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PLANT STUDY OF THE IRON AND STEEL INDUSTRY
OF THE USSR: ECONOMIC REGION XII

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FOREWORD

This report covers those plants in Economic Region XII of the USSR which produce metallurgical coke, pig iron, steel ingots, steel castings, or other types of finished steel.

Although Region XII accounted for less than 1 percent of the production of steel and finished steel in the USSR in 1954, this production, because of the strategic location of Region XII, is significant in the Soviet steel industry.

The primary intelligence value of this report lies in the basic evaluation of plant capacity of Region XII as a contribution to the capabilities of the USSR -- and particularly of the Soviet Far East -- in the production of metallurgical coke, pig iron, and steel products. Regional production estimates of the Soviet iron and steel industry are also useful as a check on Soviet official statistics.

This report is one of a series of regional provisional reports that will provide basic research data for a comprehensive study which is to be made on the iron and steel industry of the USSR.

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CIA/SC/RR 102
(ORR Project 23.605)

PLANT STUDY OF THE IRON AND STEEL INDUSTRY
OF THE USSR: ECONOMIC REGION XII*

Summary

Although the iron and steel industry of Economic Region XII, ** the Far East, produces less than 1 percent of the total steel produced in the USSR, the industry is significant because it provides a substantial part of the steel requirements of an area more than 2,500 miles from a major steel production center, Stalinsk, in Economic Region IX.

In 1954 the steel industry in Region XII produced 283,200 metric tons*** of steel, 33,000 tons of coke, and no pig iron. Estimated production of finished steel in the region in 1954 was 192,300 tons, of which 28,200 tons were steel castings.

There are seven steel-producing facilities in the region. The principal plant, the only one with rolling mill facilities, is Amurstal, in Komsomol'sk. In 1954 the Amurstal plant produced 232,400 tons of steel, 82.1 percent of the 1954 output of Region XII.

The Amurstal plant, originally designed as a fully integrated operation with more than twice its 1954 capacity, has not been provided with coking facilities and blast furnaces, and it draws its requirements of pig iron from Magnitogorsk, Stalinsk, and Manchuria.

* The estimates and conclusions contained in this report represent the best judgment of ORR as of 1 May 1955.

** The term region in this report refers to the economic regions defined and numbered on CIA MAP 12048, 9-51 (First Revision 7-52), USSR: Economic Regions.

*** Throughout this report, tonnages are given in metric tons.

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Failure to provide hot metal facilities for Amurstal probably resulted from a reappraisal of local iron ore deposits, indicating inadequate reserves of ore of suitable quality. No specific plans for further expansion are known, but a gradual buildup would seem probable. A major expansion would logically await the development of adequate supplies of iron ore and of additional requirements by the steel-consuming industries of the region.

I. Introduction.

Although the iron and steel industry of Economic Region XII accounts for less than 1 percent of the total Soviet production of steel, it is important by virtue of its strategic location. Situated more than 2,500 miles from the nearest integrated steel plant, in Stalinsk, Region XII has developed during the past 15 years a small industry meeting a significant part of the steel requirements of the area.

Original plans envisioned a much larger, fully integrated steel industry. These plans were not fulfilled. Chief among the deterring factors, probably, was the lack of an adequate iron ore base. There are two iron ore deposits, Nikolayevsk, with an estimated 23-million-ton reserve of 26 to 45 percent iron content, 1/* and Maly Khingan, with quartzite ores (similar to taconites) of 37 to 42 percent iron content. 2/ The Nikolayevsk deposit would support an annual production of pig iron of 1 million tons for only 9 years. The Khingan ores require special handling, which would be a very high-cost operation. Thus, although coking coal is available, it appears more economical for this area to draw most of its requirements for pig iron from Manchuria and from Regions VIII and IX of the USSR.

* For serially numbered source references, see Appendix D.

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Production of steel is concentrated mainly in Khabarovsk Kray; 82.1 percent of the regional total is produced at the Amurstal Metallurgical Plant. The remainder of the steel is produced in foundries of manufacturing plants, mainly in Magadan Oblast.

Finished steel is produced by the industry of Region XII only in the forms of plates, sheets, tinplate, forgings, and castings. Although it is not clear that the output of these products is sufficient for regional requirements, plates and sheets are nevertheless known to have been shipped out of the region. Most of this production, however, is consumed by local industries -- plates, sheets, castings, and forgings by the shipyards and machine building plants in Komsomol'sk, Vladivostok, and Khabarovsk, and tinplate by the fish and vegetable canning industry. On the other hand, substantially all requirements for bars, wire, pipe, structural shapes, and rails must be obtained from other regions.

Production of coke, steel, and finished steel in Economic Region XII, 1954, is shown in Table 1.*

II. Amurstal Metallurgical Works.

A. Location.

50°35' N - 137°02' E, Komsomol'sk, Khabarovsk Kray, Far East.

