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Economic Intelligence Report

THE IRON AND STEEL INDUSTRY OF THE USSR
IN 1960



CIA/RR ER 61-30

July 1961

CENTRAL INTELLIGENCE AGENCY
Office of Research and Reports

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C-O-N-F-I-D-E-N-T-I-A-L

FOREWORD

This report is intended to provide an appraisal of the current status of the iron and steel industry of the USSR and of trends significant to its future development. It is an analysis of the achievements of the industry in 1960 and an assessment of plans for 1961 in relation to the goals of the Seven Year Plan (1959-65).

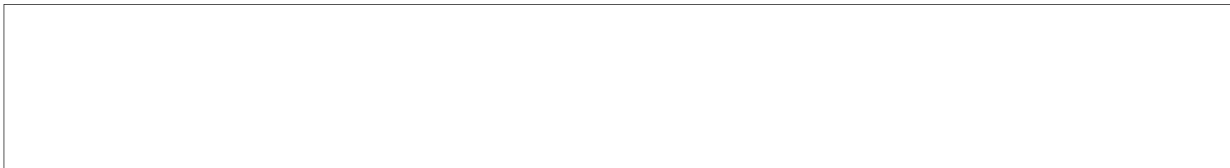
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C-O-N-F-I-D-E-N-T-I-A-L

C-O-N-F-I-D-E-N-T-I-A-L

	<u>Page</u>
Summary and Conclusions	1
I. Significant Trends	5
A. Current Production	5
B. Growth of Capacity	7
II. Raw Materials Base	15
III. Investment	18
IV. Foreign Trade	21



Tables

50X1

1. Production of Iron Ore, Iron, and Steel in the USSR, 1958-60 and Planned for 1961 and 1965	6
2. Estimated Annual Additions to Capacity in the Iron and Steel Industry of the USSR, 1951-60 and Planned for 1951-65	8
3. New Facilities Constructed for Iron and Steel Plants in the USSR, 1960 and Planned for 1961	9
4. Coefficients of Utilization of Blast Furnaces and Open- Hearth Furnaces in the USSR, Selected Years, 1940-60, and Planned for 1961 and 1965	13
5. Estimated Investment in Ferrous Metallurgy in the USSR, 1956-65	19

Chart

USSR and US Production of Crude Steel and US Steelmaking Capacity <u>following page</u>	6
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C-O-N-F-I-D-E-N-T-I-A-L

THE IRON AND STEEL INDUSTRY OF THE USSR*
IN 1960

Summary and Conclusions

The iron** and steel industry of the USSR continued to make impressive gains in 1960. Production, with the exception of pig iron, was somewhat in excess of the annual plan goals. As shown in the tabulation, production of pig iron was about 0.3 million tons*** less than the plan, but production of crude steel exceeded the plan by about 0.4 million tons and that of rolled steel by 0.6 million tons.

<u>Commodity</u>	<u>Million Tons</u>			
	<u>Plan</u>	<u>Actual</u>	<u>1961 Plan</u>	<u>1965 Plan</u>
Usable iron ore	105.5	106.5	116.5	150 to 160
Pig iron	47.1	46.8	51.2	65 to 70
Crude steel	64.9	65.3	71.3	86 to 91
Rolled steel	50.3	50.9	55.3	65 to 70

Neither crude nor rolled steel, however, attained the respective levels of 68.3 million tons and 52.7 million tons that were anticipated in the abandoned Sixth Five Year Plan (1956-60). In general, the expansion of capacity in the industry was less than that planned for 1960. Only 4 of the 5 blast furnaces and 8 of the 10 open-hearth furnaces scheduled for completion were in operation by the end of the year.†

* The estimates and conclusions in this report represent the best judgment of this Office as of 1 June 1961.

** Unless specifically designated as crude ore, all references in this report are to usable iron ore.

*** Unless otherwise indicated, tonnages are given in metric tons throughout this report.

† Totals given here are taken from official announcements concerning plan fulfillment and do not necessarily agree with the totals shown in Table 3, p. 9, below. Table 3, which is more detailed, includes some reconstruction, some carryover from 1959, and some relatively minor construction.

C-O-N-F-I-D-E-N-T-I-A-L

C-O-N-F-I-D-E-N-T-I-A-L

Soviet production of crude steel in 1960 is estimated to have been about 20 percent of world production, almost 62 percent of Bloc* production, and 72.5 percent of US production. Steelmaking capacity in the USSR, however, probably was only about 50 percent of the capacity in the US, which was almost 135 million tons. According to some Soviet forecasts, production of crude steel in 1962-63 is to reach the level of more than 77 million tons that was attained by the US in 1958.** By 1965 the USSR may be producing at an annual rate of as much as 93 million to 95 million tons of crude steel, although goals of only 86 million to 91 million tons are planned for that year.

