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PROVISIONAL INTELLIGENCE REPORT

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

CIA/RR PR-73

(ORR Project 23.179)

23 September 1954

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FOREWORD

This report covers those plants in Economic Region VIII which produce metallurgical coke, pig iron, and steel ingots, as well as steel castings and other types of finished steel.

The primary intelligence value of this report lies in the basic evaluation of the plant capacity of this region as a contribution to the capabilities of the USSR in the production of metallurgical coke, pig iron, steel, and finished steel products. The localization of industrial centers and individual plants and their importance in the Soviet iron and steel industry furnish valuable target information. Regional production estimates of the Soviet iron and steel industry also serve as a check on Soviet statistics. Economic Region VIII, Urals, is the largest steel-producing and the second largest pig iron-producing region in the USSR.

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 industries of the USSR.

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(Task Project 23.179)

PLANT STUDY OF THE IRON AND STEEL INDUSTRY OF ECONOMIC REGION VIII: URALS*

Summary

It was not until the First Five Year Plan (1928-32) that attempts were made to modernize and expand the ferrous metallurgical industry of Economic Region VIII** (the Urals). By World War II, it had become Soviet policy to develop the Urals steel industry as the primary base for a major industrial complex.

Since World War II the Urals Region has been built up through new construction, modernization, installation of evacuated equipment, and arrival of expansions, so that it now produces more steel than any other region of the USSR. Steel production in 1952 surpassed that of France and was greater than the production of all the Satellites combined, including Communist China.

Future development of the metallurgical industry in this region is hindered principally by the lack of coking coal, which at present is shipped from the Kuznetsk Basin in return for iron ore, and also from the Karaganda Basin. Upon completion of the projected North Urals Railroad the coking coal in the Vorkuta Basin will be available.***

The Urals Region as a whole accounted for 26 percent of the coke produced in the USSR in 1953, 32.5 percent of the pig iron, 34.3 percent of the steel, and 35.7 percent of the finished steel produced in the USSR, as shown in Table 1.****

There are two principal types of pig iron produced in the Urals: coke pig, amounting to 89 percent, and charcoal pig, 11 percent. The open-hearth furnace process accounts for 95.2 percent of all steel produced in the region, and the electric furnace process for most of the remainder. A very small quantity of steel is produced by the Bessemer convertor process. Table 2***** shows production in the Urals from the various types of processes.

Table 3****** shows production in the oblasts and ASSR's of the Urals. Both the national and regional share of production of each political unit is shown.

* The estimates and conclusions contained in this report represent the best judgment of the responsible analyst as of 1 Dec 1953.

** The term region in this report refers to the economic regions defined and numbered on CIA Map 12048, 9-51, USSR: Economic Regions.

*** See the map, USSR Economic Region VIII: Iron and Steel Plants, inside back cover.

**** Table 1 follows on p. 2.

***** Table 2 follows on p. 2.

****** Table 3 follows on p. 3.

Table 1

Iron and Steel Production in Region VIII
1953

Product	Production (Thousand Metric Tons)	National Share (Percent)
Metallurgical Coke	9,096.0	26.0
Pig Iron	9,089.8	32.5
Steel	13,044.2	34.3
Finished Steel	9,783.3	35.7

Table 2

Pig Iron and Steel Production
by Various Processes in Region VIII
1953

Thousand Metric Tons

Iron		Steel		
Charcoal Pig	Coke Pig	Open-Hearth	Electric Furnace	Bessemer Convertor
1,008.9	8,080.9	12,420.5	574.0	49.7

The Ministry of Ferrous Metallurgy has jurisdiction over the production of approximately all the metallurgical coke and pig iron, and 85 percent of the steel and finished steel. The balance of the steel is made in plants under the jurisdiction of the Ministry of Heavy Machine Building and Transport.

The eight principal steel-producing cities of the Urals in order of their importance are Magnitogorsk, Nizhniy Tagil, Chelyabinsk, Zlatoust, Serov, Molotov, Chusovoy, and Sverdlovsk.

In the Urals Region there are only three completely integrated plants, although some of the small charcoal iron and steel works are integrated to the extent that they produce their own charcoal for smelting. Two of the 3 integrated mills, Magnitogorsk and the Novo Tagil works, are among the

Table 3

Iron and Steel Production in the Political Units
of Region VIII
1953

Political Unit	Unit	Metallurgical Coke	Pig Iron	Steel	Finished Steel
Chelyabinsk Oblast	Thousand MT	5,730.0	4,994.6	6,853.4	5,073.3
National Share	Percent	16.4	17.8	18.1	18.5
Regional Share	Percent	63.0	54.9	52.5	51.9
Sverdlovsk Oblast	Thousand MT	2,466.0	3,410.6	4,043.1	3,170.9
National Share	Percent	7.1	12.2	10.6	11.6
Regional Share	Percent	27.2	37.6	31.0	32.4
Molotov Oblast	Thousand MT	900.0	584.7	1,283.6	930.1
National Share	Percent	2.6	2.1	3.4	3.4
Regional Share	Percent	9.8	6.4	9.9	9.5
Udmurt ASSR	Thousand MT			469.3	329.0
National Share	Percent			1.2	1.2
Regional Share	Percent			3.6	3.4
Bashkir ASSR	Thousand MT		99.9	231.3	173.8
National Share	Percent		0.4	0.6	0.6
Regional Share	Percent		1.1	1.8	1.8
Chkalov Oblast	Thousand MT			163.5	106.2
National Share	Percent			0.4	0.4
Regional Share	Percent			1.2	1.1
Regional Total	Thousand MT	9,096.0	9,089.8	13,044.2	9,783.3

5 largest plants in the USSR; the third plant, the Chelyabinsk Bakal works, is 1 of the 3 most important alloy steel producers in the USSR.

One plant, Gubakha, is limited to the production of coke. Five small charcoal iron-producing plants have only blast furnace facilities, and 9 plants have only rolling mills and finishing facilities.

Some works deserve mention because of their size or because of the specialization of their product. These plants are: Alapayevsk, a producer of galvanized sheet iron and some chrome steel; Asha, a producer of quality steel and possibly seamless pipe; Beloretsk Metallurgical Combine No. 706 of quality steel; and the Beloretsk Steel Wire Plant, a large producer of wire. Other plants are Chelyabinsk Metallurgical Plant imemi Bakal, which when completed will be the most important alloy shop in the USSR; Chelyabinsk Pipe Rolling Mill, one of the larger plants in the USSR; Chusovoy, the only duplex steel shop in the Urals; Gubakha, one of the four coke plants in the Urals; Izhevsk, an important alloy steel shop and armament producer; Lys'va, a producer of galvanized sheet and tin plate; the Magnitogorsk Cable Factory, the most important plant of its type in the USSR; the Magnitogorsk Metallurgical Combine, the largest steel mill in the USSR; and Molotov, an arsenal and special steel plant. Plants which may also be listed include Kuybyshev plant in Nizhniy Tagil, producer of electrical steel; the Novo Tagil plant, also in Nizhniy Tagil, one of the largest in the USSR; Nytva, the only bimetallic strip producer in the USSR; Pervoural'sk New Pipe Mill, one of the more important tube mills in the USSR; Satka, quality steel and some ferroalloys; Serov, quality steel and some ferroalloys; Severs k, reputedly the largest hot dip tin plate producer in the USSR; Verkhne Izetskiy, in 1947 the sole Soviet producer of the highest grade electric sheets; and the Zlatoust Metallurgical Plant, a large producer of alloy steel and ferroalloy.

In addition to the 57 plants at which some production was established, there are 26 others thought to have been in operation at one time, at which current production has not been established. None of these plants, however, is of any great importance individually. Of the 26, 15 are or were charcoal iron producers. There are Nyazepetrovsk, Kizil, Inzer, Kuva, Sysert, Ufa, Vishera, Tavda, Rezh, Sos'va, Kopi, Zigazinsk, Verkhniy Avzyan, and Katav-Ivanovsk. Four plants, Verkhniy Sergi, Porogi, Nizhnyaya Sarana, and a second plant in Nyazepetrovsk, are reported as possible steel producers. Four more, Vyya, Pudem, Irbit, and Polazna, are reported as rolling mills. Of the three remaining plants, Kusa is probably integrated, while Ivdel' and Titanogorsk (Magnitka) are reputedly sites of planned mills where construction has never begun.

Although source material consistently indicates a much greater number of employees in Soviet iron and steel plants than in analogous US facilities, employment figures for some plants in the Urals appear to be excessive even on this basis. In some instances, massive employment in plants having small

outputs of steel may be attributed to associated manufacturing or fabricating operations. Over-all employment figures should, however, be used cautiously.

I. Chelyabinsk Oblast.

Over half of the coke, pig iron, steel, and finished steel in the Urals is produced in Chelyabinsk Oblast. More steel is produced in this oblast than in any oblast in the USSR, and it is second in the USSR in the production of coke and pig iron.

The metallurgical combine at Magnitogorsk, largest in the USSR, accounts for approximately 12 percent of all the iron and steel produced in the country, between 30 and 40 percent of all iron and steel in the Urals, and between 60 and 70 percent of all iron and steel produced in Chelyabinsk Oblast. The Magnitogorsk Combine produces more than any other economic region in the USSR except the Ukraine. Large as it is, however, it only ranks sixth in the world in the production of steel from a single plant.

The complex of metallurgical and attendant industrial enterprises located in the city of Chelyabinsk forms one of the most important centers of industry in the USSR. At Bakal on the north edge of the city is the Chelyabinsk Metallurgical Plant, one of the two new large integrated plants built in the Urals since 1941.

The Zlatoust Metallurgical Plant, third largest in Chelyabinsk Oblast, and the neighboring Agricultural Machine Plant No. 259 form a medium-size complex. The two plants working in unison at Nizhniy Ufaley and Verkhniy Ufaley comprise another complex which, however, is not of great importance.

The two small steel mills at Asha and Satka complete the list of plants in Chelyabinsk Oblast which produce pig iron and steel. A small rolling mill is at Min'yar, and a large cast iron pipe shop is at Kamensk-Ural'skiy. The remaining three steel works in the oblast are primarily producers of steel castings located in machine building plants at Kopeysk, Ust'-Katav, and Kyshtym.

Chelyabinsk Oblast steel mills are important producers of coke, pig iron, carbon steels from both open-hearths (OH) and electric furnaces, alloy steels including stainless, steel castings, and steel forgings.

A. Magnitogorsk Complex. 25X1A2g [redacted]

1. Magnitogorsk Metallurgical Combine imeni Stalin.

a. Location.

53°27'N-59°04'E, Magnitogorsk, Chelyabinsk Oblast, Urals, RSFSR. The plant, originally built around the village of Magnitnaya, extends for about 3.8 kilometers (km) along the east bank of the Ural River. At this point the river is dammed to form the first of two ponds that serve as reservoirs for Magnitogorsk. 1/*

b. History and Development.

The plant was first envisioned by Soviet authorities and Gipromez planners as one-half of the Urals-Kuznetsk Combine. Iron ore from Magnitogorsk was to be used at the plant and also was to be shipped to the planned Kuznetsk Metallurgical Combine, where the empty ore cars were to be filled with Kuznetsk Basin coal and sent back to Magnitogorsk. Because the staggering transportation problem was not fully realized, the concept partially broke down under actual practice, and both plants were forced to rely on local sources of raw materials to such an extent that the Kuznetsk plant was only using 30 percent Magnitogorsk iron ore by 1950.

The first actual project as seen by the Gipromez planners in 1928 was considerably smaller than the plan formulated in 1930 by Gipromez and the A.G. McKee Company of Cleveland, Ohio. 2/ The change in policy in regard to size of the plant was instigated by the All Union Council of Peoples Economy, which had passed a resolution to increase pig iron production from 656,000 metric tons (MT) to 2.5 million MT. 3/

In 1932 the McKee contract was broken over disagreement as to the ultimate size of certain facilities. Construction of the blast furnace (BF) division was left in the McKee Company's hands, but the coke plant contract was given to the Koppers Company, the rolling mills contract to the German firms of Klein and Demag, and the remaining facilities were to be built by Soviet organizations. 4/

The ultimate plan as presented in 1934 consisted of 8 coke batteries, 8 BF, 36 OH furnaces, 3 blooming mills, 2 strip mills, 4 small merchant mills, 1 rail mill, 2 heavy wire mills, a 248,000-kilowatt (kw) powerhouse, 2 refractory plants, a machine shop, a forge shop, an iron foundry, a steel foundry, a roll shop, and an ingot mold shop. The final capacity of the combine when completed was to be 7.5 million metric tons (MT) of iron ore, 2,750,000 MT of pig iron, 3,050,000 MT of ingot steel, 2,485,000 MT of finished steel, and 2,750,000 MT of coke. Many phases of the 1934 plan have been exceeded. 5/

* Footnote references in arabic numerals are to sources listed in Appendix D.

The principal installations and facilities added to the plant from 1931 to 1948 are 6/:

1931

No. 1 coke battery

1932

No. 1 BF
No. 2 coke battery
No. 2 BF
No. 1 blooming mill
630 mm billet mill

1933

No. 3 BF
Nos. 1 to 2 OH
450 mm billet mill

1934

No. 4 BF
Nos. 3 to 7 OH
500 mm heavy bar mill

1935

Nos. 8 to 11 OH
350 mm medium bar mill

1936

No. 12 OH
300 mm medium bar mill
300 mm skelp mill

1938

250 mm wire rod mill

1940

Nos. 13 to 15 OH
No. 2 blooming mill

1941

Nos. 16 to 18 OH
720 mm billet mill

1942

No. 5 coke battery
No. 5 BF
No. 19 OH
Plate mill evacuated from the Ukraine

1943

No. 6 coke battery
No. 6 BF
No. 20 OH

1944

No. 7 coke battery
No. 21 OH

1945

No. 8 coke battery

1946

Plans for the plant as announced in the Fourth Five Year Plan consisted of two new BF, two new coke batteries, four new OH furnaces, and expansion of rolling facilities.

No. 22 OH

1947

No. 23 OH
No. 9 coke battery

1948

No. 24 OH

Although no announcements have been made since 1948 of installations added, it is assumed that two new coke batteries have been placed in operation.

c. Raw Materials and Other Inputs.

(1) Iron Ore. The total iron ore reserve of the Mount Magnitnaya deposit is approximately 450 million MT, of which over 288 million MT is of metallurgical quality. The ore falls into the following classification. 7/

(a) 80 million MT of BF ore assaying about 56 percent (FE) and less than 0.2 percent (S). This ore needs no treatment and may be charged directly. Open-pit mining of this classification has depleted stocks to the point of exhaustion.

(b) Mixed ore containing 30 percent to 56 percent Fe and up to 0.18 percent S. This ore requires concentrating before being used at the mills.

(c) High sulfur ore requiring treatment for which the sulfide treatment plant was built in 1947 at Magnitogorsk.

(d) Poorer and leaner ores with less than 30 percent Fe, requiring concentration.

The combine has extensive ore preparation facilities, consisting of three Krupps crushers with a capacity of 16,800 MT of ore every 24 hours, a concentrating plant with an estimated capacity of 3 million MT of ore per year, a Dwight Lloyd sintering plant, and a sulfide ore treatment plant with four agglomerating lines and a yearly capacity of 1.8 million MT of concentrate. 8/

The Soviet press stated that as of 1940 the Magnitogorsk ore mines were not been working at maximum efficiency. Out of 9.3 million MT of rough ore produced in 1939, 600,000 MT were thrown away completely, while 3 million MT were of poor quality. Out of the 4.3 million MT arriving at the concentrating plant, only 2.3 million MT of BF ore was produced. 9/

The situation had improved by 1951, however, and the miners were using all categories of ore mined. By blending and proper selection, by improving the neutralization and concentration of the ore, and by improving the quality of the wet and dry magnetic separation, the plan for 1951 was overfulfilled by 6 percent. Self-fluxing sinter has been produced up to the point where it is a factor in pig iron production. 10/

Magnitogorsk will probably start getting some supplementary ores from the Zigazinskiy-Komarovo deposits. 11/ The ultimate plan for development of the Mount Magnitnaya deposits calls for the mining and preparation of 7.5 million MT of ore yearly. 12/

(2) Limestone. High-quality limestone comes from the Agapovka deposit, which has reserves up to 140 million MT. 13/

(3) Manganese. Before World War II, most of the manganese ore came from Chiatura. It was necessary to locate other deposits after the Chiatura ores were cut off by the Germans during the war. A small deposit at Urasovsk was quickly exploited and abandoned. The production of Kazakhstan ores has begun at Dzhezda in 1942, and by 1947 112,000 MT of ore were shipped to Magnitogorsk. Estimated shipments for 1948 amounted to 122,000 MT. Some additional ore probably comes from Polunochnoye near Serov in the Northern Urals and from Chkalov. 14/

(4) Scrap. Little information is available as to the scrap supply except a 1950 press release complaining of the short supply. This fact is confirmed by the high hot metal practice used at Magnitogorsk. 15/

(5) Ferroalloys. When ferroalloys from the western areas were cut off during World War II the combine turned to smelting their own ferroalloys. No information exists as to what proportion of requirements was produced at the plant in 1952. All ferromanganese, ferrosilicon, and speigel are believed to be produced in the Magnitogorsk BF plant. 16/

(6) Others. In the area are found sufficient supplies of dolomite, quartzite, fireproof clays, and molding sands. 17/

d. Coal and Coke.

Eight coke batteries, comprising the largest coke plant in the USSR, were completed at Magnitogorsk by 1945. The ninth and tenth batteries were to be completed under the Fourth Five Year Plan (1946-50), and it is assumed that by 1952 these facilities were in operation. 18/

All batteries are of the Beckers type, with 69 ovens to a battery or a total of 690 ovens. The oven sizes are approximately 12 meters (m) by 4.2 m by 0.4 m wide and have a volumetric capacity of 20.2 cubic meters (cu m). 19/

If it is assumed that 9 of the 10 batteries were in operation in 1952 and 1953, then the annual capacity would be 4.5 million MT, which would result in an annual production of approximately 4.05 million MT of coke. In 1935 the coking period was established at 14.5 hours and the charge at 16.5 MT of coal. 20/

In 1935 the byproduct plant had a condensation department with 4 German exhausters capable of handling 60 million cubic feet (cu ft) of gas in 24 hours, and a sulfate department with 3 saturators and a maximum output

of 60 MT of ammonium sulfate per day. By 1936 the benzol department, with four stills having a capacity of 60 MT per day, was in operation. Later the benzol capacity was reported to have gone up to 150 MT per day. The by-products plant also had facilities for the production of toluene, crude tar, and other chemicals in lesser quantities. 21/

The coal storage fields are serviced by at least 3 overhead bridge cranes, each with a carrying capacity of 2,000 MT per hour. These cranes supply the crushing plant, where a Bradford crusher pulverizes the coal down to 40 millimeters (mm). In 1950 the coal yard was repaired and the crushing plant at least partially rebuilt. A coal concentrating unit of 3 million MT capacity was under construction in 1941. 22/

Originally most of the coal for coke came from the Kuznetsk Basin as part of the Ural-Kuznetsk Combine theory. When the Stalinsk plant needed less ore, fewer cars were available to bring coal back from the Kuznetsk Basin. Magnitogorsk then began to be supplied with Karaganda coal from Central Asia. In 1934 the mix was 15 percent Karaganda coal, 80 percent Kuznetsk coal, and 5 percent local coal. By 1943 the mix had changed to 35 percent Karaganda coal and 65 percent Kuznetsk Basin coal. 23/

In 1943 the coke produced at Magnitogorsk analyzed 0.9 percent to 1.0 percent volatile, 85 percent to 86 percent carbon, 12.5 percent ash, and 0.6 percent sulfur. Although the Karaganda coal is inferior to the Kuznetsk Basin coal, a suitable metallurgical coke is produced by proper mixing and blending. 24/ Inconsistency as to types of coal shipped from the Kuznetsk Basin resulted in a slight drop in production of coke at Magnitogorsk in 1950. 25/

e. Ironmaking Facilities.

The original furnaces designed and built by McKee were 1,080 cu m, but capital repairs after the first campaign brought this up to 1,180 cu m by using a new water jacket system in the tuyere zone. BF No. 3 was originally built with an extremely large stack opening which gave a volume of 1,220 cu m. After the first campaign this was reduced to 1,180 cu m, which remained the size of the first four BF's in 1952. 26/

By 1935 the first 4 furnaces were in full production, but their efficiency was low, as shown by the 1934 BF coefficient of 1.77. In 1941 under the press of war it was necessary quickly to increase eastern steel production. Pig iron production between 1941 and 1944 expanded nearly 50 percent due to the very rapid installation of BF Nos. 5 and 6 in record time. These 2 furnaces are the largest in Europe; the USSR claims for No. 6 the world's monthly production record. 27/

Early campaign lengths and production during the campaigns were 28/:

BF Number	Date of Campaign	Length	Production
1	14 Jun 1934 to 20 May 1937	2 years 11 mos.	1,165,000 MT
2	5 Jun 1932 to 1 Aug 1935	3 years 2 mos.	833,000 MT
3	11 Jul 1935 to 24 Nov 1937	2 years 4.5 mos.	948,000 MT
4	31 Dec 1933 to 11 Sep 1936	2 years.8.5 mos	964,300 MT

The following charts show BF operation of No. 4 BF in 1943, operation of BF No. 2 in 1933, and physical operating characteristics of BF Nos. 1 to 6 in 1943.

Operation of Blast Furnace No. 4 at Magnitogorsk 29/

	Basic Iron	Ferromanganese
1. Ratio Composition of Burden (kilograms = kg)		
Iron Ore	14,300	
Manganese Ore	800	10,300
Slag	600	
Scrap		1,100
Flux	1,300	2,200
Fuel	6,000	10,000
2. Composition of Slag (Percent)		
SiO_2	37.40	33.4
Al_2O_3	20.30	14.7
CaO	33.00	32.6
MgO	4.16	2.6
MnO	3.60	15.0
FeO	1.15	0.7
S/2	0.39	0.6
3. Composition of Product (Percent)		
C	[illegible]	[illegible]
Si	0.92	1.01
Mn	2.03	75.87
P	0.12	0.39
S	0.042	0.023

Operation of Blast Furnace No. 4 at Magnitogorsk 29/
(Continued)

		Basic Iron	Ferromanganese
4.	Product yield of Charge (Percent)	38	32.3
55.	Weight of Slag (kg/MT of product)	500	1,020
6.	Expenditure of Coke (kg/MT of product)	930	2,010
7.	Daily Smelting (MT)	1,381	400
8.	Effective Volume of Furnace (cu m)	1,180	1,180
9.	Time of Slag (hours)	8.4	14
10.	Utilization of Effective Volume (cu m/MT)	0.86	2.95

The BF operation chart just shown shows operating conditions in 1943, and the improvement should be noted and compared with the operation of BF No. 2 for 4 months of 1933. 30/

Operation of Blast Furnace No. 2 in 1933

	Aug	Sep	Oct	Nov
Average Daily Smelting (MT)	930	900	870	809
Coefficient of Utilization	1.27	1.31	1.36	1.46
MT Fuel Expended per MT of Pig Iron Produced	0.95	0.94	0.98	1.07
Air Blown (cu m/min.)	2,700	2,700	2,700	2,700
Iron Ore Consumption (MT)	1.65	1.69	1.71	1.78
Manganese Ore (MT)	0.08	0.07	0.07	0.02
Limestone Consumption (MT)	0.24	0.23	0.25	0.27
Scrap Consumption (MT)	0.04	0.04	0.03	0.01
Furnace Temperature (C)		250 to 350		

The following charts showing furnace lines and furnace operations are for the year 1943. Differences noted in BF No. 4 between 2 charts are due to 1 being yearly averages and 1 monthly. 31/

Physical Characteristics of Blast Furnaces Nos. 1 to 6

Furnace Lines	Nos. 1 to 4	Nos. 5 and 6
Hearth Diameter	25' - 0	26' - 3
Height (iron notch to platform)	101'	102'
Top Diameter	20' - 0	21' - 8
Number of Tuyeres	16	16
Volume (bottom to open bell cu ft.)	41,800	47,800
Bell Diameter	14' - 1	15' - 1
Tuyere Size	8"	8"

Operating Characteristics of Blast Furnaces Nos. 1 to 5

Furnace Operation	No. 1	No. 2	No. 3	No. 4	No. 5
Type of Iron	Basic	Foundry	Basic	Basic	Basic
Average Daily Production (MT)	1,400	1,200	1,430	1,400	1,550
Best Average Daily Production through a Month (MT)	1,450	1,275	1,530	1,430	
Average Coke Rate (kg/MT of pig)	815	940	780	809	830
Best Coke Rate through a Month (kg/MT of pig)	780		748	780	800
Average Blast Rate (cu m/ minute)	2,505	2,405	2,605	2,505	2,700

Slag Volume 628 kg/MT of pig
Flue Dust Production (in the dust catcher) 120 kg/MT of pig.

From the 4 tables shown it can be seen that BF No. 2 is often on foundry iron, that BF No. 4 goes on ferromanganese, and that probably all furnaces go on ferrosilicon at the end of campaigns. Normally the BF Nos. 1, 3, 5, and 6 are on basic iron.

In November 1939, No. 4 BF made the following casts per 24 hours: 1,289 MT, 1,331 MT, 1,137 MT, 1,426 MT, 1,280 MT, 1,136 MT, and 1,235 MT for an average cast per day of 1,262 MT on the basis of these data. 32/

At Magnitogorsk in June 1945, BF No. 4 was on ferrosilicon and all of the rest of the BF were on basic iron. 33/

Reported BF coefficients for Magnitogorsk run as follows: 1932, 1.77; 1933, 1.74; 1934, 1.22; 1935, 1.13; 1936, 1.03; 1937, 1.00; 1946, 1.01; 1948, 0.88; 1950, 0.818; 1951 Plan, 0.78; 1952 estimate 0.75. 34/

BF No. 6 was converted to the use of high gas pressures in 1950. It is estimated that use of high top pressure will increase production about 10 percent, slightly decrease the coke rate, and markedly decrease the amount of flue dust. BF Nos. 3 and 5 were scheduled for conversion under the plan, and in 1951, BF No. 5 was converted. BF No. 3 is believed to have been converted in 1953. 35/

Water additions have been tried with 23 grains H_2O per cu ft of blast being added in the stoves. Good results were obtained in furnace operation; however, the rolling mill heads complained of flaking, an indication of high hydrogen content as a result of the H_2O addition. 36/

In 1951 the use of sinter was double that of 1946 and now makes up 75 percent of the ore burden of some furnaces. Consumption of OH slag has been reduced by 77 kg per MT of pig produced. One Russian engineer source says the burden in 1940 was 1,948 kg per MT of pig produced, in 1947 it was 1,895 kg, and in 1948 it was down to 1,848 kg. Coke consumption from 1946 to 1950 dropped 71 kg per MT of pig. 37/

Some production and consumption figures for 1943 are shown below. 38/

Blast Furnace Production
1943

Pig Iron	2,350,000 MT
Foundry Pig	320,000 MT
Ferrosilicon	20,000 MT
Spiegeleisen	15,000 MT
Total Production	2,705,000 MT

Consumption of Materials by Blast Furnaces
1943

Coke	2,350,000 MT
Foundry Pig	320,000 MT
Ferrosilicon	20,000 MT
Spiegeleisen	15,000 MT
Total Production	2,705,000 MT

No announcements have been made by the USSR of the blowing in of BF Nos. 7 and 8; however, foreign reports indicate that they exist. There were only six BF in 1946 when the British steel team inspected the plant. For the purposes of this report, production resulting from six BF's will be shown. 39/

Blast Furnace Production
1952

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1 to 4	1,180	0.75*	340	2,140
5 and 6	1,340	0.75*	340	1,215
Total Pig Iron Production				3,355

BF Nos. 1, 2, and 4 are estimated to have 1953 coefficients of 0.73. BF Nos. 3, 5, and 6 on top pressure have estimated 1953 coefficients of 0.70. 40/

Blast Furnace Production
1953

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1, 2, and 4	1180 each	0.73	340	1,648.0
3	1180	0.70	340	573.0
5 and 6	1340	0.70	340	1,302.0
Total Pig Iron Production				3,523.0

The following equipment is common to BF Nos. 1 to 4. All these furnaces are equipped with Brosius type mud guns produced at Uralmash. All tops are McKee 12 sector double bell distributors. Each furnace has four

* 1952 estimate based on previous performance and pressurized operation of BF Nos. 5 and 6.

Koppers draft heaters. The draft is calculated at 555° to 700° C and 3,000 cu m per furnace. Heating is by BF gas and the gas-blowers are of a German centrifugal type. 41/

The blower house is equipped with 5 large steam turbine blowers, each with capacities of 3,100 cu m of air per minute at 2.5 atmospheres. Three steam boilers of German Duehr Werke design turn out 115 MT of steam per hour under normal conditions. The blower house is also equipped with an AEG 2,000-kw turbogenerator. 42/

The blower house for BF Nos. 5 and 6 is equipped with two turboblowers, each with a capacity of 4,100 cu m of air per minute. 43/

All furnaces have either 3 or 4 hot blast stoves heated by BF gas. Submarine ladles reportedly have a capacity of 75 MT each and slag ladles a capacity of 12 to 15 MT each. 44/

The waste gas treatment department is equiped with eight centrifugal disintegrators for BF Nos. 1 to 4, and 4 centrifugal disintegrators for BF Nos. 5 and 6. 45/

BF slag is dumped into the pond alongside the Magnitogorsk plant, and has filled in a noticeable portion. 46/

The pig-casting department has 3 casting machines, each with 3 strands. The capacity is about 560,000 MT of cast iron per year, however, only 2 strands are in operation at 1 time. Estimated cast pig production is about 375,000 MT per year. In addition to casting pig iron there is a foundry for casting all molds, stools, and maintenance items needed at the combine. 47/

f. Steelmaking Facilities.

In 1936 the initial plans for the steel production division of the Magnitogorsk combine were completed with the tapping of the last of 12, 150-MT OH furnaces. Original hearth area was 65.76 sq m, but by 1939, furnaces 1 to 4, 6 to 8, and 11 to 12 were tapping 185-MT heats, and furnaces 5, 9, and 10 were tapping 260-MT heats. 48/ In 1938, furnaces 5 and 9 produced 137,041 and 121,002 MT, respectively, while the rest, with the possible exception of furnace 10, produced around 100,000 MT of steel each. 49/

Plant expansion of steel-producing capacity was started again in 1940 with the first 3 furnaces in a new OH shop. By the end of the war, 10 furnaces were in operation in the new shop and 2 more were added after 1946, giving a total of 24 furnaces in the two shops. In addition to new furnaces, 10 old furnaces were rebuilt or enlarged during the war. An

electric furnace steel foundry has 6 15-MT furnaces producing an estimated 90,000 MT per year. 50/

At the combine there are 3 OH shops but only 2 buildings, as 1 building houses 2 shops, each with 6 furnaces. The original shop worked inefficiently up to World War II. The OH furnaces lacked gas, raw materials, cranes, runners, ingot molds, and skilled cadres, so it was decided to split this shop into two divisions to attain greater efficiency. The newer No. 3 shop is the largest in the USSR. 51/

Under the Fourth Five Year Plan, 2 additional furnaces were to be added to give a total of 26 furnaces. No information is available on construction of the furnaces, and since their addition would undoubtedly require the erection of No. 4 OH shop with its attendant complexity, it has been assumed that by 1952 these furnaces had not been added. 52/

The British steel team that visited Magnitogorsk in 1946 reported that there were 12 furnaces of 190 MT capacity and a hearth area of about 65.76 square meters (sq m) each, and 9 furnaces of 350 MT and a hearth area of about 81 sq m each. It is thought that these 9 large furnaces may partly consist of 320 MT capacity furnaces. The 3 furnaces added since 1946 are of 320 MT capacity. 53/

OH coefficients reported are: 1934, 3.73; 1936, 4.06; 1937, 4.87; 1938, 5.17; 1940, 4.58; 1945, 5.53; 1946, 5.90; 1948, 5.87; 1950 estimate, 6.6; 1951 Plan, 7.45; 1952 estimate, 7.30. 54/

Steel Production
1952

Thousand Metric Tons

No. of Furnaces	Hearth Area	Coefficient	Operating Days	Production
12 OH	65.75	7.3	325	1,872
12 OH	81.0	7.3	325	2,308
6 Electrics		15 MT each		90
Total Steel Production				4,270

The estimated coefficient for 1953 is 7.4. 55/

Steel Production
1953

Thousand Metric Tons

No. of Furnaces	Hearth Area	Coefficient	Operating Days	Production
12 OH	65.75	7.4	325	1,900.0
12 OH	81.0	7.4	325	2,340.0
6 Electrics		15 MT each		90.0
Total Steel Production				4,330.0

The old OH shop, now shops Nos. 1 and 2, has a German Demag mixer of 1,300 MT capacity, and the mixer department has a crane of 125/32 MT capacity. The shop also has a mold preparation department, an ingot mold foundry, and a scrap preparation yard with drop hammers for skull cracking. Each of the earlier furnaces is equipped with Siemans-Halsk gas analyzers and meters for measuring the quantities of BF gas, coke gas, air, and fuel oil (mazut) used in the furnaces. Two hot metal cranes of 125/32 MT capacity and three German floor chargers are in use on the charging side of Nos. 1 and 2 shops. One ladle crane is of 220 MT capacity; the stripper crane was built by Morgan Engineering; and most of the original electrical equipment was made by General Electric. 56/

The No. 3 shop has larger and somewhat never equipment than the other shops, but has essentially the same facilities. Because of the size of the heats in this department, taps are made into split runners filling two ladles simultaneously. Some of the 6 ladle cranes in No. 3 shop are of 260 MT capacity. 57/

The original No. 1 shop was converted from ordinary carbon steel to armor plate steel at the beginning of the war. The first armor heat was in the furnace 36 hours, but the time was subsequently lowered to about 17 hours. 58/ Average heat time for all shops was 13.4 hours in 1945 and 12.5 hours in 1946. 59/

OH No. 1 in shop No. 3 has set an industry-wide pattern of fuel use as follows: Coke oven gas consumption in cu m per hour is set at charging, 5,000; heating the charge, 4,000; meltdown, 3,500; refining, 2,500; and final melt, 3,500. From the 81st melt on, consumption is in-

creased by 500 cu m per hour. The consumption of BF gas at this OH is 5,000 cu m per hour and presumably this is mixed with the coke gas. Tar is added at any time. Automatic controls shut off tar and gas during reversal. 60/ In April, May, and June 1950, by following the above schedule, 3,750 MT of steel were melted above plan and the OH coefficient was increased by three MT per sq m. 61/

In 1943 the norm for fuel consumption for a 185 MT OH was 215 kg per ingot ton, and for a 300 MT OH it was 173 kg per ingot ton. In 1946, 13 OH had automatic temperature controls reducing consumption of fuel 180 kg per ingot ton to 165 kg per ingot ton. 62/

A reportedly normal carbon steel charge at Magnitogorsk is 50 percent scrap, 40 percent hot metal, and 10 percent ore additions; however, a Soviet engineer says that the charge is 65 percent to 75 percent hot metal. For the purpose of this report the assumption has been made that the plant operates all heats on a 60 percent hot metal charge, 30 percent scrap charge, and a 10 percent ore charge. 63/

In 1947 the weight of metallics charged was 1,089 kg per ingot ton and represents an OH efficiency of 91.8 percent. This figure agrees closely with American practice and with the 91 percent efficiency used for a USSR industry-wide figure. 64/

Refractory expenditure in 1943 was 30.9 kg per ingot for the 185 MT furnaces and 23.7 kg per MT for the 300 MT furnaces. By 1944 this figure had dropped to 21.3, 15.7, and 14.5 kg per MT of refractory material consumed per ingot ton for 190- 320- and 350-MT furnaces respectively. The number of heats from a roof on the smaller furnaces is 200, while the norm on the larger furnaces is 170. 65/

Magnesite obtained in the Urals is used for furnace bottoms and the bottoms are fritted in with a 10 percent mixture of basic slag. Dolomite is used for fettling the banks. The Russians hope to change to basic ends and even roofs when they completely master the use of magnesite and chrome magnesite instead of the commonly used silica brick. The silica is also obtained in the Urals. 66/

The British inspection team reports 5 men assigned to each 350 MT OH and 4 men assigned to the 190 MT furnaces. They also report that at the combine a standard of 45 weeks or 315 days is used for calculating steel production. 67/

The plant director, Gregory Nosov, in 1949 cited some of the problems facing the open-hearth shops in the near future. "Open-hearth workers are faced with the problem of reducing smelting time. The main shortcoming in the operation of OH furnaces is the unsatisfactory preparation of raw materials, and inefficient and slow charging. A strict continuity

is needed in feeding furnaces, and standard charges should be prepared for each melt. Mixing places are at present insufficient. The feeding of ore and limestone into charge boxes retards rapid charging of these materials into the furnace. Feeding of ore and limestone by conveyor directly into the working area, eliminating mixing places, should be set up. Accurate preparation for feeding standard charges and scrap into furnaces has become the most urgent problem in increasing steel output. A new system for charging raw materials into OH furnaces and new designs for charging machines, based on continuous operation, should be worked out, primarily by the planning and research institutes of the industry." 68/

Nosov further stated that "for more than 15 years, steelworkers at Magnitogorsk and in the Stalinsk plant have been working on the problem of increasing the size of OH furnaces. Research done in 1947-48 has shown that the steel smelted in large furnaces is at least equal in quality to that smelted in smaller furnaces. Reconstruction of existing furnaces for greater size is important, and even further, new furnaces should be designed and built for greater size. 69/

g. Primary Rolling Mills.

The primary mills consist of 3 blooming mills feeding 3 billet mills. There is no information on the third bloomer. 70/

The No. 1 1,150 mm bloomer, built in 1932, is connected by transfer tables to the 6-stand, 2-high, 630/570 mm, continuous billet mill and to the 6-stand, 2-high, 450/410 mm continuous billet mill. The two billet mills were built in 1932 and 1933. 71/

The No. 1 bloomer has 40 soaking pits in 10 groups of 4 with a heating rate of 6,120 MT of ingots per 24 hours. The pit equipment is German. The mill is a German Demag mill with a 7,000 horsepower (hp) General Electric motor and electrically balanced rolls. Ingots received from the soaking pits are given 19 to 26 passes, and the average time for the breakdown to a 10-inch by 12-inch bloom is 100 seconds. 72/

The capacity of the No. 1 bloomer is about 1,750,000 MT per year. Not all material passes from the No. 1 1,150 mm blooming mill to the billet mills. Some is taken off at a transfer and the blooms are shipped elsewhere. The 630-mm mill turns out billets of 150 mm by 150 mm, 125 mm by 125 mm, and 100 mm by 100 mm. The 450-mm mill turns out billets of 50 mm by 50 mm, 66 mm by 66 mm, 75 mm by 75 mm, and 84 mm by 84 mm. A German flying shear installed at the end of this billet line has never worked very well. 73/

The No. 2 1,150 mm bloomer, built in 1940, is connected to the 720 mm continuous billet mill. The No. 2 bloomer built by the USSR is served by 24 pits in 6 groups of 4. Each pit holds eight ingots. The 1,150-mm and 720-mm mills have a total power of 18,500 hp. All the electrical design was done by the Moscow Steel Design Bureau. 74/

The capacity of the No. 2 bloomer is between 1.4 million and 1.6 million MT per year. Product of the 720-mm mill is 260-mm by 260 mm and 150 mm by 150 mm billet stock, and its capacity is about 900,000 MT per year. 75/

When armor plate was needed by the armed forces in 1941, Magnitogorsk undertook the rolling of plate on a blooming mill. Although a wasteful practice productionwise, it was necessary until the armor plate mill was evacuated from the Ukraine. 76/

In 1950, the No. 1 bloomer could not roll all the steel supplied to it even when rolling above plan. Based on an ingot steel production of 4,270,000 MT in 1952, it is obvious that a third bloomer is essential for a balanced mill. Capacity of the two existing mills is approximately 3,350,000 MT. In other to give the accepted 20 percent rolling mill capacity over steel ingot production it would be necessary to have a third mill with a minimum capacity of about 1.8 million MT per year. 77/

h. Finishing Rolling Mills.

(1) Bar Mills. There are four bar mills at the Magnitogorsk plant. The largest is a 500-mm heavy bar mill, built in 1934, with 4 stands at 630/500 mm and 5 stands at 540/480 mm. The estimated capacity of this mill is 600,000 MT per year. 78/

No. 1 medium bar mill is a 300-mm mill, built in 1936, with 4 stands at 400 mm, 3 stands at 370 mm, and 3 stands at 285/325 mm. The capacity of this mill is about 250,000 MT per year. 79/ The other medium bar bill is a 250-mm mill, built in 1935, with 1 stand at 350/270 mm and a yearly capacity of about 250,000 MT. 80/

In addition to the above bar mills there is also a 300-mm continuous bar mill for rolling stock for the skelp mill. Built in 1936, this mill has a capacity of 150,000 MT per year. Total bar mill capacity is about 1,250,000 MT per year. 81/

(2) Strip Mills. The 14-stand, 300-mm, continuous skelp mill, built in 1936, rolls skelp for pipes and tubes and narrow strip for the automotive industry. The capacity of the mill is 250,000 MT per year. There is no known pipe mill at the plant to utilize any skelp rolled; therefore it is probable that this mill supplies skelp to some of the Ural pipe plants. 82/

Several German PW's report demolition of many houses near the plant for the purpose of erecting a large rolling mill. Although the reported site is outside the Magnitogorsk combine area, it would undoubtedly be subordinated to the combine. A report states that the building, already under construction, will house a German cold rolling mill. The reported size of 100 meters (m) by 40 m tends to lend credence to the statement. No other information is available on the mill. 83/

(3) Plate and Sheet Mills. Information on plate and sheet mills is incomplete. A 1,250 mm armor plate mill was evacuated from the Il'yich Plant in Zhdanov during the war. 84/ Another light plate mill and some mechanized sheet mills are probably at the plant. One mechanized sheet mill was evacuated from Moscow in 1942. The reported armor plate and sheet capacity is 194,000 MT per year, but this figure is probably low. 85/

A new rolling mill recently built by Uralmash has a flying high precision shear and is also equipped with a micrometer that measures sheet thickness while the sheet is in motion. 86/

(4) Rail Mills. A rail mill was reported to be under construction in 1939. In 1941 the rail capacity was 204,000 MT per year. No details of this mill are known. 87/

(5) Wire Mills. The 250-mm wire rod mill, installed in 1935, has a capacity of 220,000 MT per year. It rolls two rods simultaneously. Reportedly this mill is of German origin. 88/ Known mill capacities total up to 2,118,000 MT per year as shown.

Finishing Mill Capacities
about 1942

	Thousand Metric Tons
500 mm heavy bar mill	600
300 mm medium bar mill	250
250 mm medium bar mill	250
300 mm skelp bar mill	150
300 mm continuous strip mill	250
All plate and sheet facilities	194
Rail mill	204
Wire mill	220

It should be noted that, although 2,118,000 MT of mill capacity was perhaps sufficient to take care of the ingot steel produced in 1942, it is completely inadequate to cope with ingot production in 1952. Improvements and increased efficiency should bring capacity up somewhat, but it is rather obvious that at least several rolling mills in addition to those above are in operation. Information is lacking on these points.

