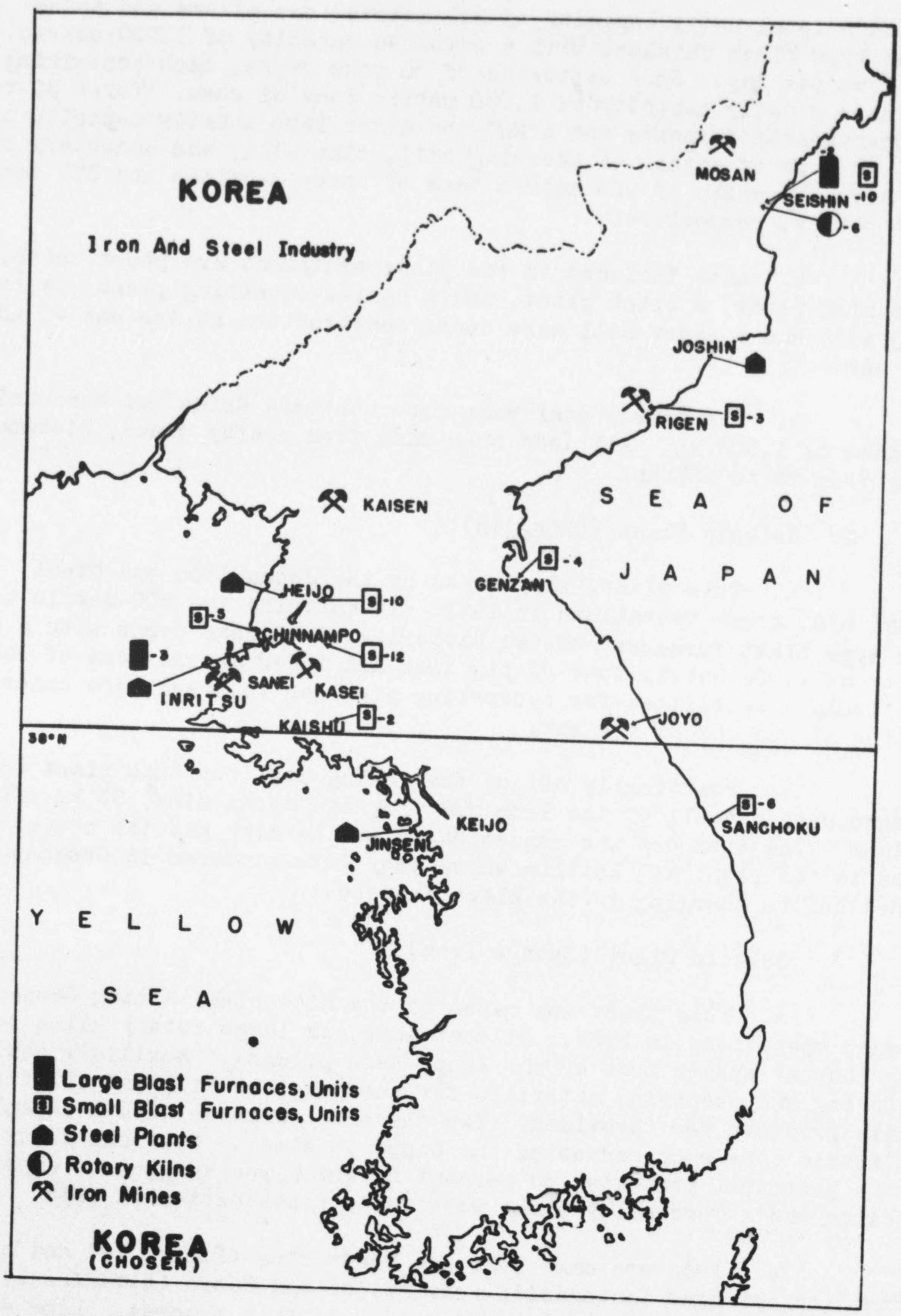
KOREA
Iron And Steel Industry
MOSAN
SEISHIN
-10
-6
JOSHIN
RIGEN
-3
KAISEN
SEA OF
JAPAN
GENZAN
-4
HEIJO
-10
-5
CHINNAMPO
-12
-3
SANEI
KASEI
INRITSU
KAISHU
-2
JOYO
38°N
SANCHOKU
-6
KEIJO
JINSEN
YELLOW
SEA
Large Blast Furnaces, Units
Small Blast Furnaces, Units
Steel Plants
Rotary Kilns
Iron Mines
KOREA
(CHOSEN)

Figure 16

4. Joshin Plant (Songjin)

a. This plant of the Japan High-Frequency Heavy Industry Company, Ltd, contains 24 small high-frequency electric furnaces which yield a small amount of pig iron in batches. The pig iron was converted to steel in ten electric furnaces with a rated capacity of 65 metric tons of steel per day. Mosan ore and Manchurian coal were reported as being the principal raw materials. Ferroalloys, cast steel, forgings, and small rolled products were produced. This plant is important for the quality rather than quantity of production.

5. Mitsubishi Mining Company, Pyongyang (Heijo)

a. Situated about 35 kilometers from Pyongyang, this plant was rated at a capacity of 180,000 metric tons of steel per annum when completed Records show 3,000 metric tons produced in 1945 and construction incomplete. The plant contained electric furnaces, forge shop, and rolling equipment with no means of making pig iron.

6. Although Korea has about forty plants, most of them are relatively small foundries and forge shops which produced minor amounts of finished material.

G. <u>Summary</u>

1. The iron and steel industry in Korea as developed by the Japanese remains an asset to the Koreans. The capacity of the plants for producing pig iron is much larger than for producing steel, while the steel capacity appears to be in excess of the country s ability to consume, unless independence makes the people more industrially minded.

2. Until such time as Korea obtains coking coal the steel industry will be confined to using stocks of ingots and unfinished steel left by the Japanese at the cessation of hostilities. This can be done with the local noncoking coals or in electric furnaces.

3. The key positions in the industry were filled by Japanese and, as few Koreans were trained to take over even the minor posts, foreign technical assistance will be necessary to re-establish the industry.

4. Production of iron and steel under the Japanese was expanded during the war years regardless of costs. While no data on costs are available, it is believed that many of the installations are high-cost producers not capable of competing in world markets during peacetime unless subsidized by the Korean Government.

IRON AND STEEL METALLURGY OF MANCHURIA

A. Introduction

1. Manchuria is rich in raw materials for the production of iron and steel. Since 1905 when the coking coal mine at Penshihu was first opened, the exploitation of coal and iron deposits and erection of processing plants have grown into a large industry which was developed, operated, and controlled by Japan until the end of hostilities in 1945.

2. The principal iron ore deposits are found in Liaoning Province in southeastern Manchuria. Large quantities of coal, limestone, dolomite, and fire clay, are available. Thus Manchuria is a veritable storehouse of raw materials for iron and steel manufacture. Japan's desire to obtain these materials was first accomplished on a peaceful basis with the Chinese, but it was later found to be more convenient to create an incident and take full control by conquest, changing the name to Manchoukuo.

3. Mines were exploited and the main processing plant established at Anshan, about 50 miles south of Mukden. The same practice was followed on a lesser scale at Penshihu (Honkeiko) about 30 miles east of Ansha, making these two localities the center of the industry in Manchuria Further expansion at other points was underway but incomplete by August 1945.

4. The South Manchurian Railway, the Showa Steel and Iron Works, Ltd, Okura and Company, Manchurian Industrial Development Company, and the Manchoukuo Government all shared in the development of the industry which was merged into the Manchurian Iron and Steel Works Ltd, in 1944 with a total capitalization of ¥ 740,000,000, or about $180,000,000.