According to preliminary Soviet data, capital investment*** in the iron and steel industry in 1960 (estimated at 12.5 billion rubles[†]) increased 17 percent above that of 1959 but was about 700 million rubles less than the planned investment for the year. Investment in 1961 is planned at 16.4 billion rubles, or about 31 percent more than the estimated investment in 1960. There are indications that capital expenditures at some projects are totaling more than was anticipated, but these expenditures are being offset by savings that result from extending modern technology to broader segments of the industry and from modernizing existing facilities. Such developments have provided sizable increments in capacity and output at lower capital costs per ton than would be required for constructing new facilities. These savings may explain, at least in part, why Soviet leaders apparently believe that some future investment funds can be diverted to agriculture without jeopardizing the goals for 1965 for production of steel.

Preliminary data indicate that Soviet foreign trade in iron and steel and in the steel industry's raw materials increased in 1960. Exports of iron ore, almost all of which went to the European Satellites, are estimated at more than 16 million tons compared with 13.4 million tons in 1959. Imports of nickel, estimated at 10,000 tons, increased significantly above the level in 1959 of 4,600 tons, and these imports, obtained mainly from Canada and France, more than offset

* Unless otherwise indicated, the term Bloc as used in this report refers to the Sino-Soviet Bloc.

** A year in which production of steel in the US was below average.

*** Unless otherwise indicated, data on investment refer to productive investment, which excludes capital expended for housing, social welfare, and similar facilities but includes investment in iron ore and manganese mining.

[†] All ruble values throughout this report are given in old pre-1961 rubles, expressed in constant 1955 prices, and may be converted to US dollars at a rate of exchange of 4 rubles to US \$1, although this rate does not necessarily reflect the actual value of the ruble in terms of dollars.

C-O-N-F-I-D-E-N-T-I-A-L

exports to other countries of the Bloc and Finland, which are estimated at 7,000 tons. The USSR remained a net importer of steel from the Free World and a net exporter of steel to other countries of the Bloc.

C-O-N-F-I-D-E-N-T-I-A-L

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I. Significant Trends

A. Current Production

Impressive increases in production of iron and steel were achieved by the USSR in 1960, reflecting not only new capacity put into operation in 1959-60 but also higher production rates obtained from many existing facilities. Production for the year amounted to 46.8 million tons of pig iron, 65.3 million tons of crude steel, and 50.9 million tons of rolled steel, as shown in Table 1.* Soviet output of crude steel represented about 20 percent of world production, 62 percent of that in the Bloc, and 72.5 percent of that in the US. Steelmaking capacity in the USSR, however, probably was no more than 50 percent of the capacity of 135 million tons in US industry.**

In 1960, as in the previous year, the over-all production of iron and steel in the USSR substantially exceeded the goal set by the Seven Year Plan (1959-65). Soviet authorities have stated that production amounted to about 1 million tons of pig iron, 5 million tons of crude steel, and 4 million tons of rolled steel in excess of the original plans for 1959-60. 1/*** By achieving the levels of production planned for 1961 -- 71.3 million tons of crude steel and 55.3 million tons of rolled steel -- which the industry probably will attain, the aggregate output during 1959-61 will amount to about 9.7 million tons of crude steel and 7.7 million tons of rolled steel in excess of the control figures of the Seven Year Plan for this period. 2/

Soviet production of crude steel increased more than 5.3 million tons in 1960 above the level in 1959. This advance was the largest yet obtained in a single year and one that followed an increase in 1959 of 5 million tons above the level in 1958. Thus the growth in production of steel has averaged 5.2 million tons, or 9 percent a year, during the first 2 years of the Seven Year Plan period. An increase of 6 million tons is scheduled for 1961. From the level of output planned for 1961, annual increases averaging only 4.9 million tons, or 6.4 percent a year, will be sufficient to enable the industry to attain production of 91 million tons -- the upper limit of the range in production goals -- in 1965. Continued expansion at the current (1959-61) average rate of 5.5 million tons per year would appear to be within the capabilities of the industry and to represent the minimum rate of increase that may be expected during 1962-65. This rate would mean that production in 1965 may amount to between 93 million and 95 million tons of crude steel.

* Table 1 follows on p. 6.