The plant is located at the southern outskirts of the city on the Amur River. 3/

B. History and Development.

Based on the assumption that coal from the Bureya basin, iron ore from the Nikolayevsk and Khingan deposits, and manganese and essential nonmetallics from nearby sources would provide the necessary raw material base, a large, fully integrated steel plant

* Table 1 follows on p. 4.

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Table 1

Production of Coke, Total Steel, and Finished Steel
in Economic Region XII of the USSR a/
1954

Thousand Metric Tons			
Plant	Coke	Total Steel	Finished Steel
Khabarovsk Kray			
Amurstal Metallurgical Works	0	232.4	161.8
Amur Shipyard No. 199	0	5.0	2.8
Total	<u>0</u>	<u>237.4</u>	<u>164.6</u>
Magadan Oblast			
Motor Vehicle Repair Plant/ Dal'stroy at Magadan	0	16.3	10.3
Orqtukan Steel Foundry	0	13.0	8.3
Total	<u>0</u>	<u>29.3</u>	<u>18.6</u>
Primorskiy Kray			
Suchan Coke Plant	33.0	0	0
Vladivostok Shipyard imeni Voroshilov	0	10.0	5.5
Total	<u>33.0</u>	<u>10.0</u>	<u>5.5</u>
Amur Oblast			
Raychikhinsk Mining Equipment Repair Shop	<u>0</u>	<u>6.5</u>	<u>3.6</u>
Grand Total	<u>33.0</u>	<u>283.2</u>	<u>192.3</u>

a. No pig iron is produced in Region XII.

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was planned in 1932. 4/ Production was to be over 500,000 tons each of pig iron and steel. In addition, a large coke-chemical plant and the rolling facilities to make 450,000 tons of rolled steel products annually were planned. 5/

Construction began in 1936. The first open hearth went into production in 1942 and the second shortly thereafter. 6/ By 1942, most of the buildings were completed, and total facilities installed were two open-hearth furnaces, a blooming mill, a medium plate mill, a light plate mill, a sheet mill, a scrap breaker, a refractory shop, and a foundry. 7/

By the end of 1954 the original plans for a fully integrated plant had not been realized. No coke-chemical facilities or blast furnaces have been installed, and the steelmaking and finishing capacity provided is less than half that initially planned. Although construction continues at the plant, it appears to be limited to an expansion of tinplate capacity and to the provision of housing and other community facilities.

C. Plant Investment.

From 1948 until the end of 1953, approximately 200 million rubles were invested in the plant. 8/ Estimated capital investments in the Amurstal plant by year were as follows 9/:

<u>Year</u>	<u>Thousand Rubles</u>
1948	26,972
1949	32,556
1950	27,311
1951	25,514
1952	N. A.
1953	75,683

Only a small portion of the total investment during these 6 years appears to have been devoted to the production facilities of the plant. A large part of the investment went for public

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improvements, a communal outdoor sewage system, a bread plant, winter cost rise, housing, schools, a lying-in home, and a nursery. 10/ The only improvements of the plant production facilities known to have taken place in this period have been an expansion of the tinplate mill, installation of a forge and boiler shop, construction of an oil warehouse, and improvements to the rail transport system. 11/

D. Raw Materials and Other Inputs.

Major inputs of raw materials into the Amurstal Metallurgical Works in 1949, 1952, and 1954 are shown in Table 2.

Table 2

Major Inputs of Raw Materials
at the Amurstal Metallurgical Works
1949, 1952, and 1954

					Metric Tons
	Iron Ore <u>a/</u>	Pig Iron <u>12/</u>	Scrap <u>b/</u>	Limestone <u>c/</u>	Fuel Oil
1949	13,200	85,000	46,000	7,914	36,000 <u>14/</u>
1952	16,600	105,000	61,000	9,978	60,000 <u>15/</u>
1954	23,400	100,000	132,000	13,944	52,000 <u>d/ 16/</u>

- a. Based on an average 10-percent ore addition to the open hearth.
b. Based on steel production minus pig iron charged.
c. Based on a consumption of 60 kilograms (kg) per ton of open-hearth steel. 13/
d. Reduced consumption of fuel oil was partly a reflection of the drive to cut fuel costs and partly the result of a higher scrap-to-pig iron ratio.

Iron ore used as feed ore for the open-hearth furnaces is obtained from Nikolayevsk. 17/ Dolomite is supplied by the Petrovsk-Zabaykal'sk Metallurgical Plant from the pit at the Tarubukin Deposit. Limestone comes from the Londok Quarry. 18/

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Principal sources of pig iron are Magnitogorsk, Stalinsk, and Manchuria. Manchuria supplied 16,000 tons in 1949, 42,500 tons in 1952, and an estimated 40,000 tons in 1954. 19/ In 1949 and 1952, pig iron requirements were approximately 65 percent of the steel production but dropped to 43 percent in 1954, indicating a greater availability of scrap.