5. Both Anshan and Penshihu are near large deposits of iron ore. In both cases the deposits contain large reserves of low-grade ore and fair reserves of high-grade ore. Japanese estimated ore reserves at the end of 1945 are:

Location	Lean Ore (35% Fe) (metric tons)	Rich Ore (50% Fe) (metric tons)
Anshan	4,000,000,000	49,000,000
Penshihu	450,000,000	10,000,000
TOTAL	4,450,000,000	59,000,000

While the ore at Anshan is a mixture of hematite and magnetite and that at Penshihu is magnetite, the ores have three features in common: (1) Both are hard and dense; (2) both contain large amounts of fine grains of silica intimately mixed with the iron oxide; and (3) both are low in sulfur and phosphorous content. Beneficiation, in an effort to reject silica before smelting, was practiced on about one-half of the ore mined. Treatment consisted of coarse and fine crushing to ½-inch, then wet grinding to 150-mesh in ball and rod mills in closed circuit with classifiers. Concentration was by wet magnetic separation of the iron from the waste minerals.

6. During 1943 Anshan and Penshihu had processing plants with combined rated annual capacities and production as follows:

Material	Annual Capacities. (1,000 metric tons)	Peak Production (1,000 metric tons)
Ore concentration	2,200	1,900
Coke	2,800	2,222
Pig iron	2,500	1,726
Steel ingots	1,330	843
Semifinished steel	1,000	774
Steel products	1,000	363

Significant in reviewing capacities is the fact that the capacity for producing pig iron is double the steel capacity. Although more steel capacity was planned by the Japanese, it was not installed. All the pig iron produced at Penshihu and part of that produced at Anshan were exported to Japan for refining to steel and foundry use.

B. Anshan

1. The Showa Steel Works was established in Anshan by the Japanese-owned Southern Manchurian Railway in 1916. Plans at that time were to strengthen Japan's meager iron and steel production by producing about 1,000,000 metric tons yearly of iron and steel, utilizing Fushun coal and the abundant iron ores found near Anshan.

2. World economic conditions coupled with the fact that the ore, contrary to expectations, was inferior in quality (35-40 percent Fe) presented grave economic and technical problems. Although two blast furnaces were completed in 1919, normal production was impossible for several years, and the company suffered many hardships. Efforts to beneficiate lean ores was the chief problems Although American and German techniques were tried, the problem was finally solved by Japanese who developed a process for converting the nonmagnetic lump ores to magnetite in special furnaces making it possible to produce artificial rich ores economically. Thereafter the plant was expanded, but it was not until 1933 that production approached original planned capacity. At that time the enterprise was detached from the Southern Manchurian Railway and became the Showa Steel and Iron Works, Ltd, which in turn was merged into the Manchurian Iron and Steel Works, Ltd, in 1944.

3. Expansion and development of the industry at Anshan paralleled growth of the industry in Japan. American engineers and American equipment played an important part in its growth. Peak production in 1943 was equal to 80 percent of the pig iron produced in Japan's largest plant at Yawata. Thereafter, production decreased, owing to a combination of causes: Excessive military demands, shortages of coal, manganese ore, spare parts and repair material, skilled and unskilled workmen, scattering of industrial power, air raids, and shortage and decrease in quality of iron ore.

4. The Anshan works as seen in June 1946 present a problem of reconstruction and repair. Operation of the plant ceased in August 1945. Successive occupation of invading troops has left the plant, as well as the mines, in a bad condition.

5. Information on the growth of the Anshan works with its corresponding production was obtained from partially destroyed records, former employees, and personal observation and is incomplete, but the part covered is believed to be accurate.

6. Iron Ore

a. Iron ore was supplied to the Anshan works from a group of mines 10 to 30 miles east and southeast of Anshan. Ore was mined by open cuts and underground methods, crushed to four inches and screened at the mines. Both high-and low-grade ores were mined and each was separated into lump and fines. Disposition of the various kinds of ore at the plant was (1) high-grade lump ore to blast furnace storage bins, (2) high-grade fines to sintering and briquetting plants, (3) low-grade lump ore to beneficiating plant followed by sintering and briquetting, and (4) low-grade fines to Luppe plant.

TONNAGES MINED FROM COMPANY MINES SINCE 1940
(1,000 metric tons)

Year	High-Grade (50% Fe)	Low-Grade (35% Fe)	Total
1940	846	1,619	2,465
1941	1,117	2,034	3,151
1942	1,146	1,943	3,089
1943	1,232	1,893	3,125
1944	1,264	1,264	1,778
1945	ND	ND	ND

ND: No data available

b. In addition to the above tonnages, about a million metric tons of high-grade ore for direct charge to the blast furnaces were purchased from independent mines on which no data are available.

c. A large tonnage of low-grade lump ore (-4" plus ½") was beneficiated by roasting, crushing, grinding, and concentrating magnetically. A reducing roast converted the nonmagnetic hematite to magnetite by the use of coke oven gas in specially developed Umene furnaces in which a downward moving column of ore was preheated and then reduced by rising coke oven gas. The treatment also caused incipient cracking which aids the subsequent steps of crushing and grinding. Twenty-three roasting furnaces each have a capacity of 280 to 300 metric tons a day. Grinding to 150-mesh released a large part of the iron from the silica and separation was made in Grondal magnetic separators. Concentration by flotation was also being tested.

d. The low-grade ores contained about 35 percent iron and 45 percent silica. Beneficiation raised the iron content to 56.5 percent and lowered the silica to 17 percent. Recovery of iron was approximately 75 percent which was contained in concentrates representing 43 percent of the ore. Ore treated and concentrates produced are:

Year	Lump Ore Treated (metric tons)	Concentrates Produced (metric tons)
1940	1,471,000	632,000
1941	1,760,000	767,000
1942	1,833,000	740,000
1943	1,520,000	693,000
1944	ND	ND
1945	ND	ND

ND: No data available

7. Sintering and Briquetting of Concentrates

a. The finely ground concentrates were prepared for blast furnace use by either sintering or briquetting. At Penshihu briquettes were preferred to sinter since only about one-tenth of the total was sintered and the remainder briquetted, while at Anshan the reverse appears to have been the case as only one-fifth was briquetted and four-fifths sintered. Sintering was done on 10 Dwight and Lloyd sintering machines using coke oven gas for igniting. The charge to the sintering machine was composed of 80 percent concentrated ore, 10 percent coal, six percent limestone and four percent flue dust, which when sintered was in the form of porous, irregular sized masses of semifused clinkers suitable for blast furnace charge. The capacity of 1,000,000 metric tons annually was not reached.

b. Briquetting of concentrates obtained from retreating the middlings of the first concentration was done in a plant of 400,000 metric tons annual capacity.

PRODUCTION OF SINTERED AND BRIQUETTED ORE
(metric tons)

Year	Sintered Ore	Briquetted Ore
1940	643,000	78,000
1941	783,000	117,000
1942	822,000	126,000
1943	749,000	155,000
1944	385,000	85,000
1945	ND	ND

ND: No data available

8. Coal and Coke

a. Fushun, Penshihu, and Pei Piao were the principal suppliers of coal for the coke ovens at Anshan, but during the latter years of the war northern China also supplied large amounts.

b. Coke was made in four coke ovens of 17 batteries containing 216 Koppers cells and 216 Otto cells. All coal was first cleaned by washing. By-products produced were crude benzol, sulfuric acid, ammonium sulfate, and tar. Further refining of the benzol yielded naphtha, motor benzol, xylol, pure toluol for TNT, and pure benzol for dyestuffs and explosives. Distilled from coal tar were raw anthracene, raw naphthalene, pitch, and creosote. Coke oven gas was produced in quantities sufficient for steel making and all other plant uses.

TABULATION OF COAL USED AND COKE PRODUCED
(metric tons)

Year	Coal Received	Coke Produced
1940	2,205,000	1,155,000
1941	2,782,000	1,452,000
1942	2,949,000	1,561,000
1943	2,921,000	1,644,000
1944	2,260,000	1,093,000
1945	ND	ND

ND: No data available

9. Pig Iron

a. The blast furnace department with a rated capacity of 1,989,250 metric tons of pig iron contains nine stacks.

Blast Furnace	Year Built	Pig Iron Capacity Per Day (metric tons)
No 1 and 2, German type	1919	2@400 - 800
No 3, American type	1930	1@550 - 550
No 4, German type	1937	1@600 - 600
No 5,6,7,8, German type	1938	4@700 - 2,800
No 9, German type	1943	1@700 - 700
		TOTAL 5,450

b. Peak production of 1,325,000 metric tons in 1943 represented 66.6 percent of rated capacity. Of this production, 37 percent was basic pig iron containing 1.8 to 2.5 percent silicon and less than 0.05 percent sulfur; 63 percent was foundry pig containing 2.5 to 3.0 percent silicon and 0.08 percent sulfur. An average of 59 percent of the pig iron was sent to the open-hearths in a molten state while 41 percent was cast into pigs and shipped to Japan.