** For a comparison of Soviet and US steel production, see the chart, following p. 6.

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C-O-N-F-I-D-E-N-T-I-A-L

C-O-N-F-I-D-E-N-T-I-A-L

Table 1

Production of Iron Ore, Iron, and Steel in the USSR
1958-60 and Planned for 1961 and 1965

Commodity	Million Metric Tons						
	1958 Actual <u>a/</u>	1959 Plan <u>b/</u> Actual <u>c/</u>		1960 Plan <u>d/</u> Actual <u>e/</u>		1961 Plan <u>f/</u>	1965 Plan <u>g/</u>
Crude iron ore	114.2	120.6	123.0	N.A.	N.A.	N.A.	230 to 245
Usable iron ore	88.8	92.7	94.4	105.5	106.5	116.5	150 to 160
Pig iron	39.6	42.6	43.0	47.1	46.8	51.2	65 to 70
Crude steel	54.9	58.9	60.0	64.9	65.3	71.3	86 to 91
Rolled steel	43.1	45.9	47.0	50.3	50.9	55.3	65 to 70

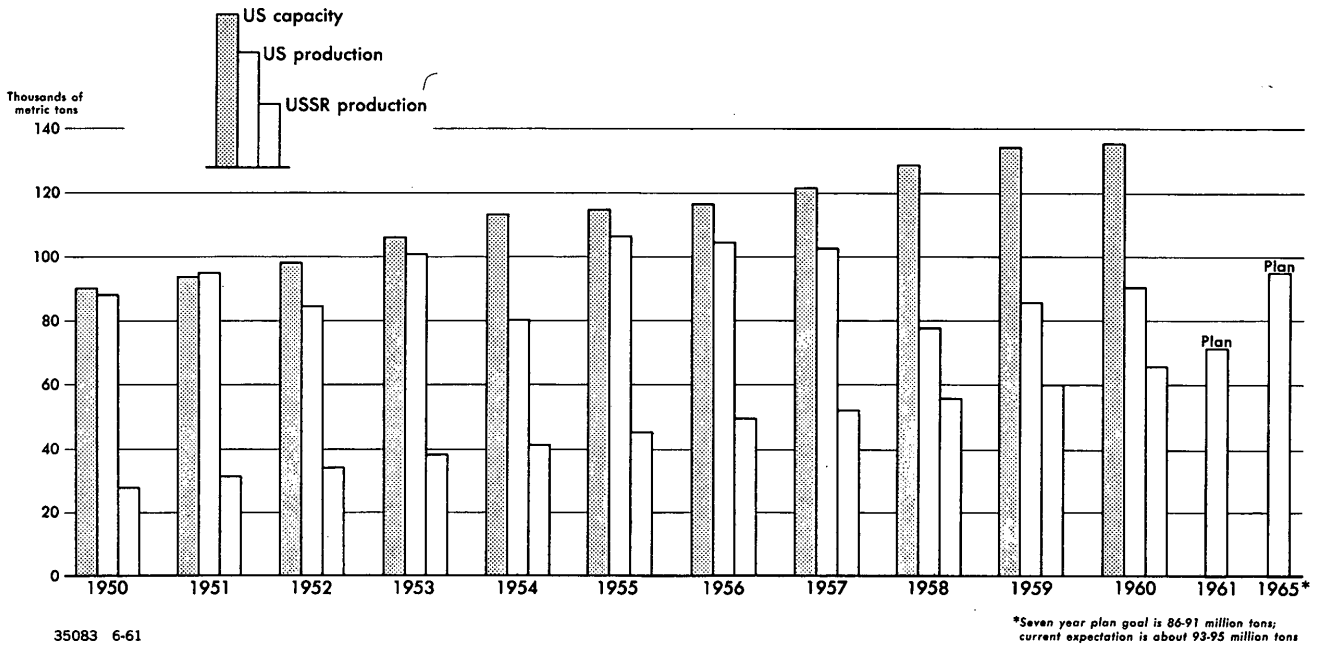
a. 3/. The figure for crude iron ore is estimated.

b. The figure for crude iron ore is estimated

c. 6/. The figure for crude iron ore is estimated.d. 7/e. 8/f. 9/. The figure for usable iron ore is estimated.g. 10/50X1
50X1

C-O-N-F-I-D-E-N-T-I-A-L

USSR and US Production of Crude Steel and US Steelmaking Capacity



C-O-N-F-I-D-E-N-T-I-A-L

B. Growth of Capacity

Although the amount of new capacity commissioned in 1960 equaled or exceeded that in 1959, as shown in Table 2,* there were shortfalls in construction of new blast furnaces and open-hearth furnaces compared with the plan for 1960. This plan included construction of 5 blast furnaces with an estimated total capacity of 4.5 million tons and of 10 open-hearth furnaces and 3 electric furnaces with an estimated total capacity of 4.3 million tons. The three electric furnaces** were completed, but only four of the blast furnaces and eight of the open-hearth furnaces were completed by the end of the year, resulting in shortfalls estimated at 900,000 tons in each category.