The strip and wire mills were the first to complete the production program for 1947, and produced 50,000 MT above 1946 production. Several of the bar mills completed their work ahead of schedule. In 1948 the No. 1 300-mm bar mill's norm for tonnage rolled was raised to 55 MT per operating hour. 89/

Despite some improvements in the work of the rolling mills, 90/ their operation as a whole does not meet the requirements of the combine. Rolling mill operations lag behind steel production. Ingots often pile up in storage and have to be shipped to other plants. 91/

i. Intraplant Services.

(1) Power. The electric power plant was erected and put into operation in 1931. Original capacity was about 123,000 KW. The BF power-house has a capacity of 10,000 KW. It is believed that 1952 capacity has been increased to about 175,000 KW of which 145,000 KW are located in the main station. 92/

By 1936, enough pipe lines were in operation at the plant for full utilization of BF and coke oven gas at the power plants and other installations. 93/ An electric power station was placed in operation in 1943, probably to supply the blowing station for BF Nos. 5 and 6. 94/

(2) Water. The Ural River is dammed in two places at Magnitogorsk to provide water for mill use. The No. 1 pond adjacent to the plant has a total capacity of 10 billion gallons and a daily capacity estimated to be 132 million gallons. 95/

(3) Refractory Plant. All except the most special type of refractories are made at the plant. In 1935 the projected capacity for the plant was 100,000 MT per year, of which 40,000 MT are chamotte or magnesite brick and 60,000 MT are dinas or silica brick. A later source claims the production is 30,000 MT per year of magnesite and 30,000 MT per year of silica. 96/

(4) Other Shops. The Magnitogorsk Combine is equipped with a complete line of maintenance facilities consisting of a mechanical shop, electrical shop, forge shop with a capacity of 3,000 MT per year, and a welding shop. 97/

(5) Transportation. The internal railway transport system at Magnitogorsk was completely electrified by 1951. It was the first steel plant in the USSR to have a completely electrified system. In 1940 the plant had approximately 350 km of track and by 1946 this had grown to 400 km. 98/

Greater efficiency has been achieved by electrification. In the past transportation was always critical, the severe winters making movements quite inadequate at times. Gregory Nosov, director of the plant, pointed out in his 1949 speech that some of the problems facing the combine were the tremendous volume of intraplant freight and the specification of proper typesof cars for the various intraplant hauls. He pointed out that there was a particular need for large capacity cars, specially designed for transporting pig iron, sinter, BF dust, and coke. Railroad car builders were not meeting these needs. 99/

j. Products and Production.

Products turned out at Magnitogorsk are coke and coke chemicals, pig iron, ferromanganese, spiegeleisen, ferrosilicon, ingot steel both carbon and alloy, blooms and billets, skelp, rails, sheet, 4 to 12 mm thick by 1,280 mm, armor plate, light plate, narrow strip other than skelp, angles, channels, bar shapes, other structural shapes, rods, wire, nails, nuts and bolts, iron and steel castings, forgings, and acid and basic refractory shapes. 100/

Production Figures 101/
1932 to 1953

Thousand Metric Tons

Year	Coke	Pig Iron	Steel	Finished Steel
1932	300	320		
1933	843	588	88	58
1934	1,590	1,150	436	288
1935	1,733	1,252	815	586
1936	1,977	1,500	1,165	959
1937	1,920	1,530	1,402	1,010
1938	1,515	1,535	1,480	1,200
1939	1,750	1,555	1,500	1,079
1940	1,900	1,575	1,750	1,270
1941	1,900	1,595	1,850	1,330
1942	2,095	1,650	2,000	1,440
1943	2,250	1,850	2,200	1,580
1944	2,700	2,073	2,468	1,780
1945	3,150	2,323	2,718	1,950

Production Figures 101/
1932 to 1953
(Continued)

Thousand Metric Tons

Year	Coke	Pig Iron	Steel	Finished Steel
1946	3,500	2,485	2,910	2,090
1947	3,600	2,690	3,075	2,210
1948	3,600	2,880	3,330	2,395
1949	3,750	2,900	3,700	2,660
1950	3,900	3,080	3,865	2,780
1951	4,050	3,265	4,100	2,950
1952	4,050	3,355	4,270	3,070
1953	4,050	3,523	4,330	3,120

k. Distribution.

Surplus coke, pig iron, and BF alloys are sent to various Urals steel plants. Steel products are widely distributed throughout the USSR, although considerable tonnages are sent to the machine building centers at Sverdlovsk and Chelyabinsk. 102/ Since 1946, other large shipments have been made to Nizhniy Tagil, Stalingrad, Gor'kiy, Moscow, and Leningrad. 103/

l. Plant Efficiency. Magnitogorsk has won many prizes and banners in metallurgical competition. In 1949 the combine was rated the best over-all steel mill in the USSR. In 1950 the plant had the transferable red banner for the best coke plant, blast furnace shop, strip mill, and wire mill. No. 3 OH shop was judged the best in the USSR. Norms for the first half of 1953 were overfulfilled. 104/

m. Administration.

Magnitogorsk is subordinate to the Ministry of Ferrous Metallurgy. 105/

n. Personnel.

In 1941 there were 26,000 workers at Magnitogorsk. It is estimated that the 1952 employment record would show over 32,000 workers, of which about 35 percent are women. 106/ The following is a list of head personnel. 107/

Plant Directors

1933 to 1937	Zavenyagin
1937 to 1939	Pavel Korobov
1939	Ivanov
1939 to 1951	Gregory I. Nosov
1951 -	Alexander Borisov

Chief Engineers

1948 to 1951	Konstantin Burtsev
1952 -	F. Voronov

o. Locational Characteristics.

Although the mill is now surrounded by the city of Magnitogorsk, this will not be a deterrent to future expansion. See section h.

25X1A2g

2. Magnitogorsk Cable Factory [redacted]

a. Location.

53°27'N - 59°04'E, Magnitogorsk, Chelyabinsk Oblast, Urals, RSFSR.

b. History and Development.

Started by the evacuation of equipment from the Ukraine during World War II, the cable works has been built up to the point where it is the most important plant of its type in the USSR. 1/

c. Raw Materials and Other Inputs.

Wire and wire rod for drawing and fabricating into cable comes from the Magnitogorsk steel plant. 2/

d. Coal and Coke.

Coke for use as a fuel in the foundry cupola comes from the coke plant in the Magnitogorsk steel works. 3/

e. Ironmaking Facilities.

A cupola furnace produces iron castings for plant use. 4/

f. Steelmaking Facilities.

None.

g. Primary Rolling Facilities.

None.

h. Finishing Rolling Facilities.

The wire drawing department contains 2 annealing furnaces for heat treating wire rod, a pickle house, 6 wire rod drawing mills, 15 wire drawing mills, and 6 continuous furnaces for patented wire. A department for galvanizing wire is also probably in operation. 5/

i. Intraplant Services.

No information available.

j. Products and Production.

Steel products produced are wire rod, wire for cable, and one size of railroad spike. 6/

Production Figures 7/
1953 and 1953

Thousand Metric Tons

Year	Finished Steel
1952	100.0
1953	100.0

k. Distribution.

All wire produced is used in the manufacture of steel cable. Other products are shipped to unknown destinations.

l. Plant Efficiency.

In the period 1946 to 1950, lack of trained personnel prevented efficient operation at the cable works. Presumably this condition has been remedied. 8/

m. Administration.

The cable works is administered directly from Moscow by an unknown ministry. 9/

n. Personnel.

The plant director is (fnu) Motalin. 10/

o. Locational Characteristics.

No information available.

B. Chelyabinsk Complex. 25X1A2g [redacted]

1. Chelyabinsk Metallurgical Plant imeni Bakal.

a. Location.

55°10'N - 61° 24'E, Chelyabinsk, Chelyabinsk Oblast, Urals, RSFSR. The plant is situated on the east bank of the Miass River near the Residential area of Sotsgorod. The whole area is a new suburb, and the industrial complex in the area is called Bakal. From the north edge of the Chelyabinsk city limits, there are about 5 km of open fields to the steel mill. 1/

b. History and Development.

The steel plant at Chelyabinsk was started in 1941 and was originally scheduled for completion under the Fourth Five Year Plan (1946-50). Delays in construction have postponed the estimated completion date to 1955. In 1942, 3 electric furnaces, 2 rolling mills, and the machine shops were put into operation. By 1943 the electric steel department was finished as was the first section of the power plant. Some new parts of the plant were made up from sections evacuated from German occupied territory. The year 1944 saw the completion of 2 blast furnaces (BF), 2 coke batteries, power, transportation and storage facilities. The agglomerating plant was partially completed in 1944. In 1945 the iron foundry, the heat treating department, the lime works, the concrete plant, the forge, the coke byproducts plant, the refractory plant, and the pattern shop were completed.

The third coke battery and additions to the power plant were completed in 1945. By 1950 the fourth coke battery and some of the OH furnaces were completed and construction had started on the new and very large rolling mill complex. Probably in this period the construction of BF No. 3 was begun. 2/

The ultimate completion of the plan will see erected at Chelyabinsk one of the major units of the metallurgicalindustry of the USSR. Bakal is to be the largest supplier of quality steel in the USSR. By 1953 it is planned to have 8 batteries of coke ovens, 3 BF producing 1,300,000 MT of pig iron annually, 26 OH and 22 electric furnaces, 3 blooming mills, 2 roughing mills, and 14 finishing mills. 3/

Actually in operation in 1953 are 4 coke batteries, 2 BF and probably a third, 6 OH's and probably 3 more for a total of 9, 5 electric furnaces, and 2 blooming mills. 4/

The planned annual steel production will be broken down as follows: carbon steel, 752,000 MT; silicomanganese steel, 34,900 MT; Hadfield steel, 23,900 MT; chrome steel, 262,700 MT; nickel steel,

77,400 MT; chrome nickel steel, 133,250 MT; carbon tool steel, 68,100 MT; chrome tool steel, 27,200 MT; high-grade carbon steel, 160,000 MT; and various alloy steels, 236,250 MT, for a grand total of 1,775,700 MT steel. 4/

c. Raw Materials and Other Inputs.

The principal iron ore base for the Chelyabinsk Metallurgical Plant is the open-pit mines at Bakal. At various times ores have been supplied by the Magnitogorsk and Krivoy Rog ore fields. The magnetite and hematite ores mined at Bakal are agglomerated before shipment to Chelyabinsk. Untreated Bakal ore is shipped to Chelyabinsk with an iron content of 41 percent to 50 percent, and the treated ores have an iron content of 46 percent to 56 percent. 5/

During World War II, an agglomerating plant was built at the Bakal mines. The plant supplied Chelyabinsk with powdery ores, as well as washed clayey ores, and siftings, which were not suitable for direct smelting in the BF. Such ores together with clayey ores comprise 30 percent to 40 percent of the total ore resources of some metallurgical plants. 6/

During the period 1945 to 1946, Chelyabinsk utilized many thousands of tons of uncalcined Bakal carbonate ores and produced an excellent grade of steel. The smelting process worked better than expected; according to the Bakal Ore Preparation Combine, however, it was costly, because 1 ton of agglomerate was 4 times as expensive and 1 ton of calcined ore was 7 times more expensive than 1 ton of raw siderite ore in lumps. 7/

The Krivoy Rog ore has a high percentage of fines. The Bakal Mine Administration has at various time in the past been publicly criticized for not supplying ore in a regular manner. On the other hand, the Chelyabinsk Plant has been criticized for not stocking sufficient ore for the long winter. The maximum known arrival of ore in one 24-hour period is 7,200 MT. 8/

The source of manganese is not known. Limestone is received from Fedrovka and from Turgoyaski. The Turgoyaski quarry administration is frequently accused of irregular supply of limestone. Scrap iron and steel is received from the factories of Chelyabinsk, in addition to amounts shipped from other cities in the Urals. 9/

Ferromanganese is received from Nikopol, but the source of the following raw materials received by Chelyabinsk is not known: chrome pigs 20 centimeters (cm) by 20 cm by 10 cm, quartz, foundry sand, nickel, tungsten, titanium, silicon, and molybdenum. Water is probably piped to the steel mill from the Miass River. 10/

d. Coal and Coke.

Coking coal for Chelyabinsk is obtained from the Kuznetsk Basin, although some small amounts were obtained at various times from the Don Basin. Coal for auxiliary and heating purposes is obtained from the nearby town of Kopeysk. 11/

The first coke battery of 61 ovens was put into operation in July 1944. The second and identical battery followed in December 1944. By 1948 the third battery was operating, and foundations for the fourth were started. In 1950 there were 4 completed coke batteries in operation at Chelyabinsk. 12/

The first 3 batteries have 61 ovens each, and it is assumed that the fourth battery also has 61 ovens for a grand total of 244 as of 1953. The ovens are approximately 19.8 cu m in volume and have a width of 406 mm. All batteries are equipped with electric coke pushers, and all handling is done by conveyor systems. 13/

Incoming coking coal is unloaded at a coal elevator which raises coal up to a crushing and sorting tower from which it drops to lorry-cars running along the top of the coke batteries distributing coal to the various ovens. 14/

After pushing, the coke is transported to one of two quenching towers. Still in the same cars, the coke is shipped to the BF skip house station or to coke storage, from which some of the coke is shipped out. 15/

The coke-chemical plant produces benzene, toluene, crude tar, and ammonium sulfate. At the byproducts plant are 2 rows of 5 18-m-high metal tanks and 2 rows of 3 18-m-tanks. Coke gas is distributed in an overhead 1.5-m to 2.0-m diameter pipe to the power house and other installations. 16/

The construction of No. 2 battery under the pressure of wartime urgency was completed in 67 days and entailed the use of 11,000 MT of refractories. The coke plant was cited for outstanding work in May 1947. 17/

Coke Production
1952 and 1953

Thousand Metric Tons

No. of Batteries	Ovens/Battery	Production/Battery	Total Production
4	61	420.0	1,680.0

There is no information available as to actual coke battery construction after the completion of the fourth battery in 1950. It is not likely that the planned production of 3,360,000 MT for 1953 was met. 18/

e. Ironmaking Facilities.

The two BF's built at Chelyabinsk in 1944 are of 930-cu m capacity. 19/ Completion of the plan for the metallurgical plant will see construction of a third BF. It was believed to have been put into operation in early 1953. In 1949 the BF coefficient was 1.10 for both BF's. During the first quarter of 1951, a BF coefficient of 1.03 was reached, and the plan for 1952 called for a norm of 0.90. In April 1952 a coefficient of 0.873 was obtained. 20/

Pig Iron Production
1952

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	930	0.90	340	352.0
2	930	0.90	340	352.0
Total Production				704.0

The estimated operating coefficient for 1953 is 0.87.

Pig Iron Production
1953

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
3	930 each	0.87	340	1091.0

Each BF is equipped with 3 hot blast stoves and inclined skip hoists. Each furnace is equipped with the conventional cast house. Flue dust is conveyed in a 2-m pipe to the dust catcher. Dust is dumped into railroad cars and hauled to the slag dump. Every 24 hours about 480 MT of dust are hauled away from each BF. Another source states that in 1947 flue

dust losses amounted to 20 percent. Slag is transported to the slag pile or cement works in special motor-driven cars. Attached to the BF division is a dump station and cooling installation. The ore field crane covers a 300-m-long storage area, and provisions are made for ore thawing by steam. 21/

The BF cast pigs of 30 kegs to 40 kegs which were shipped to Moscow, Tula, Leningrad, and Omsk. About 10 percent of the pig iron is cast in pigs and 90 percent is sent to the open-hearth shop. 22/

The sinter plant was built in 1944. An iron foundry is located in the mill, and it is equipped with two cupola furnaces. A lean-to to the foundry serves as the entrance for delivery of materials used in charging. Charging materials are loaded in the lean-to ladles with drop bottoms. The ladles are then transported to the cupola via an electric inclined skip hoist. Through an electric mechanism, the bottom of the ladle opens and charge materials drop into the cupola. At intervals coke is shoveled manually into the charge. The furnace charge is about 5 m deep. In the annex is an electric blower for the cupola. The cupola is tapped into ladles in the casting shop. The ladles are transported and tipped into molds by an overhead crane which runs the entire length of the shop. The foundry produces spare parts for the rest of the steel mill and is in operation around the clock. 23/

f. Steelmaking Facilities.

The most recent information on the open-hearth building program at Chelyabinsk indicates that 6 OH furnaces are in production out of a proposed 13-furnace shop. The second OH building has been constructed, and it is thought that three OH furnaces have been installed. Upon completion of the plan the plant will have 2 OH shops of 13 furnaces each. The 9 100-MT capacity OH in operation have an estimated hearth area of 50 sq m each and an estimated 1952 coefficient of 4.8. The 1953 coefficient is estimated to be 5.0. 24/

There are five electric furnaces in operation in the steel foundry. Four of these furnaces are of 30-MT capacity and 1 is of 70-MT capacity. One source states that the 4 30-MT furnaces were evacuated during the war from the Electrostal plant near Moscow. When the plan for the metallurgical plant is completed, Chelyabinsk will be the most important electric steel plant in the USSR, consisting of about 22 furnaces. 25/

Steel Production
1952

Thousand Metric Tons

Furnace and Type	Hearth Area (sq m)	Coefficient	Operating Days	Production
6 OH	50.0 each	4.8	325	468.0
4 Electric		30 MT each		120.0
1 Electric		70 MT		70.0
Total Production				658.0

Steel Production
1953

Thousand Metric Tons

Furnace and Type	Hearth Area (sq m)	Coefficient	Operating Days	Production
9 OH	50.0 each	5.0	325	731.0
4 Electric		30 MT each		120.0
1 Electric		70 MT each		70.0
Total Production				921.0

Open-hearth steel is cast into 1- and 6-MT ingot molds; electric furnace steel is cast into 1- and 3-MT sizes. In 1946, open-hearth heats averaged 8 to 8 1/2 hours. 26/

The electric furnace steel foundry is divided into the following three sections: scrap, foundry, and grinding. The electrodes in the 4 electric furnaces are 50 cm in diameter. One source states that the Russians told him that the furnaces are relined once a year and that the cover is renewed after each heat. The average heat time is 8 hours. The furnace charge is prepared in the scrap section. Scrap, brought into this section by standard gage railroad, is, according to type, put into 6 bins, each 10 m by 10 m by 5 m in the floor, lined with timber. Two overhead magnetic cranes run on rails over the entire section. One crane loads scrap into a container, 250 cm by 70 cm by 70 cm; the second crane pushes the filled container into the furnace and tips it. In addition to scrap, the following are charged into the furnaces: dolomite, quartz, and, according to type of steel desired, various alloys including chrome, nickel, tungsten, manganese, titanium, silicon, and molybdenum. 27/

The casting section is 180 m long by 60 m wide. This section has a 25-MT and 2 100-MT traveling cranes. The poured ingots are cooled with a blower. The casting section also contains an electric grinding mill which pulverizes firebrick so that it is suitable for coating ladles. 28/

The grinding section is equipped with 2 100-MT overhead traveling cranes. The grinding is done by 40 Russian grinders, each with an individual motor drive. All ingots are cleaned by grinding except the chrome-nickel steel ingots, which are cleaned by planing. 29/

Various storage warehouses in connection with this shop store tungsten, titanium, manganese, chrome, nickel, silicon, molybdenum, firebrick, magnetic ore, asbestos, cement, tar paper, ammonia, electrodes, and carbide. 30/

The following bottlenecks in the electric steel foundry were reported:

(1) Electrodes. Until 1948, US electrodes were still on hand; these electrodes lasted one 8-hour shift. Then came a crisis, lasting for a half-year, caused by electrodes from Chelyabinsk, which were so bad that they had to be replaced twice during an 8-hour shift. According to a Russian supervisor the quality of the electrodes has now become better than the old US electrodes, and the Russian electrodes last through three shifts.

(2) Scrap. Needed in production of steel; is in short supply; the shortage is aggravated in winter, when transportation difficulties arise.

(3) Firebrick. Used in coating ladles and troughs for molten steel; is in short supply. In the wintertime, fire-proof clay for furnaces is in short supply because it freezes hard in the open and scoop shovels cannot move it.

The electric steel foundry and casting shop operates in 3 8-hour shifts. In connection with foundry work at Chelyabinsk, N.K. Ipatov and V.A. Krivousov, engineers, have performed extensive research on the theory of gas injection through a conical sprue. 31/

g. Primary Rolling Mills.

There are two rolling mill complexes at Chelyabinsk. The old mill, built in 1943, contains a 350-mm two-high reversing billet mill which rolls small ingots down to 15 cm by 15 cm in several passes. It is believed that this mill can take ingots 40 cm by 40 cm. The soaking pits

for the billet mill were built by Stal'proyekt and are heated by a mixture of coke oven and BF gas. One oil-fired reheating furnace is located just ahead of the billet mill. 32/

The new rolling mill, unfinished in 1949 but probably in operation in 1952, has a 1,000-mm blooming mill. The mill was built by the Ministry of Heavy Machine Building in 1948 and is reported to be of about 900,000-MT capacity. 33/

h. Finishing Rolling Mills.

In the old rolling mill the finishing mills consist of a 450-mm bar and structural mill and an 800-mm plate mill. The annual output of both mills was reported by one source to be about 300,000 MT about 1947. There are two oil-fired reheating furnaces, one of the bar and structural mill and one for the plate mill. 34/

Very little information is available on the new and much larger rolling mill, but prisoners of war reported that many Russians claimed it was going to be the largest in all Europe. Indications are that, in addition to the 1,000-mm blooming mill, this complex will contain a continuous hot strip mill, cold strip tandem mill, and other finishing facilities. By 1952, nearly all sections of this new rolling mill complex should be producing, but production estimates cannot be made because to the lack of information. 35/

A forge shop has two large steam hammers. 36/

i. Intraplant Services.

(1) Power. The power station, belonging to the metallurgical plant, covers an area of about 250 m by 100 m. It consists of an old boilerhouse, probably built around 1943, and a newer section. One reliable source states that the old section contained 4 coal-fired horizontal boilers, number 4 boiler going into operation in January 1949. The new boilerhouse was to be equipped with 3 vertical-tube boilers which were not in operation by 1950. It is estimated that by 1952 there were 6 boilers in operation, 4 in the old section and 2 in the new section. 37/

The electric power station had by 1949 2 turbines, 1 of which was American. The first turbine, make unknown, is believed to be of 25,000-kw capacity. The second turbine, the American one, is of 35,000-kw capacity. The third turbine and subsequently the newly constructed fourth turbine are each of about 35,000-kw capacity. Although it is possible that in 1952, 6 turbines were in operation, information is lacking on the actual installation of the last 2. The power station probably supplies all the power requirements of the mill; the 1952 estimated capacity is 130,000 kw. 38/

(2) Mechanical and Electrical Repair. The machine shop is equipped, the machinery being about 70 percent American. One large American planer is 10 m long. The mechanical repair and machine shop also houses the electrical repair shops. 39/

(3) Transportation. The plant is equipped with numerous standard-gage railroad spurs running through the plant to a large shunting and transshipping depot five km distant. Roads in the plant area are almost impassable in rainy weather. 40/

(4) Refractories. A refractory plant was put into operation in 1948. Chamotte bricks are produced. 41/

(5) Slag Cement Plant. A slag cement plant reportedly has a capacity of 40,000 barrels a year. 42/

(6) Lime Processing. The lime processing plant has three kilns. 43/

(7) Water. The source of all water is notknown, but it is presumably the Miass River. There are at least 2 pumping stations in the plant area, 1 of which supplies water from a well to the electric steel foundry and casting shop. 44/

j. Products and Production.

The plant produces coke, pig iron, foundry iron, ordinary carbon steel ingots, quality steel ingots, chrome nickel steel, other alloy steels, electric steel 18 khGT, chrome molybdenum tungsten steel, ball bearing steel, armor plate, sheets 150 cm by 150 cm by 5 mm, steel plate from 2 m by 80 cm by 8 mm to 2 m by 3 m by 20 mm, steel rods 10 m to 18 m long b y 6 m in diameter up to rounds 90 mm in diameter, squares up to 10 cm by 10 cm, forged axles, and flats 8 cm by 1 cm thick. As the plans for complete and integrated production proceed it may be expected that the Chelyabinsk metallurgical plant will produce most of the products enumerated under the plan. Also it is estimated that with the completion of the new rolling mill hot and cold rolled sheets will be produced in large quantities, particularly for the automotive industry. 45/

Production Figures 46/
1944-53

Thousand Metric Tons

Year	Coke	Pig Iron	Steel	Finished Steel
1944	200.0	175.0	120.0	
1945	840.0	435.0	180.0	

Production Figures 46/
1944-53
(Continued)

Thousand Metric Tons

Year	Coke	Pig Iron	Steel	Finished Steel
1946	840.0	500.0		
1947	840.0	550.0		
1948	1,260.0	600.0		
1949	1,260.0	650.0		
1950	1,680.0	700.0		
1951	1,680.0	700.0		
1952	1,680.0	704.0	658.0	474.0
1953	1,680.0	1,091.0	921.0	662.0

k. Distribution.

Some steel has been shipped to the Kirov Tractor Plant and the Electric Repair Factory No. 3 in Chelyabinsk. If the new rolling mill is a hot strip mill as presumed, then a large percentage of the steel produced will be sent to automobile plants in the Urals. Shipments of high-quality steel have been made to the Volga-Don Canal project and to the Kuybyshev Hydroelectric Plant. 47/

l. Plant Efficiency.

In May and June 1947 the plant completed the established plan. In 1949 the works completed the plan ahead of time. The 1952 plan for the first 11 months was completed two weeks ahead of schedule. 48/

m. Administration.

The plant is under the Ministry of Ferrous Metallurgy and Glavspet'stal. 49/

n. Personnel.

The plant director is Ya. A. Sokol and his assistant is (fnu) Labonierz. In 1946 about 17,000 employees worked in the Bakal plant. 50/

o. Locational Characteristics.

No information available.

2. Chelyabinsk Pipe Rolling Mill. [redacted]

a. Location.

55°10'N - 61°24'E, Chelyabinsk, Chelyabinsk Oblast, Urals, RSFSR. The pipe mill is located about 10 km southwest of Chelyabinsk and 4 km south of the Chelyabinsk-to-Kopeysk road, on open level ground. 1/

b. History and Development.

Started during World War II to replace pipe-producing facilities lost in the Ukraine, the plant produced its first rolled pipe in late 1942. 2/ The original plans called for five OH furnaces, seamless, and butt weld pipe mills. 3/ As far as is known, the plant is not scheduled for major future expansions and will remain a basic producer of pipe.

c. Raw Materials and Other Inputs.

Pig iron, scrap, limestone, and fuel oil are shipped in by rail. The origin of the raw materials is not definitely known, but the Chelyabinsk Metallurgical Plant at Bakal probably supplies the cold pig iron for the open-hearths. 4/

d. Coal and Coke.

Coal for auxiliary purposes is shipped in by rail from the Donetz Basin and stored on the ground. 5/

e. Ironmaking Facilities.

None.

f. Steelmaking Facilities.

The first OH furnace was tapped on 6 January 1944. 6/ By the end of 1944, 2 75-MT OH furnaces were in regular operation. 7/ No. 3 OH furnace became operative in October 1946 and it also was rated at 75-MT. 8/ By 1949 the foundations for the fourth and fifth OH furnaces were prepared but no information is available as to when they were completed. 9/ On the basis of ingot steel needed for the pipe mills, it is assumed that Nos. 4 and 5 OH furnaces were fully operative in 1952. All furnaces are oil fired and each has a hearth area of about 33 sq m. 10/ In 1948 the furnaces achieved a coefficient of 4.4 as against a norm of 3.8, but by 1950 the coefficient of OH utilization had reached 5.0. 11/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
5	33.0 each	5.0	325	268.0

The estimated 1953 coefficient is 5.2

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
5	33.0	5.2	325	278.5

g. Primary Rolling Facilities.

No information is available on the mill used to reduce the open-hearth steel ingots to tube rounds for the Mannesmann and Pilger seamless pipe mills.

h. Finishing Rolling Facilities.

(1) Seamless Pipe Mills. Seamless pipe is made at the Chelyabinsk plant by the Pilger and Mannesmann methods. 12/ The Pilger mill makes seamless pipe with diameters ranging from 8 mm to 150 mm. 13/ Pipe produced in the Mannesmann mill is made in sizes from 150-mm diameter to 500-mm diameter and in lengths up to 8 m, although one report states that 12-m lengths are produced. 14/ The Mannesmann mill has three reheating furnaces and is reputed to be the largest and most up-to-date seamless pipe producer in the USSR. 15/ Estimated seamless pipe production at Chelyabinsk, using a yield of 69 percent, is 106,000 MT/year.

(2) Welding Pipe Mill. A skelp mill rolls coiled skelp for the Fretz Moon butt weld mill. The mill produces pipe in the following range: 12 mm to 76 mm inside diameters, 29 to 89 mm outside

diameters, wall thickness minimum 1.5 mm to 4.0 mm, wall thickness maximum 2.0 mm to 7.0 mm, black pipe up to 15 mm long, and galvanized pipe up to 8 m long. Low carbon steel ordinarily is required for welded pipe, but it will be possible at Chelyabinsk to weld pipes of OH steel up to 0.3 percent to 0.35 percent carbon and Bessemer steel up to 0.12 percent phosphorus. The Fretz Moon mill, entirely of American origin, was originally expected to go into operation in 1947, but probably did not attain full production until 1950. The shop occupies a space of 20,000 sq m and requires 180 men to operate. A normal operating production of 90,000 MT/yr should be realized from the Fretz Moon mill. 16/

Forging and heat treating shops are adjuncts of the pipe mills. 17/

i. Intraplant Services.

A mechanical repair shop and electrical repair shop are located at the mill. 18/ The mill's power requirements of approximately 20,000 kw are furnished from an outside source. 19/

j. Products and Production.

The products are steel ingots used subsequently for finishing into seamless and welded pipe.

Production Figures
1952 and 1953

	Thousand Metric Tons	
Year	Steel	Finished Steel
1952	268.0	196.0
1953	278.5	204.0

k. Distribution.

Pipe has been shipped from Chelyabinsk to Sakhalin, Tuymaza, Ukhta, to the oil fields at Baku, and to Saratov for the Moscow-to-Saratov gas line and for the Moscow sewer system. 20/

l. Plant Efficiency.

1950 steel smelting was 12.4 percent greater than in 1949, and pipe production increased 45.8 percent in 1950 over 1949. The 1952 plan was overfulfilled. 21/

m. Administration.

The pipe plant is believed to be subordinate to Glavtrubo'stal and the Ministry of Ferrous Metallurgy.

n. Personnel.

The plant director is (fnu) Tokovoy. 22/ In 1946 about 3,000 workers were employed in the pipe mill. 23/

o. Locational Characteristics.

No information available.

3. Chelyabinsk Agricultural Machine and Tank Factory Nos. 78 and 200 imeni Ordzhonikidze. [redacted] 25X1A2g

a. Location.

55°10'N - 61°24'E, Chelyabinsk, Chelyabinsk Oblast, Urals, RSFSR. The plant site is about four km east of the main Chelyabinsk railroad station in the suburb of Pesochnyy. The Trans-Siberian Railroad runs along the north side of the works. The Stalin Tractor Factory is on the north side of the railroad opposite Nos. 78 and 200. 1/

b. History and Development.

A plant for the production of agricultural equipment was first established on the site in 1912. Some time in the Third Five Year Plan (1938-42) facilities for the production of tank components and ammunition were added. The Ordzhonikidze Plant, of which the tank plant is No. 200 and the agricultural plant is No. 78, works in close union with the Stalin Tractor Plant across the Trans-Siberian Railroad. In 1952 this ordnance complex was producing both industrial and military items. It is reported that special plans exist for the rapid conversion of this complex to an all-out military effort. The agricultural equipment and machinery plant is in itself one of the more important works of this type in the USSR. 2/

c. Raw Materials and Other Inputs.

The Kasli pig iron plant has furnished foundry iron to Ordzhonikidze. Rolled steel in large quantities is shipped in from Magnitogorsk and the Chelyabinsk Bakal plant. 3/

d. Coal and Coke.

Coal arrived by rail from the nearby mines at Kopeysk. 4/

e. Ironmaking Facilities.

The agricultural equipment division has a large cupola capable of producing about 20 MT/hr. 5/

f. Steelmaking Facilities.

The OH shop has 4 oil-fired 60-MT capacity furnaces working continually. Hearth area is 30 sq m per furnace. The foundry in the agricultural equipment division has a 5-MT electric furnace. The estimated 1952 coefficient is 4.0 6/

Steel Production
1952

Thousand Metric Tons

No. and Furnace Type	Hearth Area (sq m)	Coefficient	Operating Days	Production
4 OH	30 each	4.0	325	156.0
1 Electric		5 MT		5.0
Total Production				161.0

The estimated 1953 coefficient is 4.2.

Steel Production
1953

Thousand Metric Tons

No. and Furnace Type	Hearth Area (sq m)	Coefficient	Operating Days	Production
4 OH	30 each	4.2	325	163.8
1 Electric		5 MT		5.0
Total Production				168.8

The scrap practice in the OH shop is 60 percent to 65 percent. Some alloy grades are made, additions to chrome and nickel are added to cast steel tank turret heats, and other heats have tungsten additions. Ferrosilicon is added as 45 percent FeSi and 75 percent FeSi. The grade of manganese additions are unknown. 7/

OH charging is accomplished by overhead charging cranes. Ladle cranes are of 75-MT capacity. 8/

g. Primary Rolling Facilities.

None.

h. Finishing Rolling Facilities.

There are no rolling mills. There is no information available on installations for finishing iron and steel castings. There are forging, stamping, and heat-treating facilities at Ordzhonikidze. 9/

i. Intraplant Services.

Power is received from outside the plant by high tension line. 10/

j. Products and Production.

Products of the plant are iron and steel castings. A large share of the steel is cast into tank turrets, cast armor, and tractor wheels. 11/

Production Figures
1952 and 1953

	Thousand Metric Tons	
Year	Steel	Finished Steel
1952	161.0	96.6*
1953	168.8	101.3*

k. Production.

Most of the iron and steel castings are consumed by the combine.

* Based on a 60-percent yield from steel to finished casting.

l. Plant Efficiency.

No information available.

m. Administration.

The controlling ministry is the Ministry of Agricultural Machine Building. 12/

n. Personnel.

No information available.

o. Locational Characteristics.

No information available.

4. Chelyabinsk Tractor Plant No. 178 imeni Kirov. (Stalin Tractor Plant). [redacted] 25X1A2g

a. Location.

55°10'N - 61°24'E, Chelyabinsk, Chelyabinsk Oblast, Urals, RSFSR.

b. History and Development.

Construction started on the plant in 1930 and by 1933 the first production was realized. 1/ At that time the tractor factory was to be the largest in the world. The foundry also was intended to surpass other foundries in production and mechanization. Converted to tank production in World War II, the plant played a vital role as part of the Urals arsenal. Segments of a number of factories including the Kirov plant in Leningrad, the diesel engine plant No. 75 in Kharkov, the Il'yich plant in Zhdanov, and others were moved to Chelyabinsk early in the war to form a large combine around the tractor factory. As far as can be ascertained, no increase in steel production equipment took place at this time. The plant is self-sufficient in castings and forgings, but must purchase steel structurals, plates, and sheets. 2/

c. Raw Materials and Other Inputs.

All forms of steel other than castings and forgings are required by the tractor plant. Steel scrap, pig iron, and iron ore are required to maintain foundry production. No specific information is available.

d. Coal and Coke.

No information available.

e. Ironmaking Facilities.

There are 8 cupolas in the iron foundry, 5 with a capacity of 20 MT per cast and 3 with a capacity of 10 MT per cast. Casting capacity is over 400 MT/day, and yearly production is greater than 150,000 MT of gray iron castings. 3/

f. Steelmaking Facilities.

There are 2 small 10-MT OH furnaces with hearth areas of 6.5 sq m each, and 6 electric furnaces with rated capacities of 5 MT apiece. The estimated coefficient for 1952 is 5.0 4/

Steel Production
1952

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
2 OH	6.5 each	5.0	325	21.1
6 Electric		5 MT each		30.
Total Production				51.1

The 1953 coefficient is estimated to be 5.1.

Steel Production
1953

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
2 OH	6.5 each	5.1	325	21.6
6 Electric			5 MT each	30.0
Total Production				51.6

g. Primary Rolling Mills.

There are no rolling mills at the plant; however, the mechanized foundry has all the usual equipment for rough finishing castings and forgings.

h. Finishing Rolling Facilities.

In addition to the grinding, chippingm annealing, and other casting division departments, the plant has very extensive facilities for the processing and fabrication of rolled steel shipped in from other plants. 5/

i. Intraplant Services.

No information available. 6/

j. Products and Production.

The plant produces gray and malleable iron castings, steel castings, and steel forgings. 7/

Production Figures
1952 and 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1952	51.1	28.1*
1953	51.6	28.4*

k. Distribution.

The iron and steel castings and forgings produced at the plant are consumed in the production of tanks and tractors.

l. Plant Efficiency.

A great deal of criticism was leveled at the plant management for complete failure in the postwar reconversion to tractor production. 8/

* Estimated average yield for castings and forgings of 55 percent used.

m. Administration.

The plant is under the Ministry of Transport Machine Building. 9/

n. Personnel.

Prior to World War II, the plant had 40,000 workers. With the addition of evacuated plants the total rose to 50,000. The director until his arrest in 1949 was Salzman. 10/

o. Locational Characteristics.

No information available.

5. Chelyabinsk Agricultural Machinery Plant imeni Kolyushchenko.

[redacted] 25X1A2g

a. Location.

55°10'N - 61°24'E, Chelyabinsk, Chelyabinsk Oblast, Urals, RSFSR. The plant site is on the southern outskirts of Chelyabinsk.

b. History and Development.

The plant was in existence prior to World War II. An agricultural machinery plant of some importance, convertible to certain types of war production, Kolyuschenko has a captive steel foundry. 1/

c. Raw Materials and Other Inputs.

Supplies of pig iron, scrap, limestone, sand, and other foundry raw materials arrive by rail and truck. Steel plates, sheets, and shapes are supplied to the machinery construction sections of the works. 2/

d. Coal and Coke.

Coal and coke are shipped in by rail. Some coal comes from Kopeysk. 3/

e. Ironmaking Facilities.

A gray iron foundry with 4 cupolas works 2 shifts a day, 6 days a week. There is very little mechanized equipment.

Charging of these furnaces consists of a 20-cm layer of casting sand, a layer of vertical standing logs filling the whole hearth, a layer of coke, a layer of scrap and pig iron, another layer of coke, another layer of scrap and pig iron until the furnace is full. The molten foundry iron is used for casting parts for agricultural equipment and for supplying the Bessemer converters with a source of hot metal. The estimated annual foundry production of hot metal is 20,000 MT. 4/

f. Steelmaking Facilities.

Three Bessemer converters, each with a 2-MT capacity, are used for the production of steel for steel castings. There are never more than 2 converters in operation at one time; 1 converter is always in reserve or undergoing repair. About 12 heats are made in each of 2 converters in a 24-hour period. 5/

Steel Production
1952 and 1953

Thousand Metric Tons

No. of Furnaces	Capacity (MT)	Heats/24 hrs.	Operating Days	Production
2	2 each	12	300	14.4

g. Primary Rolling Facilities.

None.

h. Finishing Rolling Facilities.

Finishing facilities consist of finishing departments for iron and steel castings, a forging department, and possibly a very small wire drawing department. 6/

i. Intraplant Services.

Power is received from outside the plant at a transformer station, where voltage is stepped down to 380 v and 220 v for plant use. 7/

j. Products and Production.

Gray and malleable cast iron, chilled iron rolls, Bessemer steel castings, forgings, weldments, and possibly wire are the products of the plant. 8/

Production Figures 9/
1943 and 1953

	Thousand Metric Tons		
Year	Cast Iron	Steel	Finished Steel
1943		10.0	
1952	20.0	14.4	8.6*
1953	20.0	14.4	8.6*

k. Distribution.

None of the products produced in the iron and steel section are shipped from the plant. 10/

l. Plant Efficiency.

The iron and steel division has very little mechanized equipment.

m. Administration.

The work is under the control of the Ministry of Machine Building.

n. Personnel.

About 2,000 workers are employed at Kolyushchenko, of whom about 20 percent are women. 11/

o. Locational Characteristics.

None.

* Based on a yield of 60 percent.

C. Zlatoust Complex.

25X1A2g [redacted]

1. Zlatoust Metallurgical Plant imeni Stalin.

a. Location.

55° 10'N - 59° 40'E, Zlatoust, Chelyabinsk Oblast, Ural's, RSFSR. The steel plant is on the left bank of the Ay River about 3 km north of the center of Zlatoust. The plant, situated in the narrow Ay River valley, is not visible from the air for any distance. Zlatoust is on the South Ural Railroad. 1/

b. History and Development.

The Zlatoust works is an old plant that belonged to the Russian government before 1917. Development at Zlatoust was at a standstill until 1929, when plans for modernization were announced.

In the period 1929 to 1935 the following new facilities were added 3/:

1929	No. 4 OH
1930	No. 1 BF
	260 mm Mill
1934	900 mm Blooming Mill
	Five Electric Furnaces
1935	750 mm Billet Mill
	No. 5 OH

Before 1930, Zlatoust had been a producer of low-grade steel. In 1929, however, the production of quality steel was attempted and success was achieved over a period of years as attested to by the rising production of alloy grades. In 1932, ball-bearing steel was made by duplexing a basic electric furnace with an acid OH, the only acid OH in the USSR at the time. 4/

It was not until after World War II that the Zlatoust works achieved the proper balance between ingot and finished steel production. Prior to this alloy, grades for rolling were supplied by Asbe. 5

A new OH shop was added during the year 1943. Sometime before 1940, the two BF's were shut down. The BF that went into operation in 1943 is believed to be a reconstructed charcoal furnace. Erection of the projected coke battery would create a integrated plant. More completed mechanization will be a feature of future planning at Zlatoust 6/

c. Raw Materials and Other Inputs.

Iron ore is received from Magnitka just north of the plant, and from the Bakal deposits at Chelyabinsk. Source of other raw materials are not known. 7/

d. Coal, Coke, and Charcoal.

Although a coke battery was projected, as late as 1949 the plant was still receiving coke by rail. Coke, originally used as a supplemental fuel in the BF, has gradually replaced charcoal in the Zlatoust BF. Some charcoal, locally produced, is still in the BF. 8/

e. Ironmaking Facilities.

Two charcoal BF's of 168 cu m and 225 cu m were in operation at Zlatoust in 1930. Before 1940 these two units went out of operation, possibly due to a lack of charcoal. Pig iron was then supplied by the Satka plant. 9/

A BF was put into operation around 1943, operated partly on coke and partly on charcoal. The size of the new or reconstructed BF is unknown, but indications are that it has a volume of 200 cu m. The estimated operating coefficient for the furnace is 0.85. 10/

Blast Furnace Production
1952

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	200	0.85	340	80.0

The estimated 1953 coefficient is 0.83.