PIG IRON AND PIG IRON PRODUCTION MADE INTO STEEL
(metric tons)

Year	Pig Iron Produced	Used for Steel	Exported
1940	939,000	468,000	471,000
1941	1,192,000	480,000	712,000
1942	1,304,000	674,000	630,000
1943	1,325,000	774,000	551,000
1944	801,000	690,000	111,000
1945	ND	ND	ND

ND: No data available

c. A typical blast furnace charge and one-year consumption of raw materials are listed:

Material	Weight Per Ton Pig (kilogram)	Weight (percent)	Total for Year (metric tons)
Sintered ore	565	14.5	723,264
Briquetted ore	132	3.4	149,033
Lump	1,318	33.9	1,746,026
O H slag	88	2.3	62,212
Flux	582	15.0	693,890
Coke	1,200	30.9	1,559,602
TOTAL	3,885	100.0	4,934,027

d. The Corby process was used in blast furnace operation. It consists of fluxing the ore so as to form high-silica slag with a ratio of 0.6 lime to one silica which has maximum fusibility at low-hearth temperature.

10. Steel

a. Steel making was done in two open-hearth plants situated north and west of the blast furnaces. The active-mixer process was used as the supply of scrap iron was negligile and silicon in the pig iron was excessive. In the No 1 steel plant the equipment consited of one 600-metric ton mixer, three 300-metric ton tilting active mixers, four 100-metric ton and two 150-metric ton tilting type, basic open-hearth furnaces. These furnaces and mixers were arranged in positions to facilitate operations. In No 2 steel plant the equipment consisted of two 600-metric ton mixers, four 300-metric ton tilting active mixers, and six 150-metric ton tilting, basic open-hearth furnaces. Each steelplant was equipped with soaking pits, ingot strippers, charging machines, ladles, and overhead cranes.

b. Hot metal from the blast furnaces was partially refined in the active mixers by adding ore and lime and slagging some of the silicon, phosphorous, and sulfur. Finishing was done in the tilting open-hearths where mill scrap, as well as regular fluxes, was added to each heat. The normal capacity of the open hearths was two heats per day.

PRODUCTION OF STEEL SINCE 1940
(metric tons)

Year	Steel Ingots Produced
1940	532,000
1941	561,000
1942	732,000 (No 2 plant started)
1943	843,000
1944	438,000
1945	ND

ND: No data available

11. Rolling Mills

a. Steel ingots from each of the two steel plants go to the respective rolling mills. Two blooming mills with a capacity of 500,000 metric tons per annum are followed by billet, rail, heavy structure, bar, rod, plate, and sheet mills, each fully equipped with hot saws, shears, hot beds, reheating furnaces, and inspection tables.

PRODUCTION OF ROLLING MILLS
(metric tons)

Year	Rail and Large Bar	Small Bar	Rod	Plate	Sheet
1940	129,000	65,000	75,000	ND	42,000
1941	127,000	76,000	75,000	ND	37,000
1942	138,000	70,000	82,000	19,000	36,000
1943	131,000	74,000	64,000	59,000	35,000
1944	64,000	38,000	33,000	24,000	19,000

ND: No data available

b. Subsidiaries of the steel company with plants in Anshan and Mukden produced finished steel from semifinished products obtained from the main rolling mills.

C. Penshihu

1. Originally Penshihu was the center of a group of small, independent coal mines where high-grade coking coal was found. The Okura Mining Company consolidated these coal mines and later developed the iron mines in the vicinity. The principal iron mine at Miao ei Gou, 16 miles from Penshihu, was the largest producer. It consists of a mountain of low-grade magnetite in which two enriched zones of high-grade ore are found.

2. In 1916 two 200-metric ton blast furnaces were erected and the first pig iron produced. In the expansion program a new mine shaft was sunk and two 500-metric ton blast furnaces erected, bringing the pig iron daily capacity to 1,400 metric tons or 511,000 metric tons per annum. Because of the crowded condition in the canyon at Penshihu, the new construction was located at Kung Yuan two miles from Penshihu. Plans for erecting a steel plant at Kung Yuan for refining the pig iron did not materialize. Owing to the low phosphorous content of Penshihu ore and coal, a large percentage of the pig iron produced was low phosphorous destined for naval armament in Japan.

3. Statistics on production of ores since 1940 illustrate the extent of operations at Penshihu.

PRODUCTION OF ORES AT PENSHIHU

Year	Lean Ore		Rich Ore		Total
	Metric tons Mined	Concentrates	Metric tons Mined	Concentrates	Concentrates
1940	75,066	22,369	402,366	172,750	195,119
1941	296,404	74,687	460,087	205,640	280,327
1942	271,681	118,109	409,799	215,725	333,834
1943	632,292	175,578	492,811	209,772	385,350
1944	463,274	153,989	554,244	238,373	392,362
1945	152,206	44,703	150,035	51,524	96,227

4. Concentration of both rich and lean ores at the mine was made separately and the concentrates kept separate in subsequent treatment steps. High-grade concentrates were briquetted and smelted with coke from low phosphorous coal and yielded low phosphorous pig iron.

TYPICAL ANALYSES OF ORES AND CONCENTRATES ON A DRY BASIS

Material	Percent			
	Fe	SiO_2	P	S
Rich ore	62.0	16.0	.017	0.10
Rich ore concentrates	69.0	2.8	.008	0.012
Lean ore	33.5	50.0	.06	0.03
Lean ore concentrates	63.0	10.0	.017	0.03

5. The concentrates were transported by rail from the mines to the two plants comprising the Penshihu district, one old plant at Penshihu and the new one at Kung Yuan. Treatment at each plant was the same, the high-grade concentrates were briquetted and the low-grade sintered, with some overlapping of the two. Briquetteing was done by table briquetting machines in which the concentrates were mixed with six percent slaked lime, moistened and pressed into 8" by 8" by 2" briquettes which were then burned in a tunnel kiln at 1250°C to a porous, firm mass suitable for blast furnace charge. Capacity of the briquetting plant was rated at 400,000 metric tons per annum.

6. Sintering was done in Greenawalt and A I B type pans in batches of three metric tons. Concentrates were mixed with six percent limerock and sintered in 40 minutes. Capacity of the plant is rated at 200,000 metric tons per annum.

COMBINED PRODUCTION OF THE PENSHIHU AND KUNG YUAN PLANTS
(metric tons)

Year	Briquetted Ore	Sintered Ore
1941	237,716	37,632
1942	303,938	48,838
1943	438,101	48,877
1944	346,600	46,000
1945	155,000	18,500

7. It was reported that the blast furnace charge consisted of briquetted and sintered concentrates only and no data regarding the use of lump ore are available; however, the production of pig iron for corresponding years indicates that lump ore was used as part of the burden in order to yield the amount of pig as shown in this tabulation of pig iron production (metric tons):

Year	Low Phos Pig	Common Pig	Total
1940	114,578	7,622	122,200
1941	149,695	17,805	167,500
1942	222,910	155,590	378,500
1943	195,040	206,660	401,700
1944	263,252	110,625	373,877
1945	72,339	15,730	88,069

8. The pig iron was produced in four blast furnaces, two 200-metric ton daily capacity at Penshihu, and two 500-metric ton daily capacity at Kung Yuan; the latter were blown-in in 1941 and 1942.

9. Limestone for blast furnace use was quarried at an adjacent quarry and transferred to the blast furnace storage bins by belt conveyer. Dolomite is also reported to be nearby, but statistics on limestone and dolomite production were not available.