In 1961 the USSR plans to build four new blast furnaces with a total capacity of 4.4 million tons of pig iron -- approximately the same as the plan for 1960 but an increase of 0.8 million tons above the amount actually built in 1960. New steelmaking capacity is planned at 7.2 million tons, the largest on record and larger, by 0.3 million tons, than the amount commissioned during 1959 and 1960. Seventeen new open-hearth furnaces and three electric furnaces are to be built during 1961. New rolling mill capacity planned for 1961 includes seven mills with a total capacity of 4.4 million tons, which also is a new high for the industry. The installation of five tube mills, with a total capacity of 1 million tons a year, also is planned for 1961. New facilities constructed for the iron and steel industry in 1960 and those planned for 1961 are listed in Table 3***.

Among the new facilities brought into production in 1960 was a 2,000-cubic-meter (cu m) blast furnace with a designed capacity estimated at 1.1 million tons of pig iron per year -- the largest in the world -- which was built at the Krivoy Rog Metallurgical Plant. Three more furnaces of this size are to be built in 1961, one each at the Cherepovets, Novo-Lipetsk, and Novo-Tula plants. An even larger unit, possibly 2,286 cu m with an annual capacity of about 1.8 million tons, is to be erected at Krivoy Rog.

The capacity of many existing Soviet blast furnaces was increased significantly by the application of improved technology. A major development in this field was the conversion of additional furnaces to the use of natural gas. At least 13 blast furnaces -- 11 in the Ukraine and 2 in the Transcaucasus at Rustavi -- were adapted to[†]

* Table 2 follows on p. 8.

** At least two additional electric furnaces and more than the six rolling mills identified in the 1960 plan were commissioned, but these facilities either were carried over from the previous year or were not included in the official plan for new construction in 1960.

*** Table 3 follows on p. 9.

† Text continued on p. 12.

C-O-N-F-I-D-E-N-T-I-A-L

C-O-N-F-I-D-E-N-T-I-A-L

Table 2

Estimated Annual Additions to Capacity in the Iron and Steel Industry of the USSR a/
1951-60 and Planned for 1951-65

Annual Average	Million Metric Tons							
	Crude Iron Ore		Pig Iron		Crude Steel		Rolled Steel	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
1951-55	13.4 to 13.6 <u>b/</u>	8.2 <u>c/</u>	2.4 <u>b/</u>	2.1 <u>d/</u>	2.5 <u>b/</u>	2.0 <u>d/</u>	2.3 <u>b/</u>	1.3 <u>d/</u>
1956	14.0 <u>e/</u>	7.0 <u>e/</u>	3.2 <u>f/</u>	1.8 <u>f/</u>	2.8 <u>g/</u>	1.4 <u>g/</u>	2.8 <u>h/</u>	1.7 <u>h/</u>
1957	20.0 <u>i/</u>	9.0 <u>f/</u>	2.1 <u>i/</u>	2.1 <u>i/</u>	3.0 <u>i/</u>	2.1 <u>i/</u>	1.9 <u>j/</u>	1.5 <u>f/</u>
1958	16.1 <u>k/</u>	14.5 <u>l/</u>	4.7 <u>i/</u>	4.9 <u>f/</u>	2.5 <u>i/</u>	2.1 <u>f/</u>	1.4 <u>f/</u>	0.8 <u>f/</u>
1959	26.3 <u>m/</u>	23.0 <u>n/</u>	4.4 <u>o/</u>	2.7 <u>f/</u>	3.6 <u>f/</u>	3.5 <u>f/</u>	2.9 <u>f/</u>	2.9 <u>f/</u>
1960	31.0 <u>p/</u>	30.0 <u>q/</u>	4.5 <u>f/</u>	3.6 <u>f/</u>	4.3 <u>f/</u>	3.4 <u>f/</u>	4.1 <u>f/</u>	4.1 <u>f/</u>
1961	40.0 <u>g/</u>	N.A.	4.4 <u>g/</u>	N.A.	7.2 <u>g/</u>	N.A.	4.4 <u>g/</u>	N.A.
1952-58	N.A.	9.6 <u>r/</u>	N.A.	2.3 <u>s/</u>	N.A.	1.8 <u>s/</u>	N.A.	1.0 <u>s/</u>
1959-65	28.9 <u>t/</u>		3.4 to 4.3 <u>s/</u>		4.0 to 5.1 <u>s/</u>		3.3 to 4.1 <u>s/</u>	

a. Excluding additions to capacity resulting from rebuilding existing facilities and from technological and other sources of increased production from existing facilities.