Blast Furnace Production
1953

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	200	0.83	340	82.0

It is reported that the plant has an iron foundry comprised of four cupola furnaces. 11/

f. Steelmaking Facilities.

Zlatoust produces both OH and electric steel. By 1930 the plant had four OH of 22, 27, 31.5, and 36.75 sq m. Between 1930 and 1935, 6 electric furnaces were put in production. Four of the Herault furnaces were of 8-MT capacity and 2 of 15-MT capacity. In 1935 the fifth OH was added to the shop. These 5 OH have estimated rated capacities of 35, 50, 55, 70, and 70 MT.

During 1943 a new OH shop of 4 oil-fired furnaces was brought into production. At the same time, 2 more 15-MT electric furnaces were installed. At the completion in 1944 of these major producing units the Zlatoust plant had 9 OH and 10 electric furnaces. 13/

Estimated 1942 steel production from 5 OH totaling 154 sq m and working on a coefficient of about 3.5 was 175,000 MT. Electric steel from the 6 electric furnaces produced about 62,000 MT, a total of 237,000 MT. The statement was made that the new OH shop would nearly double production. Making an allowance of about 46,000 MT attributable to new electric facilities leaves 191,000 to be gained from the new OH shop if production were doubled. Therefore, if each of the 4 new OH produced 45,000 MT at the estimated 1942 coefficient of 3.5, then each new OH would have a hearth area of 39.6 sq m. The hearth area checks with the furnace sizes as announced in Stal magazine for Zlatoust of 115 MT apiece. Other reports show that these OH are 100-MT furnaces. 14/

Coefficients have been reported as follows: 1936, 3.46; 1937, 4.05; 1938, 4.41; 1942, 3.5; 1948 norm, 4.5; 1949, 5.1; 1950 norm, 5.9; and 1952 estimated, 6.1. The low coefficient used for 1942 is attributable to the melting of electric furnace-grade steels in the OH, a practice necessitated by the war. 15/

Steel Production
1952

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
1 OH	22	6.1	325	43.6
1 OH	27	6.1	325	53.5
1 OH	31.5	6.1	325	62.5
2 OH	36.75	6.1	325	145.6

Steel Production
1952
(Continued)

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
4 OH	40.0	6.1	325	318.0
6 Electrics		8 MT each		48.0
4 Electrics		15 MT each		60.0
Total Production				713.2

The estimated 1953 coefficient is 6.3

Steel Production
1953

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
1 OH	22	6.3	325	45.1
1 OH	27	6.3	325	55.3
1 OH	31.5	6.3	325	64.5
2 OH	36.75	6.3	325	150.2
4 OH	40.0	6.3	325	328.0
6 Electrics		8 MT each		48.0
4 Electrics		15 MT each		60.0
Total Production				751.1

All OH are oil-fired. The OH used on a 7,000 kilocal per kilogram standard fuel: 283 kg/MT of ingots in 1940; 375 kg/MT in 1945; and 361 kg/MT in 1946. The increase in the technical level of production, the improvement in the supply of fuel, and the introduction of automatic controls resulted in 1948 in savings of 21,000 MT of fuel oil. 16/

Automatic fuel control and introduction of chrome-magnesite roofs resulted in a substantial increase in roof life. Campaigns in the smaller furnaces are about 2.3 times longer; in the larger furnaces, 1.5 times longer. 430 heats per campaign have been achieved. 17/

g. Primary Rolling Mills.

The 900-mm blooming mill went into operation in December 1934. It was built by the Izhorskiy Machine Building plant and has an estimated capacity of 330,000 MT/yr. 18/

Before 1934, rough work was performed by a 3-high 800-mm roughing mill. It is thought that this mill is no longer in operation. 19/

A 750-mm billet mill was installed in 1935 with a reported capacity of 140,000 MT/yr. Another 750-mm billet mill has probably been installed. 20/

At one time cold ingots were shipped from Asha for rolling, but with the installation of the new steelmaking facilities during the war, a balance was achieved between steelmaking and steel rolling. Because sheet production reached a level of over 700,000 MT/yr. for 1952, it is necessary to modernize and enlarge the primary rolling facilities. The 900-mm bloomer has probably had its capacity built up to 500,000 MT/yr. 21/

h. Finishing Rolling Mills.

The heavy bar mill has 1 3-high, 800-mm roughing stand and 4 600-mm finishing stands. Built in 1925, this bar mill has been modernized and now rolls high-quality steel instead of low-grade steel. 22/

The medium bar mill has one 600-mm roughing stand and five 400-mm finishing stands. 23/

The small bar and merchant mill has a series of 3-high and 2-high stands. There are 3 450-mm intermediate stands, possibly 3 400-mm finishing stands, and 8 rod mill stands at 280 mm. The other small bar mill is a 3-stand 2-high, 265-mm mill. 24/

There are 3 or 4 old sheet mills of low productive capacity. Zlatoust has a 1,000-MT hydraulic press. 25/

In 1947 the medium bar mill used an average of 34 kw per hour. 26/

i. Intraplant Services.

The power plant at the plant has 4 steam turbines, 1 of 15,000 kw, 1 of 6,000 kw, and 2 of 2,000 kw, or a total of 25,000 kw. 27/

The refractory shop produces about 12,000 MT/yr. of all types of refractories. 28/

Other shops are the mechanical shop, the roll turning shop, the gas generator plant, the scrap breaking installation, and the woodworking or pattern shop. 29/

Two oxygen installations were projected for tonnage oxygen, but as of 1948 they were still in the plan stage. 30/

Water is obtained from the Ay River.

j. Products and Production.

Products at Zlatoust are coke and charcoal pig iron, some ferroalloys both from the BF and from the electric furnaces, OH and electric steel ingots of high-quality steel, billets, bars, rods, over 50 different shapes of rolled steel, railroad car axle steel, high quality steel for the automobile industry, chrome-silicon steel for automobile springs, Sh Kh 15 ball bearing steel, sheets, chrome steels, silicon steels, stainless steel, nickel-chrome steel, high speed tool steel, and altogether over 200 types of high-quality steels. 31/

Types of Ingot Steel by Production Method 32/
1933 to 1934

Thousand Metric Tons

Type	1931	1932	1933	1934
Low Carbon OH	42.4			
Quality OH	44.9	85.5	85.9	95.0
Quality Electric Furnace	7.9	8.9	8.4	25.4

Types of Rolled Steel by Classification 33/
1931 to 1934

Thousand Metric Tons

Type	1931	1932	1933	1934
Quality Steel	30.0	52.0	54.6	62.0
Alloy Steel	12.7	24.1	37.5	50.7
Chrome	6.8	8.7	11.6	9.7
Ball Bearing	2.9	7.6	12.2	22.8
Silicon	0.3	4.0	9.2	13.4
Silico-Chrome		0.02	0.21	1.3

Percent Alloy Steels of Total Production 34/
1930 to 1933

Percent

1930	1931	1932	1933
5.1	32.0	54.3	64.0

In 1934, 37.4 percent of the steel was for automobile springs, 24.1 percent construction alloy grades, and 22.6 percent ball bearing steel. 35/

Production Figures 36/
1915 to 1953

Thousand Metric Tons

Year	Pig Iron	Steel	Finished Steel
1915		5.1	
1916		24.4	
1925	33.9	41.3	57.0
1929-30	58.0	102.0	62.0
1931		95.0	
1932	63.4	94.4	
1933	76.8	94.3	
1934	83.9	120.4	63.4
1935	66.5	161.4	118.9
1936	66.0	148.3	
1937		170.4	

Production Figures 36/
1915 to 1953
(Continued)

Thousand Metric Tons

Year	Pig Iron	Steel	Finished Steel
1938		188.5	
1941		230.0	240.0
1944		389.0	
1952	80.0	731.2	526.0
1953	82.0	751.1	540.0

k. Distribution.

No definite information exists on distribution except that alloy grades are supplied to the Uralmash plant in Sverdlovsk. Some ball-bearing steel is shipped to the Kaganovich bearing plant in Moscow. Being an alloy steel producer tends to give the Zlatoust product a much wider distribution than if it were a low carbon steel producer. 37/

l. Plant Efficiency.

In 1944 the Ministry of Ferrous Metallurgy criticized the plant for poor organization of labor, transport, and maintenance. In 1946 there were complaints about Zlatoust not sending enough steel to Novo Tagil, although the plan was fulfilled. The 1947 plan was filled and several shops received Red Banners, although the OH shop No. 1 lost their previous award. 38/

The Zlatoust plant completed the Fourth Five Year Plan (1946-50) by December 5, 1949. The plant, however, was again criticized for poor production in 1950. In 1951 both OH shops and the 750 mm mill were given the title of Stakhanovite shops. 39/

m. Administration.

A producing unit of Glavspetsstal, the Zlatoust plant is under the Ministry of Ferrous Metallurgy. 40/

n. Personnel.

In 1930 there were 4,316 employees; in 1941, 8,000; and in 1946, 15,000. 41/

The director in 1943 was M.F. Krumer; from 1947 to 1949, M.A. Pertsev, and at present it is Nesterov. 42/

c. Locational Characteristics.

Its location in a narrow river valley makes the plant difficult to see at any distance and also hinders to a degree the future expansion.

2. Zlatoust Agricultural Machine Plant No. 259 imeni Lenin. (Zlatoust Instrument and Tool Works) [redacted] 25X1A2g

a. Location.

55°10'N - 59°40'E, Zlatoust, Chelyabinsk Oblast, Urals, RSFSR.

b. History and Development.

The original plant was founded in 1754. In 1899 the new Zlatoust plant, built next to the old plant and now the Zlatoust Metallurgical Plant, took over the blast furnace facilities of the old Zlatoust plant. The old plant was converted into a rather extensive tool works with open hearths and rolling mills. Since 1945 it apparently has been converted further to enable the plant to produce agricultural machinery, although it still retains the steelmaking and rolling facilities. 1/

c. Raw Materials and Other Inputs.

No information available.

d. Coal and Coke.

No information available.

e. Ironmaking Facilities.

No information available.

f. Steelmaking Facilities.

There are 3 oil-fired open hearth furnaces of about 20 MT capacity, each at the works. Hearth area is 12 sq m for each furnace. The estimated 1952 coefficient is 4.5. In addition to the open hearths, there are 4 1-MT Gramolin type electric furnaces. 2/

Steel Production
1952

Thousand Metric Tons

Furance and Type	Hearth Area (sq m)	Coefficient	Operating Days	Production
3 OH	12 each	4.5	325	52.6
4 Electric		1 MT each		4.0
Total Production				56.6

Steel Production
1953

Thousand Metric Tons

Furnace and Type	Hearth Area (sq m)	Coefficient	Operating Days	Production
3 OH	12.0 each	4.7	325	55.1
4 Electric		MT each		4.0
Total Production				59.1

g. Primary Rolling Facilities.

Breakdown facilities apparently consist of a one-stand 650-or 600-mm mill with a yearly capacity of 20,000 MT. The 1953 capacity of 20,000 MT has probably been increased to accommodate all steel that is MT cast. 3/

h. Finishing Rolling Facilities.

There are 2 bar mills; 1 a 350-mm mill with a yearly capacity of 8,000 MT and one a 270-mm mill. In addition to the bar mills, there is a 2-stand 600-mm plate mill. 4/

i. Intraplant Services.

The plant has a 15,000 kw power plant. 5/

j. Products and Production.

Steel products of the plant are open-hearth and electric steel, steel castings, bars, and plates. 6/

Production Figures
1952 and 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1952	56.6	40.8
1953	59.1	42.6

k. Distribution.

Most of the steel is consumed at the plant.

l. Plant Efficiency.

No information available.

m. Administration.

The works is subordinate to the Ministry of Agricultural Machine Building. 7/

n. Personnel.

No information available.

o. Locational Characteristics.

No information available.

D. Ufaley Complex.

25X1A2g

1. Nizhniy Ufaley Steel Plant. [redacted]

a. Location.

55°55'N - 59°59'E, Nizhniy Ufaley, Chelyabinsk Oblast, Urals, RSFSR. The town is on the Ufa River, about 25 km from Verkhne Ufaley over a connecting road.

b. History and Development.

The plant was established in 1818. Before 1917 it belonged to the Serginsk-Ufaley Blast Furnace Company. The two plants of Nizhniy Ufaley and Verkhne Ufaley act as a complex with the OH billet mill and two sheet mills at Nizhniy Ufaley, and the blast furnace and a sheet mill at Verkhne Ufaley. 1/

c. Raw Materials and Other Inputs.

Pig iron for the OH shop comes from Verkhne Ufaley. 2/

d. Coal and Coke.

Coal is used only for auxiliary purposes at the plant.

e. Ironmaking Facilities.

None.

f. Steelmaking Facilities.

The OH shop has 1 23-sq m furnace of about 40 MT capacity. Coefficients reported are 1934, 3.07; 1935, 3.40; 1937, 3.38; 1938, 1.78; 1941, 3.85; planned for 1948, 5.0; estimated for 1952, 5.2. 3/

Steel Production
1952

Thousand Metric Tons

No. of Furnace	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	23.0	5.2	325	38.9

The estimated coefficient for 1953 is 5.4.

Steel Production
1953

Thousand Metric Tons

No. of Furnace	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	23.0	5.4	325	40.4

g. Primary Rolling Mills.

The primary mill is a two-stand, three-high billet and sheet bar mill of 650 mm. The estimated capacity of the 650-mm mill is 40,000 MT of billets a year. 4/

h. Finishing Rolling Mills.

There are 2 2-stand, 2-high, 590-mm sheet mills at Nizhniy Ufaley with an estimated capacity of 15,000 MT/year each.

i. Intraplant Services.

A refractory plant is part of the Nizhniy Ufaley Zavod Ogneupornykhne Ufaley complex and has an estimated capacity of 3,000 MT of refractory material per year. 6/

j. Products and Production.

The plant produces OH steel, billets for subsequent sheet rolling, roofing sheet, and other sheet. 7/

Production Figures 8/
1927 to 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1927-28	20.915	18.269
1935	28.0	

Production Figures 8/
1927 to 1953
(Continued)

Thousand Metric Tons

Year	Steel	Finished Steel
1936	27.6	
1952	38.9	21.0*
1953	40.4	21.8*

k. Distribution.

Some billets are sent to Verkhne Ufaley. Sheet is probably distributed locally and to Sverdlovsk and Chelyabinsk.

l. Plant Efficiency.

No information available.

m. Administration.

The plant is probably under the Ministry of Ferrous Metallurgy.

n. Personnel.

The plant director, who in all probability heads both the Verkhne Ufaley and Nizhniy Ufaley plants, is Sysoyev. 9/

o. Locational Characteristics.

No information available.

25X1A2g

2. Verkhniy Ufaley Metallurgical Plant. [redacted]

a. Location.

56°04'N - 60°14'E, Verkhniy Ufaley, Chelyabinsk Oblast, Urals, RSFSR. Verkhniy Ufaley is on the main line of the railroad running from Sverdlovsk to Chelyabinsk.

b. History and Development.

The plant was established in 1765. Prior to 1917 the iron works belonged to the Serginsk-Ufaley Blast Furnace Company. The two plants

* Based on sending 8,000 MT of billets to the Verkhne Ufaley sheet mill.

of Verkhniy Ufaley and Nizhniy Ufaley act as a complex with the blast furnace and a sheet mill at Verkhniy Ufaley and the OH, slabbing mill, and two sheet mills at Nizhniy Ufaley. These two towns, 25 km apart, are connected by a road over which interplant traffic moves. 1/

c. Raw Materials and Other Inputs.

Two types of ore are used at Verkhniy Ufaley, the chrome bearing Yelizavetinsk ore and the ordinary Verkhniy Ufaley ore. Semi-finished steel is shipped from Nizhne Ufaley and other sources. 2/

d. Coal, Coke, and Charcoal.

The BF uses charcoal from local sources. Peat is used as an auxiliary fuel. 3/

e. Ironmaking Facilities.

There is one charcoal-fired BF of 130-cu m capacity at the plant. It was probably put back into operation in 1941 after lying idle in the late 1930's. Reported coefficients of utilization are 1928, 2.22; 1934, 1.73; 1935, 1.45; and estimated for 1952 and 1953, 1.00. 4/

Pig Iron Production
1952 and 1953

Thousand Metric Tons

No. of Furnace	Volume (cu m)	Coefficient	Operating Days	Production
1	130	1.00	340	44.2

f. Steelmaking Facilities.

None.

g. Primary Rolling Mills.

None.

h. Finishing Rolling Mills.

There is a sheet mill at the plant which rolls billets shipped from the billet and slabbing mill at Nizhniy Ufaley. It is thought that the size of the mill is 590 mm. 5/

i. Intraplant Services.

No information available.

j. Products and Production.

The plant produces charcoal pig iron, natural alloy nickel-chrome pig iron, and sheets. 6/

Production Figures 7/
1927 to 1953

Thousand Metric Tons

Year	Pig Iron	Finished Steel
1927-28	21.151	17.855
1929-30	23.0	21.0
1952	44.2	21.0*
1953	44.2	21.0*

k. Distribution.

Pig iron produced here is shipped to the OH shop of the Nizhniy Ufaley plant. Distribution of sheet is unknown, but it is probably sent to Sverdlovsk and Chelyabinsk. 8/

l. Plant Efficiency.

No information available.

m. Administration.

Plant probably operates under the Ministry of Ferrous Metallurgy.

n. Personnel.

The only figure available for the total number of workers is the 1925 one of 1,500 employees. The plant director, who probably directs the Nizhniy Ufaley plant also, is (fnu) Sysoyev. 9/

o. Locational Characteristics.

No information available.

* Based on 8,000 MT of billets shipped annually from Nizhne Ufaley and additional steel from other unknown sources.

E. Individual Plants.

1. Asha Iron and Steel Plant (Balashevsk Iron and Steel Works).

25X1A2g [redacted]

a. Location.

55°02'N - 57°16'E, Asha, Chelyabinsk Oblast, Urals, RSFSR. The plant site is in southwestern Asha. 2/

b. History and Development.

The Asha Works, originally established in 1880, was only a pig iron producer until OH shop was established in the early 1930's. In 1930 a BF was restored and put into operation, and by 1935 a second BF had been built. Large segments of the mill were rebuilt in 1934 and again in 1940. The erection of a rolling mill was begun about 1948 and probably has been completed. Other extensions planned at Asha are a new boiler house and a new unloading installation. Modernization of all mill facilities is a feature of present plans at Asha. 3/

c. Raw Materials and Other Inputs.

The Asha plant receives its iron ore from Bakal and Magnitogorsk. All ore shipments are received by rail. At one time the ore supply was considered a bottleneck because of its frozen condition and the necessity of thawing. 4/

An aerial tramway transports limestone from a quarry located east of the plant to the BF area of the mill. 5/

Shipments of scrap iron and steel arrive at the plant every day or two. Manganese from an unknown source is also received. Pure electrolytic nickel in plate form has been noticed arriving at the works. 6/

d. Coal and Coke.

Coal for boilers and other auxiliary purposes comes from Chelyabinsk. The Asha plant has no coking facilities and receives coke from Chelyabinsk although this may be only a transshipment point. Coke has been received from as far away as Kemerovo, Western Siberia, and Upper Silesia. The 6,000-MT coke dump is 5 km west of the mill. Coke is shipped there by rail and from the dump to the BF by aerial tramway. 7/

Charcoal for the BF is produced at a chemical plant 8 km west of Asha. Another aerial tramway transports the charcoal from the chemical plant to the steel mill. About 160 to 200 cars, 3 m by 2 m by 2 m, of charcoal are delivered per shift. 8/

e. Ironmaking Facilities.

Originally the Asha works had two charcoal BF's with volumes of 146 and 151 cu m. Subsequent relinings have increased the volume to 157 cu m and 166 cu m, as well as partial or total conversion of one BF to coke. The 1952 coefficient is 1.1. 9/

Pig Iron Production
1952

Thousand Metric Tons

No. of Furnace	Volume (cu m)	Coefficient	Operating Days	Production
1	157	1.1	340	48.6
2	166	1.1	340	51.3
Total Production				99.9

The estimated 1953 coefficient is 1.0

Pig Iron Production
1953

Thousand Metric Tons

No. of Furnace	Volume (cu m)	Coefficient	Operating Days	Production
1	157	1.0	340	53.4
2	166	1.0	340	56.5
Total Production				109.9

Each BF has three hot blast stoves, and both are served by the same skip hoist. The plant has one pig casting machine. The cast house has a 25-MT traveling crane. There are two slag granulating installations. Experiments were carried out in the manufacturing of cast building blocks, whereby the molten slag from the BF was immediately poured into casts instead of being granulated. 10/

BF gas is cleaned by two baffle-plated dust catchers and cleaners. The ore storage field has a 5,000-MT capacity; in addition there is a small field for special ores. 11/

In the cast house pigs are cast into 20- and 50-kg sizes. The 20-kg pigs are sent from Asha to Chelyabinsk. 12/

Operation of the Asha Charcoal Furnace 13/

1. Composition of the Burden (kg/cu m of charcoal)

Iron Ore	233
Manganese Ore	1.8
Slags	21
Scrap	37
Fluxes	126
Fuels	

2. Composition of the Slag (percent)

Alkalies	40.00
SiO_2	10.30
Al_2O_3	30.00
CaO	3.75
MgO	6.31
MnO	2.34
FeO	

3. Composition of the Pig Iron (percent)

C	0.77
Si	1.80
Mn	0.08
P	0.013
S	

4. Yield of Pig Iron from the Charge (percent) 46.7

5. Weight of Slag (kg/MT of pig) 460

6. Expenditure of Fuel (kg/MT of pig) 920

7. Daily Smelting (MT) 137

8. Effective Volume of Furnace (cu m) 160

9. Time of Stay (hours) 4.8

10. Coefficient of Utilization (cu m/MT of pig/24 hrs.) 1.17

Other reported burdening practices are shown in the following table. 14/

Asha BF Burdening Practices

Parts

Raw Materials	No. 1 Practice	No. 2 Practice	No. 3 Practice
Coke	3 to 4	2	18
Charcoal	3 to 4	0.5	none
Iron Ore	6	6	16
Manganese	1	small amount	none
Scrap	3 to 4	1	4
Limestone	2	1.5	2

Scrap charge in the BF has been as high as 30 percent. Both BF at Asha use, or have used, oxygen in the blast. Relining of the BF is done by a crew that travels around from plant to plant. All refractory materials for the BF are shipped to Asha by rail. 15/

One-third of the pig produced goes to the Asha OH shop, and the other two-thirds is shipped out in pig form. 16/

The iron foundry has 2 traveling cranes of 20 MT and 15 MT, a sand preparation plant, and 2 cupola furnaces. 17/

f. Steelmaking Facilities.

The OH shop at Asha has 4 OH furnaces of about 25 MT, 35 MT, 35 MT, and 90 MT, and a total hearth area of 119 sq m. Individual hearth areas are not known. In 1950 the coefficient was 3.5 and the 1952 estimate is 3.8. In the period 1946 to 1948 the scrap practice was 70 percent. 18/

Steel Production
1952

Thousand Metric Tons

No. of Furnace	Hearth Area (sq m)	Coefficient	Operating Days	Production
1 to 4	119	3.8	325	147.0

Steel Production
1953

Thousand Metric Tons

No. of Furnace	Hearth Area (sq m)	Coefficient	Operating Days	Production
1 to 4	119	4.0	325	155.0

The OH shop is 80 m long. There are 3 traveling cranes of 25 MT capacity each and 1 of 15 MT. The 2 overhead crane-type charging machines are of 8 MT capacity. 19/

Normally the OH furnaces are fired with generator gas to which some BF gas is added. About 20 minutes before tap the furnaces are fired additionally with pre-heated fuel oil. 20/

The most commonly cast size of ingot is 40 cm square by 1.6 m long. Ingots cast at Asha weigh between 2.5 and 4.5 MT. Many ingots are bottom poured. 21/

Continual experiments to raise the quality of steel are carried out. Experiments to reduce the number of rejects in chill castings are performed. Great care is taken to eliminate surface defects by grinding cinder and coke remnants off the ingots pneumatically. Holes and bubbles exist on the surface of Asha ingots to a depth of 2 cm. At one time as much as 20 percent of the output was scrapped or down-graded. 22/

g. Primary Rolling Facilities.

No information exists as to just what sort of breakdown facilities have been set up at Asha.

h. Finishing Rolling Facilities.

The rolling mill building complete with foundations was finished in 1948 but awaited reparation equipment from Germany. The mill is believed to be the one that was installed at Walzwerke, Brandenburg/Havel in East Germany. One source believed that when completed the mill would produce seamless pipe on Pilger and Mannesman mills. Two reheating furnaces are installed in the mill building. Another rolling mill produces sheet. The rolling mills are estimated to be in full operation producing seamless pipe and sheet in 1952. All steel produced at Asha is now used in the rolling mills. 23/

i. Intraplant Services.

The estimated capacity of the Asha power station is 3,000 kw. The nearby chemical factory, however, has an estimated capacity of 1,000 kw and may provide the steel works with some power. The steel works station has 4 boilers of 20 atmospheres, 3 of which are equipped with traveling grates and under-grate blasts, and 1 of which is fired by coal dust. The powerhouse has 2 Man turbines of 15,000 kva with 2 Brown Boveri generators capable of 3,000 rpm. Current is 3-phase AC. The turbines are equipped with surface condensers. Cooling water is delivered by a pipeline from the pumping station on the Sim River. Power is delivered directly from the powerplant to transformer stations by overhead lines. The workers' settlement is also supplied with plant power through a transformer substation. Power is supplied to the Sim River pumphouse by underground cable. 24/

An aerial tramway connects the limestone quarry and the stone storage building, which houses a stone crusher. 25/

The refractory plant contains grinding mills, brick presses, drying chambers, and kilns. Kilns are fired by gas from two gas generators. Refractory plant capacity is about 10,000 MT/per year of chamotte and dinas brick. 26/

The slag and cinder block plant contains preparation installations for slack, mixing machines, and brick pressing machinery. 27/

An oxygen plant produces oxygen by the Linde method for use at the BF and OH and for welding. 28/

The compressor house has 2 steam turbine-driven compressors which supply air to the BF, 4 compressors with electric drive for OH furnaces, and 2 hot oil pumps for auxiliary oil firing of OH furnaces. 29/

Other auxiliary facilities include mechanical shops, electrical repair shops, a laboratory, and a firehouse. 30/

j. Products and Production.

Asha produces charcoal and coked pig iron, OH steel, both quality and ordinary grades, sheet, and seamless tube. 31/

Production Figures 32/
1934 to 1953

Thousand Metric Tons

Year	Pig Iron	Steel	Finished Steel
1934	67.8	58.9	
1935	77.9	67.4	
1936	90.0	69.6	
1944	105.0*	120.0*	
1948	90.0	70.0	
1952	99.9	147.0	102.0**
1953	109.9	155.0	108.0**

k. Distribution.

In 1941, quality steel ingots were shipped to Chusovoy, Zlatoust, and Chelyabinsk. All ingots were shipped westward toward Ufa in 1948. Few, if any, ingots were shipped in 1952. Destination of finished steel products is unknown. 33/

l. Plant Efficiency.

No information available.

m. Administration.

Asha is subordinate to the Ministry of Ferrous Metallurgy. 34/

n. Personnel.

The plant director is (fnu) Avvakumov. 35/ In 1948 the works employed about 7,000 workers. 36/

o. Locational Characteristics.

No information available.

25X1A2g

2. Satka Metallurgical Plant. [redacted]

a. Location.

55°04'N - 59°00'E, Satka, Chelyabinsk Oblast, Urals, RSFSR. The plant is located in the southeast part of the city. Satka is on the narrow gage Bakal-Berdyansk railroad. 1/

* Capacity.
** Using a yield from ingot to finished product, 70 percent.

b. History and Development.

The Satka plant was founded as an iron works in 1757. Prior to 1917 the plant, known as the Satka Smelter and Iron Works, belonged to the government installations of the Zlatoust mining region. 2/

The mill was re-equipped in 1913 but remained solely a pig producer until about 1940, when some steelmaking facilities were added. Future plans are not known. 3/

c. Raw Materials and Other Inputs.

The iron ore used at Satka comes almost exclusively from the nearby Bakal deposits. The high-grade Bakal ore is particularly suited for the smelting of high-quality charcoal pig iron. 4/

The Satka plant also has had success using the iron-nickel ore from the Akkerman deposit and blending it with martite ores from Blagodat. By smelting the powdered Akkerman ore with coke it has been found possible to obtain a natural alloy of iron and nickel with a nickel content up to 3.3 percent. Despite a certain complexity in the processing method used, this pig iron is believed to have some future in Soviet high-quality metallurgy. 5/

Sources of other raw materials are unknown.

d. Coal, Coke, and Charcoal.

Coke, it has been reported, is obtained from Kemerovo. Charcoal for the BF's is obtained from local forests. 6/

e. Ironmaking Facilities.

There are 2 charcoal BF's at Satka, although it is believed that at least 1 of them is operating on coke all or part of the time. 7/

The No. 1 furnace was first put in operation in 1929 with a volume of 182 cu m. When this furnace was blown in at the start of a new campaign in 1940 it had been enlarged to 205 cu m. 8/

The No. 2 furnace, possibly an older furnace, started a new campaign in 1934 with a working volume of 177 cu m. 9/

Coefficients reported at Satka are 1928, 2.19; 1933, 2.00; 1934, 1.62; 1935, 1.47; 1940, 1.4; and estimated for 1952 and 1953, 0.90. 10/

Blast Furnace Production
1952 and 1953

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	205	0.90	340	77.5
2	177	0.90	340	67.0
Total Pig Iron Production				144.5

In 1927-28, 58,545 MT of Bakal iron ore were needed to produce 32,869 MT of pig iron, or 1.7 MT of ore were needed for every MT of pig. 11/

f. Steelmaking Facilities.

The date of installation of the two OH's at Satka is unknown. It is known that in 1934 there were no OH's, and that in 1950 two were in production along with a Heroult electric furnace. 12/

The rated capacity of the OH shop has been reported at 50,000 MT/per year. The electric furnace has a 1-MT capacity. 13/

Steel Production
1952 and 1953

Thousand Metric Tons

No. of Furnace	Hearth Area	Coefficient	Operating Days	Production
2 OH	N.A.	N.A.	325	50.0
1 Electric		one MT		1.0
Total Steel Production				51.0

During World War II the output of quality steel at Satka increased. 14/

g. Primary Rolling Mills.

None.

h. Finishing Rolling Mills.

None.

i. Intraplant Services.

No information available.

j. Products and Production.

The Satka plant produces coked pig, charcoal pig, natural alloy pig, quality andordinary grades of ingot steel, and some ferro-alldys. 15/

Production Figures 16/
1927-28 to 1953

Thousand Metric Tons

Year	Pig Iron	Steel
1927-28	32.8	none
1929-30	77.0	none
1934	71.2	none
1935	86.0	none
1936	106.0	none
1944	135.0	N.A.
1952	144.5	51.0
1953	144.5	51.0

k. Distribution.

The Satka plant supplies pig iron and steel ingots to the Zlatoust plant. 17/

l. Plant Efficiency.

Satka overfulfilled the plan for pig iron in 1946 and fulfilled the plan for pig iron for 6 months of 1947. During 1 1/2 months of 1952 the BF have produced an excess of pig and have successfully bettered previous operating coefficients. 18/

m. Administration.

The mill is under the Ministry of Ferrous Metallurgy and directly subordinate to Glavuralmet. 19/

n. Personnel.

In 1944 there were 4,000 employees. In 1952 the plant director was Mineyev. 20/

o. Locational Characteristics.

No information available.

3. Min'yar Rolling Mill. [redacted]

a. Location.

55°04'N - 57°33'E, Min'yar, Chelyabinsk Oblast, Urals, RSFSR. Min'yar is on the main railroad line from Ufa to Chelyabinsk.

b. History and Development.

The plant, founded in 1784, was reconstructed and modernized by the Soviets. Although at one time there were BF's at Min'yar, none are known to exist today. 1/

c. Raw Materials and Other Inputs.

Small coal steel ingots and billets are received from Asha. At times steel has been received from Elektrostal and Krasny Sulin. 2/

d. Coal and Coke.

Coal is used only for auxiliary or heating purposes at Min'yar.

e. Ironmaking Facilities.

None.

f. Steelmaking Facilities.

None.

g. Primary Rolling Mills.

There are no major primary mills at Min'yar. The small billets received from Asha are fed directly to the roughing stand of the merchant mills.

h. Finishing Rolling Mills.

At Min'yar, in addition to the above-mentioned rougher, are three merchant bar and small strip mills at 460 mm, 303 mm, and 255 mm. The 460-mm mill is a 3-high, 4-stand mill, the 303 mm mill is a 3-high, 4-stand mill, and the 255 mm mill has 4 stands at 305 mm and 6 finishing stands at 255 mm. Mill capacities are not known. 3/

i. Intraplant Services.

A powerplant has been reported in the town of Min'yar. At one time, it is believed that Asha supplied power to the Min'yar Plant. 4/

The rolling mill has a mechanical shop and tool shop. 5/

j. Products and Production.
The Min'yar rolling mill produces merchant products, bar steel, strip steel, small sheets, small profiles, bolts and nuts, screws, wire, and barbed wire. 6/

The plant produces cold rolled bands from iron-chromium alloys nos. 1 and 2, which have high electrical and heat resistance and are used for heating elements in electric heat treating furnaces. 7/

Production Figures 8/
Selected Years, 1927-53

Thousand Metric Tons

Year	Finished Steel
1927/28	47.0
1929/30	50.0
1934	60.0
1952	75.0
1953	75.0

k. Distribution.
No information available.

l. Plant Efficiency.
No information available.

m. Administration.
Min'yar is probably under Glavmetiz which in turn is directly responsible to the Ministry of Ferrous Metallurgy.

n. Personnel.
The estimated number of employees is between 2,000 and 2,500. The plant director is Vukovich. 9/

o. Locational Characteristics.
No information available.

4. Kamensk-Ural'skiy Pipe Mill No. 705. (Sinarsk Pipe Works)

25X1A2g [redacted]

a. Location.

56°24'N - 61°50'E, Kamensk-Ural'skiy, Chelyabinsk Oblast, Urals, RSFSR.

b. History and Development.

Construction of the pipe works began in 1933, and by 1935 several units were completed and in operation. Original plans called for 2 blast furnaces producing 500,000 MT of pig iron per year; a pipe casting department with a capacity of 140,000 MT of cast iron pipe a year; and a fittings department with a capacity of 32,000 MT per year. One principal purpose of the Kamensk-Ural'skiy plant was to be the main supplier of pipe castings to the machine building plants centered in Chelyabinsk, Sverdlovsk, and Nizhniy Tagil. 1/

c. Raw Materials and Other Inputs.

Nearby ore reserves of the Sinarsk basin are estimated at 80,000,000 MT, with an iron content between 38 percent and 55 percent. There is no evidence of use of this ore at Kamensk-Ural'skiy. Other inputs are not known. 2/

d. Coal and Coke.

No information available.

e. Ironmaking Facilities.

Although plans called for two BF's, there is no evidence of their existence, and it is thought that the plans were changed. The furnaces were to be coke fired and have a capacity of 900 cu m each. 3/

An iron foundry produces cast iron for the pipe casting shop. 4/

f. Steelmaking Facilities.

Although one source mentions the installation of OH furnace, there is not enough evidence to establish any steelmaking facilities at Kamensk-Ural'skiy. 5/

g. Primary Rolling Mills.

No information is available on the method of breaking down the blooms and billets, which probably are delivered to the plant from an outside source.

h. Finishing Rolling and Casting Facilities.

There are 2 rolling mills at the plant, 1 a plate mill and the other a sheet mill. 6/

Another installation at the mill produces cold drawn aircraft tubing. 7/

There are 10 centrifugal cast iron pipe machines with a total capacity of 197,500 MT of cast material per year. The capacity of each machine is 19,750 MT. Most of the material is cast into pipe and pipe fittings. 8/

i. Intraplant Services.

Power is supplied to the plant from a local plant outside of the mill. Water for cooling comes from the nearby Iset River. 9/

j. Products and Production.

The plant produces cast iron pipe, cast fittings, plate, sheet, and some cold drawn tubing primarily for the aircraft industry. 10/

Production Figures 11/
1936-52

Thousand Metric Tons

Year	Cast Iron Pipe Products	Finished Steel
1936	50.0	13.0
1941	158.0	
1952	197.5	20.0
1953	200.0	20.0

k. Distribution.

Some material has been distributed to the large canal projects in the south. Most material continues to be consumed in the large machine-building and aircraft industries of the Urals. 12/

l. Plant Efficiency.

One report makes mention of failure to meet the plans, but no information is available. 13/

m. Administration.

Kamensk'Ural'skiy is probably under the Ministry of Ferrous Metallurgy and Glavtrubos'tal.

n. Personnel.

The plant employed between 4,000 and 5,000 workers in 1942. The plant director is S.P. Korepanov. 14/

o. Locational Characteristics.

No information available.

25X1A2g

5. Kopeysk Machine Building Plant No. 5 imeni Sergei Kirov. [redacted]
(Also known as the Kopeysk Mining Equipment Plant)

a. Location.

55°10'N - 61°38'E, Kopeysk, Chelyabinsk Oblast, Urals, RSFSR.

b. History and Development.

Nothing existed at the plant site prior to 1942, when the installation of evacuated equipment began. All or practically all of the facilities were brought from the original plant location in either Gorlovka or Makeyevka. A new foundry was under construction in 1949 and due for completion by 1952. 1/

c. Raw Materials and Other Inputs.

Raw materials are received by rail from unknown sources.

d. Coal and Coke.

Coal comes from mines near the plant in the city of Kopeysk.

e. Ironmaking Facilities.

The old foundry has 2 cupolas which produce a total of 40 to 50 MT of gray iron per day. 2/

f. Steelmaking Facilities.

The old foundry has 2 "AEG" 1.5-MT electric furnaces for producing alloy steel castings for machinery. A third electric furnace produced nonferrous castings. 3/

A 4-MT Bessemer converter installed at Kopeysk operates only 1 shift per day producing steel castings. 4/

Steel Production
1952 and 1953

Thousand Metric Tons

Furnace Type	Rated Capacity (MT)	Average Heats/Day	Production
2 Electric	1.5 each		3.0
1 Converter	4.0	10	12.0
Total Production			15.0

Indications are that 15,000 MT of steel castings yearly are more than the machine building division can consume. Reports state that the new foundry will triple present production, so it must be assumed that either the Kopeysk plant is due for expansion or else the foundry is to become a supplier of castings to industries in the Chelyabinsk area. 5/

g. Primary Rolling Facilities.

None.

h. Finishing Rolling Facilities.

None.

i. Intraplant Services.

Power is supplied by the Chelyabinsk power network. 6/

j. Products and Production.

The iron and steel division of the plant produces gray iron castings and steel castings for both electric furnaces and a Bessemer converter. 7/

Production Figures
1952 and 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1952	15.0	9.0 *
1953	15.0	9.0 *

* Based on a yield from poured steel to casting of 60 percent.

k. Distribution.

A major share of the iron and steel produced is consumed in the machine-building plant, although some is probably shipped to other plants in the Chelyabinsk area.

l. Plant Efficiency.

The works fulfilled the Fourth Five Year Plan (1946-50) ahead of schedule. 8/

m. Administration.

The controlling agency for the Kopeysk Plant is the Ministry of Construction and Road Machine Building. 9/

n. Personnel.

The plant has about 3,000 workers. 10/

o. Locational Characteristics.

No information available.

6. Ust'-Katav Machine Building Plant imeni Kirov. (also imeni Kaganovich) [redacted] 25X1A2g

a. Location.

54°56'N-58°10'E, Ust'-Katav, Chelyabinsk Oblast, Urals, RSFSR.

b. History and Development.

The Ust'-Katav plant was established in 1896. During World War II, it was expanded by the addition of evacuated units of the Kirov Plant No. 13 in Bryansk. The machine building works is the only plant in the Urals that builds trolley cars. 1/

c. Raw Materials and Other Inputs.

No information available.

d. Coal and Coke.

No information available.

e. Ironmaking Facilities.

The plant has iron-casting equipment. 2/

f. Steelmaking Facilities.

There is 1 6.3-sq m OH furnace of about 5-MT capacity at the mill. The estimated 1952 and 1953 coefficient is 4.5. 3/

Steel Production
1952 and 1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	6.3	4.5	325	9.2

g. Primary Rolling Facilities.

No information available.

h. Finishing Rolling Facilities.

There is a 3-stand, 2-high, 450-mm medium bar mill in operation, as well as a 4-stand, 3-high, 250-mm small bar mill. 4/

Other facilities include a forge and press department and a wheel and axle department. 5/

i. Intraplant Services.

A 3500-kw capacity power plant supplies power to the Ust'-Katav plant. 6/

j. Products and Production.

Steel products produced include OH steel and bar shapes.

Production Figures
1952 and 1953

	Thousand Metric Tons	
Year	Steel	Finished Steel
1952	9.2	6.6
1953	9.2	6.6

k. Distribution.

Most steel products produced at the works are used in the construction of railroad equipment and trolley cars.

l. Plant Efficiency.

No information available.

m. Administration.

The works is believed to be under the Ministry of Railroad Car Construction. 7/

n. Personnel.

No information available.

o. Locational Characteristics.

No information available.

7. Kyshtym Machinery Plant. [redacted]

a. Location.

55°44'N-60°35'E, Kyshtym, Chelyabinsk Oblast, Urals, RSFSR.

b. History and Development.

The Kyshtym plant has been reported variously as a machine-building plant, a locomotive repair plant, and as a mining machinery plant. 1/

c. Raw Materials and Other Inputs.

No information available.

d. Coal and Coke.

No information available.

e. Ironmaking Facilities.

None.

f. Steelmaking Facilities.

A 6.4-sq m OH furnace of about 5-MT capacity is used in the production of steel castings. The estimated 1952 and 1953 coefficient of utilization is 4.0. 2/

Steel Production
1952 and 1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	6.4	4.0	325	8.3

g. Primary Rolling Facilities.

None.

h. Finishing Rolling Facilities.

None.

i. Intraplant Services.

Power is received from outside the plant. 3/

j. Products and Production.

Steel products produced are OH steel used in making steel castings.

Production Figures
1952 and 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1952	8.3	5.0 *
1953	8.3	5.0 *

* Based on yield from steel to finished casting of 60 percent.

k. Distribution.

Most of the steel castings produced are for use in the production of machinery at the Kyshtym Plant. 4/

l. Plant Efficiency.

No information available.

m. Administration.

The plant is subordinate to the Ministry of Non-ferrous Metallurgy. 5/

n. Personnel.

In 1941 the works had 2,000 employees, not all of whom were employed in steelmaking. 6/

o. Locational Characteristics.

No information available.