10. Coal and Coke

a. The coal mined at Penshihu is a good coking coal but has a low melting ash and excessive swelling properties so it is mixed with other coals for coking in a ratio of about three to one.

b. Coking was done at Penshihu in two batteries of 98 ovens with a daily capacity of 700 tons, and at Kung Yuan in one battery of 120 Otto by-product ovens with a rated daily capacity of 1,400 tons

c. In addition to shipping coal to other points, Penshihu imported coal from Fushun and Pei Piao for coke making, and exported some coke as seen from these data:

COKE PRODUCTION AT PENSHIHU
(metric tons)

Year	Coke Production	Used at Penshihu	Exported
1940	198,130	158,000	40,000
1941	336,307	307,000	29,000
1942	433,576	401,000	32,000
1943	537,503	521,000	16,000
1944	568,683	486,000	22,000
1945	148,061	114,000	ND

ND: No data available

BY PRODUCTS FROM COKING OPERATIONS
(metric tons)

Year	Tar	Am Sulf	Benzol	50° Sulfuric	66° Sulfuric
1940	6,530	1,952	ND	2,000	ND
1941	11,980	2,460	ND	5,060	ND
1942	18,590	3,045	ND	6,325	382
1943	18,690	2,959	1,390	6,148	385
1944	19,225	4,704	2,186	6,874	209
1945	6,490	980	343	2,245	30

ND: No data available

D. Other Iron and Steel Works

1. In addition to the mines and plants at Anshan and Penchihu expansion of the industry was underway in several other localities in Manchuria.

2. At Tohenda in eastern Manchuria are substantial reserves of coking coal and iron ore some of which were shipped to Japanese Home Island processing plants. Plans were to construct a steel plant at Tsuka with an annual capacity of 300,000 metric tons of pig and 200,000 metric tons of steel. Construction is reported to have been 20 percent complete in August 1945.

3. Two small blast furnaces were erected at Mitsuzan in northeastern Manchuria about 200 miles west of Vladivostok. Reports are that they never operated.

4. A Smith process sponge iron plant is reported to have been in operation in Dairen; no details are available.

E. Sponge Iron

1. Three sponge iron plants operated in Manchuria at Fushun, Anshan, and Penshihu. The one at Fushun is believed to have been a rotary kiln type plant but data regarding its activity are not available. The one at Anshan is a Krupp-Renn plant of four rotary kilns with a rated capacity of 240 metric tons of Luppe per day. Low-grade fine ore, coke breeze, and blast furnace slag composed the charge. Production of iron pellets (Luppe), 80 percent of which was less than one-inch size, was shipped to Japan.

2. The plant operated six years but never at full capacity. Costs were said to compare equally with blast furnace pig iron. At Penshihu the sagger and brick kiln or Hagenas method was used. High-grade concentrates were pressed into cakes, reduced in batches, pressed cold after reduction, and melted into high-grade special steel which was sent to the navy arsenal in Japan. Production was small; data on costs are unobtainable.

PRODUCTION OF SPONGE IRON
(metric tons)

Year	Anshan Luppe	Penshihu Cake
1940	13,000	643
1941	17,000	1,330
1942	19,000	1,766
1943	18,000	1,305
1944	20,000	1,173
1945	ND	300

ND: No data available

F. Summary

1. The extent to which the iron and steel industry was developed in Manchuria is a large asset to the Chinese. Developed mines and established plants as left by the Japanese represent years of effort and large investments which the Chinese recognize and intend to utilize to the utmost.

2. The industry has been idle since August 1945 and operations are not likely to be resumed for some time because of war damage. The Chinese Nationalists currently occupying the industrial centers plan to revive and expand the industry to a million tons of steel per annum and look to reparations from Japan for the necessary equipment to do so. Until Chinese internal affairs are stabilized, likelihood of rehabilitation is small; even when conditions are stabilized it will take several years and foreign assistance before plans materialize.

TABLE 1. - IMPORTS AND DOMESTIC PRODUCTION OF IRON ORE
(1,000 metric tons)

Fiscal Year	Korea	Manchuria	China	Philippines	British Malay	Others	Total	Production	TOTAL
1925	107	0	813	0	290	0	1,210	70	1,280
1926	99	0	503	0	291	0	893	132	1,025
1927	169	0	503	0	435	0	1,107	176	1,283
1928	225	0	878	0	739	1	1,843	156	1,999
1929	314	0	950	0	959	36	2,259	177	2,436
1930	288	0	791	0	998	185	2,262	249	2,511
1931	177	0	594	0	922	34	1,727	197	1,914
1932	152	6	557	0	878	41	1,634	197	1,831
1933	253	0	573	0	927	24	1,779	355	2,134
1934	181	3	825	0	873	430	2,312	448	2,760
1935	243	0	1,262	290	1,474	378	3,641	522	4,169
1936	243	0	1,252	570	1,692	266	4,023	627	4,650
1937	302	2	596	560	1,633	220	3,313	632	3,945
1938	367	3	147	900	1,600	195	3,212	800	4,012
1939	401	12	686	642	1,937	1,271	4,949	962	5,911
1940	439	47	1,175	602	2,041	825	5,129	1,229	6,358
1941	760	52	2,506	511	1,193	36	5,058	1,614	6,672
1942	665	62	3,973	28	90	62	4,880	2,532	7,412
1943	235	0	3,255	126	43	7	3,666	3,057	6,723
1944	610	9	1,026	23	0	0	1,668	4,368	6,036
1945	124	5	15	0	0	0	144	1,356	1,500

Source: Japan Iron and Steel Council

TABLE 2. - PRODUCTION, IMPORTS, AND COKE OVEN USE OF COAL
(1,000 metric tons)

Fiscal Year	Domestic Production	Total Imports	Coking Coal and Coke	
			Coal Consumed	Coke Produced
1926	31,427	2,339	1,438	881
1927	33,531	3,024	1,713	1,042
1928	33,860	3,125	1,798	1,220
1929	34,258	3,476	1,908	1,275
1930	31,376	3,035	1,773	1,305
1931	27,987	2,987	1,351	919
1932	28,053	3,243	1,478	950
1933	32,524	4,095	2,094	1,316
1934	35,925	5,066	2,776	1,731
1935	37,762	5,203	3,350	1,833
1936	41,803	6,308	3,423	1,940
1937	45,258	6,186	4,954	2,371
1938	48,684	6,829	5,427	2,510
1939	52,409	7,995	6,752	3,254
1940	57,318	8,968	7,517	3,740
1941	55,602	9,586	8,244	4,534
1942	54,179	8,737	8,985	4,942
1943	55,539	6,218	8,002	4,801
1944	49,335	3,295	6,265	3,759
1945	22,335	312	ND	ND

ND No data available
Source: Japanese Bureau of Mines

TABLE 3. - IMPORTS AND DOMESTIC PRODUCTION OF PIG IRON
(1,000 metric tons)

Fiscal Year	China	Korea	Manchuria	British India	Others	Total	Domestic Pig Iron Production	TOTAL
1925	48	84	0	153	115	400	685	1,085
1926	4	105	0	228	168	505	810	1,315
1927	6	103	0	261	206	576	896	1,472
1928	31	140	0	311	228	710	1,093	1,803
1929	57	138	0	412	185	792	1,087	1,879
1930	35	109	0	214	156	514	1,162	1,676
1931	78	95	0	150	171	494	919	1,413
1932	0	206	322	118	4	650	1,010	1,660
1933	0	160	455	172	13	800	1,437	2,237
1934	0	164	409	202	2	777	1,728	2,505
1935	0	131	383	338	241	1,093	1,906	2,999
1936	0	123	271	375	326	1,095	2,007	3,102
1937	5	135	213	284	494	1,131	2,309	3,440
1938	2	215	210	327	418	1,072	2,562	3,634
1939	0	221	352	299	55	927	3,231	4,158
1940	0	164	431	257	2	854	3,486	4,340
1941	2	138	553	77	14	784	4,233	5,017
1942	30	133	715	0	0	878	4,220	5,098
1943	183	269	544	0	0	996	3,980	4,976
1944	112	245	306	0	0	663	2,600	3,263
1945	5	32	18	0	0	55	1,145	1,200

Note: About 85 percent of the pig iron production was absorbed by the steel works for the manufacture of ordinary steel and the remainder was used as cast iron.
Source: Japan Iron and Steel Council