Most of the fuel requirements come from Vannovka and Dzemgi, some from Gur'yev and Dzhar-Kurgan. 20/ The following inventory of raw and alloying materials was on hand as of 20 July 1954. 21/:

<u>Material</u>	<u>Metric Tons</u>
Conversion iron (pig)	13,851
Cast iron (foundry)	1,031
Specular cast iron	389
Ferromanganese	494
Ferrosilicon (20 percent)	253
Ferrosilicon (45 percent)	28
Metal scrap	15,386
Iron ore	193
Chrome ore	316
Bricks	
Magnesite	996
Chrome-magnesite	243
Dinas	1,942
Magnesite powder	
Domestic	570
Imported	76
Limestone	4,406

E. Coking Facilities.

The plant has no coking facilities.

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F. Ironmaking Facilities.

Although the plant has no facilities for producing pig iron, there are 3 cupolas 22/ which melted an estimated 14,500 tons of cast iron in 1954. The estimate is based on a 63-percent yield from poured metal to finished iron castings. The 1954 Plan called for 9,128 tons of finished iron castings.

G. Steelmaking Facilities.

As of July 1954, steelmaking facilities at Amurstal comprised 2 oil-fired, 125-ton, open-hearth furnaces 23/ which were installed in 1942. 24/ Total steel produced (in metric tons) in selected years from 1944 to 1954 was as follows:

<u>1944</u>	<u>1949</u>	<u>1950</u>	<u>1952</u>	<u>1953</u>	<u>1954</u>
130.9 <u>25/</u>	131.9 <u>26/</u>	143.4 <u>27/</u>	166.3 <u>28/</u>	200.0 <u>29/</u>	232.4 <u>30/</u>

In spite of the investments reported to have been made in this plant during the 1948-53 period, there is no evidence that steelmaking facilities are being expanded. It appears that through greater efficiency in operation and the use of improved refractory materials, production has been approaching the rated capacity of the furnaces, which is 250,000 tons annually.

H. Finishing Facilities.

Reports of finished steel tonnages and production plans indicate that the finishing facilities of the plant consist of a blooming mill, a medium plate mill, a light plate mill, a sheet mill, a hot-dip tinplate mill, a steel foundry, an iron foundry, and a forge and stamping shop. 31/

On the basis of production plans, it is estimated that the various finishing mills have the following annual capacities:

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	<u>Metric Tons</u>
Medium plate mill	100,000
Light plate mill	35,000
Sheet mill	30,000
Tinplate mill	20,000

All finishing facilities except the tinplate mill have been operating since 1942. 32/ The date of installation of the tinplate mill is unknown, but in 1954 it was being expanded to an annual capacity of 20,000 tons. 33/

I. Intraplant Services.

Electric power is supplied by a 50,000-kilowatt-capacity power plant located in Komsomol'sk. 34/ The water supply is piped from the Amur River. 35/

Rail transportation is provided by spur lines of the Khabarovsk-Komsomol'sk line of the Far East Railroad System. Additional transportation on the Amur River is available for 6 months of the year. 36/

J. Products and Production.

The 1954 Plan for gross production from Amurstal was apparently approved for 100 million rubles.

The plan was not being met. According to detailed estimates, on the basis of a production of 148,000 tons of commercial rolled steel the plant would have a gross production* value of

* Gross production of a plant includes all commercial production and, in addition, any increase or decrease in the value of unfinished production (work-in-process) since the previous accounting period. The value of unfinished production may vary from one period to another according to changes in the amounts of inputs into work-in-process as compared to the value of finished goods taken out of work-in-process. 37/

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172 million rubles (38.6 million in the first quarter), and a commercial production* value of 163.7 million rubles (36.2 million in the first quarter). 38/

In some periods the commercial production at Amurstal may exceed the value of gross. To illustrate, a breakdown of production values (in million rubles) for the second quarter of 1954 is shown as follows 39/:

	<u>April</u>	<u>May</u>	<u>June</u>
Gross production	13.7	14.0	15.2
Commercial production	13.8	13.9	14.1

Contrasted to the 1954 planned commercial production of 163.7 million rubles are the planned cost figures for all commercial production of the plant -- 258.3 million rubles.

* Commercial production is the output which has been completed in a given accounting period and is ready for shipment outside the confines of the plant. The general categories of output included in commercial production are as follows:

1. The basic and miscellaneous products completed.
2. Water, steam power, maintenance, and other services provided by the shops of the plant for outside consumption.
3. Articles and services produced by the plant for its own capital construction and repair.

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From the ruble values of commercial production and costs of commercial production planned, it seems probable that Amurstal operated at a loss of 94.6 million rubles during 1954. Although the planned value of commercial production was based on 148,000 tons of rolled steel, it is not clear whether this value included only rolled steel or all commercial production. The plant also produces iron and steel castings and refractory bricks. It may be that the sale of these items would bring the yearly receipts in line with the costs. On the other hand, prices of finished steel products are thought to be standard for all regions of the USSR, and it is probable that a small, nonintegrated plant like Amurstal would have higher costs than the average of the industry.* These costs would be justified very considerably by the alternative of transporting steel products 2,500 miles from Stalinsk, the nearest integrated steel producer, and from smaller installations located in Economic Region XI, East Siberia.