II. Sverdlovsk Oblast.

About one-third of the coke, pig iron, steel, and finished steel produced in the Urals comes from Sverdlovsk Oblast. Nationally the region accounts for about 10 percent of the iron and steel production of the USSR.

In Sverdlovsk Oblast there are two industrial complexes of great importance to the economy of the USSR, Nizhniy Tagil and Sverdlovsk. The Novo Tagil Works, built since 1940, is about the fifth largest steel mill in the USSR. When coupled with the existence in Nizhniy Tagil of the small but important alloy-producing plant imeni Kuybyshev, and the giant railroad car works, builder of tanks and railroad cars, the importance of the complex is evident.

At Sverdlovsk, steel production is primarily in support of the Ural Heavy Machine Building Plant, largest in the USSR, and itself a producer of steel. The Verkhne Izetskiy Steel Works, although of medium size, produces some important electrical and alloy steels.

Three other complexes of lesser importance are at Alapayevsk, Pervoural'sk, and at Nizhnyaya and Verkhnyaya Salda. The plants at Pervoural'sk form one of the most important pipe-producing complexes in the USSR.

An important producer of medium size is located at Serov, while somewhat smaller units are in Kushva, Polevskoy (Severs k), and Revda. The Severs k plant is important for its large tinplate production.

Small producing units of no significant importance are located at Nizhniye Sergi, Bilimbay, Staroutkinsk, Mikhaylovskiy, and Nizhnyay Tura.

Sverdlovsk Oblast steel mills are important producers of coke, pig iron, carbon steels from both OH and electric furnaces, alloy steels including stainless steel castings, and forgings.

A. Nizhniy Tagil Complex.

1. Nizhniy Tagil Metallurgical Plant imeni Novo Tagil.

[redacted] 25X1A2g

a. Location.

57°54'N-60°00'E, Nizhniy Tagil, Sverdlovsk Oblast, Urals, RSFSR. The Novo Tagil Plant in Nizhniy Tagil is located on

the southeastern side of the city, about one km south of the main railroad station on the line from Molotov to Sverdlovsk. 1/

b. History and Development.

Nizhniy Tagil has been a metal-working center since 1631, but it was not until about 1930 that plans for a large integrated plant were formulated. Originally the Novo Tagil plant was planned at the same time as the Stalinsk and Magnitogorsk combines, but development lagged as effort was concentrated on other combines at the expense of Novo Tagil. By 1931 the Freyn Engineering Company of Chicago had submitted the complete working plans for the integrated plant. Although some construction may have started about 1932, it was not until 1939 or 1940 that any real progress was made. 2/

The original project by Freyn called for an ultimate development based on requirements of surrounding industries of six BF initially producing 1,775,800 MT of pig iron yearly. Final development of the BF division has to show eight BF producing 2,366,400 MT. 3/

Plans for the steel division called for two OH shops initially producing 1,863,000 MT and ultimately showing a production of 2,160,000 MT of steel ingots per year. One shop was to consist of 10 150-MT OH feeding the slabbing mills and another shop with 12 150-MT OH. 4/

Under the original plans there were to be 2 rolling mill divisions producing 1,295,000 MT initially, and eventually 1,523,000 MT of finished rolled products yearly. 5/

The coke plant division was to produce initially 2,032,000 MT, and ultimately 2,700,000 MT of metallurgical coke per year. 6/

It is not known to what degree these plans were changed in the years 1931 to 1939 when the principal construction started, but it is assumed that the ultimate aims of the planners remained essentially unchanged.

Estimated Chronological Development of the Novo Tagil Plant 7/

1931	Final plans formulated by Freyn Engineering
1936	About this time coke batteries Nos. 1 and 2 were built.

1940	Beginning of intensive construction No. 1 BF blown in No. 3 coke battery started Nos. 1 and 2 OH No. 1 blooming mill Wheel and tire mill First section of the power plant
1941	No. 2 BF No. 3 OH No. 4 coke battery Sheet mill
1942	No. 3 BF No. 4 OH Two sheet mills
1943	No. 5 OH
1944	No. 5 coke battery No. 6 OH
1945	No. 7 OH Cold rolled sheet mill
1946	No. 4 BF Nos. 8 and 9 OH No. 2 blooming mill
1947	No. 10 OH
1948	At this time and earlier times it was stated that integration at the plant was out of balance due to the large excess rolling capacity and excess pig iron capacity.
1949	No. 6 coke battery No. 11 OH Large rail-structural mill
1951	No. 12 OH

From time to time mention has been made of two Bessemer converters at Novo Tagil, but not enough information exists to definitely substantiate this. However, it seems quite likely that the plant could have these convertors. Information on how much it is intended to increase the size of this plant is lacking. It is presumed that Freyn's original plans will serve as an ultimate goal. 8/

c. Raw Material and Other Inputs.

The principal sources of ore for Novo Tagil are the Vysokaya, Lebyaska, and Blagodat deposits. Mt. Vysokaya and the Lebyaska deposits are within 5 km of the plant site, while the Mt. Blagodat ores must come from Kushva about 40 km to the north. The ore supply has been supplemented from time to time with ores from other Ural regions such as Magnitogorsk and Alapayevsk. 9/

Mining, dressing, concentrating, and sintering plants at Vysokaya and Blagodat produce an iron ore material averaging 54 percent to 55 percent iron content. Some of the concentrates from the Vysokaya Mt. main pit can be considered to fall within the Bessemer range; however, the higher phosphorus content of other ores and concentrates and the necessity of blending ores cause the BF product to be non-Bessemer. Sulphur by its erratic occurrence at Vysokaya causes some trouble. The Lebyaska deposit is rather high in phosphorus, with an average content of 0.27 to 0.29 P. 10/

In 1945, many complaints were voiced by plant managers about the erratic delivery of Vysokaya and Blagodat, due principally to lack of transportation facilities. 11/

Manganese comes from Serov, about 130 km to the north, and from Ivdel. The Ivdel manganese deposits are estimated at 2,500,000 MT. 12/

Limestone is found in the vicinity of Nizhniy Tagil in abundant quantities and averages about 53 percent CaO and 3 percent to 4 percent SiO_2. 13/

A large part of the scrap supply for Novo Tagil, in addition to its home scrap, is the large and immediately returned scrap from the Ural Wagon Works. Ferroalloys probably come from Chelyabinsk.

d. Coal and Coke.

The coal for coking at the Novo Tagil plant comes principally from two important sources, Kizel and Kuznetsk. Because of the inferior coking properties of the Kizel coal, it is necessary to blend it with the high quality Kuznetsk coal. In 1930, it was thought that the blend would be 20 percent Kizel coal and 80 percent Kuzbas coal, but with better washing and concentrating facilities, the proportion of Kizel coal has risen to 30 percent or even 40 percent. 14/

In the early stages of Novo Tagil, an analysis of coal was given in percent as:

	Kizel	Kuznetsk
Moisture	3.00	5.50
Volatile Matter	37.00	30.55
Ash	10.00	6.18
Sulfur	3.74	0.43

Based on a 20 percent Kizel and 30 percent Kuzbas blend, the analysis of the blend and the resultant coke product in percent is:

	Coal Mixture	Furnace Coke
Moisture	7.50	
Volatile Matter	33.70	
Ash	9.96	14.00
Sulfur	3.08	1.75

Coking of the blended coal results in a yield of coke in percent as follows:

	Yield (000 MT)
Furnace Coke	63.0
Domestic Coke	4.0
Breeze	4.3
Total	71.3

Using the above coke and the iron ore material of 54 percent to 55 percent iron content as shown in section c., a resultant coke rate of 1.02 MT per ton of pig iron is obtained. 15/

Prior to 1940, there existed at Novo Tagil 2 44-oven batteries with annual capacities of 333,000 MT of coke each. Batteries Nos. 3, 4, 5 and 6 of 69 ovens each, were constructed in the years 1940, 1941, 1944 and 1949, respectively, with estimated yearly capacities of 450,000 MT apiece. 16/

Coke Production
1952 and 1953

Thousand Metric Tons

Battery No.	Number of Ovens	Production
1 and 2	88	666
3, 4, 5, and 6	276	1,800
Total 1 to 6	364	2,466

The coking time at Novo Tagil is approximately 14 hours. The coke plant is equipped with a complete byproducts plant. 17/

e. Ironmaking Facilities

The Novo Tagil plant is the second largest pig iron producer in the USSR with four large modern BF. The first 2 BF, blown in 1940 and 1941, are of 1,100-cu m capacity and the last 2 are of 1,300-cu m capacity. Reported coefficients of utilization are, for 1949, 0.87; 1950, about 0.85; 1951, plan 0.80; 1952 estimate, 0.81. 18/

Blast Furnace Production
1952

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1 and 2	1,100 each	0.81	340	924
3 and 4	1,300 each	0.81	340	1,090
Total 1 to 4	4,800	0.81	340	2,014

The 1953 coefficient is estimated to be 0.80.

Blast Furnace Production
1953

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1 and 2	1,100 each	0.80	340	935.0
3 and 4	1,300 each	0.80	340	1,104.0
Total Production				2,039.0

During the war, both ferrochrome and ferromanganese were produced in the BF. Five percent of the slag is granulated for further use at the cement plant. New additions have been made to the granulating facilities. 19/

A substantial portion of the BF iron is pigged, particularly for use at the Nizhniy Tagil Railroad Car Works. An iron foundry with two cupolas provides maintenance castings. 20/

It is possible that two or three more BFs are in partial operation or under construction at Novo Tagil. 21/

f. Steelmaking Facilities.

By 1951 the two 6-furnace shops were completed. The 12 OH were all of at least 100-MT capacity, with some rebuilt to a larger size. It is possible that the two OH built in 1949 and 1951 were originally constructed to tap around 200 to 250 MT. As of 1952, it is estimated that the Novo Tagil OH divisions had 7 furnaces with hearth areas of 43.2 sq m each and 5 furnaces with areas of approximately 70 sq m each. 22/

The following coefficients of utilization have been reported: 1946, 3.5; 1948, 5.75; 1949, 5.74; 1950, 6.3; 1951 plan, 7.0; 1952 estimate, 6.6. 23/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1 to 7	43.2 each	6.6	325	650
8 to 12	70.0 each	6.6	325	750
Total 1 to 12	652.4	6.6	325	1,400

Indications are that during 1952 or 1953, 2 furnaces were rebuilt to 70 sq m each. The estimated coefficient for 1953 is 6.7.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1 to 5	43.2 each	6.7	325	471.0
6 to 12	70.0 each	6.7	325	1,067.0
Total Production				1,538.0

A steel foundry at the plant has four small electric furnaces for making steel castings for maintenance use. Little evidence exists to substantiate the presence of the two projected Bessmer convertors, although several PW's report their operation. 24/

No. 1 OH shop has 2 75-MT hot metal cranes and 4 pit cranes, of which 1 is a 150-MT Morgan and another a 150-MT Russian-made crane. No. 2 OH shop also has a 150-MT Morgan crane. One shop has a 125-MT ladle crane from the Irkutsk Machine Building plant. The newer No. 2 shop is somewhat larger than the No. 1 shop. The two shops are complete with auxiliary facilities such as high lines and stock house lean-tos. 25/

The following norms were established at the Novo Tagil plant: 195 kg of standard fuel averaging 7,000 kilocals per kg is

required per MT of ingots produced in 1949; the heat time on the smaller furnaces was 10 hours and 30 minutes in 1949; the planned heat time for 1950 on the same size OH was 8 hours and 30 minutes; the norm for capital repairs was 240 hours, but an All Union record was set by an 180-hour capital repair; the norm for mold consumption was 32 kg per MT of ingot steel. 26/

One shop probably supplies steel for the subsequent rolling into sheet and plate, while the other shop supplies steel for merchant steel and car wheels. Ingots for car wheel steel are probably big-end-up with hot tops. 27/

g. Primary Rolling Mills.

There are 2 blooming mills at Novo Tagil, 1 installed in 1940 and the other in 1946. The No. 1 bloom-slab mill, built by the Novo Kramatorsk plant in Kramatorsk, is an 1,100-mm mill with an estimated capacity of one million MT of blooms per year. The No. 2 bloomer, built in the shops of the Novo Tagil plant, is also probably an 1,100-mm mill with an estimated capacity of 1 million MT of blooms and slabs. The No. 2 mill was built primarily for feeding the new large rail-structural mill. No information is available on the plant's billet mills. 28/

h. Finishing Rolling Mills.

The outstanding mill at Novo Tagil is the rail-structural mill. Installed in 1949, it represents the latest Soviet techniques in this field. Although very high claims are made for the mill, it does not embody new ideas as compared with American mills. The rail-structural department, 130 m wide by 600 m long, houses the 800-mm mill, the 900-mm mill, and many finishing facilities. 29/

The 800-mm mill, produced at Uralmash, is the first of its kind to be built in the USSR. Rails after being rolled are milled, drilled, heat treated, rotated for inspection, and sorted automatically. Each line is equipped with 15 semi-automatic and 25 completely automatic operations. Due to the high degree of mechanization and the fully automatic controls, the productivity of the mill will be 15 percent to 20 percent higher than originally specified. 30/

Stands are changed by a 100-MT crane in 20 minutes, saving many minutes over previous methods for roll changing. The 100-MT crane was produced in Krasnoyarsk. Some of the electrical equipment was produced at the Kharkov Electro-Mechanical Works and other parts at the Leningrad Electrosila plant. The bulk of the casting, fabricating, and assembly work was done at Uralmash. The designer of the mill was Georgi Khimich. 31/

The mill produces rails, beams, channels, angles, and rolled stock of round and square sections. The estimated capacity of this department, depending on the product mix, is 900,000 MT of finished products per year. 32/

The wheel forging and rolling division has been in operation since 1940. The annual capacity of the mill is 36,000 MT. 33/

Plate is rolled up to 15 cm thick on the 3-high mill and the estimated capacity is 650,000 MT per year of sheared plates. 34/

There are several sheet mills located in the mill. At least 3 of these mills are single stand, 530-mm, 2-high mills, while 1 mill is a 700-mm, 2-high tandem mill. Original plans called for a wide hot strip continuous mill with a capacity of 600,000 MT. This mill has not as yet been installed. 35/ More section mills were scheduled for installation in 1950, but it is not likely that these mills have as yet been installed. 36/

If the balance between steelmaking and steel rolling is to be maintained at Novo Tagil, the next new installations will be either several new OH or several convertors. After the installation of the No. 2 bloomer and the 800-mm and the 900-mm mills in 1948 and 1949, the plant had more than the necessary excess rolling capacity.

i. Intraplant Services.

By 1940 the No. 1 turbine, rated at 25,000 kw, had been installed in the power house. Several years later a second 25,000-kw capacity unit was installed. In 1952 it is estimated that power plant capacity is about 125,000 kw, consisting of 5 25,000-kw turbines. 37/

A very large and completely equipped machine building and mechanical repair shop performs not only ordinary mechanical maintenance, but builds some rolling mill equipment. The No. 2 Novo Tagil blooming mill was built here, as well as three Stiefel mills for use elsewhere in the USSR. 38/

Near the steel mill is a refractory plant producing magnesite shapes for furnace use at both Kuybyshev and Novo Tagil. 39/

Granulated slag from the BF is used by the cement plant for construction material. The cement plant may be part of the Novo Tagil plant, indicating the embracement of other industries in the neighborhood, thus forming a combine. Capacity of the cement plant is 50,000 MT yearly. 40/

Water for mill purposes is pumped to the plant from the Nizhniy Tagil lake.

j. Products and Production.

Products of the Novo Tagil steel plant are metallurgical coke, pig iron of several types, OH steel, ingots, blooms, billets, structural shapes, rails, channels, angles, rail accessories, plate up to 15 cm, sheets 1.8 m wide by 10 m long, and railroad car wheels with a diameter of 80 cm and thickness of 7 cm. 41/

Production Figures 42/
1940 to 1953

Thousand Metric Tons

Year	Coke	Pig Iron	Steel	Finished Steel
1940	700	300	100	72
1941	1,150	500	150	108
1942	1,450	800	200	144
1943	1,600	1,000	250	180
1944	1,825	1,100	310	223
1945	1,975	1,200	370	268
1946	2,000	1,350	500	360
1947	2,025	1,500	700	505
1948	2,050	1,725	1,000	720
1949	2,275	1,850	1,100	791
1950	2,400	1,920	1,200	863
1951	2,430	1,965	1,300	935
1952	2,466	2,015	1,400	1,010
1953	2,466	2,039	1,538	1,110

k. Distribution.

Novo Tagil ships large quantities of iron and steel very short distances. The principal consumer of material is the Railroad Car Works in Nizhniy Tagil. Other large nearby consumers are the fabricating shops in Salda and the Uralmash plant in Sverdlovsk. The Ministries of Heavy Machine Building and Transportation Construction are allocated, by industry, the majority of the finished steel from Novo Tagil. 43/

Other shipments have been made from Novo Tagil as follows: new types of steel shipped to the Leningrad subway; hundreds of tons of base plate and a large quantity of structural shapes shipped to

Moscow for tall buildings; rails and structurals shipped to the Volga hydro projects; and pig iron shipped to Chimkent, Alma Ata, Baku, Kharkov, Stalino, Kirov, and Leningrad. 44/

l. Plant Efficiency.

Although the mill is fairly modern and generally overfulfills the plan, it has worked poorly at times. The length of these periods of lowered productivity usually last at most for 4 months, such as the period January to April 1950. In 1943, both ore and coal were so short that a drop in production occurred, and again in 1946 the coal supply was short enough to cause delays and loss of production. 45/

m. Administration.

The plant is under the Ministry of Ferrous Metallurgy.

n. Personnel.

The plant director is Vaisberg and the superintendent of the coke plant is Didenko. The Novo Tagil works has between 10,000 and 12,000 workers. 46/

o. Locational Characteristics.

The plant has room for expansion.

2. Nizhniy Tagil Metallurgical Plant No. 53 imeni Kuybyshev (Stary Tagil Steel Plant) [redacted] 25X1A2g

a. Location.

57°54'N-60°00'E, Nizhniy Tagil, Sverdlovsk Oblast, Urals, RSFSR. The plant is situated near the junction of the Tagil River with Nizhniy Tagil Lake, in a sector near the old part of the town.

b. History and Development.

The Nizhniy Tagil plant is the oldest in the Urals and certainly one of the oldest in all Russia, having been established as an iron works about 1725. The steel works was added about 1830. Little if any efforts were made at modernization of the mill until the late 1920's, when the Communists discovered the advantages of re-equipping the outmoded and antiquated charcoal iron plants of the

Urals. Only a minimum amount of capital was expended at Nizhniy Tagil, however, and most of it was spent on modernization. A few new facilities have been added, but additions are limited by the unfortunate location of the plant site. 1/

c. Raw Materials and Other Inputs.

Iron ore comes from the same sources that the Novo Tagil plant draws upon, namely, Mt. Vysokaya, Mt. Blagodat, and other deposits in the Tagil-Kushva region. 2/ All other raw materials are believed to exist locally, and cause little trouble in the plant supply situation.

d. Coal, Coke, and Charcoal.

About 1935 the BF's were converted from the use of charcoal to that of coke. While the plant itself has no coke batteries, it is believed that the batteries of the Novo Tagil plant kept Nizhniy Tagil well supplied. The coke is made from a blend of approximately 30 percent Kizel coal and 70 percent Kuzbas coal. In 1940, experiments were carried out to ascertain the feasibility of a 25-percent substitution of Siberian coal directly into the BF in place of coke. 3/

e. Ironmaking Facilities.

There are two small BF's at Nizhniy Tagil, each with reported capacities varying between 268 and 271 cu m. For the purpose of this report the two BF's will be considered to be of 270 cu m. In 1950 the planned BF coefficient was 0.91; the 1934 coefficient had been 1.10. 4/

Blast Furnace Production
1952

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	270	0.90 *	340	102.0
2	270	0.90 *	340	102.0
Total Production				204.0

* 1952 Estimate based on the 1950 plan.

The estimated 1953 coefficient is 0.88.

Blast Furnace Production
1953

BF No.	Volume (cu m)	Coefficient	Operating Days	Thousand Metric Tons Production
1	270	0.88	340	104.3
2	270	0.38	340	104.3
Total Production				208.6

Both BF's are charged with vertical skip hoists. A double-strand pig casting machine is of the plant. A cast iron foundry is located in the plant for the purpose of making maintenance castings and ingot stools and molds. 5/

f. Steelmaking Facilities.

In 1935 the small OH shop consisted of 2 small furnaces capable of producing about 40,000 MT per year. These 2 furnaces reportedly had hearth areas of 16.77 sq m and 14.8 sq m. At this time the plant was seriously out of balance because of the OH shop took only 20 percent of the BF pig and only produced enough steel to partially satisfy the rolling mill requirements. New furnaces were built and old ones reconditioned and enlarged, so that by 1952 the plant had 4 OH furnaces of about 35-MT, 35-MT, 100-MT, and 100-MT capacity. These furnaces are estimated to have hearth areas of 18.6 sq m, 20.6 sq m, and two with 43.2 sq m respectively. In 1950 a coefficient of 5.5 was obtained. 6/

Steel Production
1952

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Thousand Metric Tons Production
1	18.6	5.5	325	33.3
2	20.6	5.5	325	36.9
3 and 4	43.2 each	5.5	325	154.8
Total Steel Production				225.0

The 1953 coefficient is estimated to be 5.6.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	18.6	5.6	325	33.9
2	20.6	5.6	325	37.5
3 and 4	43.2 each	5.6	325	157.0
Total Steel Production				228.4

g. Primary Rolling Facilities.

There is a sheet billet mill for breakdown purposes. This 700-mm billet mill is an electrically driven, 3-high, reversing mill which rolls ingots down to bars 20 cm wide, 1 cm thick, and from 15 m to 50 m long. 7/

Two gas fired soaking pits are used for bringing steel ingots up to rolling temperature. Material coming off the 600-mm mill is sheared into sheet bar about 60 cm long. 8/

h. Finishing Rolling Facilities.

The finished product of the Nizhniy Tagil mills is plate and sheet. After the breakdown from ingot to sheet bar and after the bar shear the material is reheated. The newly heated steel is then roughed down to sheets for either pack rolling or single sheet rolling. For this purpose the plant has about 6 2-high finishing sheet mills of both 530 mm and 700 mm. In 1952, one of the 700-mm mills was reconstructed. 9/

i. Intraplant Services.

There are a number of shops providing maintenance service at the mill, including the machine shop, the electrical shop, the forge and foundries, and a small structural fabricating shop. A 5,000-kw power station supplies the mill with most of its power. 10/

j. Products and Production.

Although the principal product of the mill is plain hot rolled sheet, there is a small but important production of electrical sheet and stainless steel. Blast furnace products are hot metal for the OH shop and cast pigs for outside markets. Slag is granulated and used for road and building block. One report mentioned the production of Armco iron in 1935. 11/

Nizhniy Tagil-Kuybyshev Production 12/
Selected Years, 1934-53

Thousand Metric Tons

Year	Pig Iron	Steel	Rolled Steel
1934	120.3		
1937	150.0		
1943	185.0	61.0	
1952	204.0	225.0	162.0
1953	208.6	228.4	164.5

k. Distribution.

Known distribution has been made steadily over a long period of time to the Ural Wagon Works imeni Kaganovich, located in Nizhniy Tagil. Recently information has shown shipments made to the Kuybyshev and Stalingrad hydroelectric projects. 13/

l. Plant Efficiency.

Although the plant is old and, generally speaking, outmoded, it nevertheless has been able to win some monthly premiums for good work and high production. In 1942 and 1943 the plan was not fulfilled, due primarily to the failure of the transportation system. The plan was overfulfilled in 1946 and underfulfilled in 1951. In 1950 the plan for steel and rolled steel was met. 14/

m. Administration.

The plant is under the Ministry of Ferrous Metallurgy.

n. Personnel.

The director of the plant is Gulyayev. The mill employs about 6,000 workers. 15/

o. Locational Characteristics.

Reportedly the plant is located in an old sector of Nizhniy Tagil where extensions to BF, OH, and rolling mills entail destruction of large housing areas. 16/

3. Nizhniy Tagil Railroad Car Plant No. 183. (Ural Wagon Works, Komintern Railroad Car Works, Kaganovich Railroad Car Works, and Dzerzhinskl Railroad Car Works). [redacted] 25X1A2g

a. Location.

57°54'N-60°00'E, Nizhniy Tagil, Sverdlovsk Oblast, Urals, RSFSR.

b. History and Development.

Originally designed as a 5,000-railroad car per year plant, it has been expanded greatly since construction started in 1931. The initial plan for the car works was completed by 1936 and included a large steel casting section. During the war, when the plant was one of the most important tank producers in the USSR, parts of plants were moved to the works from Kharkov, Zhdanov, and Leningrad. Today the car works, producing both railroad cars and tanks, remains an important cog in the Soviet war potential. 1/

c. Raw Materials and Other Inputs.

The original plans intended the surrounding metallurgical plants of the Urals to supply the car plant with all the steel it needed in addition to its own production. The proximity of the Novo Tagil plant ensures a smooth supply of castings, sheets, and plates which constitute 26.3 percent of the metal required by the car works. Of the remainer, steel girders, beams, angles, channels, bars, rounds, and castings constitute 43.9 percent of the requirements and were supplied by the Verkhnaya Salda and Nizhnaya Salda plants. The wheels, axles, and castings constituting the remaining 24.8 percent will be supplied by the Serov plant, the Kuybyshev plant in Nizhniy Tagil, and by the car works itself. Essentially the input pattern remains unchanged, but information is lacking on this point. 2/

d. Coal and Coke.

Peat, coal, and coke are shipped to the plant daily for use in the power plant, in the foundry, and for auxiliary purposes. 3/

e. Ironmaking Facilities.

The iron foundry has at least four coke-fired cupolas. 4/

f. Steelmaking Facilities.

There are 2 steel casting foundries at the car works; the large one has 10 30-MT OH furnaces and the small one has 5 electric furnaces. The 10 OH have hearth areas of 15.8 sq m, and the capacity of the electric furnaces is 5 MT apiece. The estimated coefficient of utilization for 1952 is 5.5. 5/

Steel Production
1952

				Thousand Metric Tons
No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
10 OH	15.8 each	5.5	325	282.5
5 electric furnaces at 5 metric tons apiece				25.0
Total Production				307.5

The estimated coefficient for 1953 is 5.7.

Steel Production
1953

				Thousand Metric Tons
No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
10 OH	15.8	5.7	325	288.0
5 electric		5 MT each		25.0
Total Production				313.0

The large foundry casts parts for railroad cars, while the steel produced in the smaller foundry is used only for casting wheels. Both foundries are quite modern and fully mechanized, with molding presses, sand chutes, sandslingers, conveyors, vibrators, and heat treating equipment. 6/

The OH's are fired by gas piped from the Novo Tagil plant. The OH use, according to one report, 506 kg of a standard 7,000 kilocal/kg fuel for every ton of steel produced. 7/

g. Primary Rolling Facilities.

None.

h. Finishing Rolling Facilities.

There are no rolling mills at the car works, but extensive facilities exist for the finishing of castings and the treatment and fabrication of steel. Some of the finishing and assembly shops are the sheet metal shop, die pressing shop, axle forge shop, toolmaking shop, screw and rivet production shop, weldment shop, and many others. 8/

i. Intraplant Services.

The power station at the car works has a capacity of 100,000 kw. In addition to power the works has many auxiliary shops for maintenance and new construction. 9/

j. Products and Production.

The steel products produced at the car works consist almost entirely of cast and forged products for railroad car building and castings for tanks. 10/

Production Figures
1952 and 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1952	307.5	169.2 *
1953	313.0	172.2 *

* Yield of 55 percent used to represent a product mix of large and small castings, forgings, and pressed shapes.

k. Distribution.

All of the steel produced at the car works is consumed at the plant although infrequent shipments have been made to outside sources.

l. Plant Efficiency.

No information available on the efficiency of the steel division.

m. Administration.

The steelmaking is subordinate to the plant directorate, which in turn is subordinate to the Ministry of Transport Machine Building.

n. Personnel.

Of the reported 25,000 workers in the whole plant, about 7,000 are attached to the steelmaking division. 11/

o. Locational Characteristics.

There is ample room for expansion at the car works.

B. Sverdlovsk Complex.

1. Verkhne Izetskiy Steel Plant. (VIZ, Verkhne Izetskiy Zavod, Krasnaya Krovlya, and Kabakov) [redacted] 25X1A2g

a. Location.

56°50'N-60°38'E, Sverdlovsk, Sverdlovsk Oblast, Urals, RSFSR. The Plant is located on the northeast bank of Verkhne Izetskiy Pond in the western part of the city of Sverdlovsk. 2/

b. History and Development.

The Verkhne Izetskiy plant was founded in 1725. Prior to 1917 it belonged to the holdings of Count Stenbrock-Fermor. 3/

Before 1930 the plant was a producer of charcoal pig iron and roofing sheet. At the beginning of the First Five Year Plan (1928-32) it was decided to install new facilities at Verkne Izetskiy for the production of dynamo and transformer sheet. By 1931 the conversion had been completed. Production of pig iron was stopped. In 1947 the plant was the only one in the USSR producing the highest grade of electrical sheets, although other plants produced some of the lower grades. 4/

c. Raw Materials and Other Inputs.

No information exists on the source of raw materials needed for operation of the steelmaking and rolling facilities.

d. Coal and Coke.

No information available.

e. Ironmaking Facilities.

The blast furnace at Verkhne Izetskiy was taken out of commission before 1930. 5/

f. Steelmaking Facilities.

There are 5 OH furnaces at Verkhne Izetskiy with the following hearth areas, 2.4 sq m, 17.4 sq m, 19 sq m, 30.4 sq m, and 30.8 sq m. The 2.4-sq m OH is for experimental purposes and does not enter into production output. The 2 OH's of 30.4 and 30.8 sq m hearth area are approximately 45-MT furnaces. The 2 smaller ones of about 30-MT capacity each may have been rebuilt to the same size, but confirmation of this fact is lacking. 6/

The 3 electric furnaces, originally of 7-, 10-, and 15-MT capacity, are now rated at 2 of 15 MT capacity and 1 of 7 MT capacity. 7/

The small Bessemer converter is rated between 1.5 MT and 1.7 MT. 8/

Coefficients reported at the plant are 5.57 for the winter of 1950, 7.0 for the summer of 1950, and 6.5 the norm for 1950. The estimated coefficient for 1952 is 6.8. 9/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
OH No. 1	17.4	6.8	325	38.5
OH No. 2	19.0	6.8	325	42.0
OH No. 3	30.4	6.8	325	67.2
OH No. 4	30.8	6.8	325	68.1
Electric No. 1		7 MT capacity		7.0
Electric No. 2		15 MT capacity		15.0
Electric No. 3		15 MT capacity		15.0
Bessemer No. 1		1.6 MT capacity		12.0
Total Production				264.8

The estimated coefficient for 1953 is 6.9.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
OH No. 1	17.4	6.9	325	39.0
OH No. 2	19.0	6.9	325	42.5
OH No. 3	30.4	6.9	325	68.2
OH No. 4	30.8	6.9	325	69.0
Electric No. 1		7 MT capacity		7.0
Electric No. 2		15 MT capacity		15.0
Electric No. 3		15 MT capacity		15.0
Bessemer No. 1		1.6 MT capacity		12.0
Total Production				267.7

Steel coefficients are lower in winter than in summer. Fuel oil is delivered in cold weather and must be preheated by steam, which imparts a 10-percent moisture content to the oil with a resulting lowered efficiency. 10/

Another complaint about efficiency at the plant stems from lack of foresight in the rebuilding and repair of furnaces after a campaign. The roofs on the OH's as of 1952 have never been raised, the hearth area has not been increased, nor has the checker size been increased. As a result the duration of a campaign is only 120 heats, whereas similar furnaces at Lysva withstand 300 heats. 11/

g. Primary Rolling Facilities.

The breakdown mill, producing sheet bar for the sheet mills, is a 2-stand 3-high 665/660/730-mm mill. A 650-mm billet mill was removed from the mill before 1930. 12/

h. Finishing Rolling Facilities.

In 1935 there were three sheet mills at Verkhne Izetskiy. The No. 1 mill is a 2-stand 2-high 760-mm mill. The No. 2 mill is a duplicate of No. 1. The No. 3 mill has 2 stands, 2-high 760-mm, and 2 stands 800-mm for finishing. 13/

In addition to those sheet mills mentioned above, 3 more have been added since 1935. The No. 4 mill is a 2-stand 2-high 720-mm mill. The No. 5 mill is a 3-stand 2-high 720-mm mill. 14/

The five mills above are all hot sheet mills. The No. 6 mill is believed to be a 5-stand, 4-high, tandem cold strip mill. 15/

The electrical steel produced is of high permeability of the mark VP, which is rolled into 0.5 mm to 1.10 mm sheets and used in transformer construction of low and medium magnetic fields. The best of this steel is EHAA, annealed in a vacuum or in hydrogen. The electrical characteristics of this steel are: 100 to 120 Gauss of magnetic flux density at 0.05 mm thickness and 300 to 350 Gauss at 0.15 mm; watt losses are 1.20 watts per kilogram; initial magnetic permeability is 350 Gauss/Oersted, while the maximal is 7,400; the coercive force is 0.40 to 0.45 Oersted. 16/

i. Intraplant Services.

Power is obtained from the Sverdlovsk municipal system. The plant has a forge shop and a gas generator shop. Other services are not mentioned. 17/

j. Products and Production.

The plant produces quality steel from its OH and electric furnaces, transformer and dynamo sheets, ordinary sheet, ball bearing steel, and some skelp and pipe billets. 18/

Production Figures 19/
1913 to 1953

	Thousand Metric Tons	
Year	Steel	Finished Steel
1913		24.2
1914		25.4
1929/30	46.0	41.0
1934	99.8	52.3
1935	113.7	66.1
1936	128.4	
1944	152.0	
1952	264.8	191.0
1953	267.7	192.5

The following table shows the various types of steel made at the plant in the period 1927 to 1934. 20/

Thousand Metric Tons

Type	1927/28	1923/29	1929/30	1931	1932	1933	1934
Dynamo	10.6	16.8	17.3	25.4	24.9	28.2	24.0
Transformer		0.9	2.5	5.4	9.9	8.7	12.3
Automobile							2.6
Ordinary Rolled	25.1	23.6	21.2	8.3	14.3	11.3	13.5
Quality Rolled	29 percent	23 percent	43.5 percent	73.8 percent	71.5 percent	77.1 percent	75 percent

k. Distribution.

The 1935 distribution of steel from Verkhne Izetskiy is as follows: 21/

Percent

17.6 to Kharkov Electric Machinery Plant, Kharkov
15.7 to Electric Power Plant, Leningrad
8.2 to Dynamo Plant, Moscow
8.0 to Transformer Plant, Moscow
3.1 to Yaroslavl Electric Plant, Yaroslavl
2.5 to Electric Plant, location unknown
2.4 to Electric Plant Skorokhodov, Leningrad
2.8 to Electric Apparatus Plant, Leningrad
3.3 to Electromechanical Plant Volta, Baranchinsk
1.3 to Electric Motor Plant Lepse, Moscow
1.7 to Electric Motor and Cast Iron Plant Revolutionary Labor, Tambov
33.4 to other consumers

One report stated that in 1944 the mills supplied the Uralmash Plant in Sverdlovsk with 60,000 MT per year. 22/

l. Plant Efficiency.

The Verkhne Izetskiy plant has enjoyed a reputation for being a highly efficient plant. The plan was overfulfilled in 1946, in April 1947, in 1948, and in the first 6 months of 1950. Various units of the plant have won banners and premiums for outstanding operation. A number of complaints were raised about the amount of idle time in the steelmaking and rolling divisions of the plant in 1945. 23/

m. Administration.

The plant is subordinate to Glavuralmet and the Ministry of Ferrous Metallurgy. 24/

n. Personnel.

In 1941 the mill employed between 20,000 and 25,000 people under the direction of (fnu) Radkevich. 25/

o. Locational Characteristics.

Expansion of this plant may be economically infeasible, because of the present plant location in a densely built up area. 26/

2. Urals Heavy Machine Building Plant imeni Ordzhonikidze. (Uralmash and UZTM) [redacted] 25X1A2g

a. Location.

56°50'N-60°38'E, Sverdlovsk, Sverdlovsk Oblast, Urals, RSFSR. The works is situated 4 to 5 km north of the center of Sverdlovsk. 1/

b. History and Development.

Uralmash, the largest engineering works in the USSR, was started during the First Five Year Plan in 1928. By late 1932, all important departments were in operation, although it was not until 1937 that the project was essentially complete. 2/

Under the original plan, yearly production was to be as follows--70,000 MT of metallurgical equipment for the iron and steel industry, including complete blast furnace installations capable of producing 1,000 MT of pig iron daily, complete OH plants with 150-MT capacity furnaces, peat and coal gas producer installations, and complete standard equipment for all kinds of rolling mills; 5,000 MT of equipment for metallurgical plants of the nonferrous metal industry, including converters, water-jacketed furnaces, accessories for reverberatory and roasting furnaces, and wire rolling mills; 17,000 MT of equipment for mines and concentration installations, including large crushing machines, ore and coal mills with a capacity of 1,000 MT per hour, heavy lifting and conveying machinery for mines and potash plants; 5,000 MT of forging and pressing machines, including steam hammers weighing up to 5 MT, heavy presses, shears, and hydraulic presses; and 3,000 MT of spare parts for the above equipment. The forge shop was to produce 30,000 MT of forgings yearly for other plants. 3/

Some armament production was realized as early as 1934. By 1941 Uralmash was a major armament producer making all types of guns and gun tubes, shell cases of all calibers, mobile artillery and tanks, and many other ordnance items. 4/

Plant No. 8, a gun factory in Podlipki, and the Stalin Novokramatorsk plant in Kramatorsk were partially evacuated to Uralmash in 1941. In Sverdlovsk the Metallist plant and the Voyevodin Railroad Car plant were both subordinated to Uralmash. Equipment was added from other evacuated areas, and Uralmash production increased so significantly that by 1944 output was 7 times that of 1940. 5/

The area of the plant is about 1.5 km long by 0.75 km wide. A small amount of new construction continues; one of the new buildings reportedly houses a rolling mill. 6/

c. Raw Materials and Other Inputs.

Incoming daily shipments of pig iron and scrap amounted to 450 MT in 1949. Steel has been received from Zlatoust, Nizhnaya Salda, and the Verkhne Isetskiy plant in Sverdlovsk. Copper has been received from Pyshminsk and Sredneuralsk. 7/

d. Coal and Coke.

On the basis of the original plan, the peat beds 25 km to 40 km from the plant were to supply 250,000 MT to 300,000 MT of peat annually. Incoming coal shipments were reliably reported to be 120 MT daily. 8/

e. Ironmaking Facilities.

The gray iron foundry covers an area of 21,000 sq m. Scheduled annual production under the original plan had been 30,000 MT, of which 11.2 percent were castings weighing up to 40 kg, 14.2 percent castings up to 150 kg, 20 percent castings up to 500 kg, 26 percent castings up to 2,000 kg, and 28.6 percent castings over 2 MT. 9/

The foundry now consists of three longitudinal sections. The central section is equipped with a 50-MT crane which is used in the casting of large and complicated pieces. One side section contains drying kilns used for castings in molding boxes. The other side is used for casting small parts. The cupola furnaces, the foundry cleaning shop, and the molding sand shop are in this section. 10/

There are 4 cupolas in the foundry, 2 with hourly production rates of 20 MT each and 2 with rates of 10 MT each. Yearly production is about 150,000 MT. In addition Machine Shop No. 72 has a small iron foundry. 11/

The iron foundry needs 60 to 70 carloads of sand for molding purposes each year. The sand comes from Argayash, about 180 km from Sverdlovsk. Productivity was increased with the introduction of permanent molds, the use of which has increased considerably in the postwar period. Chill castings and pressure and centrifugal cast iron castings are produced. 12/

F. Steelmaking Facilities.

A new OH furnace added in 1940 brought the steel producing facilities up to 4 OH's, 2 electric furnaces, and 1 2-MT experimental OH. Three OH's have hearth areas of 19.0 sq m each, and 1 has an area of 25.0 sq m. The electric furnaces are of 4- and 8-MT capacity. At least 1 OH produces acid steel, probably for steel castings, and 1 or more of the furnaces are of the tilting type. The 4 OH's are, respectively, of 40, 40, 40, and 50 MT capacity. The estimated 1952 coefficient is 5.0. 13/

Steel Production
1952

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
3 OH	19.0 each	5.0	325	92.7
1 OH	25.0	5.0	325	40.6
2 Electric		12 MT total		12.0
Total Production				145.3

The 1953 estimated coefficient is 5.2.

Steel Production
1952

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
3 OH	19.0 each	5.2	325	96.3
1 OH	25.0 each	5.2	325	42.2
2 electric		12 MT total		12.0
Total Production				150.5

Original plans called for a steel production of 55,000 MT per year, of which 30,000 MT was to be for castings and 25,000 MT was to be for forging ingots. By 1952, forging capacity was 75,000 MT per year, although production reached only 60,000 MT per year. Estimated 1952 steel for castings, therefore, amounted to about 45,000 MT and that for forgings, 100,000 MT. Most of the castings were in the medium and heavy, over one metric ton, class. 14/

g. Primary Rolling Facilities.

None.

h. Finishing Rolling Facilities.

There are none in operation, although possibly a rolling mill is under construction. 15/

The forge and press shops, numbers 37 and 50, have 1 10,000-MT hydraulic press, 13 3,000-MT presses, 12 1,000-MT presses, 74 steam hammers up to 5 MT, 51 annealing furnaces, and some machine tools. It is believed that one of the German 30,000-MT presses was brought to Sverdlovsk and re-erected. 16/

A heat treating shop has 10 gas fired annealing furnaces, 4 electric annealing furnaces, 5 quenching tanks, and 4 special baths. All thermal treatment of tank and gun parts and shells is done here. 17/

i. Intraplant Services.

A thermal electric station serving Uralmash is located at the plant. Power plant capacity is estimated to be 28,000 kw. Additional power is probably supplied by the Sredneuralsk station north of Sverdlovsk. The open-air transformer station with 15 transformers is just west of the powerhouse. 18/

The combine has many more auxiliary shops performing or capable of performing maintenance on steelmaking facilities than most mills. 19/

j. Products and Production.

The plant produces a wide range of heavy industrial goods. Steel products at Uralmash include OH steel, electric steel, gray and malleable iron castings, steel castings, and steel forgings. 20/

Production Figures 21/
Selected Years, 1934-53

Thousand Metric Tons

Year	Cast Iron	Steel	Steel Castings	Steel Forgings
1934		43.3		
1935		65.3		
1936		79.2		
1952	150.0	145.3	27.2 *	60.0 *
1953	150.0	150.5	28.2 *	62.2 *

* Based on 60 percent yields.

k. Distribution. Distribution of the steel products is mostly limited to fulfilling requirements of the rest of the combine, although some forgings are shipped to other consumers. 22/

l. Plant Efficiency.