TABLE 4. - IMPORTS AND DOMESTIC SCRAP PRODUCTION (1,000 metric tons)								
Fiscal Year	China	British India	United Kingdom	U S A	Others	Total	Domestic Scrap Production	TOTAL
1925	ND	ND	ND	ND	44	44	551	595
1926	10	5	17	19	29	80	707	787
1927	11	71	14	78	50	224	755	979
1928	14	95	14	170	71	364	865	1,229
1929	14	129	20	216	109	488	992	1,480
1930	15	95	31	249	99	489	991	1,480
1931	15	108	47	33	93	296	846	1,142
1932	9	113	98	154	185	559	1,096	1,655
1933	20	194	124	454	221	1,013	1,459	2,472
1934	12	100	95	960	246	1,413	1,753	3,166
1935	5	96	40	1,326	225	1,692	2,058	3,750
1936	30	139	5	1,027	296	1,497	2,367	3,864
1937	10	200	6	1,776	428	2,420	2,910	5,330
1938	30	81	4	1,006	237	1,358	3,036	4,394
1939	25	107	1	2,174	248	2,555	3,279	5,834
1940	16	77	0	1,115	183	1,391	3,281	4,672
1941	19	1	0	109	207	203	3,430	3,633
1942	24	0	0	0	80	39	3,775	3,814
1943	19	0	0	0	6	25	3,463	3,488
1944	22	0	0	0	52	74	3,498	3,572
1945	0	0	0	0	1	1	274	275

ND No data available
Source: Japan Iron and Steel Control, 15 April 46

TABLE 5. - STEEL PRODUCTION AND IMPORTS (1,000 metric tons)						
Fiscal Year	Ordinary Steel		Alloy Electric	Total	Imports	TOTAL
	Open Hearth	Converter				
1925	ND	ND	ND	1,300	11	1,311
1926	1,418	78	11	1,507	34	1,541
1927	1,589	84	13	1,686	88	1,774
1928	1,886	a/	20	1,906	90	1,996
1929	2,265	a/	29	2,294	166	2,460
1930	2,249	a/	41	2,290	70	2,360
1931	1,850	a/	33	1,883	26	1,909
1932	2,354	a/	44	2,398	26	2,424
1933	3,097	a/	101	3,198	105	3,303
1934	3,693	a/	150	3,843	89	3,932
1935	4,530	a/	174	4,704	274	4,978
1936	4,990	1	231	5,222	242	5,464
1937	5,490	a/	311	5,801	434	6,235
1938	5,845	63	564	6,472	300	6,772
1939	5,889	152	655	6,696	214	6,910
1940	5,883	233	739	6,855	291	7,146
1941	5,672	324	848	6,844	152	6,996
1942	5,657	350	1,036	7,043	163	7,206
1943	5,557	330	1,933	7,820	183	8,003
1944	3,857	197	1,859	5,913	102	6,015
1945	610	0	455	1,065	2	1,067

a/ Not operated
ND No data available
Source: Metal Bureau of Ministry of Commerce and Industry

TABLE 6. - MAJOR IRON AND STEEL CAPACITY BY DISTRICTS (1,000 metric tons)				
District	Pig Iron		Steel	
	Capacity	% of Total	Capacity	% of Total
Yawata	2,412	37.5	2,375	31.4
Kobe-Osaka	1,156	18.0	2,356	31.2
Tokyo-Yokohama	1,098	17.1	1,348	17.8
Kamaishi	594	9.2	587	7.8
Muroran	1,170	18.2	776	10.3
Others	ND	ND	115	1.5
TOTAL	6,430	100.0	7,557	100.0

ND No data available
Source: Iron and Steel Council and individual companies

TABLE 7. - MAJOR IRON AND STEEL PLANTS BY COMPANIES (1,000 metric tons)				
	Pig Iron		Steel	
Company	Capacity	% of Total	Capacity	% of Total
Japan Iron and Steel Co	4,644	72.2	3,990	52.7
Japan Steel Tube Co	1,098	17.1	984	13.0
Others	688	10.7	2,583	34.3
TOTAL	6,430	100.0	7,557	100.0

Source: Iron and Steel Council and individual companies

TABLE 8. - BLAST FURNACES IN JAPAN (1 August 1946)						
Company	District	Plant	No	Furnaces		Remarks
				Size a/	Condition	
Nippon Seitetsu	Yawata (Kyushu)	Higashida	1	300	Banked	Banked since Sep 45
			2	300	Operating	Producing at rate of 100 T/d, operated for 2 yrs
			3	350	Banked	Banked since Jun 45
			4	350	Operating	Producing at rate of 100 T/d, operated for 5 yrs
			5	400	Idle	Out for repairs
			6	400	Banked	Banked since Aug 45
		Kukioka	1	500	Idle	Shut down Aug 45
			2	700	Operating	Producing at rate of 100 T/d, operated for six yrs
			3	1,000	Banked	Banked since Apr 46
			4	1,000	Banked	Banked since Jun 44
		Tobata	1	400	Idle	Out in Oct 45
			2	300	Idle	Out ir Oct 45
	Wanishi (Hokkaido)	Wanishi-machi	1	350	Idle	Stopped Jul 45
			2	350	Banked	Banked since Oct 45
			3	225	Banked	Banked since Dec 45
			4	225	Banked	Banked since Dec 45
		Nakamochi	1	700	Banked	Banked since Mar 46
			2	700	Operating	Producing at rate of 150 T/c operated for 5 yrs
			3	700	Idle	Repaired, ready to operate
	Kamaishi (Honshu)	Kamaishi	8	600	Idle	Damaged by U S Navy
			9	350	Idle	Bombardment
			10	700	Idle	#10 repaired
	Hirohata (Honshu)		1	1,000	Banked	Banked since Aug 45, records being kept
			2	1,000	Banked	Banked since Jan 46, records being kept
Nippon Kokan KK	Kawasaki (Tokyo)	Ogimachi	1	400	Idle	Aux equip damaged, air raid
			2	350	Idle	Aux equip damaged, air raid
			3	600	Idle	Aux equip damaged, air raid
		Oshima	4	600	Idle	In good shape, ready to run
			5	600	Idle	In good shape, ready to run
		Tsurumi (Yokohama)	1	200	Idle	Stopped full of charge,bombed 45
			2	300	Idle	Crucible partly relined
Nakayama KK Seikosho	Osaka (Honshu)	Funamachi	1	430	Idle	Banked since Sep 44
			2	430	Idle	Banked since Sep 44
Amagasaki Seitetsu KK	Osaka (Honshu)	Amagasaki	1	350	Idle	Banked since Sep 44
Kokura Seiko KK	Kokura (Kyushu)	Konomimachi	1	350	Idle	Built 38, partly dismantled
			2	350	Idle	Built 43, not operated
TOTAL			36	17,850		

a/ Rated daily capacity, metric tons
Source: Iron and Steel Council and individual companies

TABLE 9. - COMPARISON OF ANNUAL PIG IRON PRODUCTION WITH CAPACITY (1,000 metric tons)

Year	Rated Capacity in Operation	Production	Percent of Capacity
1926	736	810	110.0
1927	900	896	99.6
1928	1,059	1,093	103.5
1929	1,099	1,087	99.0
1930	1,139	1,162	102.0
1931	940	919	97.8
1932	956	1,010	105.7
1933	1,463	1,437	98.3
1934	1,834	1,728	94.1
1935	1,978	1,906	95.8
1936	2,091	2,007	95.7
1937	2,614	2,309	88.5
1938	3,129	2,562	81.4
1939	4,122	3,231	78.2
1940	4,581	3,486	76.1
1941	5,416	4,233	78.0
1942	5,826	4,220	72.5
1943	5,731	3,980	69.5
1944	5,858	2,000	44.4
1945	3,741	1,145	30.6