b. 11/

c. 12/

d. 13/

e. The total planned for 1956-58 was 50 million metric tons. The amount commissioned was slightly less than the 31 million metric tons planned for 1960. 14/

f. Estimated.

g. 15/

h. 16/

i. 17/

j. 18/

k. 19/

l. 20/

m. 21/

n. 22/

o. 23/

p. 24/

q. 25/

r. 26/

s. 27/

t. 28/

C-O-N-F-I-D-E-N-T-I-A-L

Table 3

New Facilities Constructed for Iron and Steel Plants in the USSR
1960 and Planned for 1961

Economic Region ^{a/}	Plant	Coke Batteries		Blast Furnaces		Steelmaking Facilities		Steel-Shaping Facilities	
		1960	1961	1960	1961	1960	1961	1960	1961
Ia (Northwest)	Leningrad Rolling Mill								Cold bar mill
Ib (North)	Cherepovets	2		1 ^{b/}		2 open-hearths ^{c/}	3 open-hearths	1,700-mm continuous hot thin sheet mill 700-mm continuous billet mill	Cold-rolling shop 250-mm small bar mill
IIa (Baltic)	Liyepaya-Sarkanas							350-mm bar mill	
III (South)	Avdeyevka Dneprospetstal Il'ich (Zhdanov)		1			4 electric furnaces	1 electric furnace 3 open-hearths	1,700-mm continuous hot thin sheet mill	1,150-mm slabbing mill Cold sheet mill (2d section of the 1,700-mm mill)
	Krivoy Rog	2		1 ^{d/}	1 ^{b/}	2 open-hearths ^{e/}	3 open-hearths	250-mm wire rod mill	4 fine wire mills Small bar mill
	Karl Liebknecht (Dnepropetrovsk) Novomoskovsk Stalino							Four-strand continuous casting line	Thermal tube processing shop Electroweld tube mill ^{f/}
	Voroshilovsk (Alchevsk)			1					
	Yenakiyev Zaporozh'ye			1 ^{g/}		2 electric furnaces		1,700-mm cold strip mill	1,100-mm blooming mill 1st section of cold-rolling shop

C-O-N-F-I-D-E-N-T-I-A-L

C-O-N-F-I-D-E-N-T-I-A-L

Table 3

New Facilities Constructed for Iron and Steel Plants in the USSR
1960 and Planned for 1961
(Continued)

Economic Region ^{a/}	Plant	Coke Batteries		Blast Furnaces		Steelmaking Facilities		Steel-Shaping Facilities	
		1960	1961	1960	1961	1960	1961	1960	1961
V (Transcaucasus)	Transcaucasus (Rustavi)								2 tube-drawing mills
	Sungait					1 open-hearth			
	Lt. Schmidt (Baku)					1 electric furnace			
	Sardarov						Electric furnaces		
VII (Central)	Elektrostal Krasnoye Sormovo							2d continuous casting line	600-mm rolling mill
	Novo-Lipetsk		2		1 b/			2d continuous casting line	2d section of cold-rolling shop
	Novo-Tula				1 b/			1,200-mm five-stand continuous cold sheet mill	
VIII (Urals)	Chelyabinsk-Bakal		2			1 electric furnace	h/		2,300-mm sheet mill 1,700-mm sheet mill
	Chelyabinsk Tube							2d continuous pipe-welding shop	
	Chusovoy Magnitogorsk	1		1 g/		2 open-hearths	1 open-hearth	2,500-mm continuous hot sheet mill	
	Novo-Tagil					1 open-hearth	1 open-hearth		
	Novo-Troitsk					1 open-hearth	1 open-hearth	2,800-mm plate mill	1,150-mm blooming mill
	Pervoural'sk - Novo-Trubnyy								Continuous seamless tube shop
	Seversk-Polevskoy								Tube shop