In 1942 the plant won a Red Banner for tank production. Many prizes and awards have been won by individual workers, designers, engineers, and executives at the plant. 23/

m. Administration.

Uralmash is under the Ministry of Machine Building.

n. Personnel.

Until 1948 the director was Boris Glevovich Muzrukov. Since then the director has been N. S. Churmichev. 24/

The number of employees is estimated at 30,000 workers. 25/

o. Locational Characteristics.

No information available.

C. Alapayevsk Complex. 25X1A2g [redacted]

1. Alapayevsk Metallurgical Plant.

a. Location.

57°52'N-61°42'E, Alapayevsk, Sverdlovsk Oblast, Urals, RSFSR. The plant site is on Pushkin Street in a very restricted area along a bend in the Nevya River. 1/

b. History and Development.

Prior to 1917 the works belonged to the Yakolev family who had their headquarters in St. Petersburg and controlled the charcoal iron works at Alapayevsk, Verkhnaya Sinyachikha, Neyvo Shaytanskiy, and Irbit. 2/

In 1935 the plant temporarily discontinued the smelting of pig iron with charcoal. The mines in the vicinity of Alapayevsk were closed from 1936 to 1938, but because of the difficulty in transporting iron ore from Magnitogorsk they were reopened. By 1940, if not earlier, the mill was again producing high-quality charcoal pig iron. During World War II the power facilities for the plant and the town were increased. The integrated plant that exists today is a mixture of old and new facilities. However, with the increasing use of automatic devices, the gradual modernization of the mill is reflected in an increasing efficiency. 3/

c. Raw Materials and Other Inputs.

The Alapayevsk BF's use ore from Alapayevsk, Verkhnaya Sinyachikha, Nizhnaya Sinyachikha, Vysokaya, and Bakal. Nickel bearing iron ore is received from the Yelizavetinsk deposit. 4/

The average iron content (Fe) of various ore fields is as follows: 5/

		Percent
Alapayevsk		
1st grade ore	(Limonite and	47.0
2nd grade ore	(Siderite	42.5
Vysokaya		
Magnetites		59.0 to 61.0
Martites		55.0 to 63.0
Yelizavetinsk		
Nickel bearing ore		46.0

Ore trains arrive at Alapayevsk daily. 6/

Large scrap shipments were received at the mill immediately after the war. At that time the furnaces were on a high scrap practice. 7/

Limestone comes from quarries in the vicinity of Alapayevsk. 8/

The water supply for the works is obtained from the Nevya River and from the city water system. 9/

d. Coal and Coke.

There are no coke batteries for the production of the metallurgical coke needed in No. 1 BF. Coal and coke trains arrived daily. Occasionally shipments have been received from Stalinsk and Kemerovo in western Siberia. Periodic coal and coke shortages have caused slowdowns. Charcoal for the charcoal furnaces is prepared in the vicinity of Alapayevsk. 10/

e. Ironmaking Facilities.

In 1946 a new coke-fired BF was built at Alapayevsk in addition to the existing charcoal furnace that was modernized in 1941. The No. 1 coke furnace has a volume of 200 cu m and the No. 2 charcoal furnace a volume of 168 cu m. In 1952 the estimated operating coefficient was 0.90 for the No. 1 BF and 1.3 for the No. 2 BF. 11/

Pig Iron Production
1952

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	200	0.90	340	75.5
2	168	1.30	340	42.9
Total Production				118.4

The 1953 estimated operating coefficients are 0.88 for No. 1 BF and 1.25 for No. 2 BF.

Pig Iron Production
1953

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	200	0.88	340	77.1
2	168	1.25	340	45.6
Total Production				122.7

The 200-cu m furnace erected in 1946 was the first of 13 new BF's built in the USSR during the Fourth Five Year Plan (1946-50). It was either US-designed or some of the equipment was furnished by the US. All operations on this furnace are mechanized and operate with automatic controls. The furnace was the first in the USSR on which all automatic controls operate on alternating current. A cast of about 20 MT of pig is made every 2 hours. The molten pig is then cast into 30-kg pigs or shipped as hot metal to the OH plant. The No. 1 BF has three hot blast stoves. 12/

The ore yard, which is kept supplied by daily train loads of iron ore, is serviced by a traveling crane. The furnaces are loaded by skip cars, which receive their materials from a skip house. The skip house is fed by scale cars of raw materials. 13/

At times all BF casts are pigged and shipped out of the plant and at other times no shipments are made. In 1940, Alapayevsk shipped all of its high-quality charcoal pig to other plants, while the OH plant operated on pig shipped in. 14/

The pig iron produced at Alapayevsk has an average content of 0.3 percent to 0.5 percent nickel, 0.2 percent to 0.4 percent chrome, and about 0.5 percent copper. To obtain a pig with a lower content of these alloys it is necessary to add to the burden a rather large quantity of complex ores from Yelizavetinsk or Rezh, the latter having a low nickel content. The Yelizavetinsk ores, however, must be sintered. 15/

An iron foundry at the mill produces molds and casting for plant use. 16/

f. Steelmaking Facilities.

The OH shop at Alapayevsk has 4 furnaces estimated to be of 40, 40, 50 and 80 MT, and a fifth furnace that may be in the process of construction. Two furnaces have a hearth area of 18 sq m, the third an area of 28.4 sq m, and the fourth an area of 40 sq m. The estimated 1952 coefficient is 4.5. 17/

Steel Production
1952

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	18.0	4.5	325	26.3
2	18.0	4.5	325	26.3
3	28.4	4.5	325	41.5
4	40.0	4.5	325	58.5
Total Production				152.6

The estimated 1953 coefficient is 4.7.

Steel Production
1952

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	18.0	4.7	325	27.5
2	18.0	4.7	325	27.5
3	28.4	4.7	325	43.4
4	40.0	4.7	325	61.1
Total Production				159.5

The OH shop is about 200 m by 150 m wide by 25 m high. The charging side of the shop has 3 overhead electric traveling cranes and 2 charging machines, and the pit side has 2 ladle cranes. 18/

The OH furnaces are fired by gas produced in six generators. In 8 to 12 hours the generators burn 140 MT of coal and 30 MT to 40 MT of green wood. It is believed that BF gas is mixed with the producer gas. 19/

Almost all steel is cast into ingots which are about 1.5 m long by 30 cm square. The usual charge is about 50 percent hot metal and 50 percent scrap, although the following table shows 2 heats which are described as typical. Manganese additions are made to various heats. 20/

Two Typical Heats
About 1948

Charge	Percent	
	No. 1 Heat	No. 2 Heat
Scrap	31	68
Hot Metal	59	22
Ore	10	10

A foundry equipped for casting steel rolls is located just outside the plant, but works in conjunction with plant requirements. 21/

g. Primary Rolling Facilities.

For the initial breakdown of ingots delivered from one of the 3 soaking pits, the mill has 2 2-stand, 3-high, 650-mm slab-bloomers. One mill is of German origin, built around 1901, and powered by an obsolete steam engine. 22/

h. Finishing Rolling Facilities.

There are 6 sheet mills as follows, a 1-stand 2-high 535-mm mill, a 1-stand 2-high 635-mm mill, a 2-stand 2-high 535 mm mill, and a 4-stand 2-high 635-mm mill. The 4-stand mill is believed to roll and coil strip at a norm of 14.7 MT/hour. 23/

For reheating purposes in the sheet mill there are six coal-fired reheat furnaces. Furnace dimensions in the hearth zone are 5 m long by 2 m wide by 1.8 m high. The furnaces are automatically charged, but must be manually discharged. There are also annealing furnaces in the sheet mill department. 24/

Other finishing facilities include a galvanizing shop and a forging and stamping department. The forge shop has 5 air hammers of American, German, and Soviet design and 3 forge furnaces of Soviet design. The forge and press department produced axles, nuts, bolts, screws, and shovels. 25/

i. Intraplant Services.

Prior to 1945 the steel mill at Alapayevsk received its power from the Ural grid. In 1945, however, a thermal power plant was built on the Nevya River next to the works. Power plant capacity is reported to be 14,000 kw. At peak demand town lighting dims, while factory power is unaffected. 26/

The mill has its own internal rail system that serves the plant, some of the iron ore mines, and the forests where wood is cut for charcoal. A narrow-gauge line connects the works with the rolling mill at Neyvo Shaytanskiy. 27/

The plant also has two machine shops, a carpenters shop, a toolmakers shop, a scrap baler, and a locomotive repair shop. 28/

j. Products and Production.

The plant produces charcoal pig iron, coke pig iron, OH steel, some alloy steel--mostly chrome, sheet bar, armor plate 2.5 m by 1.7 m by 7 cm, plate 1.5 m by 80 cm by 2 to 5 cm, strip 80 cm wide by 2 mm thick, sheets 1.5 m to 2 m by 1 m by 0.5 to 3 mm thick, black plate, electrical sheet, galvanized sheet, and roofing sheet. Of the sheets produced, 25 percent are kept at the plant for fabrication. 29/

Production Figures 30/
1934 to 1953

Thousand Metric Tons

Year	Pig Iron	Steel	Finished Steel
1934	31.3	51.2	62.9
1935	22.9	51.9	70.8
1936		61.2	69.0
1941	70.0		
1944	130.0	114.0	
1950		132.0	
1952	118.4	152.6	80.0
1953	122.7	159.5	83.6

k. Distribution.

Most of the sheet and plate produced is shipped to Sverdlovsk and Nizhniy Tagil. Armor plate is shipped to Nizhniy Tagil and 50-kg billets are delivered to the machine tool factory in Alapayevsk. Pig iron is exported from the works. About 30,000 MT of slabs and sheet bar are shipped annually to Neyvo Shaytanskiy. 31/

l. Plant Efficiency.

A German engineer adjudged the plant as obsolete by German metallurgical standards, but modernization at Alapayevsk is correcting this. 32/

m. Administration.

The plant is subordinate to the Ministry of Ferrous Metallurgy. 33/

n. Personnel.

The plant director is (fnu) Vershinin. 34/ There are about 7,500 workers employed at the steel plant. 35/

o. Locational Characteristics.

Because the BF plant and some of the mills are located in a low spot near the Nevya River, they are flooded occasionally in the springtime. 36/

25X1A2g

2. Neyvo-Shaytanskiy Rolling Mill. [redacted]

a. Location.

57°44'N-61°15'E, Neyvo Shaytanskiy, Sverdlovsk Oblast, Urals, RSFSR. The works is located in the former bed of the Neyvo River just to the north of the lake made by a dam on the river. It is south of the confluence of the Neyvo and Susanka Rivers. Neyvo Shaytanskiy is about 80 km east southeast of Nizhniy Tagil and 30 km from Alapayevsk, to which runs a narrow-gage railroad. 1/

b. History and Development.

Established in 1704, the Neyvo Shaytanskiy works is part of the former holdings of the S. S. Yakolev family, which also controlled the Alapayevsk and the Verkhnyaya Sinyachikha plants. In 1926 the plant was partially reconstructed. 2/ Future development plans for the works are unknown.

c. Raw Materials and Other Inputs. The steel for rolling

the Alapayevsk steel plant. 3/ Water is piped into the plant from the Neyvo River. 4/

d. Coal and Coke.

Brown coal for the boilers is delivered over the narrow-gage railroad from Alapayevsk. 5/

e. Ironmaking Facilities.

None.

f. Steelmaking Facilities.

None.

g. Primary Rolling Facilities.

It is not known in what form the rolling mill receives its steel from Alapayevsk. However, since there is no indication of a blooming mill, it is assumed that the Neyvo Shaytanskiy mill receives slabs or sheet bar from Alapayevsk.

h. Finishing Rolling Facilities.

The rolling mills have two reheating furnaces and 5 or 6 sheet rolling trains. 6/ In 1930 the mills were driven by three steam engines. 7/ The yield on these mills is approximately 31 percent.

i. Intraplant Services.

The works has its own hydroelectric station. 8/ The water is supplies by the Neyvo River through a 1 1/2-m diameter pipe line. 9/ A boiler house is located at the plant. 10/

j. Products and Production.

Roofing sheets, sheeting, and steel plates are produced. 11/ The plates are 2 to 3 cm thick and vary in size from 100 cm on a side to between 25 cm and 200 cm on the other side. 12/

Production Figures 13/
1930, 1952, 1953

Thousand Metric Tons

Year	Finished Steel
1930	20.0
1952 Estimate	25.0
1953	25.0

k. Distribution.

Steel products are shipped to the Stanka Zavod and to the steel mill in Alapayevsk. 14/

l. Plant Efficiency.

German PW's regarded the plant as being old-fashioned and the equipment as obsolete. 15/

m. Administration.

The plant is under the direction of the Alapayevsk Steel Plant, which in turn is under the Ministry of Ferrous Metallurgy.

n. Personnel.

In 1945, 5,000 employees worked under an unknown director. 16/

o. Locational Characteristics.

See Section a.

25X1A2g

3. Verkhnyaya Sinyachikha Steel Plant. [redacted]

a. Location.

57°59'N-61°40'E, Verkhnyaya Sinyachikha, Sverdlovsk Oblast, Urals, RSFSR. Verkhnyaya Sinyachikha is 102 km east of Nizhniy Tagil and 15 km north of Alapayevsk. 1/

b. History and Development.

The works was established in 1790 and belonged to the S. S. Yaklev family, along with the Alapayevsk Steel Works and the

Neyvo Shaytanskiy Rolling Mill. 2/ While future plans of the plant are unknown, it is believed that further developments depend on local charcoal and iron ore supplies.

c. Raw Materials and Other Inputs.

Iron ore for the blast furnace at Verkhnyaya Sinyachikha comes from the Verkhnyaya Sinyachikha, Nizhnyaya Sinyachikha, and Zyryanovsk mines. Rich veins of ore exist in the Poskotino mines, located close to the industrial center of Verkhnyaya Sinyachikha. 3/

d. Coal, Coke, and Charcoal.

Charcoal is made from wood cut in the vicinity of Verkhnyaya Sinyachikha. 4/

e. Ironmaking Facilities.

The plant has one 205-cu m charcoal BF. No coefficients are known; however, a 1952 estimate is 1.6. 5/

Pig Iron Production
1952

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	205	1.6	340	43.7

The estimated 1953 coefficient is 1.5.

Pig Iron Production
1953

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	205	1.5	340	46.6

f. Steelmaking Facilities.

At the Verkhnyaya Sinyachikha plant there are three gas-fired OH furnaces. 6/ One OH of about 50-MT capacity has a

Hearth area of 36.5 sq m; the other hearth areas are unknown. 7/ A reliable source has estimated over-all steel production at 65,000 MT annually. 8/ In 1937 the coefficient was 3.13. 9/ The 1940 scrap practice was 40 percent. 10/

Steel Production
1952 and 1953

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
3	NA	NA	325	65.0

g. Primary Rolling Facilities.

None.

h. Finishing Rolling Facilities.

None.

i. Intraplant Services.

There is an electric power station at this plant. The powerplant has 4 generators with a combined capacity of 270 kw. 11/

The installation of improved jets for burning BF gas under four steam boilers is being continued with great success. 12/

j. Products and Production.

The only products produced at Verkhnyaya Sinyachikha are charcoal pig iron and steel ingots. 13/

Production Figures 14/
Selected Years,
1928-53
Thousand Metric Tons

Year	Pig Iron	Steel
1928	30.1	25.3
1930	35.0	40.0
1934	30.5	24.3
1935	43.5	26.2
1936	30.0	29.0
1942	—	56.0
1943	30.0	63.0
1947	30.0	62.0
1948	30.0	63.0
1952	43.7	65.0
1953	46.6	65.0

k. Distribution.

All the production of steel at the plant is utilized elsewhere because there are no rolling mill facilities at Verkhnyaya Sinyachikha. 15/ Most of the output is shipped either to Alapayevsk or Neyvo Shaytanskiy for rolling.

l. Plant Efficiency.

No information available.

m. Administration.

The plant is probably under the direction of the Alapayevsk Metallurgical Plant which in turn is under the control of the Ministry of Ferrous Metallurgy.

n. Personnel.

Director unknown; employees in 1942, 1,000. 16/

o. Locational Characteristics.

No information available.

D. Pervoural'sk Complex.

1. Pervoural'sk New Pipe Mill No. 703. (Usually referred to as Novo-Trubny) [redacted]

25X1A2g

a. Location.

56°54'N-59°58'E, Pervoural'sk, Sverdlovsk Oblast, Urals, RSFSR. The plant site is immediately northeast of the Khrompik railroad station on the southeast outskirts of Pervoural'sk. 1/

b. History and Development.

Construction began at Novo Trubny in 1930; however, first production was not realized until 1934. In 1937 the plant was producing at only 40 percent of the norm. It was not until 1940 that the pipe works was operating at anywhere near its rated capacity. In 1941, part of the Lenin Tube Works in Dnepropetrovsk was evacuated to Pervoural'sk. During World War II, Novo Trubny was the principal pipe and tube supplier in the USSR. Today Pervoural'sk is the most important pipe and tube plant in the USSR. 2/

c. Raw Materials and Other Inputs.

Pervoural'sk has no iron and steelmaking facilities and therefore all steel must be shipped into the works. Although Magnitogorsk has been mentioned frequently as the only supplier of pipe steel to Pervoural'sk, it is thought that some steel comes from other Ural mills. 3/

d. Coal and Coke.

Large shipments of peat are received daily for use in the gas generators which supply the powerhouse heating facilities, and reheating furnaces with gas. 4/

e. Ironmaking Facilities.

The iron foundry has 2 10-MT capacity cupola furnaces. 5/

f. Steelmaking Facilities.

None.

g. Primary Rolling Facilities.

None.

h. Finishing Rolling Facilities.

All pipe produced at Novo Trubny is seamless. The first 2 mills which went into operation in 1935 were a Stiefel disc-piercing seamless mill with a yearly capacity of 110,400 MT and a Stossbank seamless mill with an annual capacity of 30,000 MT. The No. 2 Stiefel mill, built by Demag, for small size seamless has a yearly capacity of 43,200 MT. 6/

During the war the pipe mill was greatly increased by the addition of at least two Stiefel disc-piercing seamless mills from unknown occupied areas. It is estimated that these two seamless mills each have annual capacities of 60,000 MT. 7/

In 1952, Pervoural'sk produced 275,000 MT of hot rolled seamless pipe from four Stiefel mills. The old Stossbank mill probably has been scrapped. It is estimated that 30,000 MT of the total hot rolled seamless is sent on to the cold drawing department for further finishing. Therefore, 1952 finished steel production consists of 245,000 MT of hot rolled and finished seamless and 30,000 MT of cold drawn and finished seamless. 8/ It is estimated that in 1953 production will be 3 percent greater than in 1952.

The cold finishing department, largest in the USSR, has a number of Rockrite cold rolling machines evacuated from the Lenin Works in Dnepropetrovsk and some cold drawing benches. 9/

During World War II the mill produced 50 new sizes of rolled pipe and 85 new sizes of drawn pipe, including rectangles, squares, ovals, and heart-shaped tubes. 10/

The Pervoural'sk plant was the first in the USSR to cold roll stainless pipe successfully on Rockrite mills. The percentage of alloy and high-alloy tubing produced at Novo Trubny is considerable and is steadily increasing. 11/

i. Intraplant Services.

Power is received from outside the plant. A transformer station at the works steps the voltage down to 380 v and 220 v for mill use. Among the usual assortment of auxiliary facilities is an unusually well-equipped mechanical shop. 12/

f. Products and Production.

Pervoural'sk produces hot and cold finished seamless pipe of the following types and uses: aircraft tubing, ball bearing

tubing, fire tubes, gas pipe, still tubes, water pipe, oil well casing, automotive tubing, tubing for the tractor industry, galvanized pipe, stainless tube, capillary tube--both carbon and stainless thin walled pipe, and thick walled pipe. 13/

Experiments have been carried out by engineers at Pervoural'sk on the manufacture of tubes from El402 austenitic stainless with columbium and Zh27Ti ferritic heat resistant steel containing titanium. 14/

Production Figures 15/
1940, 1952, 1953

Year	Finished Steel
1940	168.0
1952	275.0
1953	283.5

k. Distribution.

Tubes from Pervoural'sk have a wide distribution although a large portion go to the automotive and aircraft industries. 16/

l. Plant Efficiency.

A notoriously inefficient plant before the war, Novo Trubny won a number of awards for production during and since World War II. 17/

m. Administration.

The plant is subordinate to Glavtrubostal and the Ministry of Ferrous Metallurgy. 18/

n. Personnel.

There were 12,000 workers employed at the plant in 1940. The director before the war and at present is Yakov Pavalovich Osadchiy. 19/

o. Locational Characteristics.

No information available.

2. Pervoural'sk Old Pipe Mill (Usually referred to as the Staro Trubny Works) [redacted]

25X1A2g

a. Location.

56°54'N-59°58'E, Pervoural'sk, Sverdlovsk Oblast, Urals, RSFSR. The old pipe works is completely separated from the new pipe works which is to the south. See report No. 38 of this working paper for the new pipe works.

b. History and Development.

The plant is the first tube works built by the USSR; construction started in 1922. When the requirements of the First Five Year Plan (1928-32) for pipe were greater than the supply, it became necessary to erect new pipe mills. However, instead of enlarging the old mill at Pervoural'sk, a new one was built. Some modernization took place at the old mill, but no expansion. Future increases in pipe production at Pervoural'sk will be obtained by enlarging the newer works. 1/

c. Raw Materials and Other Inputs.

No information available.

d. Coal and Coke.

Peat is used extensively for heating and generating gas for firing pipe mill furnaces.

e. Ironmaking Facilities.

None.

f. Steelmaking Facilities.

There is 1 15-sq m oil fired OH furnace of about 25-MT capacity at the mill. The estimated 1952 coefficient is 4.5. 2/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	15.0	4.5	325	21.9

The 1953 coefficient is estimated to be 4.7.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	15.0	4.7	325	22.9

g. Primary Rolling Facilities.

For the breaking down of ingots to flats and pipe billets for the skelp and seamless mills, the plant has a three high 600-mm billet mill. 3/

h. Finishing Rolling Facilities.

(1) Welded Pipe. The skelp mill has 14 stands in front of the welding furnace. Three sizing and scale breaking rolls follow the furnace. The welded pipe mill has a stretch reducing mill. 4/

(2) Seamless Pipe. A Pilger mill with a piercer is in operation at the plant. Tube is finished on the Erhardt mill in the cold finishing department. 5/

i. Intraplant Services.

Power is obtained from outside the plant.

j. Products and Production.

The plant produces seamless and welded pipe for use as fire tubes, radiator tubes, boiler tubes, ball bearing tubes, and tubing for the tractor and automotive industry. 6/

Production Figures 7/
1934-53

Year	Steel (Thousand Metric Tons)	Finished Steel (Thousand Metric Tons)
1934	20.7	6.1*
1935	23.5	6.1
1936	28.8	4.8
1943	20.0	15.0
1952	21.9	15.3**
1953	22.9	16.0**

* Including 3,000 MT of seamless locomotive flue pipe.
** Using an average yield for ingot to pipe of 17 percent.

k. Distribution.

Pipes and tubes receive a wide distribution from this plant to areas in the USSR; some go to the locomotive building industry and some to the tractor and automotive industry. 8/

l. Plant Efficiency.

No information available.

m. Administration.

The old tube plant is probably under the direction of the new tube plant, which in turn is subordinate to Glavtrubostal and the Ministry of Ferrous Metallurgy. 9/

n. Personnel.

Plant director in 1948 was (fnu) Sleptsov. In 1941 the works had 1,200 employees. 10/

o. Locational Characteristics.

No information available. 11/

E. Salda Complex.

25X1A2g [redacted]

1. Nizhnyaya Salda Metallurgical Plant.

a. Location.

58°05'N-60°48'E, Nizhnyaya Salda, Sverdlovsk Oblast, Urals, RSFSR.

b. History and Development.

Prior to 1917 and under the name of Nizhnyaya Salda Smelter, the plant belonged to the firm of P. P. Demidov. In 1935, plans for the reconstruction of the plant envisaged a pig iron production of 180,000 MT/year, a steel production of 125,000 MT/year, a rolled steel production of 115,000 MT/year, and a cast iron production of 90,000 MT/year. The rail accessories department was to be liquidated and the Nizhnyaya Salda plant was to concentrate on the production of quality steel products. 1/

c. Raw Materials and Other Inputs.

Iron ore for the natural alloy pig iron and high nickel pig comes from Yelizavetinsk. Reports indicate that ore is received from a wide variety of sources, such as Kushva, Vysokgorsk, Blagodat, Orsk-Khalilovo, and Alapayevsk. The source of other raw materials, particularly steel for further rolling, is not known. 2/

d. Coal, Coke, and Charcoal.

Coke is used in the BF, supplemented by coal, peat, and charcoal. Coal and coke come from Kemerovo, peat from nearby cuttings, and charcoal from local forests, although they are greatly depleted. 3/

e. Ironmaking Facilities.

There are two BF's in the iron producing division of the plant with capacities of 330 cu m and 209 cu m. A third BF has been reported under construction, but it is not believed to be in operation. 4/

The estimated 1952 coefficient of utilization is 1.0 for the BF operating on a coke burden. 5/

Blast Furnace Production
1952

Thousand Metric Tons

Furnace No.	Volume (cu m)	Coefficient	Operating Days	Production
1	330	1.0	340	112.0
2	209	1.0	340	71.0
Total Production				183.0

The estimated coefficient for 1953 is 0.98.

Blast Furnace Production
1953

Thousand Metric Tons

Furnace No.	Volume (cu m)	Coefficient	Operating Days	Production
1	330	0.98	340	114.6
2	209	0.98	340	72.6
Total Production				187.2

Most of the time the BF work on a coke charge or a 50 percent coke 50 percent coal charge. Apparently charcoal and peat make up part of the charge. 6/

After the installation and completed mechanization of the mud gun, production increased 2.3 percent, and the wind was not off the furnace at any time. Instead of removal of slag to a dump, it is granulated in the BF area. 7/

f. Steelmaking Facilities.

There are two OH furnaces of about 95-MT and 50-MT capacity with hearth areas of 41.5 sq m and 28.5 sq m, respectively. The Plan coefficient for 1950 is 5.0, and the estimated coefficient for 1952 is 5.2. 8/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	41.5	5.2	325	70.0
2	28.5	5.2	325	48.1
Total Production				118.1

The estimated coefficient for 1953 is 5.3.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	41.5	5.3	325	71.5
2	28.5	5.3	325	49.2
Total Production				120.7

The OH had automatic controls installed in 1948. In 1930 the plant had 2 7-MT Bessemer converters which did not work well on the high phosphorous ore and subsequently were dismantled. 9/

g. Primary Rolling Facilities.

The roughing breakdown is done by the No. 1 stand of the 800mm bar mill. 10/

h. Finishing Rolling Facilities.

The heavy bar mill takes small ingots and rolls heavy strip on a 3 stand, 800-mm mill. The mill is powered by a 5,000-hp steam engine and has a capacity of 100,000 MT per year. Rails and structural shapes can also be rolled on the mill. 11/

In addition to the bar mill, there is a small merchant mill. It is not clear whether the track accessories department is still in operation. 12/

i. Intraplant Services.

There is no regular powerplant at the mill; however, a small diesel power plant may be in operation. The steel works has a machine shop. 13/

j. Products and Production.

The plant produces natural alloy pig iron, high nickel pig iron, ferrosilicon and ferronickel in experimental quantities, openhearth steel, plate, rails, strip, and cast products. 14/

Production Figures 15/
1929 to 1953

Thousand Metric Tons

Year	Pig Iron	Steel	Finished Steel
1929/30	93.0	41.0	70.0
1934	100.2	40.5	82.1
1935	83.2	40.0	84.0
1941	90.2	45.0	180.0
1942	100.0		
1944	130.0	100.0	180.0
1952	183.0	118.1	180.0*
1953	187.2	120.7	180.0*

* Based on past performance.

k. Distribution.

Shipments of steel amounting to 2,000 MT/month have been reported as having been set to the Uralmash plant in Sverdlovsk. A machine building factory in Chimkent was supplied with alloyed cast iron. 16/

l. Plant Efficiency.

The plant overfulfilled the plan for 1946 and May 1947. Both the OH division and the rail accessories shop won premiums in 1946. 17/

m. Administration.

The plant is subordinate to Glavuralmet and the Ministry of Ferrous Metallurgy. 18/

n. Personnel.

In 1940 the plant employed about 3,200 workers. The director in 1948 was (fnu) Zhuravlev. The director in 1953 was Shchukin. 19/

o. Locational Characteristics.

No information available.

25X1A2g [redacted]

2. Verkhnyaya Salda Steel Plant. (Sever Steel Mill)

a. Location.

58°02'N-60°32'E, Verkhnyaya Salda, Sverdlovsk Oblast, Urals, RSFSR.

b. History and Development.

Built around 1880, the plant belonged to an Italian for a while and then was acquired by the Russian firm of P. P. Demidov, which retained control until 1917. One source stated that as soon as the Novo Tagil Steel Plant was completed, it was planned to shut down Verkhnyaya Salda and completely recondition the plant. Some new construction was in progress at the plant in 1947, but the nature or extent of the improvements is not known. 1/

c. Raw Materials and Other Inputs.

Cold pig iron, arriving at the plant by rail for OH use, comes from the surplus pig iron produced either at Nizhniy Tagil or at Nizhnaya Salda. 2/

Other material received by rail included small amounts of iron ore for the OH, manganese ore, limestone, dolomite, scrap, oil to augment gas as the OH fuel, and semifinished steel for subsequent rolling. 3/

d. Coal and Coke.

Coal and coke were both received by rail from outside the plant area. Peat from turf cutting areas nearby was also used as an auxiliary fuel. 4/

e. Ironmaking Facilities.

A small 4-MT cupola was installed for producing maintenance castings for use at the plant. 5/

f. Steelmaking Facilities.

There are two OH furnaces in the steel works with hearth areas of 14.3 and 18.4 sq m. The rated capacity of these furnaces is about 30 and 40 MT/heat respectively. The estimated 1952 coefficient is 5.0. 6/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	14.3	5.0	325	23.2
2	18.4	5.0	325	29.9
Total Production				53.1

The estimated coefficient for 1953 is 5.2.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	14.3	5.2	325	24.2
2	18.4	5.2	325	31.1
YTotal Production				55.3

The furnaces are fired by producer gas generated in five wood and coal burning gas producers. Fuel oil is occasionally injected in the gas flow. After the war, utilization of war scrap reached a point where the practice stood at 75 percent scrap and 25 percent cold pig. In 1952 this ratio was approximately 50 percent scrap and 50 percent cold pig. 7/

The steelmaking shop had two charging machines. Horses were used as late as 1948 to pull stripped ingots from the stripper to the soaking pits. 8/

g. Primary Rolling Facilities.

Breakdown of ingots is accomplished in the reversing No. 1 stands of both the heavy and light bar mills. 9/

h. Finishing Rolling Facilities.

The heavy bar mill is a Schloemann 3-stand 3-high 600-mm mill. It is powered through a rope drive by 2 500-hp German steam engines although plans call for replacement of steam by an electric motor. The 600-mm mill rolls angles, channels, beams, and rails. 10/

The small bar mill is also a Schloemann 3-stand 3-high 375/280-mm mill, powered by 2 steam engines of 500 and 175 hp. The 375/280-mm mill rolls small angles, rounds, bars, and rod. 11/

The approximate capacity of the 2 bar mills is 70,000 MT/yr. 12/

i. Intraplant Services.

The hydroelectric station at the plant supplied most of the requirements of the mill, but some power was brought in from outside. The powerhouse had two German AEG undershot turbines and two dynamos. The capacity is approximately 2,000 kw. 13/

The mill has auxiliary shops for maintaining equipment.

j. Products and Production.

The mill produces iron castings, OH steel, ingots 20 cm by 20 cm by 1,200 cm angles, channels, beams, rails, rounds, bars, and rod. 14/

Production Figures 15/
1929 to 1953

	Thousand Metric Tons	
Year	Steel	Finished Steel
1929/30	29.0	32.0
1934	23.4	38.1
1935	26.8	40.1
1936	32.4	40.8
1952	53.1	70.0*
1953	55.3	72.8*

* Based on Section h.

k. Distribution.

No information available.

l. Plant Efficiency.

The plan was overfulfilled in 1948, 1951 and 1952. The plant failed to meet its quota in 1949 and the first quarter of 1950. 16/

m. Administration.

The plant is subordinate to Glavuralmet and the Ministry of Ferrous Metallurgy. 17/

n. Personnel.

In 1938, 4,000 employees worked at the plant. The plant durector in 1948 was (fnu) Voropayev. 18/

o. Locational Characteristics.

No information available.

F. Individual Plants

1. Serov Metallurgical Plant. (Nadezhinski Plant, Kabakov Plant)

[redacted] 25X1A2g

a. Location.

59°36' N60°35'E, Serov, Sverdlovsk Oblast, Urals, RSFSR. The plant, originally built in the Taiga, now is surrounded by the city of Serov. 1/

b. History and Development.

The plant was built in 1890 near Kabakov, later known as Nadezhinsk and still later as Serov. Prior to 1917 the mill belonged to the Bogoslovsk Iron and Steel Works. During the early 1920's, operations at Serov were at a standstill, but by 1931 the plant had recovered and had been converted to a point where it was one of the largest quality steel producers and the largest charcoal pig producer in the USSR. 2/

Some auxiliary facilities such as the sinter plant have been added since the 1930's. The OH facilities have been enlarged and expanded. In the post-World War II period, production was greatly increased, largely by increased efficiency and by rehabilitation of existing production units. 3/

c. Raw Materials and Other Inputs.

Sixty percent of the iron ore for Serov comes from the Auerbakh, Vorontsov, and Gora Blagodat deposits, while the other 40 percent is supplied by the Vysokaya deposit. Small quantities of nickel-bearing iron ores, important in the preparation of quality steels, come from the Yelisavetinsk deposits. The Serov concentrating plant treats ores for sulfur to give an ore with a 0.02 percent maximum sulfur content. Some of the northern iron ores are virtually phosphorus-free, so that the BF's are guaranteed ore with a 0.1 percent maximum phosphorus content. 4/

Manganese ore comes from the nearby Ivdel deposits, although records show shipments from Nikopol and Chiatura. Manganese reserves in the Ivdel region are estimated at 2.5 million MT. 5/

Limestone comes from nearby quarries at Bogoslovsk and Alapayevsk, as well as from pits in the vicinity of Miass. 6/

Some BF ferroalloys are produced at Serov, probably for plant consumption. Ferrochrome has been smelted in a Serov BF. 7/

d. Coal, Coke, and Charcoal.

Mentioned briefly in some plans is the construction of two coke batteries to supply the two coke-burning BF; however, information is lacking on actual progress of such an installation. In the past, coke has been received from Kemerovo, although it is possible that some coke may now come from Gubakha or Nizhny Tagil. 8/

Twenty-five percent of the plant's charcoal requirements are fulfilled by Kakvenskoye, 4 km west of Serov, and the rest by Novokalinskoye, 10 km east of Serov. Lignite used as an auxiliary fuel comes from Bogoslovsk. 9/

e. Ironmaking Facilities.

At one time the Serov plant had 7 BF's, 5 fired on charcoal and 2 on coke. Before 1948, 2 of the charcoal BF's were apparently taken out of production. 10/

The USSR claimed for the Serov plant a world's record for BF efficiency when the coefficient for one cast was below 0.60. Reported coefficients are, 1945, 1.1; 1948, 0.833; 1949, 0.75; 1950, 0.744; and 1951, 0.678. The estimated actual coefficient for 1951 was 0.71 and for 1952 and 1953, 0.70. 11/

Blast Furnace Production
1952 and 1953

Thousand Metric Tons

No. and Type	Volume (Cu m)	Coefficient	Operating Days	Production
1 - Coke	214	0.70	340	104.0
3 - Charcoal	193	0.70	340	93.8
4 - Coke	177	0.70	340	86.0
5 - Charcoal	171	0.70	340	83.0
7 - Charcoal	190	0.70	340	92.2
Total Pig Production	945	0.70	340	459.0

It is possible that at least two of the charcoal furnaces have been converted to the use of coke, particularly if the reported coke batteries under construction are completed. 12/

The averaged charcoal furnace operation at Serov for three months of 1942 is shown below. 13/

Serov Blast Furnace on Charcoal - 1942

1. Ratio composition of the burden (kg)

Iron Ore	1,973
Manganese Ore	95
Slags	
Scrap	276
Flux	175
Fuel	1,032

2. Composition of the slag (percent)

SiO_2	35.60
Al_2O_3	23.13
CaO	29.73
MgO	3.00
MnO	5.25
FeO	1.55
Alkalies	1.74

3. Composition of the pig iron (percent)

Si	0.71
Mn	1.69
P	0.11
S	0.021

4.	Yield of pig iron from the charge (percent)	56.7
5.	Weight of the slag (kg/ton of pig)	450
6.	Expenditure of charcoal (kg/ton of pig)	660
7.	Daily smelting (MT)	174
8.	Effective volume of furnace (cu m)	193
9.	Time of stay (hrs.)	3.5
10.	Utilization of effective volume (Cu m/ton)	1.1

The ores that made up the charge on this BF were from Blagodat and Vysokaya and are more difficult to reduce than the Bakal ores. The composition of the gangue is not favorable for deriving good slags. 14/

The charcoal is weaker and more porous than that of the Southern Urals, the weight of one cubic meter being from 128 to 130 kg as compared to 140 to 145 kg. The expenditure of this charcoal is almost a minimum for the Urals, averaging 5.1 cubic meters or 660 kg per ton of pig iron. The coefficient is high for the test period covered on the Serov furnace. 15/

In its chemical composition the pig iron at Serov is ordinarily OH pig with a low phosphorus content. The slags in a general way resemble the slags of other Ural furnaces working on magnetic iron ores. However, it is not a good slags the high alumina content makes it sticky and difficult to fuse. 16/

In order to obtain the increased production as shown by the low BF coefficients, the BF's were, while undergoing their major overhauls, substantially redesigned. Their internal contours were altered in such a way as to facilitate the continuous descent of the charge. The hearths were widened. The use of sintered ore was introduced, and the method of charging the furnaces was changed. The amount of blast was substantially increased. 17/

The use of sinter and concentrated ore is in an advanced state at Serov. The concentrating plant believed to have been completed just before 1950 has a capacity of 250,000 MT of ore. Sinter has been used since 1942. 18/

f. Steelmaking Facilities.

Prior to World War II the Serov plant had 7 OH, 5 of which were about 75 MT and 2 were about 35 MT. Two new OH's were installed during the war and 5 old OH's were modernized. In 1952, it is estimated that the Serov plant had 9 OH's. Four of these furnaces have hearth areas of 30 sq m and a rated capacity of 60 MT each, while the other 5 have hearth areas of 40 sq m and are rated at 100 MT each. 19/

The only reported yearly coefficient is 4.9 for 1950. The norm for the first quarter of 1951 was 4.9. Individual melters have reached coefficients as high as 7.9 for short periods. The estimated coefficient for 1951 was 5.0 and for 1952, 5.1. 20/

Steel Production
1952

Thousand Metric Tons

No. of OH	Hearth Area (sq m)	Coefficient	Operating Days	Production
1 to 4	30 each	5.1	325	198.8
5 to 9	40 each	5.1	325	331.2
Total Production				530.0

The OH furnaces are fired by BF gas mixed with producer gas. The shop has a 250-MT hot metal mixer. A new charging machine was installed in the OH shop during the Fourth Five Year Plan. A scrap preparation base at Serov was also to have been completed in this period. 21/

The 1953 estimated coefficient is 5.3.

Steel Production
1953

Thousand Metric Tons

No. of Furnace	Hearth Area (sq m)	Coefficient	Operating Days	Production
1 to 4	30.0 each	5.3	325	206.5
5 to 9	40.0 each	5.3	325	344.5
Total Production				551.0

During the war, many former electric furnace grades of steel were made in the basic OH furnaces of the Serov plant. Experiments in deoxidizing steel by the use of coke were conducted at Serov. Fifteen heats of 30 KhGSA,

a chrome-silicon-manganese structural steel, were produced in one of the 100-MT furnaces using coke as a deoxidizer. 22/

g. Primary Rolling Facilities.
There is a bloomer of unknown size at Serov. 23/

h. Finishing Rolling Facilities.
A steam driven, heavy bar mill has 3 stands consisting of a reversible, 2-high, 900-mm roughing stand and 2 850-mm finishing stands. 24/

A medium bar mill has 5, 3-high stands consisting of a 550-mm rougher and 4 450-mm finishing stands. 25/

The small bar mill has 8, 3-high stands consisting of a 450-mm rougher and 8 320-mm finishing stands. 26/

Other mills include a sheet mill and a wire drawing shop. 27/

Prior to 1930, the Serov plant produced rails and sections. Reconstruction of many of the rolling mills was completed in 1934. The heavy bar mill was equipped with more elaborate finishing facilities, while the other two bar mills were separated. 28/

In 1947 the yield on finished quality steel rolled items was between 75 percent and 76 percent. Estimated capacities of the various mills in unknown. 29/

i. Intraplant Services.
The Serov powerplant up to 1941 had 2 turbines and 2 generators giving a total capacity of 10,700 kw. After 1941, power facilities were expanded by the addition of 2 turbines of 25,000-kw capacity each. The 1952 capacity at Serov is 60,700 kw. 30/

Except for an oxygen plant, nothing is known about other intraplant services at Serov. 31/

j. Products and Production.
Products produced at Serov are, BF pig irons, some BF ferroalloys, small ingots, billets, semi-finished and finished bars of all sizes, sheet, strip, quality types of steel, ball bearing steel, spring steel, tool steel, and various rolled shapes. 32/

Production Figures 33/
1948 - 1953

Thousand Metric Tons

Year	Pig Iron	Steel	Finished Steel*
1948	386.0	488.0	352.0
1949	426.0	500.0	360.0
1950	433.0	510.0	367.0
1951	453.0	520.0	374.0
1952	459.0	530.0	381.0
1953	459.0	551.0	396.5

k. Distribution.
Serov supplies steel to the transportation, automobile, tractor, aircraft, machine building, and war material industries. In 1950 some shipments were made to the Volga-Don project. 34/

l. Plant Efficiency.
The Serov plant fulfilled the plan for 1948 and also for 1950. A large number of transferable Red Banner awards have been won at Serov by the BF shop and the power plant. 35/

m. Administration.
Serov is administered by Glavspetstal, a division of the Ministry of Ferrous Metallurgy. 36/

n. Personnel.
The 1952 director is Lukashenko, former BF superintendent. He succeeded N. I. Goncharenko and the 1943 director Dyadov. 37/

o. Locational Characteristics.
Serov is one of the northernmost steel works in the world; consequently, the cold weather tends to affect operations, but not significantly. 38/

25X1A2g

2. Kushva Metallurgical Plant.

a. Location
58°18'N - 59°45'E, Kushva, Sverdlovsk Oblast, Urals, RSFSR.