Source: Iron and Steel Council and individual companies

TABLE 10. - SINTERING PLANTS IN JAPAN

Company	Plant	Sintering Machines		
		Number	Type	Annual Cap, metric tons
Japan Iron Mfg	Yawata	16	A I B	164,250
Japan Iron Mfg	Yawata	6	Greenawalt	273,750
Japan Iron Mfg	Hirohata	10	Greenawalt	750,000
Japan Iron Mfg	Wanishi	19	Greenawalt	920,000
Japan Iron Mfg	Wanishi	2	Dwight & Lloyd	600,000
Japan Iron Mfg	Kamaishi	2	Dwight & Lloyd	57,000
Japan Iron Mfg	Kamaishi	7	Greenawalt	55,000
Japan Steel Tube	Kawasaki	2	Dwight & Lloyd	{730,000
Japan Steel Tube	Kawasaki	4	Greenawalt	
Japan Steel Tube	Tsurumi	1	Dwight & Lloyd	110,000
Nakayama Steel	Nakayama	4	Greenawalt	90,000
Kokura Steel	Kokura	1	Dwight & Lloyd	110,000
Amagasaki Steel	Amagasaki	1	Dwight & Lloyd	110,000
TOTAL		75		3,970,000

Source: Iron and Steel Council and individual companies

TABLE 11. - COKE OVENS

(At Principal Iron and Steel Plants)

Location	System	Type a/	Batteries	No of Ovens	Ton Charge Per Oven	Rated Annual Cap 1,000 M T Coal?
Yawata	Kuroda	(r)	3	190	11	1,624
Higashida	Kuroda	(c)	1	90	13	303
	Ohno	(r)	2	70	14	508
Kukioka	Kuroda	(c)	2	150	14	1,089
	Ohno	(c)	4	300	14	4,350
Wanishi	Kuroda	(c)	1	45	10.5	122
	Ohno	(c)	3	219	13	2,215
	Ohno	(r)	2	60	10.5	327
	Kamaishi	(r)	1	30	10.5	82
Kamaishi	Kuroda	(c)	2	65	12	405
	Ohno	(c)	3	101	12	940
Hirohata	Ohno	(c)	3	225	14	2,450
Kawasaki						
Ogimachi	Kuroda	(c)	3	155	12.5	1,515
Oshima	Kuroda	(c)	1	75	12.5	242
Tsurumi	Kopper	(r)	2	72	8	298
	Ohno	(c)	2	48	17	422
Osaka						
Funamachi	Kuroda	(c)	2	110	13.2	1,042
Amagasaki	Ohno	(c)	1	41	14	57
TOTAL			38	2,046		17,991

a/ (r) - Regenerative; (c) Combined type
Source: Iron and Steel Council and individual companies

TABLE 12. - ANNUAL PRODUCTION OF BLAST FURNACE PIG IRON
(1,000 metric tons)

Fiscal Year	Japan Iron Manufacturing Co				Japan Steel Tube Co		Others	TOTAL
	Yawata	Wanishi	Kamaishi	Hirohata	Kawasaki	Tsurumi		
1926	640	95	65	ND	ND	ND	10	810
1927	702	92	68	ND	ND	22	12	896
1928	837	110	76	ND	ND	55	15	1,093
1929	787	117	99	ND	ND	63	21	1,087
1930	865	118	96	ND	ND	58	25	1,162
1931	641	83	112	ND	ND	61	22	919
1932	731	78	120	ND	ND	64	17	1,010
1933	1,013	129	194	ND	ND	63	38	1,437
1934	1,177	219	249	ND	ND	42	41	1,728
1935	1,294	255	240	ND	ND	75	42	1,906
1936	1,330	251	244	ND	72	75	35	2,007
1937	1,467	223	242	ND	235	85	57	2,309
1938	1,525	255	278	ND	300	151	51	2,562
1939	1,788	286	303	37	384	150	283	3,231
1940	1,632	391	335	224	429	154	321	3,486
1941	1,755	544	366	481	443	152	492	4,233
1942	1,746	658	323	365	472	120	516	4,220
1943	1,643	604	299	459	404	80	491	3,980
1944	1,167	424	274	385	267	40	43	2,600
1945	612	162	112	120	80	32	19	1,145

ND No data available
Source: Japan Iron and Steel Council

TABLE 13. - ROTARY KILN PLANTS

Plant & Location	Ore	Kilns	Rated Capacity	Type of Product	Analysis (%)
Iwaki Cement Co, Ltd Nanao-shi, Ishikawa	Limonite	1(3.45x88 m) 2(3.45x73 m)	212 T ore/24 hrs	Luppe	Fe,94.6;C,1.13;Si,0.065;P,0.097; S,0.22;Ni,1.9;Cr,1.58
Kawasaki Heavy Ind Co, Ltd Kuji Town, Iwate	Sandy limonite sands	2(3.6x60 m) 1(1.0x8 m)	152 T ore/24 hrs	Luppe	C,1.5;Si,0.2;P,0.24;S,0.1;Mn,0.1; Ti, trace
Nippon Metallurgical Ind Co, Ltd Iwataki, Kyoto	Limonite	4(3.6x70 m)	288 T ore/24 hrs	Luppe	Fe,93.47;C,0.80;Si,0.32;P,0.113; S,0.124; Ni,2.53;Cr,1.18;Co,0.10
Nippon Nickel Co, Ltd Onishi, Gumma	Serpentine limonite	1(2.8x50 m)	60 T ore/24 hrs	Nickel Luppe	C,0.5-1.2;Si,1.0-6.0;P,0.1-0.25; S,0.15-0.30;Ni,0.9-1.6;Cr,0.2-1.0; Mn,0.3-0.6
Nippon Iron Sand Steel Ind Co, Ltd Hachinohe, Aomori	Va leached iron sands	2(2.8x50 m) 100 HP each	120 T ore/24 hrs	Sponge iron	ND
Nippon Iron Sand Co, Ltd Takasago, Hyogo	Va leached iron sands	2(1.83x27 m) 1(1.25x17 m)	72 T ore/24 hrs	Sponge iron	ND
Riken Industrial Corp Tokyo, Tokyo	Limonite	2(2.3x38.0 m)	72 T ore/24 hrs	Luppe and Ni Luppe	Fe,92.13;C,?;Si,1.20;P,0.05; S,0.20;Ni,1.70;Cr,2.01
Toa Jyukogyo-sha Tsukiji, Fukuoka	Mill Scale	1(1.8x30 m)	36 T ore/24 hrs	Sponge iron	Fe,73.0;C,0.52;Si,0.38;P,0.03; S,0.18;Mn,0.32
TOTAL			1,172 T ore/24 hrs		

ND No data available

Source: Iron and Steel Council and individual companies

TABLE 14. - ANNUAL PRODUCTION OF LUPPE FROM ROTARY KILNS
(metric tons)

Name of Company	1939	1940	1941	1942	1943	1944	1945	Total
Iwaki Cement Co, Ltd Nanao	219	6,119	11,795	16,416	24,939	15,787	2,089	77,364
Kawasaki Heavy Ind Co, Ltd Kuji	ND	ND	1,690	15,520	23,870	24,260	6,280	71,620
Nippon Metallurgical Ind Co, Ltd Iwataki	ND	ND	ND	ND	8,863	20,325	7,785	36,973
Nippon Nickel Co, Ltd Onishi	ND	298	4,035	5,201	1,107	ND	ND	10,641 NiFe
Nippon Iron Sand Steel Ind Co, Ltd Hachinohe	ND	ND	ND	ND	5,280	26,434	13,801	45,515
Nippon Iron Sand Steel Ind Co, Ltd Takasago	ND	ND	1,784	2,056	8,304	5,286	270	17,700
Riken Industrial Corp Tokyo	786 ND	2,810 1,516	230 3,720	241 2,313	ND 2,100	ND ND	ND ND	4,067 Luppe 9,649 NiFe
Toa Jyukogyo-sha Tsukiji	ND	ND	2,705	5,271	6,171	5,620	1,448	21,215
TOTAL	1,005	10,743	25,959	47,018	80,634	97,712	31,673	294,744

ND No data available
Source: Iron and Steel Council and individual companies

TABLE 15. - OPEN-HEARTH STEEL PLANTS IN JAPAN
(1,000 metric tons)