Production of steel and finished iron and steel at the Amurstal Metallurgical Works in 1954 is shown in Table 3.**

On the basis of a US Bureau of Labor Statistics survey of prices paid on the market in June 1953, a comparable tonnage of plates, sheets, and tinplate produced in the US would have had a market value of \$14,677,900.

Table 3 shows that in 1954 the Amurstal plant produced an estimated 153,600 tons of rolled steel -- 5,600 tons more than the planned production of 148,000 tons. On the basis of the planned production having a commercial value of 163.7 million rubles, the actual production would have a commercial value of 169.9 million rubles. Therefore a ruble-to-dollar ratio of 11:6 is obtained. This figure must be accepted with caution; the output of each product

* Evidence indicates that a subsidy of 7 million rubles was approved in 1954 for the Irkutsk Heavy Machine Building Plant for unprofitable items. This plant is a small steel producer, and rolled steel was specifically mentioned as an unprofitable product.

** Table 3 follows on p. 12.

Table 3

Production of Total Steel and Finished Iron and Steel at the Amurstal Metallurgical Works a/
1954

Thousand Metric Tons								
Steel	Medium Plates	Light Plates	Steel Sheets	Tinplate	Total Rolled Steel	Steel Castings	Total Finished Steel	Iron Castings
232.4	96.0 <u>b/</u>	31.2 <u>b/</u>	24.0 <u>b/</u>	2.4 <u>c/</u>	153.6 <u>d/</u>	8.2 <u>e/</u>	161.8	9.1 <u>f/</u>

a. The annual productions of finished steel products are estimated. July 1954 production reports were multiplied by 12.

b. 42/

c. Although the tinplate mill was being expanded in 1954 to an annual capacity of 20,000 tons, that production during the third quarter was 200 tons per month. Tinplate production is subtracted from the sheet tonnage. 43/

d. Includes medium plates, light plates, steel sheets, and tinplate.

e. 44/

f. 45/

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category is estimated, and little is known of the sizes and finishes produced within the categories. The US prices used, consequently, may not be precisely applicable to the items actually produced.

K. Distribution of Products.

shipments of rolled steel from the Amurstal Metallurgical Works in 1954 are shown in Table 4.

Table 4

Shipments of Rolled Steel
from the Amurstal Metallurgical Works
1954

<u>Month</u>	<u>Number of Cars</u>	<u>Amount</u> <u>(Metric Tons)</u>
February	564	11,792 <u>46/</u>
March	628	13,144 <u>47/</u>
May	558	11,677 <u>48/</u>
June	506	10,733 <u>49/</u>
November	609	12,789 <u>50/</u>
Total	<u>2,865</u>	<u>60,135</u>

Table 4 indicates an average monthly shipment of 12,027 tons of rolled steel products with an average carload of 21 tons. Extending the monthly average for 12 months gives an estimate of 144,324 tons shipped in 1954.

The estimate of about 144,000 tons of rolled steel shipped leaves a difference of approximately 10,000 tons when compared with the estimated 1954 production of rolled steel. Assuming both estimates to be correct, the 10,000 tons could be accounted for in manufactured items and steel used in capital construction and repair.

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In 1950, Amurstal provided rolled steel for the following ministries and directorates 51/: Ferrous Metallurgy, Coal Industry, Oil Industry, Shipbuilding, Agriculture, Internal Affairs, Transport Fleet, Fish Industry, Armed Forces, Irkutsk Metal Warehouse of the Chief Directorate of Metal Sales, and the Chief Directorate of City Construction.

Available evidence indicates that the recipients of rolled steel produced at Amurstal remained the same throughout 1952, 1953, and 1954. A notable exception was that in each of these years rolled steel was shipped to Communist China. 52/

In 1952, Amurstal exported 390 tons of plates and 245 tons of sheets to Communist China. 53/

In 1953 the plant was behind in its shipments to Communist China. Undershipments in the second and third quarters of 1953 amounted to more than 300 tons. 54/ As of 1 December 1953, undershipment on orders for export (presumably to Communist China) was 1,630 tons, and the order for export in December called for 2,840 tons. In December the plant shipped against these orders a total of 4,364 tons. 55/ During 1954 the plant continued to ship rolled steel to Communist China. In addition to plates and sheets, tinplate and blackplate were exported. 56/

The tonnages mentioned in the preceding paragraph should not be construed as the total shipments of steel from Amurstal to Communist China. Available information is too scanty to permit estimates of annual shipments.

In the fourth quarter of 1953, emphasis was put on shipments of rolled steel to the Ministry of Manufactured Consumer Goods, 57/ and at about the same time small quantities of rolled steel were being shipped to the open market. 58/ Open market shipments amounted to 6 carloads, approximately 125 tons, in September and 27 carloads, about 570 tons, in October. 59/ The October tonnage was scheduled for the Far East, Amur, Transbaikal, East Siberia, Turksib, Tomsk, Omsk, and Karaganda Railroads. 60/

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Lack of sufficient information precludes any estimate of the annual tonnages furnished by Amurstal to individual consuming industries or ministries.