- 10 -

C-O-N-F-I-D-E-N-T-I-A-L

C-O-N-F-I-D-E-N-T-I-A-L

Table 3

New Facilities Constructed for Iron and Steel Plants in the USSR
1960 and Planned for 1961
(Continued)

Economic Region ^{a/}	Plant	Coke Batteries		Blast Furnaces		Steelmaking Facilities		Steel-Shaping Facilities	
		1960	1961	1960	1961	1960	1961	1960	1961
IX (West Siberia)	Kuznetsk Metallurgical Combine	2		1					1,150-mm blooming mill
	Novosibirsk imeni Kuzmin West Siberian		1					Electroweld tube mill ^{i/}	
Xa (Kazakhstan)	Karaganda Metallurgical Combine (Temir Tau)	2	1	1	1 ^{b/}		1 open-hearth ^{c/}		
Xb (Central Asia)	Chardzhou Repair and Excavator						1 electric furnace		
	Begovat							Bar mill	Bar mill
XII (Far East)	South Sakhalin Mining Equipment Repair Amurstal'					1 electric arc furnace			450-mm bar mill

- a. Economic regions are those defined and numbered on map 27052 (7-58), USSR: Political-Administrative Divisions and Economic Regions, March 1958.
b. Probably a 2,000-cubic-meter furnace.
c. Probably units with a capacity of 600 metric tons.
d. Reported to be the largest in the world, probably a 2,000-cubic-meter furnace.
e. Reported to be the largest in Europe, probably units with a capacity of 600 metric tons.
f. For 1,020-mm pipe.
g. Reconstructed and greatly enlarged.
h. The Chelyabinsk-Bakal plant will acquire some steelmaking facilities in 1961, possibly another furnace for the electric furnace shop commissioned in 1960.
i. Probably the 102-mm electroweld tube mill previously believed to have been in operation in 1959.

C-O-N-F-I-D-E-N-T-I-A-L

C-O-N-F-I-D-E-N-T-I-A-L

natural gas during 1960, bringing the total to a minimum of 45 furnaces, or about 35 percent of all blast furnaces in the USSR. The use of natural gas has resulted not only in increases in production from blast furnaces but has contributed to a reduction in consumption of coke per ton of pig iron from 771 kilograms (kg) in 1959 to 718 kg in the first half of 1960.* 30/ By the end of 1961, all blast furnaces in the Ukraine, representing more than one-half of the present capacity in the USSR, are to be operating on natural gas, and, in the USSR as a whole, 60 percent (about 30 million tons) of the pig iron is to be produced in furnaces in which natural gas is used.

Improved blast furnace productivity also has been obtained from the increased use of fluxed sinter, high top-pressure, and humidity control. Production of sinter increased from 56.8 million tons in 1959 to approximately 65 million tons in 1960, thereby permitting an increase in the proportion of sinter in the total ore charge from 70.3 to 79 percent. The application of high top-pressure and humidity control was extended in 1960 to include 75 percent of all Soviet blast furnaces, representing 85 percent of total blast furnace volume compared with 81.8 percent in 1959.** The effect of these and other developments was reflected in continued improvement in the blast furnace coefficient in 1960, as shown in Table 4.***

As in the case of new blast furnaces, the new open-hearth furnaces being built by the USSR average larger in size than those constructed in earlier years. The aggregate capacity of the 8 open-hearths built in 1960 was about equal to that of the 10 furnaces built in 1959. Three of the units constructed in 1960 -- two at Cherepovets and one at Krivoy Rog -- are believed to be 600-ton furnaces, each with an annual capacity estimated at 500,000 tons. Even larger units are being designed, current reports indicating that 850-ton to 950-ton open-hearth furnaces with a designed capacity of 650,000 to 750,000 tons of steel annually are now contemplated. 31/

In the USSR, as in the leading countries of the Free World, considerable attention is being given to the use of oxygen in the steel-making process. In the Soviet steel industry, about 25 percent of the open-hearth steel produced in 1959 came from oxygen-fed furnaces, and by 1965 the proportion is expected to reach 70 percent. A substantial

* As a direct result of these decreased requirements for coke, mainly at the Rustavi plant, planned production of coking coal and of coke in the Georgian SSR in 1961 is less than the actual output in 1960 in spite of a planned increase of 3.3 percent in production of pig iron. 29/

** In 1960, only 16 US furnaces had been adapted to this usage.

*** Table 4 follows on p. 13.

C-O-N-F-I-D-E-N-T-I-A-L

Table 4

Coefficients of Utilization of Blast Furnaces
and Open-Hearth Furnaces in the USSR a/
Selected Years, 1940-60, and Planned for 1961 and 1965