*Obtained by using yield of 72 percent from ingot to finished product.

b. History and Development.
The Kushva plant was founded in 1736. In the years immediately before 1917 the works was under government control. Plans drawn up in 1930 called for modernization and the addition of three mills for rolling merchant bar and rods. At the same time plans were formulated to make Kushva the mold and steel casting center of the Urals. Extensive modernization was carried on in the period 1946-48. To what extent earlier plans were fulfilled is not clear, but the plant does not have any rolling mills. 1/

c. Raw Materials and Other Inputs.
Iron ore of very high iron content comes from Mt. Blagodat in Kushva by aerial tramway. Manganese ore comes from the Maryatsk deposit near Serov. 2/

d. Coal and Coke.
The BF's operate on Kuznetsk coal and coke. In earlier years before conversion, local charcoal was used. 3/

e. Ironmaking Facilities.
There are 3 small BF's at Kushva with volumes of 173, 169, and 166 cu m. At least 1 of these BF's was added in the period 1936-44. Reported coefficients are for 1950, 0.71 on No. 1 BF; and 1952 estimate, 0.73 for all furnaces. 4/

Pig Iron Production
1952

Thousand Metric Tons

No. of Furnaces	Volume (cu m)	Coefficient	Operating Days	Production
1	166	0.73	340	78.4
2	169	0.73	340	78.7
3	173	0.73	340	80.6
Total Production				237.7

The estimated 1953 coefficient is 0.71

Pig Iron Production
1953

Thousand Metric Tons

No. of Furnaces	Volume (Cu m)	Coefficient	Operating Days	Production
1	166	0.71	340	79.5
2	169	0.71	340	80.8
3	173	0.71	340	82.7
Total Production				243.0

f. Steel-making Facilities
There are three OH furnaces of about 50-MT, 30-MT and 20-MT capacity, with hearth areas of 25.5, 18.2, and 13.2 sq m at the plant. The 1950 coefficient norm was 4.4, and the 1952 estimate is 5.5. 5/

Steel Production
1952

Thousand Metric Tons

No. of Furnace	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	25.5	5.5	325	45.5
2	18.2	5.5	325	32.5
3	13.2	5.5	325	23.6
Total Production				101.6

g. Primary Rolling Facilities.
None.

h. Finishing Rolling Mills.
None.

The 1953 coefficient is estimated to be 5.6

Steel Production
1953

Thousand Metric Tons

No. of Furnace	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	25.5	5.6	325	46.4
2	18.2	5.6	325	33.2
3	13.2	5.6	325	24.1
Total Production				103.7

i. Intraplant Services.
The plant has a power installation, but capacity is unknown.

A cement plant is located at the mill, and uses some slag for construction material. 6/

j. Products and Production.
The plant produces pig iron, some vanadium alloy pig, silico-manganese, and OH steel. 7/

Production Figures 8/
1913 - 1953

Thousand Metric Tons

Year	Pig Iron	Steel
1913	27.7	
1929/30	103.0	66.0
1934	78.0	39.6
1935	73.9	41.3
1936	94.8	57.6
1944	180.0	110.0
1952	237.7	101.6
1953	243.0	103.7

k. Distribution.
No information available.

l. Plant Efficiency.
Production was under Plan in 1942, and over Plan for 1946 and 1947. 9/

m. Administration.
The mill is subordinate to Glavspetsstal and the Ministry of Ferrous Metallurgy. 10/

n. Personnel.
In 1944 there were 3,000 workers at the plant, under Markov as director. 11/

o. Locational Characteristics.
No information available. 25X1A2g

3. Severak Metallurgical Plant. [redacted]

a. Location.
56°30'N-60°10'E, Polevskoy, Sverdlovsk Oblast, Urals, RSFSR. The plant site is actually northwest of the residential section of Severak, which itself is a suburb of Polevskoy.

b. History and Development.
The Severak Plant was started about 1911. Some expansion took place in the early 1930's. Up until the BF was abandoned around 1940, the Severak Works had been integrated. The greatest expansion took place in the years 1945 to 1948, when the rolling mill facilities were enlarged. By 1950 Severak was one of the three most important tinplate producers in the USSR. At one time it was claimed that tinplate produced here was sufficient to fulfill one-half of the canning industry's tin can input requirements. At the present time Severak boasts the foremost tinplate mill in the USSR. 1/

c. Raw Materials and Other Inputs.
The sources of supply of iron ore, pig iron, scrap, various acids, zinc bars, tin bars, sunflower oil, fuel oil, and other inputs are unknown. 2/

d. Coal and Coke.
A large amount of coal for use in firing soaking pits, reheating furnaces, annealing furnaces, and steam boiler installations is received daily from the vicinity of Sverdlovsk. 3/

e. Ironmaking Facilities.

The obsolete 90-cu m blast furnace, which had been producing about 32,500 MT of pig iron annually, was abandoned before World War II. 4/

f. Steelmaking Facilities.

The Severak OH shop has 4 100-MT oil-fired furnaces. The first 2 furnaces were built before World War II and have hearth areas of 34 sq m each. No. 3 OH was under construction in 1941, and No. 4 OH was finished before 1945. Each has a hearth area of 34 sq m. The 1947 coefficient of utilization was between 3.0 and 3.5, and the steelmaking division of the plant was criticized by Moscow for its low productivity. The estimated 1952 coefficient is 4.5. 5/

Steel Production
1952

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
4	34 each	4.5	325	245.5

The 1953 estimated coefficient is 4.7.

Steel Production
1953

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
4	34	4.7	325	256.2

Steel from the OH is usually cast into ingots 1.5 long, 20 cm by 20 cm at the top and 30 cm by 30 cm at the base. All steel goes to the sheet mills. 6/

Charging of the furnaces is accomplished by two overhead crane charging machines. The pit side of the shop is serviced by 1 and possibly 2 150-MT Demag ladle cranes. 7/

g. Primary Rolling Facilities.

The breakdown of the 1.5 m x 20 cm x 20 cm x 30 cm x 30 cm ingots is accomplished by 2 primary mills located in the same building and using the same soaking pits. Each mill has 2, 3-high 550-mm stands and a crop shear. The semifinished products from these mills are sheet bar and slabs. After shearing, the sheet bar and slabs are cooled by running through a water basin before being conveyed to the slab yard. 8/

The 5 or 6 soaking pits and the primary mills are serviced by a 25-MT overhead crane, which was also used in place of an ingot buggy. The slab yard is serviced by a 10-MT crane. The estimated 1952 production of sheet bar and slabs is 213,500 MT.* 9/

h. Finishing Rolling Facilities.

From the slab yard 25 percent of the steel goes to Sheet Mill No. 1, a prewar department. Three 3-high packrolling stands hotroll sheet bar down to sheet. No. 1 Sheet Mill has a coal-fired reheating furnace; upon discharging, scale is manually broken off by steel brushes. Manually fed, the mill has doublers, shears, inspection tables, and is serviced by a 10-MT crane. A narrow-gage manually pushed transfer car connects the mill with the slab yard. The No. 1 sheet mill produced 46,000 MT of sheet in 1952.** 10/

From the slab yard another 25 percent of the steel goes to Sheet Mill No. 2, a prewar department. Four 3-high mills hotroll sheet from slabs. No. 2 sheet Mill has four coal fired reheat furnaces; upon discharging, steel is manually fed to the mills. The department has 4 shears, inspection tables, and is serviced by two 10-MT cranes. In 1952, production from this shop amounted to 46,000 MT. 11/

Sheet Mill No. 3 is a postwar installation completed about 1948. 50 percent of the slabs go to this department which has 4, 3-high mills hot-rolling slabs down to sheet. The four reheating furnaces are oil-fired. Other equipment consists of 3 shears and a 10-MT crane to service the area. A narrow-gage rail transfer connects the sheet mill and the slab yard. 1952 production from the No. 3 mill was 92,000 MT. 12/

After hot-rolling on the sheet mills, 10 percent of the product is shipped out as black plate in the as-rolled condition. In 1952 this amounted to 18,400 MT. 13/

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* Based on a yield from ingot to semi-finished product of 87 percent.
** Based on a yield from ingot to hot rolled carbon sheet of 75 percent.

The remaining 165,600 MT of sheet goes to the new pickle house built in 1945 and 1946. From the pickle tanks the sheet is transferred by crane to the charging side of the two car bottom annealing furnaces. Each furnace is equipped with 20 cars, and the annealing cycle is 24 to 36 hours at 950° to 1150° centigrade. These annealing facilities were completed in 1946. In addition to the two car bottom furnaces, there exist a number of small annealing bases with hoods in the same building. 14/

After annealing, 66 percent or 121,440 MT of annealed sheet goes to black plate inspection. Here in an area served by two 15-MT overhead cranes, 300 women and 30 men inspect and bundle black plate for shipment. Rejection rates are unknown. Two narrow-gage rail transfers transport finished bundles to the shipping department. 15/

Another 4 percent or 7,360 MT, goes to the hot dip galvanizing shop completed in August 1949. There are two zinc pots here. The remaining 20 percent, or 36,800 MT, goes to the cold finishing department. 16/

The cold rolling mills were finished in 1946 and consist of 3 mills, 3 stands in each continuous 2-high mill. The area is serviced by one 10-MT crane. Production from this department in 1952 amounted to 36,800 MT, of which one-fourth or 9,200 MT, is shipped out as finished temper-passed black plate. The black plate storage area usually had 15,000 MT to 20,000 MT in storage. 17/

27,600, or 15 percent, of the hot-rolled sheet product goes to the tin mill. There are three tin pots in the tin mill, with some room for expansion. Two of the pots were automatic throughout the acid bath, liquid tin, sunflower oil, and bran polishing cycle. The other older pot had no acid bath; this was performed separately by hand dipping. The tin mill is serviced by a 10-MT crane, and the tin mill warehouse by a 5-MT crane. Inspection is done by 300 women. About 27,600 MT of tinplate was produced in 1952. 18/

i. Intraplant Facilities.

Power is sent from outside the plant by high tension line to a transformer station at the works. A mechanical shop and a refractory plant are located at the Severak mill. 19/

j. Products and Production.

Products of the Severak plant are: Oil steel; steel ingots 1.1 m x 20 cm x 20 cm x 30 cm x 30 cm; sheet bar and slabs; hot rolled sheets; black plate 71 cm x 142 cm x 0.35 mm, 0.5 mm, 0.75 mm, 1.00 mm, 1.25 mm, 1.5 mm, 1.75 mm, 2.0 mm, 2.5 mm, 3.0 mm, occasionally 2.25 mm, 4.0 mm, and 5.0 mm; black plate 71 cm x 51 cm x 0.18 mm, 0.24 mm, 0.28 mm, 0.32 mm, 0.35 mm, 0.4 mm,

0.5 mm, occasionally 0.22 mm, and 0.6 mm; occasionally black plate 71 cm x 120 cm; 71 cm x 90 cm, and 51 cm x 35.3 cm, all in the thicknesses given above; galvanized sheets 71 cm x 142 cm x 0.5 mm to 1.0 mm thick; galvanized sheets 71 cm x 71 cm x 0.5 mm to 1.0 mm thick; tinplate 71 cm x 71 cm x 0.125 mm, 0.163 mm, 0.25 mm, and 0.5 mm; and tinplate 71 cm x 51 cm x 0.28 mm, 0.32 mm, seldom 0.24 mm and 0.34 mm. 20/

Black plate is bundled with steel strap into 80-kg packs for the 71 cm x 142 cm plate, and 50-kg packs for the 71 cm x 61 cm plate. Tin plate is packed in 50-kg bundles in wooden boxes. Galvanized sheet packs contained 20 to 25 sheets. 21/

Production Figures 22/
1941, 1952, 1953

Thousand Metric Tons

Year	Pig Iron	Steel	Finished Steel
1936	32.5	68.4	72.0
1941		120.0	
1952		245.5	184.0*
1953		256.2	192.2*

* Based on a 75-percent yield ingot to hot rolled sheets.

k. Distribution.
In 1949, shipments of black plate were principally to the central and northwest sections of the USSR, among them 5 20- and 60-MT cars per week went to Leningrad and the same amount to Moscow, some to Nizhniy Tagil, and once a month one or two cars to Vladivostok. In 1948 and 1949 a total of 20 18-ton cars went to East Germany, and 20 cars to Rumania. There were no shipments in 1948 and 1949 to any other satellites. No indications were found of distribution of ingots from Severak. 23/

l. Plant Efficiency.
Although the mill failed to meet the plan in the second quarter of 1949, it is believed to be an efficient plant, considering the obsolescence of much of its equipment. 24/

m. Administration.
The Severak plant is under the Ministry of Ferrous Metallurgy.

n. Personnel.
In 1941 there were 3,000 workers, but with postwar expansion the number has risen to about 10,000, of whom 40 percent are women. The Director in 1948 was (fnu) Revebtsov. 25/

o. Locational Characteristics.
No information available.

4. Revda Metallurgical Plant. (Revda Metiz Metallurgicheskiy Zavod, RMMZ). [redacted] 25X1A2g

a. Location.
56°49'N - 59°58'E, Revda, Sverdlovsk Oblast, Urals, RSFSR. The plant is on the east side of Revda.

b. History and Development.
Revda was founded some time before the 1917 Revolution. A considerable amount of new construction has been under way at Revda since 1945, but it is believed that facilities being erected are duplications of existing operatings rather than an enlargement in the scope of operations. At one time there were two small charcoal blast furnaces in Revda, although their location is not pinpointed. They are not in operation now. The Revda plant seems to hold a fairly important place in the production of wire, nails, and other small wire products. 1/

c. Raw Materials and Other Inputs.
All raw materials arrive by rail. No other information available. 2/

d. Coal and Coke.
Coke is used in the cupolas at Revda. The source of this coke is not known. 3/

e. Ironmaking Facilities.
There are three cupolas producing cast iron. 4/

f. Steelmaking Facilities.
In 1935 the mill had 1 20.25 OH furnaces. The third OH added since the outbreak of World War II was completed in 1943, bringing the total OH at Revda to 4. The estimated size of these 4 OH's is 20 sq m each, or about 30 MT capacity apiece. Estimated coefficient of utilization for 1952 is 5.0. 5/

Steel Production
1952

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
4	80	5.0	340	136.0

The estimated 1953 coefficient is 5.2

Steel Production
1953

Thousand Metric Tons

No. of Furnaces	Hearth Area (sq m)	Coefficient	Operating Days	Production
4	80	5.2	340	141.5

Furnaces are of the three-door type, fired by both oil and producer gas generated by six gas generators. 6/

g. Primary Rolling Facilities.
In the mill rolling wire rod there are two roughing stands taking small ingots for breakdown passes. Size of the roughing stands is 500/550-mm. 7/

h. Finishing Rolling Facilities.
The wire rod mill in addition to the two roughing stands has 350/300-mm intermediate stands and 4 300/275-mm finishing stands. The wire rod mill, produced by Demag, was installed in 1938. 8/

In the wire drawing department there are about 19 American wire drawing machines for drawing 8-mm wire; 6 machines for drawing 3 to 4-mm wire; and 14 American machines for drawing wire down to 0.03 mm. A great deal of this equipment arrived and was installed in 1949. 9/

The nail and screw shops of the Revda plant receive wire from the drawing department and turn out a large quantity of barbed wire, nails, and other

wire products. In the newer nail shop there are 19 nail machines. 10/

Facilities exist for galvanizing wire. 11/

i. Intraplant Services.
Power is brought in by a high tension line to the transformer station. The power originates in Sverdlovsk. The mill has several repair shops and an old brick kiln. 12/

j. Products and Production.
The plant produces cast iron, OH steel ingots, small structural shapes, wire rod, wire, nails, and other small wire products. 13/

Production Figures 14/
Selected Years, 1936 to 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1936	42.0	
1938		30.0
1942 Plan		100.0
1952	136.0	98.0*
1953	141.5	101.8*

k. Distribution.
No information available.

l. Plant Efficiency.
The plant received a third premium for the rolling mill section in June 1946. In May 1947 the Revda mill overfulfilled the plan for steel production and rolled steel production. 15/

One wire drawer produced one ton of wire in 6.4 minutes in 1950, a 14 percent increase, enabling the plant to eliminate the wire drawing bottleneck and meet the 1950 Plan for wire. 16/

m. Administration.
The plant is believed to be subordinate to Glavmetis and the Ministry of Ferrous Metallurgy.

n. Personnel.
The plant has between 2,000 and 6,000 employees. In 1946 the director was Davidov, but he was replaced by Bolshchikov in 1948. 17/

* Based on a yield from ingot to wire of 0.72.

c. Locational Characteristics.
No information available.

25X1A2g [redacted]

5. Nizhniye Sergi Metallurgical Plant.

a. Location.
56°30'N-59°16'E, Nizhniye Sergi, Sverdlovsk Oblast, Urals, RSFSR.

b. History and Development.
The plant was founded in 1743 and re-equipped in 1891. Prior to 1917 the installation was known as the Nizhniye Sergi Smelter and Steel Works and belonged to the holdings of the Serginsko-Ufaleisk Blast Furnace Company. Since the Revolution the plant has been modernized by the Soviets.

c. Raw Materials and Other Inputs.
The iron ore used in the BF comes from Yelisavetinsk. Manganese ore comes from Marsyata. 2/

d. Coal, Coke, and Charcoal.
Charcoal comes from wood cut locally. Coal and coke are used for auxiliary purposes. 3/

e. Ironmaking Facilities.
The smelting section has one charcoal BF with a volume of 121 cu m and a hearth diameter of 2,750 mm. The estimated coefficient of utilisation for 1952 is 0.835. 4/

Pig Iron Production
1952 and 1953

Thousand Metric Tons

Furnace No.	Volume (cu m)	Coefficient	Operating Days	Production
1	121	0.835	340	49.3

f. Steelmaking Facilities.
There are definitely 2 OH furnaces of about 25-MT and 35-MT capacity, and possibly a third, in the steelmaking division at Nizhniye Sergi. The two OHs have hearth areas of 15.6 sq m and 19.6 sq m, respectively. Coefficients have been reported as 3.49 in 1936, 3.48 in 1937, 2.85 in 1938, 4.3 in 1945, 4.7 in 1946, and 4.5 in March 1947. The estimated coefficient for 1952 is 6.0. 5/

S-E-C-R-E-T

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	15.6	6.0	325	30.4
2	19.6	6.0	325	38.2
Total Production				68.6

The estimated coefficient for 1953 is 6.1.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	15.6	6.1	325	30.9
2	19.6	6.1	325	38.8
Total Production				69.7

g. Primary Rolling Facilities
The breakdown equipment consists of an 800-mm slab bloomer. A finishing stand at 600 mm completes the primary mills. 6/

h. Finishing Rolling Facilities
Finishing facilities consist solely of a plate and sheet mill. 7/

i. Intraplant Services
The plant has ten auxiliary shops. 8/

j. Products and Production
Products produced at Nizhniye Sergi include charcoal pig iron, OH, slabs, steel plate, and sheet. 9/

Production Figures 10/
Selected Years, 1927 to 1953

Thousand Metric Tons

Year	Pig Iron	Steel	Finished Steel
1927/28	20.5	26.7	24.4
1934	24.1	29.5	27.0
1935	25.4	31.6	32.1
1936	25.0	40.8	33.6
1943	40.0	61.0	
1952	49.3	68.6	49.2
1953	49.3	69.7	49.9

k. Distribution
At one time the plant supplied the Mikhaylovskiy Rolling Mill with steel, but there is no postwar information available on distribution. 11/

l. Plant Efficiency
The production plan for all phases of operation was overfulfilled in 1946, for 11 months of 1947, and for 5 months of 1951. 12/

m. Administration
The plant is subordinate to the Ministry of Ferrous Metallurgy and Glavuralmet. 13/

n. Personnel
In 1941 the plant employed 3,000 people under Levin as Director. 14/

o. Locational Characteristics
No information available.

6. Bilimbay Iron Works. [redacted] 25X1A2g

a. Location
56°58'N-59°49'E, Bilimbay, Sverdlovsk Oblast, Urals, RSFSR.

b. History and Development
The Bilimbay Works was started in 1734 and belonged to the holdings of Count Stroganov up to the time of the 1917 revolution. 1/

c. Raw Materials and Other Inputs

Iron ore for the Bilimbay BF comes from the Bilimbay Basin. The ore analyzes as follows: the magnetite is 39 to 57 percent Fe, less than 1 percent Mn, 14 to 27 percent SiO_2, and up to 0.17 percent P; the hematite is 51 to 58 percent Fe, and about 0.5 percent Mn. The reserves in the basin are estimated at about 1.3 million MT. 2/

d. Coal and Coke

Coal and coke come from the Kuznetsk Basin. 3/

e. Ironmaking Facilities

The plant has an 89-cu m capacity coke-fired BF with an estimated 1952 coefficient of 1.0. No increase in efficiency is noted in 1953. 4/

Pig Iron Production
1952 and 1953

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	89	1.0	340	30.2

f. Steelmaking Facilities

None.

g. Primary Rolling Facilities

None

h. Finishing Rolling Facilities

A cast iron tube shop is the only finishing facility at Bilimbay and has an estimated yearly production of 16,500 MT. Cast iron pipe capacity has variously been reported to be between 26,160 and 36,000 MT per year. 5/

i. Intra-plant Services

A power plant with two turbines is reportedly in operation at Bilimbay. 6/

j. Products and Production

The products at Bilimbay are pig iron and cast iron pipe from 50 mm to 220mm diameter. 7/

Production Figures 8/
Selected Years, 1927 to 1953

Thousand Metric Tons

Year	Pig Iron	Cast Iron Pipe
1927/28	12.30X	NA
1929/30	15.0	NA
1944	30.0	NA
1952	30.2	16.5
1953	30.2	16.5

k. Distribution
No information available.

l. Plant Efficiency
No information available.

m. Administration
Nikopol is subordinate to the Ministry of Ferrous Metallurgy.

n. Personnel
In 1945 the plant director was Puskov. 2/

o. Locational Characteristics
No information available.

25X1A2g

7. Staroutkinsk Metallurgical Plant. [redacted]

a. Location
57°14'N-59°20'E, Staroutkinsk, Sverdlovsk Oblast, Urals, RSFSR.

b. History and Development
The Staroutkinsk works was established in 1725. Although the plant was adjudged obsolete in 1935, evidence points to continued operation. 1/

c. Raw Materials and Other Inputs
Iron Ore is received from the Yelizavetinsk mines. 2/

d. Coal and Coke
No information available.

e. Ironmaking Facilities
In operation at Staroutkinsk is a small 100-cu m charcoal blast furnace. The estimated coefficient for 1952 is 1.6. 3/

Pig Iron Production
1952

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	100	1.6	340	23.4

The estimated 1953 coefficient is 1.5.

Pig Iron Production
1953

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	110	1.5	340	25.0

f. Steelmaking Facilities
None.

g. Primary Rolling Facilities
None.

h. Finishing Rolling Facilities
None.

i. Intraplant Services
No information available.

j. Products and Production
The Staroutkinsk plant produces charcoal pig iron.

Production Figures 4/
Selected Years, 1927 to 1953

Thousand Metric Tons

Year	Pig Iron
1927/28	1,487
1934	13.2
1952	23.4
1953	25.0

k. Distribution
No information available.

l. Plant Efficiency
The plan for the first 5 months of 1951 was overfulfilled. 5/

m. Administration
The plant is believed to be under the Ministry of Ferrous Metallurgy.

n. Personnel
The director of the plant is (fnu) Kas achenko. 6/

o. Locational Characteristics
No information available. 25X1A2g

8. Mikhaylovskiy Rolling Mill. [redacted]

a. Location
56°23'N-59°10'E, Mikhaylovskiy, Sverdlovsk Oblast, Urals, RSFSR.

b. History and Development
The works was established in 1812. 1/

c. Raw Materials and Other Inputs
Steel sheet bar for the rolling mill has come from the Mikhaylovskiy Serpinsk works. 2/

d. Coal and Coke
No information available.

e. Ironmaking Facilities.
None.

f. Steelmaking Facilities.
None.

g. Primary Rolling Facilities.
None.

h. Finishing Rolling Facilities.
In the sheet mill there are 6 single stand, 2-high [illegible]-in. mills. 3/

i. Intraplant Services.
No information available.

j. Products and Production.
The sole product of the plant is steel sheet.

Production Figures 4/
Selected Years, 1927 to 1953

Thousand Metric Tons

Year	Finished Steel
1927/28	15.456
1952	20.0*
1953	20.0*

k. Distribution.
No information available.

l. Plant Efficiency.
The rolling mill performed satisfactorily in 1947. 5/

* Based on a yield from sheet bar to sheet of 78 percent.

m. Administration.
The plant belongs to the Ministry of Ferrous Metallurgy. 6/

n. Personnel.
No information available.

o. Locational Characteristics.
No information available.

25X1A2g

9. Nizhnyaya Tura Rolling Mill. [redacted]

a. Location.
58°37'N-59°49'E, Nizhnyaya Tura, Sverdlovsk Oblast, Ural'skaya, RSFSR. Nizhnyaya Tura is eight km northwest of Vyya to which runs a narrow-gage railroad. 1/

b. History and Developments. The metallurgical works with BF was established in 1754. By World War II, however, only the rolling mill was operated, the other facilities having been abandoned as obsolete. 2/

c. Raw Materials and Other Inputs.
Steel sheet bar is obtained from Nushva and Serov. 3/

d. Coal and Coke.
No information available.

e. Ironmaking Facilities.
None.

f. Steelmaking Facilities.
None.

g. Primary Rolling Facilities.
None.

h. Finishing Rolling Facilities.
The rolling mill division has five sheet mills. Each mill is a single stand 2-high 630-mm mill. 4/

i. Intraplant Services.
No information available.

j. Products and Production.
The only steel product of the Nizhnyaya Tura [illegible] is sheets.

Production Figures 5/
Selected Years, 1927 to 1953

Thousand Metric Tons

Year	Finished Steel
1927/28	12.700
1934	11.200
1935	13.700
1952	20.0*
1953	20.0*

k. Distribution.
No information available.

l. Plant Efficiency.
By 1947 the mill was rolling at the 1950 norm. 6/

m. Administration.
The plant belongs to the Ministry of Ferrous Metallurgy. 7/

n. Personnel.
No information available.

o. Locational Characteristics.
No information available.

III. Molotov Oblast.

Molotov Oblast produces about 10 percent of the iron and steel made in the Urals and about 3 percent of the total of the USSR.

Three of the oblast's plants are of medium importance: Chusovoy, the only duplex shop in the Urals, for general production; Molotov for ordnance grade steels supplied to the gun factory of which it is a part; and Lysva for galvanized sheet and tin plate.

One of the four coke plants in the Urals is at Gubakha. The remaining installations in the oblast are at Chermoz, Dobryanka, Pashiya, Lytva--the only bimetallic strip producer in the USSR, Yuge-Kenskiy, Meyker, and at Teplaya Gora.

The oblast is a producer of medium importance and the more important products are coke, pig iron, carbon steels from both open hearths and electric furnaces, alloy steels--including a small amount of stainless steel castings, and some steel forgings.

25X1A2g [redacted]

1. Chusovoy Metallurgical Plant No. 138. 1/

a. Location.

58°20'N-57°48'E, Chusovoy, Molotov Oblast, Urals, RSFSR. The plant, located on Lenin Street in Chusovoy, is favorably situated near the Chusovoy River for transport purposes. 2/

b. History and Development.

The Chusovoy steel plant was established in 1879 by the Kama Corporation. 3/ No definite plans are known for the future of the Chusovoy plant, but it seems apparent that, although small, it is a major producer of quality steels and will benefit from expansion and modernization programs.

c. Raw Materials and Other Inputs.

The iron ores used at Chusovoy are the vanadium-titanium magnetites found along the Vishera River and at Kusa near Zlatoust. Below is an analysis in percent showing two grades of Kusa ore. 4/

Percent

Element	Grade I	Grade II
Fe	52.92	46.16
V	0.358	0.348
P	0.018	0.021
Mn	0.38	0.30

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Dolomite and limestone come from the region near Pechiyo. 5/ Coke fuel for the OH and reheating furnaces is a mixture of coke gas from the Cubatão coke plant and blast furnace gas from the Chaserey blast furnaces. 6/

d. Coke Ovens and Chemicals

Coke for the Chaserey BF comes from Mogi-Guaçu, Cubatão, and Tamarerey. The source of auxiliary coal is unknown. Coal for the charcoal used at Chaserey is cut in the vicinity and floated down the river to the plant. 7/

e. Ironmaking Facilities.

By 1939 there were three BF's with a combined volume of 597 cu m at Chaserey, and all of these furnaces were charcoal fired. 8/ In 1943 a new coke-fired BF of 600 cu m was constructed, making a total of 4 BF's operating until the end of the war in 1945, at which time the small charcoal furnace was abandoned. 9/ The Chaserey plant in 1952 had 3 BF's with volumes of 600 cu m, 297 cu m, and 206 cu m, or a total volume of 1,063 cu m. Two of the furnaces are coke-fired and one is charcoal-fired. 10/ In 1950 the BF coefficient was reported to be 0.91. Subsequently more very low coefficients have been recorded, but these are believed to have been achieved over too short a period of time to constitute a yearly average. For 1952 the BF coefficient is estimated to be 0.85. 11/

Pig Iron Production
1952

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	600	0.85	360	232.0
2	297	0.85	360	90.5
3	206	0.85	360	78.5
Total Production				401.0

The estimated coefficient for 1953 is 0.84. 11 6/

Pig Iron Production
1953

Thousand Metric Tons

BF No.	Volume (cu m)	Coefficient	Operating Days	Production
1	600	0.84	340	243.0
2	257	0.84	340	104.0
3	206	0.84	340	83.4
Total Production				430.4

The BF division modernized the hot blast stove and skip loading operations in 1949, and at the same time a new blower was installed along with automatic blast temperature controls. 12/

During the war the plant started production of sinter with the use of vanadium-bearing chemical waste products from the ferroalloy plant. At first the high chromium content of these waste products did not permit a satisfactory sinter, but by blending with other materials a sinter of proper quality was obtained. Complete operation of the sinter plant has resulted in utilization of all chemical waste products as well as all the BF flue dust. 13/

The product of the Chusovoy BF is properly classified as low alloy vanadium pig iron.

An iron foundry for casting rolling mill couplings is located at the Chusovoy steel plant. 14/

f. Steelmaking Facilities.

Before World War II the OH shop consisted of 4 45-MT OH furnaces, each with a hearth area of 27.5 sq m. 15/ In 1952 these furnaces had a coefficient of 4.4. 16/

Started during 1943 and finished in 1946 was a duplexing shop consisting of two Bessemer converters of 10- or 12-MT capacity

and 2 OH furnaces of 100-MT capacity. The 2 new OH furnaces have a hearth area of about 48 sq m apiece. 17/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
4 OH	27.5 each	4.4	325	157.0
2 Duplex OH			325	260.0*
Total Production				417.0

The estimated 1953 coefficient is 4.8.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
4 OH	27.5 each	4.8	325	157.0
2 Duplex OH			325	260.0*
Total Production				432.0

Chusovoy is the first plant in the USSR to use the duplex process, and a continual effort is being made to improve the technology of producing vanadium slag and steel from low alloy vanadium pig iron.

* Two OH and two converters on duplex process average 6 hours tap to tap on OH furnaces; [(20F) (100 MT each) (4 heats) (325 days)]

The duplex shop has started production of silicon spring steel, which is made possible by the vanadium content of the plant's hot metal. 18/

g. Primary Rolling Facilities.

For breaking down ingots to blooms, there exists at Chusovoy an 800-mm blooming mill reportedly built by Uralmash. Blooming mill capacity is approximately 300,000 MT/year. 19/ For subsequent rolling to billet size there exists a 500-mm billet mill. 20/

h. Finishing Rolling Facilities.

The finishing bar-making facilities consist of a heavy bar mill, 550-mm with 3 stands, and a small bar mill, 250-mm with 10 stands. One source reports the 250-mm bar mill as having 2 350-mm intermediate stands following the 500-mm billet mill and 8 250-mm finishing stands. 21/

For rolling plates there is a 650/470/650-mm 3 high plate mill. 22/

The 370-mm mill rolls light sections such as channels and angles. 23/

A strip mill with a capacity of about 60,000 MT/year is part of the finishing facilities. There are 4 350-mm stands to the mill and the principal product is spring steel strips for the automotive and aircraft industries. At the finishing end of the mill are several controlled cooling furnaces. 24/

i. Intraplant Services.

Although there was a small 850-kw power plant at the Chusovoy plant prior to 1917, no evidence exists of one there now. 25/

j. Products and Production.

The principal products are low-alloy vanadium pig iron, ingots; blooms, billets, bars, and plates, sheets, light channels and sections, reinforcing rod, chrome and silicon spring steel, and some axles and shafting. In addition, before 1940 the plant produced Ferroalloys, which are now administered separately from the metallurgical plant.

During the war, armor plate and shell casings were produced here. 26/

Production Figures 27/
Selected Years, 1913 to 1953

Year	Pig Iron	Steel	Finished Steel
	Thousand Metric Tons		
1913	23.6	45.5	
1927/28	28.9	37.9	
1934	82.6	104.9	87.3
1935	100.5	114.2	102.3
1936	108.0	122.4	
1944	236.0	187.0	135.0
1945	251.0	203.0	146.0
1946	271.0	272.0	195.0
1947	291.0	306.0	230.0
1949	352.0	357.0	270.0
1952	411.0	417.0	300.0
1953	430.4	432.0	312.0

k. Distribution.

At various times shipments of rolled products have been made to Molotov, the Volga-Don canal, to the Kuybyshev hydroelectric plant project, and to the Novo Tagil steel plant. 28/

l. Plant Efficiency.

In 1946 the Chusovoy plant overfulfilled the plan. Recognition was won in the All Union Socialist Competition in 1947, at which time the SF division was particularly cited. Planned quotas were fulfilled in 1949 by the plant, and in 1951 the duplex shop fulfilled its yearly quota by mid-November. 29/ The 1953 plan was fulfilled in all respects. 29a/

During the winter of 1950, Chusovoy experienced serious delays in operation due to a deficiency in ore and coke caused by inefficient stockpiling in the open shipping season. 30/

m. Administration.

The Chusovoy plant is directly under Glavmetalmet and subsequently the Ministry of Ferrous Metallurgy. 31/

a. Personnel.
Before 1950 the plant director was (fnu) Popov. He was succeeded by G. P. Zatulayev. 32/ The director in 1947 was (fnu) Popov.

In 1937 the plant employed about 14,000 persons, and by 1946 the number had risen to 15,000. 33/

c. Locational Characteristics.
No information available.

2. Molotov Steel Plant No. 172. (Father of Russian Artillery Plant).
[redacted] 25X1A2g

a. Location.
58°00'N-56°15'E, Molotov, Molotov Oblast, Urals, RSFSR.
The plant is in the northeast part of Molotov, between the Kama River and the railroad line to Chusovoy. 1/

b. History and Development.
The large ordance plant at Molotov, formerly Perm, was founded in 1863 and was known as the Perm Governmental Cannon Plant. It is probably the largest gun plant in the USSR. In 1922 a large reconstruction project was undertaken at the plant. Nothing is known about the steel producing section, except that during the war some OH furnaces were added. 2/

c. Raw Materials and Other Inputs.
Pig iron comes to the plant from Kushva and Nizhniy Tagil. Some steel shapes come from Chusovoy and Mayskor. Armor plate comes from the Dobryanka plate mill. Ferroalloys are shipped to Molotov from the Chelyabinsk ferroalloy plant. 3/

d. Coal and Coke.
No information available.

e. Ironmaking Facilities.
There is a gray iron foundry at the gun works. 4/

f. Steelmaking Facilities.
There are two OH shops at Molotov with a total of 13 OH furnaces. In addition, 6 electric furnaces and 1 Bessemer converter are part of the steel producing facilities. Two foundries cast gun barrels and ordnance parts, making the plant self-sufficient in its need for castings. 5/

The average hearth area of the 13 OH's is 20 sq m each and the approximate capacity of each furnace is 30 M, while the 6 electric furnaces have an average capacity of 2 M apiece. The size of the converter is unknown, but is estimated to have a 1.5-M capacity. No coefficients are available; however, the estimated 1952 coefficient is 5.0. 6/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
13 OH	20 each	5.0	325	423.5
6 Electric		2 M each		12.0
1 Converter		1.5 M		11.3*
Total Production				445.8

The estimated coefficient for 1953 is 5.2.

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
13 OH	20.0 each	5.2	325	440.0
6 Electric		2 M each		12.0
1 Converter		1.5 M		11.3
Total Production				463.3

* Capacity x 25 charges per day x 300 operating days.

Some of the OH's were completed during the war. The furnaces at the mill burn both fuel oil and producer gas. Some of the electric furnaces produce high-speed steel. 7/

c. Primary Rolling Facilities.
There are two blooming mills at the gun works, but no details are available. 8/

d. Finishing Rolling Facilities.
In 1935 a South 3000-mm heavy plate mill was installed at the plant with a capacity of 60,000 MT/year. 9/

A sheet mill was in operation in 1934, but a much newer sheet mill is believed to be in operation now. The new mill, designed by N. N. Nechayev, rolls metal strip ranging from 30-mm to 0.1 mm thick. A 15-m strip can be converted by this mill into a 0.35-mm sheet in one pass. 10/

Three or 4 other mills of an unknown type are in operation at the plant. 11/

Other finishing facilities include a wire drawing shop, two forge shops, a weldment shop, and a heat treating division with ten vertical hardening furnaces. 12/

i. Intraplant Services.
The daily power consumption of the whole gun factory is 40,000 kw to 50,000 kw, of which 60 percent comes overland from Gubakha. 13/

The plant has an unusually high number of auxiliary facilities such as electrical and mechanical repair shops, which are needed not only by the steel division, but also by the gun producing section. 14/

j. Products and Production.
In addition to the numerous ordnance materials produced by the plant, the steel section produces high speed steel, various special steels, chrome-nickel steel, chrome-nickel-molybdenum steel, plate, sheet, and steel wire. 15/

Production Figures 16/
Selected Years, 1944 to 1953

Thousand Metric Tons

Year	Steel	Finished Steel
About 1944	351.0	
1952	442.8	294.0*
1953	463.3	304.5*

k. Distribution.
A greater part of the steel produced, both rolled and cast, is consumed by the plant itself. At one time 60,000 MT per year were shipped to the Uralmagon Plant in Nizhniy Tagil. 17/

l. Plant Efficiency.
No information available.

m. Administration.
No information available.

n. Personnel.
There are between 40,000 and 50,000 workers employed in the whole plant. The number employed in the steel section is not known. The plant director is Abram Isayevich Rybkovskiy and the head of the rolling mills is (fnu) Sutyanta. 18/

o. Locational Characteristics.
Expansion of existing facilities may be hindered by the proximity of the Kama River and the Trans-Siberian Railroad.

3. Lys'va Metallurgical Combine imeni Caseta Industriya No. 700

25X1A2g [redacted]

a. Location.
59°34'N-56°39'E, Lys'va, Molotov Oblast, Urals, RSFSR.

* Yield from steel based on a product mix of 67 percent rolled steel and 33 percent cast steel with yields of 72 percent and 55 percent, respectively, or a weighted yield of 66 percent.

b. History and Development.
The Lys'va mill was founded in 1785. In the early 1930's the mill was modernized and new facilities added. During World War II the shell and punch press division from the Kosaya Gora plant in Tula was evacuated to Lys'va. In 1948 plans were formulated for adding an automatic wire mill to the plant. 2/

c. Raw Materials and Other Inputs.
Oil fluxes are shipped to Lys'va from Chusovoy. 2/

d. Coal and Coke.
Coal from the Donets Basin has been used at the plant, although recently it has been partially supplemented by peat cut from nearby turf fields. The metallurgical department uses a mixture of coke gas from the Cebakha Coke Plant and gas generated in producers at Lys'va. 2/

e. Brewmaking Facilities.
Although in early days there had been BF's at Lys'va, they are no longer in operation.

f. Steelmaking Facilities.
In 1936 the Lys'va plant had four OH furnaces of about 30-MT, 30-MT, 30-MT, and 50-MT capacity, with hearth areas of 16.53 sq m, 19.14 sq m, 19.14 sq m, and 25 sq m. The major rehabilitation of some of these OH's was undertaken in 1943 and 1944. By 1952 all furnaces were estimated to have hearth areas of 25 sq m. 2/

The 1948 norm or coefficient was set at 3.76; however, the workers produced 4.6. In 1949 the coefficient exceeded the norm by 0.2. The norm for 1951 was reportedly set at 6.53, but the estimated achieved coefficient for 1952 was 6.0. 2/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1 to 4	25.0 each	6.0	325	195.0

~~S E C R E T~~

The estimated coefficient for 1953 is 6.2.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1 to 4	25.0 each	6.2	325	201.5

Open hearths are both oil and gas fired. In 1949, No. 1 OH made 296 heats against the norm of 160 before a new roof was needed. No. 4 OH melted 275 heats against the norm of 160 heats. 7/

A small steel foundry provided castings for maintenance. 8/

6. Primary Rolling Facilities.
Breakdown facilities at Lys'va consist of a 600-mm 3 high reversing slab mill followed by a 2 high mill. 9/

h. Finishing Rolling Facilities.
There are six sheet mills at Lys'va rolling steel for tinplate, galvanized sheet, and ordinary sheets. Two mills are 3- stand 2- high 670-mm mills, 1 is a 5- stand 2- high 670-mm mill, 1 is a 4- stand 2- high 640-mm mill, 1 is 6- stand 2- high 700-mm mill, and the last is a 5- stand 2- high 700-mm mill. 10/

Other finishing facilities include an annealing division, a galvanizing shop, a tin plating and a stamping section. The galvanizing shop has four Dalenbach galvanizing vats, and the tin mill hot dip facilities consist of twelve units. 11/

A far-reaching mechanization of sheet rolling operations at the Lys'va plant was achieved between 1946 and 1950 by installing sheet doublers, scale removers, and conveyors. 12/

i. Intraplant Services.
There is a 10,000-kw power station south of the plant on the lake which primarily supplies power to the steel mill. 13/

S E C R E T

In addition to the ordinary mechanical and electrical repair shops, the works contains an oxygen plant. 14/

j. Products and Production.

During the war, they've produced 76- and 152 mm shells, 37-mm AA rockets, bombs, aircraft parachute flares, gas mask bodies and containers, steel helmets, and ammunition boxes. 15/

Present production consists of sheets, galvanized sheets, hot dip tin plate, automobile sheets 0.5 mm to 2.0 mm, and enameled sheet. The metalware section of the combine produces a wide assortment of household products. 16/

Production Figures 17/
Selected Years, 1927 to 1952

Thousand Metric Tons

Year	Steel	Finished Steel
1927/28	65.177	57.074
1929/30	79.0	80.0
1934	99.8	69.7
1935	105.0	87.0
1936	126.0	96.0
1943	120.0	
1952	195.0	140.0
1953	201.5	144.8

In 1927/28, 19,000 MT of tin plate were produced, along with 18,000 MT of galvanized sheet. About 1943 the tin plate production was reported to be 34,000 MT/year. 18/

k. Distribution.