Name of Company	Plant	No of furnaces	Annual Capacity	Remarks a/
Japan Iron Mfg	Yawata	46	2,413	7 tilting, 2 Talbot, 5 acid
Japan Iron Mfg	Wanishi	5	500	All tilting
Japan Iron Mfg	Kamaishi	10	587	4 tilting
Japan Iron Mfg	Hirohata	6	600	All tilting
Japan Steel Tube	Kawasaki	13	360	Also 3 Bessemer Converters
Japan Steel Tube	Tsurumi	8	348	1 tilting
Kobe Steel	Kobe	9	276	2 acid
Japan Steel	Muroran	16	276	8 acid
Yamato Steel	Osaka	5	167	1 acid
Nakayama Steel	Funamachi	5	203	
Amagasaki Steel	Amagasaki	4	205	
Kawasaki Steel	Kobe	10	350	
Sumitomo Metals	Wakayama	4	110	1 tilting, 2 acid
Sumitomo Metals	Osaka	4	98	3 acid
Sumitomo Metals	Amagasaki	3	90	
Nichia Steel	Amagasaki	3	86	
Osaka Steel	Osaka	4	72	
Hitachi Mfg	Mito	2	81	1 acid
Kokura Steel	Kokura	5	72	
Others		31	532	
TOTAL		193	7,426	

a/ All open hearths are stationary, basic furnaces except those noted
Source: Japan Iron and Steel Council

TABLE 16. - ANNUAL PRODUCTION OF STEEL INGOTS IN MAJOR PLANTS
(1,000 metric tons)

Fiscal Year	Japan Iron Manufacturing Company				Japan Steel Tube Co		Others	TOTAL
	Yawata	Wanishi	Kamaishi	Hirohata	Kawasaki	Tsurumi		
1926	861	0	47	0	136	0	321	1,365
1927	966	0	57	0	161	7	340	1,531
1928	1,095	0	66	0	204	54	392	1,811
1929	1,316	0	77	0	224	62	501	2,180
1930	1,291	0	60	0	194	66	93	1,714
1931	928	0	59	0	179	64	88	1,318
1932	1,228	0	71	0	225	80	145	1,749
1933	1,532	0	128	0	286	103	234	2,333
1934	1,679	0	185	0	354	133	412	2,763
1935	1,942	0	239	0	470	161	656	3,468
1936	2,086	0	290	0	527	188	740	3,831
1937	2,158	0	308	0	552	223	831	4,072
1938	2,320	0	303	0	587	238	981	4,429
1939	2,367	ND	287	ND	560	220	1,080	4,514
1940	2,337	ND	381	ND	507	212	961	4,398
1941	2,357	8	398	28	399	205	992	4,387
1942	2,263	125	412	291	714	210	911	4,926
1943	2,213	260	416	427	689	226	858	5,089
1944	1,553	146	357	399	389	137	516	3,497

ND No data available
Source: Japan Iron and Steel Council

TABLE 17. - PRINCIPAL ROLLING MILLS OF JAPAN
(1,000 metric tons)

Company	Plant	ROLLED PRODUCTS Primary Capacity	Secondary Capacity	Types
Japan Iron Mfg	Yawata	2,570	2,000	Rails, plates, bars, sheets, rods
Japan Iron Mfg	Hirohata	600	450	Plate (armor)
Japan Iron Mfg	Wanishi	600	180	Wire rod, billets
Japan Iron Mfg	Kamaishi	600	380	Shapes, bars, billets
Japan Iron Mfg	Fuji	0	130	Hoops and bars
Japan Steel Tube	Kawasaki	400	300	Bars, pipes, tubes, skelp
Japan Steel Tube	Tsurumi	300	280	Plates and sheets
Sumitomo Metals	Amagasaki	180	61	Tubes, hollow bodies
Sumitomo Metals a/	Wakayama	0	60	Tubes
Sumitomo Metals	Osaka	0	30	R R tires
Japan Steel Works	Muroran	52	38	Plate (armor)
Kokura Steel	Kokura	0	62	Wire, rod, bars
Kobe Steel	Kobe	216	130	Wire rod, bars, plates
Amagasaki Steel	Amagasaki	132	238	Pipe, tubes, bars, sheets
Kawasaki Steel	Osaka	192	156	Plate and sheet
Nakayama Steel	Funimachi	86	170	Plate, bar, wire rod
TOTAL		5,928	4,705	

a/ New rolling mill of 600,000 tons annual capacity and 12,000 forging press, 70 percent complete in August 1945
Source: Iron and Steel Council

TABLE 18. - DISTRIBUTION OF ROLLED STEEL IN JAPAN, 1926-44 (1,000 metric tons)										
Year	Rails	Bars	Shapes	Plate	Sheet	Tinplate	Wire Rods	Tubes	Others	TOTAL
1926	174	427	170	236	44	12	50	43	24	1,180
1927	179	461	208	247	88	15	54	50	34	1,336
1928	213	552	253	317	101	16	58	64	49	1,623
1929	271	684	256	352	174	18	68	78	27	1,928
1930	290	484	251	334	214	22	122	88	32	1,837
1931	110	467	203	280	252	27	177	63	23	1,602
1932	234	568	252	316	257	34	215	96	38	2,010
1933	272	774	331	476	271	36	285	117	54	2,616
1934	368	778	430	603	325	61	348	137	64	3,114
1935	367	1,018	468	713	389	95	413	167	107	3,737
1936	269	1,027	555	878	520	139	487	189	180	4,264
1937	217	1,201	727	1,063	442	166	447	224	187	4,674
1938	283	1,315	664	1,280	338	183	401	226	181	4,871
1939	361	1,260	574	1,177	254	169	383	270	193	4,641
1940	367	1,248	635	822	388	184	329	261	288	4,522
1941	291	1,213	617	794	423	110	338	233	223	4,242
1942	295	1,118	578	1,016	360	54	321	227	153	4,122
1943	171	876	479	1,477	307	64	311	286	154	4,125
1944	79	537	276	971	220	43	170	226	86	2,608

Source: Metal Bureau of Ministry of Commerce and Industry

TABLE 19. - IRON ORE PRODUCTION IN KOREA - 1925-45 (1,000 metric tons)								
Fiscal Year	Mines							Exported to Japan
	Mosan	Rigen	Kaisen	Kosei	Saines	Others	Total	
1925	0	59	64	18	78	132	351	107
1926	0	71	58	42	78	101	352	99
1927	0	84	60	51	93	196	484	169
1928	0	117	74	73	89	151	504	225
1929	0	102	70	88	90	209	559	314
1930	0	120	80	90	85	207	582	288
1931	0	130	95	132	80	80	417	177
1932	0	150	71	108	76	71	376	152
1933	0	210	103	119	ND	91	523	253
1934	0	250	78	121	ND	121	570	181
1935	0	240	89	117	ND	152	598	243
1936	0	234	76	126	ND	190	626	243
1937	0	250	98	154	ND	213	705	302
1938	0	262	130	164	135	79	770	367
1939	3	367	150	164	174	202	1,021	401
1940	255	273	154	181	76	133	1,072	439
1941	597	254	259	228	118	235	1,691	760
1942	1,001	234	306	314	163	260	2,278	665
1943	869	249	405	280	126	430	2,359	235
1944	1,100	314	543	503	122	805	3,387	610
1945	137	55	89	116	74	210	681	124
TOTAL							19,906	6,356

ND No data available
Source: Japan Iron and Steel Control Association

TABLE 20. - IRON ORES FROM FIVE PRONCIPAL MINES IN KOREA					
Mine	Type	% Fe	% SiO_2	% P	% S
Musan a/	magnetite	56.4	18.5	0.059	0.01
Rigen	hematite	49.4	24.5	0.076	0.014
Kaisen	hematite & limonite	45.8	17.0	0.076	0.083
Kasei	limonite	51.0	11.8	0.073	0.041
Sainei	limonite	50.1	14.0	0.058	0.013

a/ Magnetically concentrated from 38 percent
Source: Japan Iron and Steel Council

TABLE 21. - KOREA PIG IRON - 1925-45 PRODUCTION AND EXPORT TO JAPAN (metric tons)		
Fiscal Year	Production	Export to Japan
1925	99,160	83,857
1926	115,036	104,717
1927	129,022	102,668
1928	146,159	139,832
1929	153,627	137,598
1930	150,524	109,432
1931	147,257	95,127
1932	161,940	205,955
1933	161,163	160,429
1934	210,807	164,185
1935	211,441	130,627
1936	208,958	122,910
1937	226,022	134,834
1938	294,523	214,991
1939	289,697	221,034
1940	238,360	164,152
1941	297,422	137,999
1942	395,832	136,798
1943	537,320	269,000
1944	557,139	245,000
1945	121,524	32,000
TOTAL	4,852,933	3,113,145