<u>Year</u>	<u>Blast Furnaces <u>b/</u></u>	<u>Open-Hearth Furnaces <u>c/</u></u>
1940	1.19	4.24
1950	0.98	5.36
1955	0.803	6.55
1956	0.785	6.80
1957	0.791	6.98
1958	0.775	7.21
1959	0.771	7.48
1960	0.75	7.69
1961	0.737	7.82
1965	0.70	8.7

a. 32/

b. Cubic meters of usable volume per ton of basic pig iron produced in 24 hours.

c. Tons of crude steel per square meter of hearth area per 24 hours.

increase in production of steel in oxygen converters also is planned -- from about 6 percent of the total at the present time to 20 percent of the steel to be produced in 1965. The plan for 1961 includes construction of an unknown number of 100-ton oxygen converters, which would be the largest yet constructed in the USSR, although 200-ton to 250-ton units are in the design stage. The largest unit in the US, which is expected to be in production in 1961, has a rated capacity of about 180 tons.

The converter program in the USSR was launched with considerable fanfare, but it has not proceeded on schedule. One reason for the delay is that Soviet industry has not yet fully mastered the technology of building and operating top-blown oxygen converters. As a consequence, efforts were continued during 1960 to purchase equipment and complete technical data from Austria for making steel by the L-D (Linz-Donawitz) process. "Agreement in principle" reportedly was reached, and the deal

C-O-N-F-I-D-E-N-T-I-A-L

may be concluded in 1961. The USSR also is experiencing some difficulty in providing sufficient oxygen-generating capacity to meet the increasing demands of the steel industry.

The USSR in 1960 continued the development of semicontinuous teeming techniques. A new four-strand casting unit (allegedly the largest in the world, with a reported capacity of 600,000 tons per year) was installed at Stalino, and a central laboratory was established there to continue the work of the research institutes in developing continuous casting technology. 33/ Five other semicontinuous steel-casting installations are known to be operating in the USSR, and five more are reported to be under construction.

Soviet additions to rolling mill capacity in 1960, an impressive 4.1 million tons, are substantially greater than those of any earlier year and represent a significant increase above the previous record of 2.9 million tons added in 1959. Six rolling mills were commissioned: a 2,800-millimeter (mm) plate mill at the Orsk-Khalilovo Metallurgical Combine at Novo-Troitsk, the first section of a 2,500-mm continuous sheet mill at Magnitogorsk, 1,700-mm continuous sheet mills at both the Cherepovets and the Il'ich (Zhdanov) plants, a 1,200-mm continuous cold sheet mill at Novo-Lipetsk, and a 700-mm continuous billet mill at Cherepovets.

The seven rolling mills planned to be completed in 1961 include three blooming mills -- the 1,100-mm mill at Yenakiyevo and 1,150-mm mills at both Novo-Troitsk and Kuznetsk -- a slabbing mill and the second section of the 1,700-mm sheet mill at the Il'ich plant in Zhdanov, and 2,300-mm and 1,700-mm sheet mills at Chelyabinsk. In addition, several bar mills will be put into operation.

Although in the past 2 years the USSR apparently has succeeded in commissioning the rolling mills provided for by the plans for those years, there is considerable evidence that delays in designing, constructing, and installing such equipment continue to harass the industry. Timelags of 5 to 10 years between the beginning of designing and the completion of installations are not unusual. In addition to delaying the buildup of capacity, such long lead times often result in the installation of rolling mills that, by Western standards, are obsolete when installed. Moreover, the amount of new rolling mill capacity installed in the past 2 years, although impressive in relation to that put into operation in previous years, is far less than is required to replace the obsolete facilities that now represent a large proportion of the total capacity. Nor has the industry made any significant progress toward installing the amount of cold-rolling and finishing capacity that will be required to achieve the rolled steel product mix planned for 1965. Most of the capacity installed during 1959-60 is for

C-O-N-F-I-D-E-N-T-I-A-L

production of hot flat-rolled products and represents some progress toward the goal for 1965 of doubling production of sheet, which in 1958 amounted to about 11.3 million tons. The amount of cold-rolling capacity installed in 1959 and 1960 is negligible in relation to the plan to increase production of cold-rolled sheet during 1959-65 by 5 million to 6 million tons.