L. Administration.

The Amurstal plant is subordinate to the Ministry of Ferrous Metallurgy, Chief Directorate of the Metallurgical Industry. 61/

M. Personnel.

Director of the Amurstal Plant in 1954 was Frolov (fnu). 62/ The labor plan of the Amurstal Metallurgical Works for the first quarter of 1951 is shown in Table 5.

Table 5

Labor Plan of the Amurstal Metallurgical Works 63/
First Quarter, 1951

<u>Classification</u>	<u>Number of Workers</u>	<u>Wages (Thousand Rubles)</u>
Production workers	1,970	6,915
ITR (engineering-technical workers)	300	2,400
Clerical workers	185	657
MOP (junior service personnel) "	75	101
Guards	137	236
Students	70	91
Transport workers	650	2,145
Communal workers	400	840
Others	175	385
Capital repair	100	340
Allocation for unlisted personnel		15
Total	<u>4,062</u>	<u>14,125</u>

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The cash awards customarily paid in the Soviet steel industry for outstanding work amounted to 14 million rubles at Amurstal in 1954. 64/ This would amount to approximately 8.5 percent of the planned commercial value or 5.4 percent of the planned costs of the plant.

III. Amur Shipyard No. 199.

A. Location.

50°33' N - 137°02' E, Komsomol'sk, Khabarovsk Kray, Far East.

The plant is on the northeast bank of the Amur River just below the main section of the city of Komsomol'sk.

B. History and Development.

Construction of the shipyard at Amurstal started in 1932, and operations began in 1937. 65/

C. Raw Materials and Other Inputs.

Steel plate, sheets, and castings are supplied by Amurstal. 66/ Coal for the thermal electric power plant is brought in by barge and rail from the Raychikhinsk mine located on the Amur River about 300 miles west of Komsomol'sk. 67/

D. Steelmaking Facilities.

The foundry is equipped with 1 electric furnace of 5-ton capacity. 68/ Although earlier German reports 69/ indicate that there were 4 electric furnaces with an annual capacity of 30,000 tons, later reports show only 1 electric furnace producing steel.

Production of steel at the Amur Shipyard No. 199 in 1954 was as follows:

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<u>Number of Furnaces</u>	<u>Type</u>	<u>Individual Capacity. (Metric Tons)</u>	<u>Number of Heats per Day</u>	<u>Number of Operating Days per Year</u>	<u>Total Production (Thousand Metric Tons)</u>
1	Electric	5	N. A.	325	5

E. Finishing Facilities.

1. Rolling Mills.

The shipyard has no rolling mills.

2. Steel Foundry.

The steel foundry is equipped with molding, casting, and cleaning facilities to produce steel castings for repair and construction of ships.

F. Products and Production.

Production of total steel and finished steel (in thousand metric tons) at the Amur Shipyard No. 199 in 1954 was as follows:

<u>Steel</u>	<u>Steel Castings</u>	<u>Rolled Steel</u>	<u>Total Finished Steel</u>
5.0	2.8*	0	2.8

G. Distribution of Products.

Most of the castings produced are consumed by the shipyard for the manufacture of component parts. 70/

* Based on a yield of 55 percent from poured steel to finished castings.

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H. Administration.

This shipyard was reported to be under the direct control of the Ministry of Shipbuilding. 71/ Volik was plant director in 1954. 72/

I. Personnel.

The labor estimate for 1954 is about 15,000 persons. 73/

IV. Motor Vehicle Repair Plant/Dal'stroy at Magadan.

A. Location.

59°34' N - 150°48' E, Magadan, Magadan Oblast, Far East.

B. Ironmaking Facilities.

The plant has one cupola with a diameter of 80 centimeters. Based on US practice, the melting capacity is estimated at 6,000 to 8,000 pounds per hour. 74/

C. Steelmaking Facilities.

An electric furnace 3 meters in diameter with a capacity of 5 tons 75/ produces 8 to 10 heats per day for ingots and castings. 76/

Production of steel at the Magadan Motor Vehicle Plant in 1954 was as follows:

<u>Number of Furnaces</u>	<u>Type</u>	<u>Individual Capacity (Metric Tons)</u>	<u>Number of Heats per Day</u>	<u>Number of Operating Days per Year</u>	<u>Total Production (Thousand Metric Tons)</u>
1	Electric	5	8 to 10	325	16.3

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D. Finishing Facilities.

1. Rolling Mill.

A rolling mill exists, but details regarding it are not known. Billets 2 meters by 15 centimeters by 10 centimeters were produced in 1952. 77/

2. Steel Foundry.

Facilities in the foundry provide for making ingots and castings. 78/

3. Forge Shop.

E. Intraplant Services.

1. Water Supply.

Water for all plant purposes is supplied by pipeline from the west section of the city. 79/

2. Maintenance Shop. 80/

F. Products and Production.

The plant manufactures and repairs excavators, bulldozers, pneumatic drills, compressors, and mining machinery. 81/

Production of steel and finished steel (in thousand metric tons) at the Magadan Motor Vehicle Plant in 1954 was as follows:

<u>Steel</u>	<u>Steel Castings</u>	<u>Rolled Steel</u>	<u>Total Finished Steel</u>
16.3	4.5*	5.8**	10.3

G. Distribution of Products.

Most of the rolled products, castings, and forgings are consumed in machinery products made within the plant.