Source: Japanese Iron and Steel Control Association

TABLE 22. - SMALL BLAST FURNACES IN KOREA						
Location	Furnaces Planned	Furnaces Constructed	Furnaces Operated	Production Metric Tons		
				1943	1944	1945
Kenjiko	10	10	10	20,128	38,226	1,708
Seishin	10	10	10	8,164	29,014	ND
Heinan	10	4	4	1,234	4,171	645
Sanchoku	10	6	2	686	3,697	1,818
Ranko	5	3	3	19	4,072	1,599
Kaisyu	2	2	2	1,033	3,792	721
Chinnampo	8	5	3	207	2,497	661
Ginzen	10	4	3	ND	5,876	825
Heijo	15	12	2	ND	3,788	12,562
TOTAL	80	56	39	31,471	95,133	20,539

ND No data available
Source: Japan Iron and Steel Association

TABLE 23. - PRODUCTION OF PIG IRON AND STEEL IN KOREA (metric tons)						
	1939	1940	1941	1942	1943	1944
Pig iron	289,697	238,360	297,422	395,832	537,320	557,139
Low phosphorous iron	4,110	10,944	18,848	30,465	16,368	25,666
Luppe or sponge iron	13,744	36,974	51,331	58,513	52,922	51,158
Reduced iron (elect)	9,564	10,845	11,753	11,951	16,307	20,655
Steel ingot	93,131	93,177	116,802	127,841	107,534	99,883
Steel material	73,160	76,768	92,658	110,170	101,922	72,025
Special steel material	2,639	7,343	10,519	13,186	16,204	20,249
Ferroalloy	1,305	1,240	2,834	2,596	6,172	10,717
Cast steel	7,423	10,877	10,707	12,412	12,976	14,378
Wrought steel	4,001	3,616	4,326	3,099	2,858	2,348
Special cast steel	2,904	2,789	3,668	4,085	3,863	2,993

Source: Japan Iron and Steel Control Association

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Report No.	50.	Iron and Steel Metallurgy of the Japanese Empire	31 Oct 46

NATURAL RESOURCES SECTION
REPORT NUMBER 50
31 October 1946

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INCOMING AIRGRAM

DEPARTMENT OF STATE DIVISION OF COMMUNICATIONS AND RECORDS TELEGRAPH BRANCH

FROM: USPOLAD, Tokyo

Date of mailing: July 31, 1948 1465

Rec'd: Aug. 11, 1948 8:34 a.m.

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Secretary of State,

Washington.

A-161, July 31, 1948.

694.9631/6-2248

894.6351

Reference this Mission's airgram A-132, June 22, 1948, regarding iron ore procurement for Japan.

Since July 8 there have been four contracts for iron ore signed totalling 590,000 tons which includes 40,000 tons from the United States, 200,000 tons from Hainan, 150,000 tons from Malaya and 200,000 tons from China.

694.9631

Negotiations are still under way for an additional 540,000 tons of iron ore which includes a possible 10,000 tons from Sweden, 50,000 tons from the U.S.S.R., 125,000 tons from India, 105,000 tons from the Philippines, and 250,000 tons from North or South America.

Iron ore deliveries for July are estimated at 37,000 tons, for August-September 197,500 tons, for October 102,500 tons, for November 102,500 tons and for December 102,500 tons.

The iron ore situation therefore has improved in the past month in that this Headquarters now has firm contracts signed for immediate delivery and it appears that by December 1 the shortage so far existing in the iron ore program will have been made up.

Although this Headquarters is skeptical with regard to attaining full performance on the China contract as signed, as an offset, it does have an option on additional Malayan iron ore and preliminary discussions have taken place on additional Philippine as well as additional iron ores from China.

SEBALD

863
DRMaynard:mf

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JAN 12 1949
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John H. Whitlock,
Whitlock Mining Company,
343 206 South Spring Street,
Los Angeles, California.

Reurtel Jan. 7, unable advise current demand, but you may/wish make offer Boeki Cho, C/o Import Bureau, Kasumigaseki, Chiyodaku, Tokyo, giving details on source, analysis, price, quantity, delivery dates.

Isaiah Frank
Isaiah Frank, Adviser
International Resources Division
State Department

894.6351/1-749

1949 JAN 12 PM 6 27
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LOSANGELS CALIF JAN 7 1949

STATE DEPARTMENT

FOREIGN AFFAIRS

WISH INFO PARTIES WANTING TO PURCHASE IRON ORE SHIP JAPAN [redacted]

HAVE DEPOSIT HIGH GRADE WIRE COLLECT WHITLOCK MINING CO 34[redacted]

206 SO SPRING ST

JOHN H WHITLOCK

232A JAN 8

343 206 SO..

INTERNATIONAL RESOURCES DIVISION

JAN 10 1949

DEPARTMENT OF STATE

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TRADE POLICY
JUN 10 1949
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DEPARTMENT OF STATE

PLEASE ADDRESS REPLY TO
613 Blackstone Building
Cleveland, Ohio.
Telephone WEbster 9249.

May 20, 1949.
AIR MAIL

DYK

894.6351/5-2049

The Reconstruction Finance Corporation
Washington, D. C.

Sirs:

The economic recovery of Japan is being hindered by an acute shortage of Iron Ore in Japan.

Our associate company in Japan has requested us to supply, if possible, up to several hundred thousand tons of iron ore. Our associate company in Japan is well financed and can pay for the ore.

We are in position to supply this ore but ocean freight rates on cargoes moving from the U.S.A. to Japan make the delivered ore price in Japan to high to be within economic range.

As the United States Government is interested in the economic recovery of Japan, it would appear that some United States Government agency may be desirous of helping out in this matter.

Will you please tell us to what Government agency we shall present this problem and this opportunity to be of economic aid to Japan.

FILED
JUN 27 1949

Very respectfully,

BROWN, BROWN and BROWN

T G Gregory

613 Blackstone Building
Cleveland, Ohio.
Telephone WEbster 9249.

CS/A

DIVISION OF COMMERCIAL POLICY
Reply drafted 6/14
JUN 10 1949
DEPARTMENT OF STATE

Via Air Mail

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166258

894.6351/5-2049

RECONSTRUCTION FINANCE CORPORATION
WASHINGTON 25, D. C.

June 7, 1949

Gentlemen:

Enclosed is a letter that has come to the Reconstruction Finance Corporation from Mr. T. G. Gregory of Brown, Brown and Brown, Cleveland, Ohio.

The inquiry is referred to your Department for such consideration as it is in a position to give to the matter and the correspondent has been advised of this reference.

Yours very truly,

A. B. MERRITT
Chief
Division of Information

Department of State
Washington 25, D. C.

FW 894.6357/6-749

JUN 20 1949

In reply refer to
CP 894.6351/5-2049

894.6351/5-2049

My dear Mr. Gregory:

Your letter of May 20, 1949, to the Reconstruction Finance Corporation, stating your interest in supplying iron ore to Japan, which was referred to the Department of State, has been brought to the attention of this Division for reply.

As you know, Japan is importing iron ore in considerable quantity which is being procured on a strictly competitive basis. According to available information there are no negotiations going on at the present time for the procurement of iron ore for Japan in the United States. If such negotiations are undertaken at any time in the future, it is presumed that your associate company in Japan would be able to make bids on such quantities as are desired.

In the event that you desire to make further inquiry, it is suggested that possibly the Food Administrator, Occupied Areas, Office of the Assistant Secretary of the Department of the Army, may be of help to you.

Sincerely yours,

Merrill C. Gay
Assistant Chief
Division of Commercial Policy

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Mr. T. G. Gregory,
613 Blackstone Building,
Cleveland, Ohio.

cc. Army (CAD)

ITP:CP:JFShaw:lhj
June 14, 1949

NA

A true copy of the signed original.
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