No information available.

l. Plant Efficiency.

The plan for the complete metallurgical cycle was overfulfilled in 1946. The power station was awarded a premium in June 1946. The 1949 plan was completed in September. The plant overfulfilled the plan for the first 5 months of 1950. 19/

m. Administration.
The mill is subordinate to Glavuralmet and the Ministry of Ferrous Metallurgy. 20/

n. Personnel.
The director prior to 1950 was (fnu) Dyelovtsov. There were apparently two directors in 1950, and it is not known which is the later of the two. They are A. Tregubov and I. F. Belobrov. In 1943 the Lys'va Works employed about 3,000 people. 21/

o. Locational Characteristics.
No information available.

25X1A2g

4. Gubakha Coke-Chemical Plant. [redacted]

a. Location.
58°52'N-57°36'E, Gubakha, Molotov Oblast, Urals, RSFSR.
The plant is next to the power station on the right bank of the Kosva River. 1/

b. History and Development.
Construction of the coke works started in 1930 and was originally scheduled for completion by 1937. Progress at Gubakha lagged, and by 1935 only the first two batteries were finished. The third battery was in operation by 1942 and the fourth by 1944. There are no known future expansion plans for this works. 2/

c. Raw Materials and Other Inputs.
No information available.

d. Coal and Coke.
An analysis (made at the plant) of the local Kizel metallurgical coal, which comprises 80 percent to 85 percent of the requirements of the Gubakha plant, is shown below: 3/

	Ash (percent)	Sulfur (percent)	Volatiles (percent)
imeni Kalinin	10.6 to 11.3	3.7 to 4.2	39.7 to 41.81
imeni Volodarskiy	9.3 to 11.2	3.6 to 3.7	39.05 to 40.26
imeni Chkalov	8.5	3.2	44.0
imeni Serov	10.3 to 10.5	3.8 to 3.9	40.7 to 40.74

SECRET

Coal from the Ikel basin is characterized by its valuable coking properties and high yield of gas and byproducts. However, the use of Ikel coal for coking requires preliminary cleaning. From run-of-the-mine coal, with an ash content of 21.5 percent and a sulfur content of 5.8 percent, 68 percent to 71 percent of concentrate can be obtained with an ash content of 10 percent to 11 percent and a sulfur content of 3.2 percent to 3.3 percent. The phosphorous content of run-of-the-mine coal ranges from 0.007 percent to 0.012 percent. 4/

There are 4 coke batteries at Cukakha consisting of 2 batteries of 47 ovens apiece, a third battery of 35 ovens, and a fourth of 61 ovens for a total of 230 ovens. Part of the ovens are 10 cu m. 5/

Coke Production
Selected Years, 1952 and 1957

Thousand Metric Tons

No. of Batteries	No. of Ovens	Production
2	47 each	403.0
1	35	248.0
1	61	959.0
Total Production		950.0

e. Screening Facilities.
None.

f. Sintering Facilities.
None.

g. Primary Rolling Facilities.
None.

h. Finishing Rolling Facilities.
None.

i. Intermediate Services.
The plant receives power from the nearby power station. 6/

j. Products and Production.
Cukakha produces metallurgical grade coke, coke oven gas, and byproducts.

SECRET

[redacted]

[redacted] 1/
Selected Years, 1937 to 1953

Thousand Metric Tons

Year	Coke
1937	351.0
1940	290.0
1942	500.0
1943	500.0
1944	750.0
1952	900.0
1953	960.0

k. Distribution.
Coke is sent in the direction of Molotov and also beyond the southern Urals. Byproducts are used by the chemical industry. 40 percent of the coke oven gas is burned. Of the remaining 60 percent, some is used at Chelyabinsk and some is piped to the steel pipe station. It is not known what part of the coke production is available to the metallurgical industry of the Urals. 2/

l. Plant Facilities.
The coke plant is a well-managed unit, as indicated by the above-plan events it has run. 2/

m. Administration.
No information available.

n. Personnel.
The plant director is (fnu) Nabilkov. 2/

o. Locational Characteristics.
No information available. 25X1A2g [redacted]

5. Chermoz Metallurgical Plant.

a. Location.
58°46'N-56°10'E, Chermoz, Molotov Oblast, Urals, Rated. 1/
The steel works are on the south bank of the Chermoz River, 4 km west of the confluence of the Kama and Chermoz Rivers. 2/ The only railroad in Chermoz runs from the rolling mill to a pier on the Kama River. 2/

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[redacted]

b. History and Development.

In 1761 Stroganov established an iron foundry and metal processing plant in Chermoz. 1/ Later in Tsarist times, but prior to 1917, the works belonged to the Prince Abamelak Lazarev Iron and Steel Works Company. 2/ Future development plans for the Chermoz plant are unknown.

c. Raw Materials and Other Inputs.

Iron ore for use in steel production comes from the Kuz-Tishera basin and arrives by barge at the Kama River port, where it is transhipped by railroad to the steel works. 3/ Pig iron for steelmaking comes from the Nyukor blast furnace. 4/

d. Coal and Coke.

Coke reportedly arrives from the Kuznetsk Basin, although local peat sources have been exploited in an attempt to make the Chermoz plant less dependent on outside supplies. 5/

e. Ironmaking Facilities.

At one time Chermoz had BF's for making iron, but in the general rehabilitation of the small Urals steel plants it is believed that the BF division was abandoned. The Chermoz plant now depends on shipments of pig iron from Nyukor and probably Chusovoy for its steel making plant. 6/

f. Steelmaking Facilities.

The steel section of the Chermoz plant has two 30-MT OH furnaces. Each furnace has a hearth area of 20 sq m. 10/ The following coefficients are reported 1936, 5.61; 1937, 5.80; 1938, 3.74; 1940, 4.35; and 1951, 4.80. 11/ The 1952 estimate is 4.8.

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
2	20.0 each	4.8	325	62.4

The 1953 coefficient is estimated to be 5.0.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
2	20.0 each	5.0	325	65.0

g. Primary Rolling Facilities.
For breaking down ingots there is a 550-mm slabbing mill which rolls slabs for the sheet mills. 12/

h. Finishing Rolling Facilities.
There are 6 sheet mills with the following characteristics: No. 1 and No. 2 mills are 2- stand 2- high 560-mm mills, No. 3 and No. 4 are 3- stand 2- high 610-mm mills, No. 5 mill is a 2- stand 3- high 610-mm mill, and No. 6 mill is a 1- stand 3- high 610-mm mill. 13/

i. Intraplant Services.
The plant is equipped with a powerplant containing two turbines of unknown capacity, a mechanical workshop, and an electrical workshop. 14/

j. Products and Production.
Open-hearth steel ingots 120 cm by 30 cm by 20 cm and plates and sheets 1 mm to 15 mm thick by 1 m long by 1 m wide are produced at Chermoz. 15/

Production Figures 16/
Selected Years, 1934 to 1953

Thousand Metric Tons

Year	Pig Iron	Steel	Finished Steel
1934	30.7	32.0	23.9
1935	41.1	39.6	30.1
1936	42.0	49.2	33.6
1943	N.A.	50.0	N.A.
1952	0	62.4	46.8*
1953	0	65.0	48.7*

k. Distribution.
Some steel is shipped to Dobryanka and Molotov. Other destinations are not known. 17/

l. Plant Efficiency.
The 1946 plan was overfulfilled. 18/

m. Administration.
The controlling ministry is believed to be the Ministry of Ferrous Metallurgy. Administratively, the Chermoz plant controls the Meykor Iron Works. 19/

n. Personnel
Director Lapukhin is the plant head and controls the efforts of about 5,000 or 6,000 workers. 20/

o. Locational Characteristics.
Chermoz is one of several northwest Urals metallurgical centers not located on a railroad connected to the rest of the Urals railroad net. Because the Kama River is frozen over during the winter, the steel works is dependent on supplies stockpiled during the shipping season.

* Based on a yield from ingot to plate and sheet of 75 percent.

25X1A2g

6. Dobryanka Steel Plant. (Komintern Steel Plant) [redacted]

a. Location.
58°27'N-56°25'E, Dobryanka, Molotov Oblast, Urals, RSFSR. Dobryanka is not connected with the Urals rail net, and must use the Kama River as a means of supply. 2/

b. History and Development.
The Dobryanka and Sofisk Iron and Steel Works was founded in 1725, and prior to 1917 belonged to the steel holdings of Count Stroganov. 3/ Plans for future developments are unknown.

c. Raw Materials and Other Inputs.
Iron ore requirements at Dobryanka are limited to feed and charge ore for the OH shop. Origin of the cast pig iron used in the OH shop is not definitely known, but probably some comes from Mayker and the rest through Molotov from other Urals plants.

Incoming plant supplies are shipped over the narrow-gage railroad from the Kama River docks. According to a report by the harbormaster at Dobryanka, the plant needs about 138,000 MT of raw materials a year. All raw materials must be delivered during the navigation season. Due to the lack of good organization at the harbor, only fuel was supplied in sufficient quantities in 1946. The scrap requirement in 1946 was 30,000 MT, of which only 8,000 MT was delivered, and still less of the pig iron requirement was completed. Incoming shipments of dolomite and limestone were almost nonexistent in 1946. 4/ Fuel oil is piped from oil barges on the Kama River to storage tanks at the plant. 5/

d. Coal and Coke.
Coal is used only for auxiliary purposes at Dobryanka, as there are no coking facilities. Coal comes from the Donetz Basin and from Karaganda. 6/

e. Ironmaking Facilities.
The plant has a puddling furnace for making sponge iron, in addition to an iron foundry. 7/

f. Steelmaking Facilities.
In the OH shop at Dobryanka are 2 35-MT OH furnaces, each with a hearth area of 18.8 sq m. 8/ These furnaces were originally installed in 1900, but subsequently have been modernized. 9/ Coefficients

of utilization of OH furnaces are reported as follows: 1936, 3.12; 1937, 3.33; 1938, 3.34; 1950 plan, 5.60; and actually attained for a short period in 1950, 7.14. The 1952 estimated coefficient is 5.0. 10/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
2	18.8 each	5.0	325	61.2

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
2	18.8 each	5.2	325	63.5

In addition to the OH shop, one source reports an electric furnace shop of 2 furnaces of 1- and 8- MT capacity, producing 8,500 MT/year. 11/ Because this information is not confirmed at this time, the production will not be carried.

g. Primary Rolling Facilities.

No information is available as to how ingots are broken down in preparation for the sheet rolling mill.

h. Finishing Rolling Facilities.

In 1940, Dobryanka had one of the two heavy plate mills in the Urals, although it was quite old and had a rather small capacity. The mill is a 3- high reversing sheet and plate mill, 750/500/750-mm, powered by a 500-horsepower steam engine. 12/ The capacity of this mill was reported to be 54,000 MT/year. 13/

i. Intraplant Services.

The power plant at Dobryanka has 2 AEG turbines and 2 coal fired boilers. 14/ A mechanical repair shop is available for mechanical repairs to the rolling mill. 15/

j. Products and Production.

The products are OH steel ingots, sheets, and plate. 16/

Production Figures 17/
Selected Years, 1934 to 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1934	26.1	21.0
1935	31.2	23.4
1936	37.2	28.8
1941	60.0	54.0
1944	70.0	
1952	61.2	49.0*
1953	63.5	50.8*

k. Distribution.

Products are shipped from Dobryanka through the port on the Kama River by barge to Molotov, where transfer is made to rail. In 1946, 12,000 MT of boiler plate piled up at the dock because of inadequate shipping. 18/

l. Plant Efficiency.

The Dobryanka plant fulfilled the 1947 plan for steel production 45 days ahead of schedule. 19/

m. Administration.

It is not definitely known to what ministry the Dobryanka plant is responsible, but it is believed to be the Ministry of Ferrous Metallurgy.

n. Personnel.

In 1941 the plant had 5,000 employees. The director of the works is (fnu) Kiselev. 20/

* Based on a yield from ingot to heavy plate of 80 percent.

c. Locational Characteristics.
Dobryanka is one of several northwest Urals metallurgical centers not located on a railway connected to the rest of the Urals railroad net. Because the Kama River is frozen over during the winter, the steel works is dependent on supplies stockpiled during the shipping season.

25X1A2g

7. Pashiya Iron Works. [redacted]

a. Location.
58°26'N-58°16'E, Pashiya, Molotov Oblast, Urals, RSFSR. The plant is on the north side of Pashiya. 1/

b. History and Development.
The Pashiya works was founded in 1785. 2/

c. Raw Materials and Other Inputs.
About one-half of the iron ore requirements are fulfilled by local mines and the rest is supplied from the Kushva-Nizhniy Tagil area. Dolomite is furnished by the big dolomite mines in Pashiya. 3/

d. Coal and Coke.
Wood for making charcoal is obtained from local forests. 4/

e. Ironmaking Facilities.
There are 2 charcoal blast furnaces in operation with capacities of 168 cu m and 165 cu m. The estimated 1952 coefficient is 1.6. 5/

Pig Iron Production
1952

Thousand Metric Tons

Furnace No.	Volume (cu m)	Coefficient	Operating Days	Production
1	168	1.6	340	35.7
2	165	1.6	340	35.0
Total Production				70.7

The estimated 1953 coefficient is 1.5.

Pig Iron Production
1953

Thousand Metric Tons

Furnace No.	Volume (cu m)	Coefficient	Operating Days	Production
1	168	1.5	340	38.1
2	165	1.5	340	37.4
Total Production				75.5

f. Steelmaking Facilities.
None.

g. Primary Rolling Facilities.
None.

h. Finishing Rolling Facilities.
None.

i. Intraplant Services.
No information available.

j. Products and Production.
The works produces charcoal pig iron.

Production Figures 6/
Selected Years, 1927 to 1953

Thousand Metric Tons

Year	Pig Iron
1927/28	23.444
1929/30	65.0
1934	54.0
1935	42.8
1936	43.2
1952	70.7
1953	75.5

k. Distribution.
No information available.

l. Plant Efficiency.
No information available.

m. Administration.
The plant is believed to be under the Ministry of Ferrous Metallurgy.

n. Personnel.
700 employees worked here in 1941 under the supervision of (fnu) Yermakov. 7/

o. Locational Characteristics.
No information available.

8. Nytva Metallurgical Plant. [redacted]

a. Location.
57°56'N-55°20'E, Nytva, Molotov Oblast, Urals, RSFSR. Nytva is at the end of a spur railroad line 25 km south of the Kirov-to-Molotov mainline. The steel mill is on the northeast side of Nytva near the west bank of the Kama River. 1/

b. History and Development.
The Nytva plant, one of the oldest in the Urals, has been in existence since 1756. In 1913 the plant had puddling furnaces and produced only roofing sheet. Prior to 1917, the installation was part of the Kama Corporation. At one time there was a charcoal blast furnace at Nytva, although in 1933 the plant had only rolling mills. Now, however, quality steel is produced at Nytva, and the plant seemingly is destined to play a small but important part in Soviet production as the only bimetallic strip producer in the USSR. 2/

c. Raw Materials and Other Inputs.
Although steel is shipped to Nytva for rolling, no information exists as to the probable source.

d. Coal and Coke.
No information available, but coal and coke would only be needed for auxiliary purposes.

e. Ironmaking Facilities.
Charcoal pig iron and sponge ironmaking facilities

at Nytva have apparently been discontinued.

f. Steelmaking Facilities.

There are at least two and possibly more OH furnaces at Nytva. The estimated hearth area of the 2 furnaces is 6.5 sq m each, or a rated capacity of 10 MT. 3/

Steel Production*
Selected Years, 1952 and 1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Rated Capacity	Heats/Day	Production
2	6.5 each	10 MT each	3	19.5

g. Primary Rolling Facilities.

Although two reports mention a roughing mill, no details are known as to the size of this unit. 4/

h. Finishing Rolling Facilities.

A sheet mill has been in operation here since 1935. It is believed that two cold rolling mills that were reported under construction are also in operation. The hot mill has a reported capacity of 45,000 MT/year, and the cold mills have a combined capacity of 28,000 MT/year of bimetallic strip. 5/

i. Intraplant Services.

Power is supplied by the powerplant at Nytva which has a capacity between 3,500 kw and 6,000 kw. 6/

j. Products and Production.

Products of the Nytva plant are quality OH steel, hot rolled sheets, and bimetallic strip. 7/

* No coefficients of utilization available.

Production Figures 8/
Selected Years, 1913 to 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1913		19.0
1927/28		31.8
1952	19.5	40.0
1953	19.5	40.0

k. Distribution.
Steel is shipped from Nytva by rail and by the Kama River during the navigation season. Destinations are unknown, but the hot rolled sheet is consumed locally while the bimetallic strip is consumed all over the USSR. 9/

l. Plant Efficiency.
The 1947 plan was fulfilled at Nytva 41 days early. 10/

m. Administration.
No information available.

n. Personnel.
In 1945 there were 4,500 workers at Nytva under Director G. Derevyanko. 11/

o. Locational Characteristics.
No information available.

9. Yugo-Kamskiy Machine Building Plant. (Agricultural and Petroleum Machinery Plant) [redacted] 25X1A2g

a. Location
57°42'N-55°35'E, Yugo-Kamskiy, Molotov Oblast, Urals, RSFSR. Yugo-Kamskiy is about 60 km south of Molotov and 12 km east of the Kama River. A spur line runs from the barge docks on the Kama to the plant area. 1/

b. History and Development
The original Yugo-Kamskiy Iron and Steel Works was founded in 1774. Before 1917 the mill was known as the South Kama Iron Works. Very little modernization has been achieved at the plant, and there are no known plans to improve the status of the operation. 2/

c. Raw Materials and Other Inputs.

Most raw materials are shipped down the Kama by barge and transported overland to the plant by a narrow-gage steam and diesel powered spur railroad line. Occasionally in winter when pig iron is in short supply, trucks from Molotov bring material overland. All refractories arrive by truck. Stockpiles of raw materials for the winter when the Kama is forzen are located at the river bank. Actual source of raw materials is unknown. 3/

d. Coal and Coke.

No information available.

e. Ironmaking Facilities.

A small amount of cast iron is produced for plant use. 4/

f. Steelmaking Facilities.

There are 2 oil fired OH's of about 35 and 5 MT capacity of Yugo-Kamskiy producing steel for castings and ingots for the rolling mill. One furnace has a hearth area of 22.4 sq m, and the other is a very small furnace with a reported hearth area of 3.5 sq m. The estimated 1952 coefficient is 4.5. 5/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	22.4	4.5	325	32.8
2	3.5	4.5	325	5.2
Total Production				38.0

The estimated 1953 coefficient is 4.6.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	22.4	4.6	325	33.5
2	3.5	4.6	325	5.3
Total Production				38.8

g. Primary Rolling Facilities.
The breakdown mill is a steam-driven 3- stand 3- high 500-mm billet mill. After the hot saw the billet is 2 m long by 8 cm by 8 cm. 6/

h. Finishing Rolling Facilities.
Billets proceed from the hot saw to a reheating furnace. From the furnace the billets feed a steam-driven 6- stand 3- high 250-mm rod and bar mill. The rod product usually rolled is 8 to 10 m long by 13 mm in diameter. 7/

i. Intraplant Services.
Power is generated at the plant by 1 American diesel generating unit and 1 Russian steam turbine. 8/

j. Products and Production.
Iron and steel products at Yugo-Kamskiy are cast iron, OH ingots and castings, billets, bars, and rod. 9/

Production Figures
Selected Years, 1944 to 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1944	30.0	25.2
1952	38.0	28.7*
1953	38.8	29.3*

* Based on No. 1 OH producing bar steel with a yield fron ingot to bar of 0.78, and No.2 OH producing castings with an average yield of 60 percent.

k. Distribution.
All steel produced at the plant is consumed in producing finished machinery and parts.

l. Plant Efficiency.
Efforts were made in 1952 to surpass the annual production plan by the 21 December. 10/

m. Administration.
Yugo-Kamskiy has been under the Ministry of Machine Building. 11/

n. Personnel.
The plant director is (fnu) Maleletkin. 12/

o. Locational Characteristics.
No information available.

25X1A2g

10. Maykor Iron Works. (Gorkov Iron Works) [redacted]

a. Location.
59°01'N-55°51'E, Maykor, Molotov Oblast, Urals, RSFSR. The plant is situated on the In'va River. The only railroad at Maykor runs east 20 km from the iron plant to Ust Pozhva on the Kama River. 1/

b. History and Development.
The Maykor Iron Casting Plant was established in 1811 and reequipped in 1914. 2/ Major reconstruction of the BF division took place in 1939. 3/ Future plans for Maykor are not known.

c. Raw Materials and Other Inputs.
Iron ore is obtained from the iron-vanadium ores of the Vishera River valley north of Berezniki. These Vishera ores are very poor in iron content (25 percent to 30 percent) and require extensive preparation before smelting. Ore is shipped down the Kama River by barge to Ust Pozhva, where it is transferred to narrow-gage railroad running to Maykor. 4/ One source reported that incoming ore shipments averaged about 600 MT/day. 5/ Limestone is received from Pashiya. 6/

d. Coal, Coke, and Charcoal.
Wood is cut in the vicinity of Maykor or floated down the In'va River from places further west. Charcoal is prepared in about 105 to 120 charcoal kilns near the plant. 7/

e. Ironmaking Facilities.
The Maykor plant has one charcoal-burning BF, put into operation in 1940. The volume of the furnace is 180 cu m, and in 1948 a coefficient of utilization of 1.50 was obtained. 8/

Pig Iron Production
1952

Thousand Metric Tons

Furnace No.	Volume (cu m)	Coefficient	Operating Days	Production
1	120	1.5	340	40.8

The estimated coefficient for 1953 is 1.4.

Pig Iron Production
1953

Thousand Metric Tons

Furnace No.	Volume (cu m)	Coefficient	Operating Days	Production
1	180	1.4	340	43.7

The molten iron is cast into pigs 50 cm by 30 cm by 25 cm. 9/

f. Steelmaking Facilities.
None.

g. Primary Rolling Facilities.
None.

h. Finishing Rolling Facilities.
None.

i. Intraplant Services.
One source says that the Maykor plant has a 500-kw power plant, although another says that at least part of the power is received over a high tension line from Poshva. 10/

j. Products and Production.
The Maykor plant produces charcoal pig iron.

Production Figures 11/
Selected Years, 1927 to 1953

Thousand Metric Tons

Year	Pig Iron
1927/28	24.28
1952	40.8
1953	43.7

m. Distribution.
Maykor pig iron is probably shipped to Chermoz and Molotov. 12/

l. Plant Efficiency.
No information available.

m. Administration.
The plant is probably under the Ministry of Ferrous Metallurgy. Immediate jurisdiction over the Maykor plant is exercised by the Chermoz Metallurgical Combine. 13/

n. Personnel.
In 1944 and again in 1946 the works was reported as having 4,000 employees. 14/ The plant director is (fnu) Mutovkin. 15/

o. Locational Characteristics.
Maykor is one of several northwest Urals metallurgical centers not located on a railway connected to the rest of the Urals railroad net. Because the Kama River is frozen over during the winter, the iron works is dependent on supplies stockpiled during the shipping season.

25X1A2g

11. Teplaya Gora Iron Works. [redacted]

a. Location.
58°32'N-59°04'E, Teplaya Gora, Molotov Oblast, Urals, RSFSR.

b. History and Development.
The iron works was established in 1880. 1/

c. Raw Materials and Other Inputs.
Iron ore comes from local pits. 2/

d. Coal and Coke.
No information available.

e. Ironmaking Facilities.
There is a 165-cu m charcoal blast furnace in operation at Teplaya Gora. The estimated 1952 coefficient for operation is 1.7. 3/

Pig Iron Production
1952

Thousand Metric Tons

Furnace No.	Volume (cu m)	Coefficient	Operating Days	Production
1	165	1.7	340	33.0

The estimated coefficient for 1953 is 1.6.

Pig Iron Production
1953

Thousand Metric Tons

Furnace No.	Volume (cu m)	Coefficient	Operating Days	Production
1	165	1.6	340	35.1

f. Steelmaking Facilities.
None.

g. Primary Rolling Facilities.
None.

h. Finishing Rolling Facilities.
None.

i. Intraplant Services.
No information available.

j. Products and Production.
The only product of the mill is charcoal pig iron.

Production Figures 4/
Selected Years, 1927 to 1953

Thousand Metric Tons

Year	Pig Iron
1927/28	24.029
1934	27.1
1935	26.4
1936	26.0
1952	33.0
1953	35.1

k. Distribution.
No information available.

l. Plant Efficiency.
The plan was overfulfilled for 1946. 5/

m. Administration.
The plant belongs to the Ministry of Ferrous Metallurgy. 6/

n. Personnel.
No information available.

o. Locational Characteristics.
No information available.

IV. Udmurt ASSR.

The steel produced in the Udmurt ASSR is of minor importance; it accounts for about 1 percent of the national production and 3.5 percent of the Ural production. No coke or pig iron is produced in this area.

One of the plants in the Udmurt ASSR, the Izhevsk Steel and Armament Combine is quite important, however. The other mill at Votkinsk is part of a machine building plant.

The Udmurt ASSR steel mills are producers of carbon and alloy steels.

1. Izhevsk Steel and Armament Combine Nos. 71 and 74.
(Uksa Steel Plant) [redacted] 25X1A2g

a. Location.
56°51'N-53°14'E, Izhevsk, Udmurt ASSR, Urals, RSFSR.

b. History and Development.
The pig iron facilities, now abandoned, were first established in 1760. The weapons plant started operations in 1807. During World War II the addition of evacuated plants enlarged the combine. In 1947 a small amount of new construction was proceeding at the combine; however, significant additions to the plant were not planned. The steel and arms combine as it exists today is an important producer of armaments, motorcycles, and small consumer items. 1/

c. Raw Materials and Other Inputs.
Some iron ore, amounting at times to 180 MT/day, is shipped to the plant. Pig iron, probably from Nizhniy Tagil, arrives daily; some pig iron is occasionally shipped from the direction of Gorkiy. 2/

Scrap is prepared at a scrap yard to the northwest of the plant. Limestone is received at the stone storage area, where four furnaces calcine and burn some of it. 3/

d. Coal and Coke.
Coal and peat arrive in daily carload lots. The peat shipments originate at the turf fields 25 km south of Izhevsk. 4/

e. Ironmaking Facilities.
There are no BF's at Izhevsk. Shop number 17, the iron foundry, has 3 cupolas producing iron for castings. A typical cupola charge in the 2- diameter stack is a ratio of 1.5 cu m of coke, 150 kg of iron scrap, 1,000 kg of steel scrap, and 7 or 8 50-kg pigs of foundry iron; the process is repeated about 7 times in 24 hours. Iron foundry production averages about 120 MT/per 24-hour period. 5/

f. Steelmaking Facilities.
Ingot and casting production at Izhevsk is carried out in Shops 21 and 22. The old OH shop number 21 has 3 OH's and 3 electric furnaces. The newer shop number 22 has 4 OH furnaces. The average size of

the 7 OH's is 35 MT each, and for the electric furnaces 12 MT each. Hearth areas in the OH's are estimated to be 22.5 sq m each. 6/

Reported coefficients of utilization are 1950 norm, 6.24; 1950 achieved, 7.24; 1951 norm, 7.22; 1952 estimate, 6.5. 7/

Steel Production
1952

Thousand Metric Tons

Type of Furnace	Hearth Area (sq m)	Coefficient	Operating Days	Production
Shop 21				
3 OH	22.5 each	6.5	325	142.5
Shop 22				
4 OH	22.5 each	6.5	325	190.0
Shop 21				
3 Electric	12 MT each			36.0
Total Steel Production				368.5

The estimated coefficient for 1953 is 6.6.

Steel Production
1953

Thousand Metric Tons

Shop and Furnace	Hearth Area (sq m)	Coefficient	Operating Days	Production
Shop 21				
3 OH	22.5 each	6.6	325	145.0
Shop 22				
4 OH	22.5 each	6.6	325	193.0
Shop 21				
3 Electric	12 MT each			36.0
Total Production				374.0

The OH furnaces at Izhevsk, some of which are acid-lined, operate on a high scrap charge. 8/

Both furnace shops are served by highlines. Alloy bins are conveniently located at the edge of the OH charging floor. Ingots are usually cast in 1-, 2-, and 3- metric ton sizes. 9/

g. Primary Rolling Facilities.

Breakdown facilities consist of a 850-mm Krupp Gruson slab-bloomer installed in 1934. The mill is electrically driven and is followed by a German Sack built bloom shear. Ingot time in the mill runs 2 to 3 minutes. The estimated yearly capacity is 250,000 MT. 10/

Following the bloomer is a 3- high electrically driven billet mill rolling 12 cm by 12 cm blooms down to 4 cm by 4 cm wire rod billets. Soaking pit facilities consist of four gas fired furnaces. 11/

h. Finishing Rolling Facilities.

Shop 18 is the bar and structural mill. Shop 20, the bloomer, feeds 12 cm by 12 cm billets to shop 18, which has 2 rolling mills, rolling rounds, squares, flats, angles, channels, and small beams. 12/

Shop 14 is the rod mill. The estimated yearly capacity, based on a production of 20 MT/shift, is 130,000 MT. 13/

Shop 19 is the wire drawing mill. There are approximately 8 large and 50 small wire drawing machines. Finished wire sizes range from 16 mm diameter down to small sizes. In addition to the drawing facilities, the shop has heat treating and galvanizing departments. 14/

Other finishing shops include a forge and press department and a large department for the production of files. The forge shop has 8 Erie steam hammers, 2 heavy German Eumako hammers, 3 large cold die presses, and 24 annealing furnaces. 15/

i. Intraplant Services.

The thermal power plant is located just north of the combine and has an estimated capacity available to the mill of 35,000 kw. A small hydro station may supply an additional 5,000 kw to the combine. Power comes on steel high tension poles to the plant and is 220/380 volt 3- phase AC. 16/

The refractory plant produces chamotte and Dinas brick in regular and special shapes. All production is consumed at the mill. 17/

In addition to the usual mechanical and electrical repair shops, the plant has a number of other maintenance units connected with both the steel plant and the armament plant.

j. Products and Production.

Steel mill products produced at the Izhevsk combine are OH and electric steel ingots, iron and steel castings, alloy steel, special steels for the aircraft industry, chrome-silicon steel for automobile parts, tool steel, chrome-nickel-vanadium steel, chrome-nickel-molybdenum steel, blooms, billets, bars, structural shapes, rounds, flats, squares, wire rod, wire, and forgings. 18/

Production Figures 19/
Selected Years, 1943 to 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1943	260.0	
1952	368.5	254.5*
1953	374.0	258.5*

k. Distribution.

Most of the steel produced is consumed at the plant in the production of armaments and consumer goods. However, small amounts of alloy steels are shipped to other parts of the USSR. In the past some billets have been shipped to Leningrad and some profiles to other plants. 20/

l. Plant Efficiency.

The combine received the Order of Lenin on its 135th anniversary in 1944. One source gives the following information on bottlenecks. "Compared with the general level of efficiency of Soviet industry, the plant normally operates well in spite of various shortcomings and bottlenecks. One of the most serious bottlenecks is poor organization of the production process, resulting in delays and even interruptions in the flow of products and materials from workshop to workshop, useless and superfluous work, and waste of valuable materials. In winter shortages of raw materials, particularly of fuels, occur. During periods of severe cold many workshops must shut down for one or two weeks. Also in winter, power shortages occur, causing individual shop shutdowns of up to two weeks. Steam pipes are so badly insulated that they often freeze, bringing production to a standstill. When the temperature reached -40°C all work at the plant stopped. Other bottlenecks are less significant and are typical of general conditions in Soviet industry." 21/

* Based on 67 percent of the steel going into rolled steel with a yield of 72 percent; 33 percent of the steel going into steel castings and forgings with a yield of 63 percent.

m. Administration.
The plant is not believed to be subordinate to the Ministry of Ferrous Metallurgy. During World War II the combine was controlled by the Munitions Trust. 22/

n. Personnel.
The Chief Engineer of the steel plant in 1951 was N. F. Vasil'yev. The whole combine has between 15,000 and 18,000 workers, of whom 40 percent are women. 23/

o. Locational Characteristics.
For a description of the weather hazards that occasionally hamper operations at Izhevsk, see section 1.

2. Votkinsk Machine Building Plant No. 235 imeni Lenin.
[redacted] 25X1A2g

a. Location.
57°03'N-53°59'E, Votkinsk, Udmurt ASSR, Urals, RSFSR.

b. History and Development.
The Votkinsk works was founded in 1761. During World War II, expansion took place as a result of the additon of the evacuated Budyenny Ordnance Plant No. 352 from Novocherkassk and the Kiev Arsenal. Votkinsk is an important component of the ordnance industry, although at present it is more concerned with civilian production. 1/

c. Raw Material and Other Inputs.
No information available.

d. Coal and Coke.
No information available.

e. Ironmaking Facilities.
None.

f. Steelmaking Facilities.
There are four gas-fired OH furnaces of about 30, 35, 40, and 5 MT capacity in operation at the plant with hearth areas of 16.8, 18.6, 22.5, and 4.5 sq m, respectively. The estimated 1952 coefficient is 4.5. 2/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	16.8	4.5	325	24.6
2	18.6	4.5	325	27.2
3	22.5	4.5	325	32.9
4	4.5	4.5	325	6.6
Total Production				91.3

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	16.8	4.7	325	25.6
2	18.6	4.7	325	28.4
3	22.5	4.7	325	34.4
4	4.5	4.7	325	6.9
Total Production				95.3

g. Primary Rolling Facilities.

There is no information available concerning the type of mill on which ingots are broken down. Possibly small ingots are fed directly to the roughing passes on the bar and plate mills.

h. Finishing Rolling Facilities.

Rolling mills consist of a 600/430-mm medium bar mill with 2 3- high 600-mm roughing stands and 4 3- high 430-mm finishing stands a 500/350/270 mm small bar mill with 1 3- high 500-mm roughing stand, 2 3- high 350-mm intermediate stands, and 6 3- high 270-mm finishing stands; and 1 2- stand 2- high reversing 810/650-mm plate mill. 3/

i. Intraplant Services.
The mill has its own power generating facilities of unknown capacity. 4/

j. Products and Production.
Steel products at Votkinsk are OH ingots, bars, and plate.

Production Figures
Selected Years 1952 and 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1952	91.3	67.5*
1953	95.3	70.5*

k. Distribution.
Steel products not consumed in machine building are shipped by rail through Izhevsk. 5/

l. Plant Efficiency.
No information available.

m. Administration.
The Votkinsk works is probably subordinated to the Ministry of Defense. 6/

n. Personnel.
In 1942, 10,000 employees, some of whom were engaged in machine building activities, worked on 3 shifts under the direction of (fnu) Chebotarev. 7/

o. Locational Characteristics.
No information available.

V. Bashkir ASSR: the Beloretsk Complex.

The steel produced in the Bashkir ASSR is of relatively minor importance; it accounts for about 0.5 percent of the national production and about 2 percent of the production of the Urals.

The 3 plants in the area are confined to the Beloretsk Complex, of which the Beloretsk Metallurgical Plant is the only important producer; it makes

* Based on an average yield from ingot to bars and plates of 74 percent.

steel for the Beloretsk Wire Mill and the Tirlyanskiy Rolling Mill.

The Bashkir ASSR steel mills are producers of pig iron, carbon steels from OH furnaces, and some steel castings. 25X1A2g [redacted]

1. Beloretsk Metallurgical Combine No. 706.

a. Location.
53°58'N-58°24'E, Beloretsk, Bashkir ASSR, Urals, RSFSR. The plant site is on the right bank of the Belaya River just below the dam which forms a large lake for steel mill use. The mill is several hundred meters southwest of the Beloretsk railroad station on the eastern outskirts of town. 1/

b. History and Development.
It is believed that a charcoal pig iron producing BF has existed in Beloretsk since 1874. Before 1917 the plant was known as the Beloretsk Iron and Steel Works Corporation. In 1930 the position of the plant was summed up by a government statement that if the Beloretsk Combine was to continue as a profitable enterprise, its output should be devoted to a special product. Charcoal steel is well suited for the best grade of cable wire, and rationalization of the plant should be toward this end. The completion in 1950 of a new rolling mill indicates the continued need for Beloretsk in the economy of the USSR. The Beloretsk Combine probably includes the Beloretsk Steel Wire Plant and the Tirlyansk Rolling Mill, both of which have been reported separately. 2/

c. Raw Materials and Other Inputs.
The principal source of iron ore for Beloretsk is the Zigazinsk-Komarovo field about 90 km west of Beloretsk at the end of the connecting railroad. In addition to the Zigazinsk-Komarovo field, ore comes from Tukan near Zigazinsk and from Magnitogorsk. 3/

In the extensive Zigazinsk-Komarovo field there are numerous deposits of brown iron ore. The ores yield quantities of a good grade for charcoal pig iron. The ores are lumpy and average around 41 percent iron, but numerous analyses of the solid brown ore give an iron content up to 50 percent. Manganese in these ores is rather high, about 1.2 percent on the average. The amount of harmful impurities is low and averages around 0.015 percent sulfur and 0.074 percent phophorus. The the following table shows an analysis of three grades of Zigazinsk-Komarovo ore. 4/

Analysis of Zigazinsk-Komarovo Ores 5/

Percent

Ore Analysis	I	II	III
SiO_2	13.60	18.16	25.80
Al_2O_3	2.90	7.72	10.05
Fe_2O_3	72.00	61.94	51.26
CaO	0.40	0.32	0.45
MgO	0.11	0.35	0.40
MnO	1.48	1.40	1.81
P_2O_5	0.183	0.208	0.081
S	0.018	0.010	0.010
Losses During Roasting	9.50	9.89	10.90
Total	100.19	100.00	100.76
Fe	50.40	43.36	36.12
Mn	1.15	1.08	1.40
P	0.08	0.091	0.036

During the summer, about 60 to 70 20-MT cars of iron ore arrive daily. This is more than the daily requirement, since an attempt is made to stockpile ore for the winter months when the railroads are occasionally snowbound. The only known shortage at Beloretsk is the shortage of ore for the BF's at some periods of the winter. 6/

Limestone comes from a quarry 6 to 8 km southwest of Beloretsk. Twelve 20-ton cars of fist-sized limestone are delivered daily. At the steel mill are 2 lime kilns for calcining lime and a crushing plant with 2 electric mills. 7/

Twenty or 25 20-MT cars of scrap arrive daily. Two 20-MT cars of ferroalloys arrive daily, and smaller quantities of magnesite and casting sand arrive by rail. 8/

If the plant were cut off completely from outside supplies, production could be maintained about one week before shutting down. 9/

d. Coal and Coke.

Coal, coke, and charcoal are delivered by rail. The originating point of the coal and coke for Beloretsk is unknown, although some trains arrive from Ufa. Fifty 20-MT cars of hard coal and 50 to 60 20-MT cars of coke arrive daily. The charcoal used at Beloretsk comes from the vicinity of Inzer and Belagust, about 125 km to the northwest. Twenty to 25 20-ton cars of charcoal arrive daily. In place of coal, attempts have been made to use gasified peat cut from nearby turf fields. There are two hard coal storage areas 120 m by 10 m and 80 m by 8 m. A storage area for slack coal is 60 m by 6 m. Charcoal is stockpiled in an area 50 m by 10 m. 10/

e. Ironmaking Facilities.

At the Beloretsk plant there are two charcoal pig iron-producing BF's. The No. 1 BF was rebuilt to 187 cu m in 1929. At this time the No. 2 BF had a useful volume of 130 cu m. It is thought that this furnace was rebuilt to about 180 cu m. Each furnace has its own skip system and three hot blast stoves. The estimated 1952 coefficient is 1.3. 11/

Pig Iron Production
1952

Thousand Metric Tons

Furnace No.	Volume (cu m)	Coefficient	Operating Days	Production
1	187	1.3	340	49.0
1	180	1.3	340	47.0
Total Production				96.0

The estimated 1953 coefficient is 1.25.

Pig Iron Production
1953

Thousand Metric Tons

Furnace No.	Volume (cu m)	Coefficient	Operating Days	Production
1	187	1.25	340	50.9
2	180	1.25	340	49.0
Total Production				99.9

One source states that a third BF is to be built directly south of the existing facilities, but confirmation of this could not be found. 12/

The molten pig iron from the BF's is either sent by a hot metal ladle on an underground narrow-gage railroad to the OH, or is cast into pigs. Pig sizes are 70 cm by 40 cm to 50 cm by 40 cm, and 75 cm by 25 cm by 8 cm. The open-top hot metal ladle is 3.5 m high by 2.5 m in diameter. The slag from the BF is dumped in the lake at the edge of the plant. 13/ The storage area for iron ore andllimestone measures 60 m by 12 m. 14/

Burdening practice on the 187-cu m BF had at one time been in a ratio of 5 charcoal, 2 coke, 2 iron ore, and a half limestone by volume. 15/

The iron foundry has four cupolas and some pneumatic molding machines. The foundry produces cast iron molds and stools for plant use. 16/

f. Steelmaking Facilities.

There are four oil-and gas-fired OH furnaces of about 55 MT capacity in the steelmaking shop of the Beloretsk Works. It is considered likely that a fifth OH exists, although there is no definite information available. An 8- MT electric furnace is also in production. The hearth areas of the 4 OH's are 30.8, 31.0, 35.0, and 35.2 sq m. The estimated 1952 coefficient is 5.0. 17/

S-E-C-R-E-T

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	30.8	5.0	325	47.5
2	31.0	5.0	325	47.5
3	35.0	5.0	325	54.0
4	35.2	5.0	325	54.0
1 8-MT Electric				8.0
Total Production				211.0

The estimated 1953 coefficient is 5.2.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
1	30.8	5.2	325	52.3
2	31.0	5.2	325	52.6
3	35.0	5.2	325	59.2
4	35.2	5.2	325	59.5
1 8-MT Electric				8.0
Total Production				231.6

The OH shop is housed in a brick and sheet iron building 100 m by 80 m by 15 m. There are two 75-MT German cranes and seven 30- to 35-MT Russian cranes to service the shop. The OH shop has a scrap preparation area, 80 m by 40 m, partially used for ferroalloy storage. The scrap area has 3 20-MT handling cranes. 18/

S-E-C-R-E-T

Ingot sizes produced are 1.8 m by 40 cm square on the bottom by 30 cm square on top, and 1.3 m by 25 cm square on the bottom by 15 cm square on the top. One known charging practice is 20 percent hot metal, 50 percent cold pig, and 30 percent steel scrap. On the basis of an ingot production of 150,000 MT/year, the plant uses 100,000 MT/year of pig iron and 90,000 MT/year of steel scrap. 19/

A critical analysis of the results of experiments in diffusion deoxidation of steel, conducted at Beloretsk in 1938 and 1939, shows that in the basic OH process, diffusion deoxidation with the use of ground coke, charcoal, or crushed electrodes is most effective. 20/

There is a steel foundry in connection with the OH shop. 21/

g. Primary Rolling Facilities.