H. Personnel.

The plant director in 1947 was Golikov. 82/

V. Orotukan Steel Foundry.

A. Location.

62°21' N - 150°48' E, Orotukan, Magadan Oblast, Far East.

The plant is located on the highway between Magadan and Berelyakh.

B. History and Development.

Construction of the plant was started in 1942, 83/ and steel production began during World War II. 84/

C. Coking Facilities.

The plant has no coking facilities.

D. Ironmaking Facilities.

-----, an analysis of the operations shows that there are only cupolas for the production of iron castings. 85/

* Based on the assumption that 50 percent of steel produced goes to castings with a finished yield of 55 percent.

** Based on a yield of 72 percent on 50 percent of the steel produced.

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E. Steelmaking Facilities.

There is one open-hearth furnace, which -- because of the scope and type of plant operations -- is estimated to be of 10-ton capacity. 86/ From World War II until 1952 this furnace operated with acid linings and slags. The process was changed to basic to permit the production of high-manganese steel for wear-resistant mining and crushing equipment. 87/ During 1953, in 3 campaigns, a total of 1,111 heats of steel was produced. 88/

Production of steel at the Orotukan Steel Foundry in 1954 was as follows:

<u>Number of Furnaces</u>	<u>Type</u>	<u>Individual Capacity (Metric Tons)</u>	<u>Number of Heats per Day</u>	<u>Number of Operating Days per Year</u>	<u>Total Producti (Thousand Metric Tons)</u>
1	Open hearth	10	3 to 4	325	13*

F. Finishing Facilities.

1. Rolling Mill.

There is a rolling mill of unknown characteristics. In 1952, plans were made to roll angles and bars up to 26 millimeters square. 89/

2. Steel Foundry.

The foundry is equipped for making ingots and castings. 90/

G. Products and Production.

Ingots and castings of high-manganese-content steel, bars, and angles are produced in unknown tonnages.

* Based on 4 heats per day times 325.

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Production of total steel and finished steel (in thousand metric tons) at the Orotukan Steel Foundry in 1954 was as follows:

<u>Steel</u>	<u>Steel Castings</u>	<u>Rolled Steel</u>	<u>Total Finished Steel</u>
13.0	3.6*	4.7**	8.3

H. Distribution of Products.

The rolled products and castings are consumed in the repair and manufacture of mining equipment. The high-manganese-content steel in the form of rolled products and castings is used for wear parts of excavators and bulldozers. 91/

I. Plant Efficiency.

Ryabkin, Director of the Orotukan Plant, announced in January 1954 that the 1953 Plan for production of structural steel, steel ingots, and cast iron had been overfulfilled. 92/

J. Administration.

The plant is under the direction of Dal'stroy Supply Administration. 93/

K. Personnel.

Ryabkin was the plant director in 1953. 94/ In 1952 the chief engineer was Zavitonovy. 95/

* Based on the assumption that half of the steel production goes to castings, with a 55-percent yield on finished castings.

** Based on a yield on rolled steel of 72 percent on half of total production.

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VI. Suchan Coke Plant.

A. Location.

43°14' N - 133°07' E, Suchan, Primorskiy Kray, Far East.

The plant is located southwest of the railroad station on the Suchan River.

B. History and Development.

This is an old plant which produces coke by the beehive process. 96/

C. Raw Materials and Other Inputs.

Coal is supplied by rail from local mines. About 150 tons per day were received in 1950. 97/

D. Coking Facilities.

Ten rectangular brick ovens were in operation in 1950 producing coke by the beehive process. 98/ Except for the charging of ovens from an overhead track, this is a manually operated plant. 99/

E. Intraplant Services.

1. Electric Power.

Electric power is obtained from a source outside of the plant. 100/

2. Water Supply.

Water from the Suchan River is piped throughout the plant. 101/

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F. Products and Production.

Coke is the only product of this plant. The production is about 100 tons per day, or 33,000 tons per annum. 102/

G. Distribution of Products.

Most of the production of coke is shipped to Vladivostok for industrial use. 103/

H. Personnel.

About 120 civilians and 20 prisoners of war (Japanese) were employed in 1950. 104/

VII. Vladivostok Shipyard imeni Voroshilov.

A. Location.

43°08' N - 131°55' E, Vladivostok, Primorskiy Kray, Far East.

The plant is on the north bank of Zolotoy Rog Bay about 3 kilometers east of the railroad station.

B. History and Development.

Essentially an old plant reconstructed before World War II, the Vladivostok Shipyard received new equipment from the US during the war. In 1948 the plant layout included cast iron, steel, and nonferrous foundries; pattern, forge, and machine shops; a boiler works; assembly, carpenter, and paint shops; a compressor plant; an electric shop for welding and charging submarine batteries; and diesel engine and plating shops. 105/

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C. Raw Materials and Other Inputs.