The Beloretsk plant has a 650-mm sheet bar and billet mill consisting of 2 stands, one a 3-high stand and the other 2-high. The mill, it is believed, also prepares some slabs for the sheet and plate rolling mills. High quality steel is rolled on the mill, and the mill itself is considered to be in fair condition. The probable capacity of the sheet bar and billet mill is 80,000 MT/year. 22/

In 1949 the mills at Beloretsk could not process all steel from the OH's, and it was necessary to ship the surplus to Magnitogorsk for rolling. The new mill, which very probably is some sort of primary mill, was due to go into operation in 1950. 23/

h. Finishing Rolling Facilities.

The rod mill installation has a roughing train consisting of 3 500/475-mm 3- high and 2- high roughing stands, 7 330/300-mm intermediate stands, and 6 300/260-mm finishing stands. The estimated capacity of the rod mill is 60,000 MT/year. 24/

There are at least 2 sheet mills and possibly as many as 3. The two sheet mills are of a modern reversing type, electrically driven, with hydraulic table lifts. These mills have gas-fired reheating furnaces. 25/

i. Intraplant Services.

The power station for the Beloretsk works is located about 3 km from the plant. It is equipped with 4 coal fired boilers and 2 turbogenerators. The estimated capacity of the power plant is 11,000 kw. 26/

Water is pumped to the plant through an underground 120 cm pipe from the pumping station on the lake to the east of the works. 27/

Other auxiliary units at Beloretsk are the breeze block plant, the gas generating unit, the locomotive repair shop, the electric repair shop, the mechanical maintenance shop, the welders shop, the laboratory, and the oil storage area consisting of three tanks. 28/

The roll shop machined and heat treated the rolls for the rolling mills. 29/

The brick factory 2 km to the south of the mill produced fire brick for the OH shop. Sand, clay, quartz, and iron oxide were mixed with water and pressed in an automatic press. The bricks then were carefully dried and placed in a normal coal-fired kiln for four days. The brick factory belonged to the combine. 30/

3. Products and Production.

The plant produces high quality charcoal pig iron as well as some coked pig used either as hot metal for the OH shop or cast into pigs; high quality OH and electric steel ingots; sheet bar and [illegible] plates, 60 to 75 cm by 15 to 25 cm by 0.8 cm thick and also 150 cm by 75 cm by 0.5 cm thick; roofing and corrugated sheeting, wire rods, mostly for subsequent finishing into wire at the Beloretsk Wire Mill; and iron and steel castings. 31/

Production Figures 32/
Selected Years, 1928 to 1953

Thousand Metric Tons

Year	Pig Iron	Steel	Finished Steel
1928/29	85.0	N.A.	N.A.
1929/30	90.0	125.0	100.0
1934	73.3	92.7	77.9
1935	68.3	108.5	93.9
1936	83.0	129.6	114.0
1940	N.A.	180.0	N.A.
1943	N.A.	150.0	N.A.
1952	96.0	211.0	40.0*
1953	99.9	231.3	43.8*

* Does not include semifinished steel shipped to the Beloretsk Steel Wire Plant or the Tirlyansk Rolling Mill.

k. Distribution.

About 100,000 MT of semifinished steel, mostly wire rod, is sent to the Beloretsk Steel Wire Plant annually. An additional 30,000 MT of sheet bar and billets are sent to the Tirlyansk Rolling Mill each year. Roofing sheet is often picked up by trucks and used in Beloretsk, nearby towns, and on kolkhozes. 33/

l. Plant Efficiency.

In 1942 the plant did not meet its assigned quota, but the mill finished the Fourth Five Year Plan (1946-50) 4 months ahead of schedule. The Plan was overfulfilled in 1952. 34/

m. Administration.

Beloretsk is subordinate to the Ministry of Ferrous Metallurgy. 35/

n. Personnel.

Prior to 1948 the plant director was (fnu) Smolnikov. He was succeeded by (fnu) Ovcharenko. The works had about 8,000 employees in 1943, of whom 30 percent were women. 36/

o. Locational Characteristics.

Snow occasionally blocks railroad lines in winter, causing shortages of raw materials. 37/

25X1A2g

2. Beloretsk Steel Wire Plant. [redacted]

a. Location.

53°58'N-58°24'E, Beloretsk, Bashkir ASSR, Urals, RSFSR. The wire plant is located next to the Beloretsk Metallurgical Combine.

b. History and Development.

The wire mill has been in operation since 1914, and has been enlarged and modernized. 1/

c. Raw Materials and Other Inputs.

Steel for drawing into various wire products is received from the Beloretsk Metallurgical Combine in the amount of about 100,000 MT/year. 2/

d. Coal and Coke.

Coal is received only for heating purposes.

e. Ironmaking Facilities.

None.

f. Steelmaking Facilities.
None.

g. Primary Rolling Facilities.
None.

h. Finishing Rolling Facilities.
The wire drawing installation consists of a Klein wire drawing bench with a probable wire production of 90,000 MT/year. There are also four automatic nail machines at the wire mill. 3/

i. Intraplant Services.
Power is received from the Beloretsk Metallurgical Plant. 4/

j. Products and Production.
The plant products steel wire, steel for welding electrodes, steel cable, nails and screws, resistance wires for electric heaters, barbed wire, and steel rivets. 5/

Production Figures 6/
Selected Years, 1952 and 1953

Thousand Metric Tons

Year	Finished Steel
1952	90.0
1953	90.0

k. Distribution.
Steel wire and cable have been supplied by the wire plant to the following enterprises: The Kuybyshev-Stalingrad hydro project; the Volga Don canal project, 1951; machine plants for use in construction of striding excavators; the Red Army and Air Force; and to various fleet uses. 7/

l. Plant Efficiency.
In the first 9 months of 1951, production had increased 17.2 percent over 1950, while fuel and metal were being saved. 8/

m. Administration.
The plant belongs to the Ministry of Ferrous Metallurgy. 9/

n. Personnel.
Between 2,000 and 3,000 workers are employed here. The director is Nodelman. 10/

o. Locational Characteristics.
No information available. 25X1A2g

3. Tirlyansk Rolling Mill. [redacted]

a. Location.
54°18'N-58°35'E, Tirlyansk, Bashkir ASSR, Urals, RSFSR.

b. History and Development.
No information available.

c. Raw Materials and Other Inputs.
Sheet bar and billets for the plate and sheet mills at Tirlyansk come from Beloretsk. In 1935, 30,000 MT of sheet bar were received from Beloretsk. 1/

d. Coal and Coke.
No information available.

e. Ironmaking Facilities.
None.

f. Steelmaking Facilities.
None.

g. Primary Rolling Facilities.
All breakdown of Beloretsk sheet bar and billets is performed on the roughing stands of the two sheet mills.

h. Finishing Rolling Facilities.
The No. 1 sheet mill is a 2- high 3- stand 700-mm mill, and the No. 2 mill is a 2- high 5- stand 700 mm-mill. 2/

In addition to the rolling mills there are facilities for tinning, galvanizing, pickling, and drawing. 3/

i. Intraplant Services.
No information available.

j. Products and Production.
The steel products from the rolling mill are plate, sheet, boiler plate, black plate, roofing sheet, tin plate, and galvanized sheet. 4/

Production Figures 5/
Selected Years, 1934 to 1953

Thousand Metric Tons

Year	Finished Steel
1934	19.8
1935	27.7
1936	34.8
1952	40.0
1953	40.0

k. Distribution.
Some steel is shipped to the Chelyabinsk Tractor plant. Black plate is supplied to the enamelware industry. Recently 270,000 sheets were supplied to the Stalingrad Hydroelectric Power Plant, and more are on order for the Kuybyshev power project. 6/

l. Plant Efficiency.
No information available.

m. Administration.
Tirlyansk is probably subordinated to the Beloretsk Steel Works and to the Ministry of Ferrous Metallurgy.

n. Personnel.
No information available.

o. Locational Characteristics.
No information available.

VI. Chkalov Oblast.

The steel produced in Chkalov Oblast is of minor importance accounting for less than 0.5 percent of the national production and about 1 percent of the production of the Urals.

Only one plant, the South Ural Heavy Machine Building Plant, produces steel. At Novotroitsk near Orsk is the proposed site of a large metallurgical combine that was not yet under construction in 1953.

About the only steel products produced in Chkalov Oblast are castings and forgings.

1. South Ural Heavy Machine Building Plant. (YuZTM, Orsk Plant for Heavy Machine Construction, OZTM) [redacted] 25X1A2g

a. Location.
51°10'N-58°34'E, Orsk, Chkalov Oblast, Urals, RSFSR. The plant site is about 4 km west of the old town of Orsk in the new suburb of Novo-Orsk. The South Ural Combine at Orsk should not be confused with the Orsk-Khalilovo Combine at Novotroitsk about 18 km away. 1/

b. History and Development.
The Orsk Machine Building Plant, as it was originally known, was started in 1938. The iron and steel foundry started production in 1941. Some war production was carried on by the plant; in 1943 the name was changed to South Ural Heavy Machine Building Plant, indicating the greater emphasis placed on this machine producer. Some evacuated equipment was received from Novo-Kramatorsk. 2/

The Fourth Five-Year Plan (1946-50) envisioned the YuZTM plant as the third largest heavy machine plant in the USSR, smaller only than the works in Sverdlovsk and Kramatorsk. The enlargement of the plant was to be made possible by the addition of reparations equipment from Magdeburg and from Hindenburg, Upper Silesia. By the spring of 1949, two-thirds of the total planned construction was reportedly completed, although the OH shop was not yet in production. It is believed that the plant was essentially complete in 1952. The South Ural Works is an important producer of metallurgical equipment. 3/

c. Raw Material and Other Inputs.
No information available.

d. Coal and Coke.
No information available.

e. Ironmaking Facilities.
The foundry has 1 6-MT capacity cupola for the production of gray iron castings. 4/

f. Steelmaking Facilities.
The steel foundry has 2 electric furnaces of 3 and 10 MT capacity. 5/

The OH shop went into production in 1950 with 3 furnaces. It is estimated that in 1952 all 5 planned furnaces are producing. The 40-MT capacity OH's have estimated hearth areas of 22 sq m each, and obtained a coefficient in 1952 of 4.0. 6/

Steel Production
1952

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
5 OH	22 each	4.0	325	143.0
1 Electric		3 MT		3.0
1 Electric		10 MT		10.0
Total Production				156.0

The estimated 1953 coefficient is 4.2.

Steel Production
1953

Thousand Metric Tons

Furnace No.	Hearth Area (sq m)	Coefficient	Operating Days	Production
5 OH	22.0 Each	4.2	325	150.5
1 Electric		3 MT		3.0
1 Electric		10 MT		10.0
Total Production				163.5

g. Primary Rolling Facilities.

A rolling mill building was completed in 1949 and the equipment was being installed. It is believed that this mill, of an unknown type, came from Magdeburg, Germany. 7/

h. Finishing Rolling Facilities.

One report states that there are two cold sheet rolling mills located here. Forging, pressing, and heat treating facilities are in existence at the works. 8/

i. Intraplant Services.
Power is received from the Novo-Orsk thermal power plant by underground cable. A transformer station in the plant steps the voltage down to 380 v. 9/

j. Products and Production.
The principal iron and steel products are gray iron castings, electric furnace and OH steel castings, OH steel, forgings, and probably some type of rolled steel. 10/

Production Figures
Selected Years, 1952 and 1953

Thousand Metric Tons

Year	Steel	Finished Steel
1952	156.0	101.3*
1953	163.5	106.2*

k. Distribution.
Most of the iron and steel products produced are used subsequently in the manufacture of heavy machinery at the South Ural Works.

l. Plant Efficiency.
No information available.

m. Administration.
The YuZTM is under the direction of the Ministry of Heavy Machine Building. 11/

n. Personnel.
In 1949 the plant employed 2500 workers. Since the installation of new equipment between 1949 and 1952, it is believed that the labor force is considerably larger. The director in 1949 was (fnu) Zinoyev. 12/

o. Locational Characteristics.
No information available.

2. Novotroitsk Metallurgical Plant. (Orsk-Khalilovo Metallurgical Works, South Urals Metallurgical Works). [redacted]

25X1A2g

*Based on an average yield to castings and rolled steel of 65 percent.

a. Location.

51°12' N-58°20' E, Novotroitsk, Chkalov Oblast, Urals, RSFSR. The Novotroitsk construction site is about 18 km southwest of Orsk and 1.5 km north of the Ural River. Novotroitsk is a new city formed in 1945. Construction at the site began in 1940, and by 1946 the population had grown to 20,000. 1/

b. History and Development.

Plans for a steel works at Novotroitsk were first formulated during the First Five-Year Plan (1928-32). Actual construction was to take place during the Second Five Year Plan (1933-37), but nothing was started and construction was deferred to the Third Five-Year Plan (1938-42). 2/

Only slight progress was made during the war. Work already begun was stopped. As far as can be ascertained, the only operating installation at the end of the war was the refractory plant. 3/

Since 1945, work has again been proceeding on construction of facilities. In the period of the Fourth Five Year Plan (1946-50), work progressed very slowly, with apparently a good deal of bungling. As of 1950 there probably were still no major production facilities in operation. There is an almost total lack of information since 1950 on progress, which is believed to be great. 4/

The ultimate plan for Novotroitsk has been outlined as 4 BF's producing from 1 million to 1.5 million MT/year of pig iron, 6 or 7 OH's and either 3 or 5 Bessemer converters producing 1.3 million MT/year of steel ingots, rolling facilities capable of producing 950,000 MT/year of finished steel, six coke batteries with an annual capacity of 1,050,000 MT/year, and other auxiliary equipment and facilities. 5/

The completion of the initial phase scheduled for 1950, but not accomplished, called for 2 BF's, 6 OH's, a blooming mill, and 2 coke batteries. 6/

c. Raw Materials and Other Inputs.

The Third Five Year Plan set a quota of 3 million to 3.7 million MT/year of iron ore to be processed for use at the Orsk-Khalilovo Works. Work on ore development fell behind just as plant construction did. 7/

The ore is to be received at the steel plant from the nearby Khalilovo and Akkerman mines. The ores are polymetallic and contain high percentages of nickel, chromium, and cobalt. 8/

Manganese ore under the plan will be obtained from the Kulminsk manganese deposit. 9/

d. Coal and Coke.

Coal for the production of coke at Novotroitsk will be obtained from Karaganda. Some coal may also be obtained from the Kizel fields. 10/

Two of the projected 6 coke batteries were to be finished by 1950. In 1947 construction was proceeding on the first of the 54 oven batteries, but no information is available as to completion or even continuing construction. It is possible that by 1952 two batteries were complete. 11/

e. Ironmaking Facilities.

The only size announced for the 4 proposed BF's is 1,300 cu m. These BF's would be big enough to produce at least the 1.5 million MT/year of pig iron needed according to the plan. Completion of two of these BF's was scheduled for 1950, but it is not possible to establish their operation, although reports indicate that they are under construction. 12/

f. Steelmaking Facilities.

Plans call for 6 or 7 OH's either 3 or 5 converters, producing duplexed steel amounting to about 1.3 million MT/year. No information exists on the beginning of construction on this section of the mill. 13/

g. Primary Rolling Facilities.

The planned blooming mill at Novotroitsk is a 1,000 mm mill. 14/

h. Finishing Rolling Facilities.

Announced plans do not break down the type of rolling mills to be installed to produce about 950,000 MT/year.

i. Intraplant Services.

Plans call for 2 heat and power plants of 60,000 kw each. 15/

j. Products and Production.

Plans call for the production of the following products: coke, natural alloyed pig iron, OH ingot steel, Bessemer steel ingots, duplex steel, axle steel, alloy grades, sheet, rails, wires, transformer and dynamo sheet, refractories, and iron and steel castings. 16/

k. Distribution.

No planned distribution pattern known.

l. Plant Efficiency.
Efficiency of construction is apparently quite poor, as attested to by the fact that in 1 2- year period the project had 3 directors and 5 Chief engineers. 17/

m. Administration.
Upon completion, the plant will be directly subordinated to the production administration of the Ministry of Ferrous Metallurgy.

n. Personnel.
No information available.

o. Locational Characteristics.
No information available.

APPENDIX A

Summary Tables of Production and Capacity of Individual Plants

The summary tables in this Appendix are arranged in alphabetical order.

Alapayevsk Metallurgical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
2 BF	122.7
Steel Production	
4 OH	159.5
Rolling Mill Capacity	N.A.
Finished Steel Production	83.6
Power Plant Capacity	14,000 kw

Asha Iron and Steel Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
2 BF	109.9
Steel Production	
4 OH	155.0
Rolling Mill Capacities	N.A.
Finished Steel Production	108.0
Power Plant Capacity	3,000 kw

Beloretsk Metallurgical Combine
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
2 BF	99.9
Steel Production	
4 OH and 1 Electric	231.3
Rolling Mill Capacities	
Sheet Bar and Billet Mill	80.0
Rod Mill	60.0
Others	N.A.
Finished Steel Production	43.8
Power Plant Capacity	11,000 kw

Beloretsk Steel Wire Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	0
Rolling Mill Capacities	
Various Wire Drawing Installations	90.0
Finished Steel Production	90.0
Power Plant Capacity	0

Bilimbay Iron Works
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
1 BF	30.2
Steel Production	0
Rolling Mill Capacities	
Cast Iron Pipe Mill	26.16 to 36.0
Finished Steel Production	0
Power Plant Capacity	N.A.

Chelyabinsk Agricultural Machine and Tank Factory
Nos. 78 and 200 imeni Ordzhonikidze
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
4 OH and 1 Electric Furnace	168.8
Rolling Mill Capacity	0
Finished Steel Production	101.3
Power Plant Capacity	0

Chelyabinsk Agricultural Machinery Plant
imeni Kolyushchenko
1953

	Thousand Metric Tons
Metallurgical Coke	0
Pig Iron Production	0
Cast Iron Production	
4 Cupolas	20.0
Steel Production	
2 Bessemer Converters	14.4
Rolling Mill Capacity	0
Finished Steel Production	8.6
Power Plant Capacity	0

Chelyabinsk Metallurgical Plant
imeni Bakal
1953

	Thousand Metric Tons
Metallurgical Coke Production	
4 Batteries--244 Ovens	1,680.0
Pig Iron Production	
2 BF	1,091.0
Steel Production	921.0
Rolling Mill Capacities	
1000 mm Blooming Mill	900.0
Rod and Structural Mill	300.0
Other Rolling Mills	N.A.
Finished Steel Production	662.0
Power Plant Capacity	130,000 kw

Chelyabinsk Pipe Rolling Mill
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
5 OH	278.5
Rolling Mill Capacities	
Fretz Moon Butt Weld Pipe Mill	90.0
Mannesmann and Pilger Mills	106.0
Finished Steel Production	204.0
Power Plant Capacity	0

Chelyabinsk Tractor Plant No. 178 imeni Kirov 1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
2 OH and 6 Electrics	51.6
Rolling Mill Capacity	0
Finished Steel Production	28.4
Power Plant Capacity	0

Chermoz Metallurgical Plant 1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
2 OH	65.0
Rolling Mill Capacities	N.A.
Finished Steel Production	48.7
Power Plant Capacity	N.A.

Chusovoy Metallurgical Plant
1953

		Thousand Metric Tons
Metallurgical Coke Production		0
Pig Iron Production		
3 BF		430.4
Steel Production		
4 OH	(172.0)	
2 OH and 2 Bessemers	(260.0)	
		432.0
Rolling Mill Capacities		
"800" Blooming Mill		300.0
Strip Mill		80.0
Other Rolling Mills		N.A.
Finished Steel Production		312.0
Power Plant Capacity		0

Dobryanka Steel Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
2 OH	63.5
Rolling Mill Capacities	
1 Sheet and Plate Mill	54.0
Finishing Steel Production	50.8
Power Plant Capacity	N.A.

Gubakha Coke-Chemical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	
4 Batteries	900.0
Pig Iron Production	0
Steel Production	0
Rolling Mill Capacity	0
Finished Steel Production	0
Power Plant Capacity	0

Izhevsk Steel and Armament Combine Nos. 71 and 74
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
7 OH and 3 Electric Furnaces	374.0
Rolling Mill Capacities	
850 mm Blooming Mill	250.0
Billet Mill	
Bar and Structural Mill	N.A.
Rod Mill	130.0
Wire Drawing	N.A.
Finished Steel Production	258.5
Power Plant Capacity	40,000 kw

Kamensk-Uralskiy Pipe Mill No. 705
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Cast Iron Pipe Production	200.0
Steel Production	0
Rolling Mill Capacities	N.A.
Finished Steel Production	20.0
Power Plant Capacity	0

Kopeysk Machine Building Plant No. 25
imeni Sergei Kirov
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
2 Electric Furnaces and 1 Converter	15.0
Rolling Mill Capacity	0
Finished Steel Production	9.0
Power Plant Capacity	0

Kushva Metallurgical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
3 BF	243.0
Steel Production	
3 OH	103.7
Rolling Mill Capacity	0
Finished Steel Production	0
Power Plant Capacity	N.A.

Kyshtym Machinery Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
1 Open Hearth	8.3
Rolling Mill Capacity	0
Finished Steel Production	5.0
Power Plant Capacity	0

Lysva Metallurgical Combine No. 700
imeni Gazeta Industriya
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
4 OH	201.5
Rolling Mill Capacity	N.A.
Finished Steel Production	144.8
Power Plant Capacity	10,000 kw

Magnitogorsk Cable Factory
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	0
Rolling Mill Capacity	N.A.
Finished Steel Production	100.0
Power Plant Capacity	N.A.

Magnitogorsk Metallurgical Combine
1953

	Thousand Metric Tons
Metallurgical Coke Production	
10 Batteries -- 9 Operating	4,050
Pig Iron Production	
6 BF	3,523.0
Steel Production	
24 OH and 6 Electric Furnaces	4,330.0
Rolling Mill Capacities	
No. 1 Blooming Mill	1,750
No. 2 Blooming Mill	1,500
720 mm Billet Mill	900
630 mm Billet Mill	N.A.
450 mm Billet Mill	N.A.
500 mm Bar Mill	600
300 mm Bar Mill	250
250 mm Bar Mill	250
300 mm Skelp Bar Mill	150
300 mm Skelp Bar Mill	250
All Plate and Sheet Mills	194
Rail Mill	204
Wire Mill	220
Others	N.A.
Finished Steel Production	3,120.0
Power Plant Capacity	175,000 kw

Maykor Iron Works
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
1 BF	43.7
Steel Production	0
Rolling Mill Capacity	0
Finished Steel Production	0
Power Plant Capacity	N.A.

Mikhaylovskiy Rolling Mill
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	0
Rolling Mill Capacity	N.A.
Finished Steel Production	20.0
Power Plant Capacity	N.A.

Min'yar Rolling Mill
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	0
Rolling Mill Capacity	N.A.
Finished Steel Production	75.0
Power Plant Capacity	0

Molotov Steel Plant No. 172
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
13 OH, 6 Electric Furnaces and 1 Converter	463.3
Rolling Mill Capacity	
3,000 mm Plate Mill	60.0
Other mills	N.A.
Finished Steel Production	304.5
Power Plant Capacity	0

Nevyo-Shaytanskiy Rolling Mill
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	0
Rolling Mill Capacity	N.A.
Finished Steel Production	25.0
Power Plant Capacity	N.A.

Nizhnyaya Salda Metallurgical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
2 BF	187.2
Steel Production	
2 OH	120.7
Rolling Mill Capacity	
800 mm Bar Mill	100.0
Other	N.A.
Finished Steel Production	180.0
Power Plant Capacity	0

Nizhniye Sergi Metallurgical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
1 BF	49.3
Steel Production	
2 OH	69.7
Rolling Mill Capacity	N.A.
Finished Steel Production	49.2
Power Plant Capacity	0

Nizhniy Tagil Metallurgical Plant No. 53
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
2 BF	208.6
Steel Production	
4 OH	228.4
Rolling Mill Capacity	N.A.
Finished Steel Production	164.5
Power Plant Capacity	5,000 kw

Nizhniy Tagil Railroad Car Plant No. 183
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
Foundry Iron	N.A.
Steel Production	
10 OH and 5 Electric Furnaces	313.0
Rolling Mill Capacity	N.A.
Finished Steel Production	172.2
Power Plant Capacity	100,000 kw

Nizhniy Tagil Metallurgical Plant imeni Novo Tagil
1953

	Thousand Metric Tons
Metallurgical Coke Production	
6 Batteries	2,466
Pig Iron Production	
4 BF	2,039.0
Steel Production	
12 OH	1,538.0
Rolling Mill Capacity	
No. 1 Bloom-Slab Mill	1,000
No. 2 Blooming Mill	1,000
Rail-Structural Mill	900
Plate Mill	650
Wheel Mill	36
Other Mills	N.A.
Finished Steel Production	1,110.0
Power Plant Capacity	125,000 kw

Nizhnyaya Tura Rolling Mill
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	6
Rolling Mill Capacity	N.A.
Finished Steel Production	20.0
Power Plant Capacity	N.A.

Nizhniy Ufaley Steel Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
1 OH	40.4
Rolling Mill Capacity	
650 mm Billet Mill	40.0
590 mm Sheet Mill	15.0
590 mm Sheet Mill	15.0
Finished Steel Production	21.8
Power Plant Capacity	0

Novotroitsk Metallurgical Plant
1953

	Thousand Metric Tons
No known production	

Nytva Metallurgical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
2 OH	19.5
Rolling Mill Capacity	
Hot Sheet Mill	45.0
No. 1 Cold Mill	14.0
No. 2 Cold Mill	14.0
Finished Steel Production	40.0
Power Plant Ca	0

Pashiya Iron Works
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
2 Blast Furnaces	75.5
Steel Production	0
Rolling Mill Capacity	0
Finished Steel Production	0
Power Plant Capacity	N.A.

Pervoural'sk New Pipe Mill No. 703
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	0
Rolling Mill Capacity	
No. 1 Stiefel Mill	110.4
No. 2 Stiefel Mill	43.2
No. 3 Stiefel Mill	60.0
No. 4 Stiefel Mill	60.0
Stossbank Mill	0
Finished Steel Production	283.5
Power Plant Capacity	0

Pervoural'sk Old Pipe Mill - Staro-Trubny
1953

	Thousand Metric Tons
Metallurgical Coke	0
Pig Iron Production	0
Steel Production	
1 OH	22.9
Rolling Mill Capacity	N.A.
Finished Steel Production	16.0
Power Plant Capacity	0

Revda Metallurgical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
4 OH	141.5
Rolling Mill Capacity	N.A.
Finished Steel Production	101.8
Power Plant Capacity	0

Satka Metallurgical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
2 BF	144.5
Steel Production	
2 OH and 1 Electric Furnace	51.0
Rolling Mill Capacity	0
Finished Steel Production	0
Power Plant Capacity	N.A.

Serov Metallurgical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
5 BF	459
Steel Production	
9 OH	551.0
Rolling Mill Capacity	
Blooming Mill	N.A.
850 mm Bar Mill	N.A.
450 mm Bar Mill	N.A.
320 mm Bar Mill	N.A.
Other Mills	N.A.
Finished Steel Production	396.5
Power Plant Capacity	60,700 kw

Severak Metallurgical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
4 OH	256.2
Rolling Mill Capacity	N.A.
Finished Steel Production	192.2
Power Plant Capacity	0

South Ural Heavy Machine Building Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
5 OH and 2 Electric Furnaces	163.5
Rolled Steel Capacity	N.A.
Finished Steel Production	106.2
Power Plant Capacity	0

Staroutkinsk Metallurgical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
1 BF	25.0
Steel Production	0
Rolling Mill Capacity	0
Finished Steel Production	0
Power Plant Capacity	N.A.

Teplaya Gora Iron Works
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
1 BF	35.1
Steel Production	0
Rolling Mill Capacity	0
Finished Steel Production	0
Power Plant Capacity	N.A.

Tirlyansk Rolling Mill
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	0
Rolling Mill Capacity	N.A.
Finished Steel Production	40.0
Power Plant Capacity	N.A.

Urals Heavy Machine Building Plant imeni Ordzhonikidze
1953

		Thousand Metric Tons
Metallurgical Coke Production		0
Pig Iron Production		0
Cast Iron Production		
4 Cupolas		150.0
Steel Production		
4 OH and 2 Electric Furnaces		150.5
Rolling Mill Capacity		0
Finished Steel Production		
Steel Castings	28.2	
Steel Forgings	62.2	
		90.4
Power Plant Capacity		28,000 kw

Ust'-Katav Machine Building Plant imeni Kirov
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
1 Open Hearth Furnace	9.2
Rolling Mill Capacity	
250 mm Bar Mill	N.A.
450 mm Bar Mill	N.A.
Finished Steel Production	6.6
Power Plant Capacity	3,600 kw

Verkhne Izetskiy Steel Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
4 OH, 3 Electric Furnaces, and 1 Bessemer Converter	267.7
Rolling Mill Capacity	N.A.
Finished Steel Production	192.5
Power Plant Capacity	0

Verkhnyaya Salda Steel Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
2 OH	55.3
Rolling Mill Capacity	
600 mm and 375/280 mm Bar Mills	70.0
Finished Steel Production	72.8
Power Plant Capacity	2,000 kw

Verkhnyaya Sinyachikha Steel Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
1 BF	46.6
Steel Production	
3 OH	65.0
Rolling Mill Capacity	0
Finished Steel Production	0
Power Plant Capacity	270 kw

Verkhniy Ufaley Metallurgical Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
1 BF	44.2
Steel Production	0
Rolling Mill Capacity	N.A.
Finished Steel Production	21.0
Power Plant Capacity	0

Votkinsk Machine Building Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
4 Open Hearth Furnaces	95.3
Rolling Mill Capacity	N. A.
Finished Steel Production	70.5
Power Plant Capacity	N. A.

Yugo-Kamskiy Machine Building Plant
1953

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
2 Open Hearth Furnaces	38.8
Rolling Mill Capacity	N.A.
Finished Steel Production	29.3
Power Plant Capacity	N.A.

Zlatoust Agricultural Machine Plant No. 259
imeni Lenin

	Thousand MetricTTons
Metallurgical Coke Production	0
Pig Iron Production	0
Steel Production	
3 Open Hearth and 4 Electric Furnaces	59.1
Rolling Mill Capacity	
650 mm Blooming Mill	35.0
350 mm Bar Mill	8.0
270 mm Bar Mill	N.A.
600 mm Plate Mill	N.A.
Finished Steel Production	42.6
Power Plant Capacity	15,000 kw

Zlatoust Metallurgical Plant
imeni Stalin

	Thousand Metric Tons
Metallurgical Coke Production	0
Pig Iron Production	
1 BF	80.0
Steel Production	751.1
Rolling Mill Capacity	
900 mm Blooming Mill	500.0
750 mm Billet Mill	140.0
Other Mills	N.A.
Finished Steel Production	540.0
Power Plant Capacity	25,000 kw

APPENDIX B

METHODOLOGY

It was necessary to establish a methodology governing such details as the actual postwar existence of an installation; blast furnace production; steel production from open-hearth furnaces, electric furnaces, and Bessemer converters; duplex steel production; and finished steel production.

A number of charcoal blast furnace plants and sheet rolling mills in the Urals have been dismantled because of obsolescence. Some were probably rehabilitated during World War II and then became inactive again. In many cases SDS intelligence proved the existence of facilities up to 1944. If no postwar information could be found, however, the plant was not carried in production, but was mentioned in the regional summary.

Blast furnace volumes and coefficients of utilization were generally available up to 1952. Almost all 1953 coefficients were estimates based on 1952. The Soviets use the term coefficient as applied to blast furnaces in a sense different from its usual connotation. This is further explained in the sample calculation outlined below. Estimates for 1952 and 1953 were based on the developing pattern of furnace performance. The number of operating days on a furnace in a year was established at 340. It should be noted that 340 days probably represents an optimistic estimate. [redacted] The following sample computation shows the method of estimating annual pig iron production from a blast furnace:

25X1X7

25X1X7

$$\frac{A}{B} \times C = \text{yearly production}$$

A is the volume of the blast furnace in cu m
B is the coefficient of utilization with dimensions of cu m of furnace volume used per MT of pig iron produced per 24-hour period.
C is 340, the number of operating days.

Open-hearth furnace hearth areas and coefficients of utilization were generally available up to 1952. Almost all 1953 coefficients were estimates based on 1952. Estimates for 1952 and 1953 were based on the USSR pattern of furnace performance. The number of operating days of a furnace in a year was established at 325, probably an optimistic estimate. [redacted] The following

25X1X7

25X1X7

sample computation shows the method of obtaining annual steel production from an open hearth furnace:

A x B x C = yearly production

A is the hearth area in sq m
B is the coefficient of utilization with dimensions of MT of steel produced per sq m of hearth area per 24-hour period.
C is 325, the number of operating days.

Electric furnace steel production is based on a factor of 1,000 MT of steel annually per MT of furnace capacity. Experience has shown this factor to be consistently within reason, although production from various types of electric furnace operations will fluctuate widely.

The small amount of Bessemer steel produced in converters in the Urals is based on 25 heats per day per converter for 300 operating days. The sample computation given below shows the method of obtaining annual Bessemer steel production from a converter. None of this converter steel is duplexed.

A x B x C = yearly production

A is the rated capacity of the converter in MT
B is the 25 heats per 24-hour period
C is 300 the, number of operating days.

The only duplex steel shop in the Urals, at Chusovoy, produces an estimated 417,000 MT of open-hearth steel and 260,000 MT of converter steel. It has been assumed that all of the converter steel was used in producing the open-hearth steel.

The amount of finished steel produced was estimated on the basis of the average yield of the specific product from the ingot. When the product mix was unknown or when it consisted of many products, a yield of 72 percent was used. When the product mix was known or limited to a single product a yield was used consistent with US practice. Such yields are specified in the production table of each plant.

APPENDIX C

GAPS IN INTELLIGENCE

The major gaps in intelligence in developing plant studies on Region VIII are threefold. The first is the absence of information necessary to establish any production or operation at the 26 plants mentioned in the summary but not included in the body of the report. The second is the inadequacy of intelligence material in regard to most installations. The third gap is the general decline in quality and quantity of intelligence on iron and steel producing facilities since 1950.

APPENDIX D

SOURCES AND EVALUATION OF SOURCES

1. Evaluation of Sources.

a. German Intelligence Reports.

Information from this source is excellent when the existence of producing facilities is substantiated by other sources. Although dated, the intelligence presented by these reports is basic, particularly for descriptions of furnaces and rolling mills.

b. Prisoner-Of-War Reports.

For the period 1946-50 the PW reports are useful in bringing older information up to date. The information in these reports usually stops about 1950, and consequently they lose their value for more recent studies. Several prisoners with technical backgrounds have provided such good information that it stands completely apart. Some plants had no prisoners at all.

c. Soviet Periodicals and Newspapers.

In the absence of other material, heavy reliance was placed on reports of progress at metallurgical plants from 1950 on, in Soviet periodicals and newspapers. In many cases these sources contain the only information available on plants after 1950.

25X1X7000

[redacted]

f. Reports from Private Engineering Companies.

The best of all reports where available are those studies made in the

early 1930's by American engineering firms. Although this information is not current, it is thorough and quite detailed in respect to the original plans for the plants covered.

g. Other Sources.

Other sources, not necessarily original sources, however, that have proved valuable are John Scott, a worker and traveler in the Urals; the American-Russian Chamber of Commerce; and the basic research of other CIA branches.

2. Sources.

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

Source of Information	Information
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."

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.

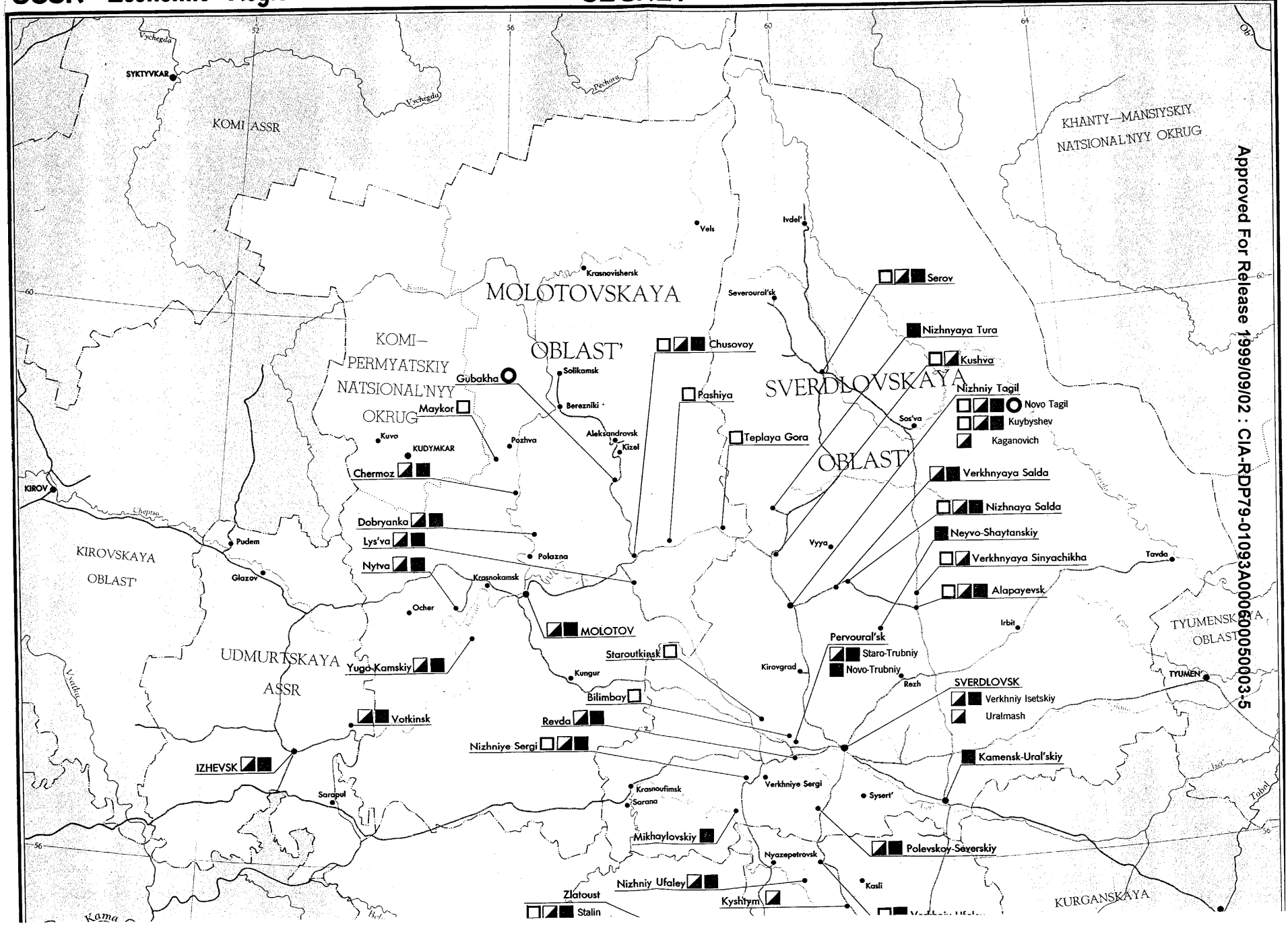
Many of the sources listed below are US OFFICIALS ONLY but are not so designated. The report is, however, classified US OFFICIALS ONLY.

Next 66 Page(s) In Document Exempt

USSR–Economic Region VIII

SECRET

IRON AND STEEL PLANTS



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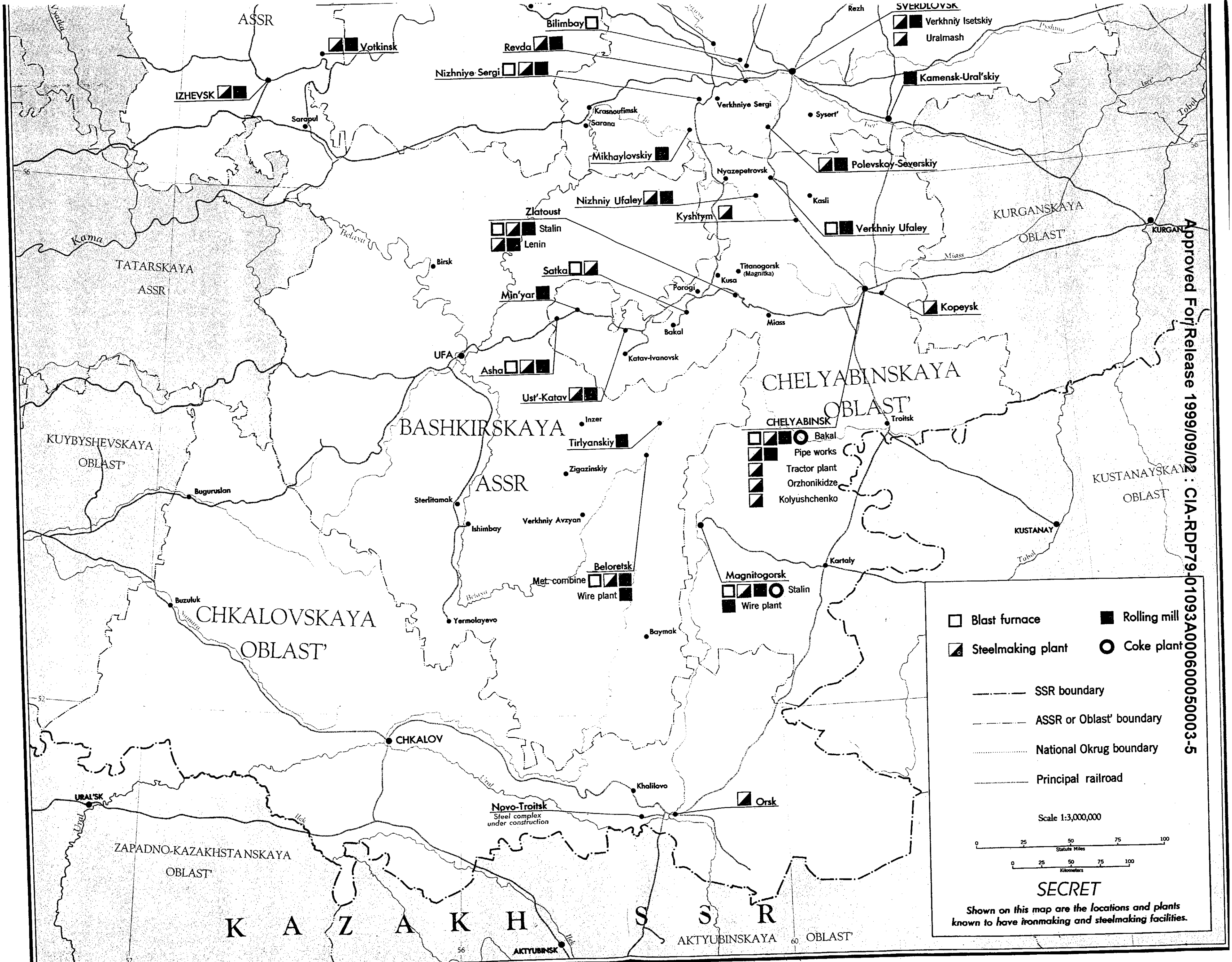

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