Scrap structural steel and pig iron are supplied by unknown sources, and plates, sheets, and some castings are shipped from the Amurstal Steel Plant. 106/ Coke is received from the Suchan Coke Plant, and coal for the boilers and plant heating comes from Sakhalin Island. 107/

D. Coking Facilities.

The plant has no coking facilities.

E. Steelmaking Facilities.

Two electric furnaces with a capacity of 3 tons each produced an estimated 10,000 tons of steel in 1951. 108/ There are no indications that annual production increased in 1954.

Production of steel at the Vladivostok Shipyard in 1954 was as follows:

<u>Number of Furnaces</u>	<u>Type</u>	<u>Individual Capacity (Metric Tons)</u>	<u>Number of Heats per Day</u>	<u>Number of Operating Days per Year</u>	<u>Total Production (Thousand Metric Tons)</u>
2	Electric	3	N. A.	325	10.0

F. Finishing Facilities.

1. Forge Shop. 109/
2. Steel Foundry.

The foundry has equipment for producing, cleaning, and heat-treating steel castings.

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G. Intraplant Services.

1. Electric Power.

Power is supplied by a power plant in Vladivostok. 110/

2. Maintenance Department.

The shipyard has a machine shop for the maintenance of plant installations. 111/

H. Products and Production.

Machine parts are made by centrifugal and chill-molding practices. 112/ Propellers, valves, pistons, and crank shafts are produced from castings and forgings. 113/

Production of total steel and finished steel (in thousand metric tons) in the Vladivostok Shipyard in 1954 was as follows:

			Total
<u>Steel</u>	<u>Steel Castings</u>	<u>Rolled Steel</u>	<u>Finished Steel</u>
10.0	5.5*	0	5.5

I. Distribution of Products.

All of the steel produced is consumed in the form of castings and forgings in the repair and building of ships.

J. Administration.

The plant is subordinate to the Ministry of the Shipbuilding Industry. 114/

* Based on a yield of 55 percent from poured steel to finished castings.

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VIII. Raychikhinsk Mining Equipment Repair Shop.

A. Location.

49°46' N - 129°19' E, Raychikhinsk, Amur Oblast,
Far East.

The plant is 3 kilometers southeast of the railroad station
at Raychikhinsk.

B. Coking Facilities.

The shop has no coking facilities.

C. Ironmaking Facilities.

The repair shop has one cupola with an unknown capacity. 115/

D. Steelmaking Facilities.

Two electric furnaces with a capacity of 5 tons each operate
alternately, each producing 2 heats daily. On this basis, 1954 pro-
duction is estimated to be 6,500 tons. 116/

Production of steel at the Raychikhinsk Mining Equipment
Repair Shop in 1954 was as follows:

<u>Number of Furnaces</u>	<u>Type</u>	<u>Individual Capacity (Metric Tons)</u>	<u>Number of Heats per Day</u>	<u>Number of Operating Days per Year</u>	<u>Total Producti (Thousand Metric Tons)</u>
2*	Electric	5	4	325	6.5

E. Finishing Facilities.

1. Forge Shop.

The forge shop is equipped with one 3-ton hammer and
two 2-ton hammers, forge shafts, and other parts for mining machinery. 1

* One furnace operates at a given time.

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2. Steel Foundry.

Equipment is installed for making ingots for forgings and castings for use in manufacturing mining machinery. 118/

3. Iron Foundry. 119/

Production of total steel and finished steel (in thousand metric tons) at the Raychikhinsk Mining Equipment Repair Shop in 1954 was as follows:

<u>Steel</u>	<u>Steel Castings</u>	<u>Forgings</u>	<u>Rolled Steel</u>	<u>Total Finished Steel</u>
6.5	3.6*	N.A.	0	3.6

F. Distribution of Products.

All of the steel produced is used within the plant in the repair and manufacture of mining equipment. 120/

G. Personnel.

There were 100 employees on each of three shifts in 1950. 121/

* Based on a yield of 55 percent from poured steel to finished castings.

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APPENDIX A

PLANT SUMMARY TABLES

Table 6

Production and Capacity of the Amurstal Metallurgical Works
1954

	Thousand Metric Tons
Metallurgical coke production	0
Pig iron production	0
Total steel production	
Two open-hearth furnaces	232.4
Rolling and finishing capacities	
Blooming mill	N. A.
Medium plate mill	100.0
Light plate mill	35.0
Sheet mill	30.0
Tinplate mill	20.0
Forge shop	N. A.
Steel foundry	N. A.
Iron foundry	N. A.
Finished steel production	
Castings	8.2
Rolled	
Medium plates	96.0
Light plates	31.2
Sheets	24.0
Tinplate	2.4
Total rolled	153.6
Power plant capacity a/	50,000 kw

a. The capacity of the Komsomol'sk City Power Plant is 50,000 kw.

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Table 7

Production and Capacity of the Amur Shipyard No. 199
1954

	Thousand Metric Tons
Metallurgical coke production	0
Pig iron production	0
Total steel production	
One electric furnace	5.0
Rolling and finishing capacities	
Rolling mills	0
Steel foundry	N. A.
Iron foundry	N. A.
Finished steel production	
Castings	2.8
Rolled	0
Power plant capacity <u>a/</u>	
a. N. A.	

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Table 8

Production and Capacity of the Motor Vehicle Repair Plant/Dal'stroy
at Magadan
1954

	Thousand Metric Tons
Metallurgical coke production	0
Pig iron production	0
Total steel production	
One electric furnace	16.3
Rolling and finishing capacities	
Primary rolling mills	N. A.
Rolling mill billets	N. A.
Plate mill	N. A.
Tube mill	N. A.
Steel foundry	4.5
Finished steel production	
Castings	4.5
Rolled	5.8
Power plant capacity	N. A.

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Table 9
Production and Capacity of the Orotukan Steel Foundry
1954

	Thousand Metric Tons
Metallurgical coke production	0
Pig iron production	0
Total steel production	
One open-hearth furnace	13.0
Rolling and finishing capacities	
Primary rolling mill	N. A.
Rolling mill	4.7
Steel foundry	3.6
Iron foundry	N. A.
Finished steel production	
Castings	3.6
Rolled	4.7
Power plant capacity	N. A.

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Table 10

Production and Capacity of the Suchan Coke Plant
1954

	Thousand Metric Tons
Metallurgical coke production	33.0
Pig iron production	0
Total steel production	0
Rolling and finishing capacity	
Steel foundry	0
Iron foundry	0
Finished steel production	
Castings	0
Rolled	0
Finished iron production	
Castings	0
Power plant capacity	N. A.

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Table 11

Production and Capacity of the Vladivostok Shipyard
imeni Voroshilov
1954

	Thousand Metric Tons
Metallurgical coke production.	0
Pig iron production	0
Total steel production	
Two electric furnaces	10.0
Rolling and finishing capacities	
Rolling mills	0
Forge shop	N. A.
Steel foundry	5.5
Iron foundry	N. A.
Finished steel production	
Castings	5.5
Rolled	0
Power plant capacity	N. A.

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Table 12

Production and Capacity
of the Raychikhinsk Mining Equipment Repair Shop
1954

	Thousand Metric Tons
Metallurgical coke production	0
Pig iron production	0
Total steel production	
Two electric furnaces	6.5
Rolling and finishing capacity	
Rolling mills	0
Forge shop	N. A.
Steel foundry	3.6
Iron foundry	N. A.
Finished steel production	
Castings	3.6
Rolled	0
Power plant capacity	N. A.

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APPENDIX B

METHODOLOGY

Methods used to derive the production estimates shown in various tables throughout this report were as follows:

1. Cast Iron.

When the diameter of a cupola is known, its capacity can be estimated on the basis of US standards as follows:

<u>Cupola Diameter (Inches)</u>	<u>Iron Melted Per Hour (Pounds)</u>
32	6,000 to 8,000
48	14,000
60	20,000 to 25,000

For example, since Magadan has 1 cupola that is 80 centimeters in diameter, its production is estimated to be 6,000 to 8,000 pounds per hour of operation.

2. Steel.

To determine the yearly production of steel produced by the open-hearth and electric processes, the following formula was used: Capacity of furnace (metric tons) x number of heats per day x number of working days per year = annual production in metric tons.

The average number of working days per year of a steel-producing facility in the USSR is estimated to be 325.

The specific methods used, in most instances, are described at that point in the report where they were employed.

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APPENDIX C

GAPS IN INTELLIGENCE

Coefficients of utilization were not available for any of the open-hearth furnaces located in Economic Region XII. .

In most cases, specific recent data, such as hearth areas of open-hearth furnaces and daily, weekly, or annual tonnages of total steel and finished steel, were lacking. This was particularly true of information on the smaller installations and to some extent on the Amurstal Plant since 1950.

There were pronounced gaps in intelligence regarding the capacities of finishing mills, requirements, and amounts and sources of raw material inputs.

Information on quantities of steel shipped to specific industries was sparse.

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APPENDIX D

SOURCE REFERENCES

----- were of considerable value in preparing estimates of raw materials, rolled steel production, plant investments and costs and, to a lesser degree, in providing information on the distribution of products, insofar as the Amurstal plant is concerned.

provided little information of value on the smaller installations in Economic Region XII.

reports were often inaccurate and misleading. Unimportant details such as the type of roof on a building and the height and material of a fence were emphasized.

Periodicals and newspapers were fair. Frequently they quoted percentages and relationships which were not of much value.

Evaluations, following the classification entry and designated "Eval.," have the following significance:

<u>Source of Information</u>	<u>Information</u>
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

"Documentary" refers to original documents of foreign governments and organizations; copies or translations of such documents by a staff officer; or information extracted from such documents by a staff officer, all of which may carry the field evaluation "Documentary."

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Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this report. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

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