The USSR has made some progress in expanding the capacity of pipe and tube mills but continued, during 1960, to be deficient in capacity for production of large-diameter pipe -- particularly 1,020-mm (40-inch diameter) pipe required for the oil and gas pipeline programs. A site at Novomoskovsk was cleared late in 1960 for the first such shop, but the reported target date for production, the second quarter of 1961, is unlikely to be met. The only other 1,020-mm mill known to be planned for 1959-65 is one which, according to a report in 1960, is to be put into operation at Novo-Lipetsk "during the next few years." An electroweld pipe mill, possibly 820-mm, is being installed at Taganrog and is planned to be in operation in the third quarter of 1961. Two other 820-mm electroweld pipe mills have been installed in the USSR, both at the Chelyabinsk Tube Mill.

The USSR is deficient not only in mill capacity for large-diameter pipe but also in mill capacity for making the wide plate that is required for production of large-diameter pipe. Plate of the dimensions (3,300-mm wide by 12 to 13-mm thick) required to produce 1,020-mm pipe on a single-weld, straight-seam basis is not yet produced in the USSR, and as late as October 1960 plate mills capable of producing such plate reportedly were only in the planning stage. 34/ A 4,500-mm* plate mill is to be installed at Novo-Lipetsk but is not to be in production until 1964. 36/ A 4,200-mm plate mill and an electroweld pipe mill are planned for the projected plant that is to be built at Tayshet in West Siberia, but this capacity will not become available during the Seven Year Plan. The Chelyabinsk Tube Mill apparently is undertaking to produce 1,020-mm pipe by welding two preformed halves, a method that would permit production of large-diameter pipe from plate of dimensions that are now produced in the USSR.

II. Raw Materials Base

Production of raw materials for the iron and steel industry of the USSR in 1960 was, in general, equal to or greater than the amounts planned for that year. Production of iron ore increased 12.1 million tons 37/ above the level in 1959 to 106.5 million tons 38/ -- the largest increase yet achieved in a single year and about 1 million tons more than the plan. Production of coke was scheduled to increase

* Also reported as a 4,200-mm plate mill. 35/

C-O-N-F-I-D-E-N-T-I-A-L

6.6 percent to 57 million tons, but it actually amounted to only 56.2 million tons. About 6 million tons of manganese ore were produced, almost 3 percent more than the announced goal. Soviet production of chromite, nickel, cobalt, and molybdenum also reportedly exceeded the plan in 1960, although neither the plan nor the actual output of these metals was announced.

Unlike similar reports issued in recent years, Soviet statements concerning the plan for 1961 have not given the exact production goal for iron ore. Production, however, reportedly is to be at least 10 million tons greater than in 1960, or more than 116.5 million tons. ^{39/} An increase of about 5 percent that is planned for production of coke ^{40/} would put the goal at about 60 million tons. Except for a planned increase of 14 percent in production of nickel, ^{41/} the goals for producing other raw and alloying materials in 1961 are unknown.

According to preliminary reports, an unprecedented amount of new capacity -- about 30 million tons -- was constructed for the Soviet iron ore mining industry in 1960. ^{42/} This amount, which was a substantial increase of 7 million tons above that constructed in 1959 and was within 1 million tons of the planned goal for 1960, also was the best performance achieved by the industry in recent years relative to construction plans. In 1961, 40 million tons of new iron ore mining capacity are to be built. If this goal is achieved, about 93 million tons of capacity will have been built in the first 3 years of the plan period -- approximately the amount required (an average of about 30 million tons a year) to meet the over-all goal of 206 million tons planned for construction during 1959-65.

In addition to constructing new iron ore mining capacity, the USSR also must develop more concentrating and sintering capacity in order to supply the increasing quantities of upgraded iron ore that are required both for domestic consumption and for export to the European Satellites. The USSR concentrated about 58 percent ^{43/} of its crude ore in 1960 compared with a little more than 50 percent in 1959. ^{44/} The proportion is expected to increase to 72 to 73 percent in 1965. ^{45/} Production of sinter, which amounted to 56.8 million tons in 1959, is estimated at 65 million tons in 1960. Installation of 19 new sinter lines, with an aggregate capacity of more than 15 million tons, is planned for 1961. The design for what the USSR claims to be the world's largest sinter line has been completed, and its construction is to begin in 1961. The size of this equipment is unknown, but previously the USSR claimed to be designing a sinter line with a hearth area of 2,150 square feet. At present the largest such facility in the world, located at the Jones and Laughlin plant in Aliquippa, Pennsylvania, has a hearth area of 2,419 square feet and is capable of producing more than 225,000 net tons of sinter per month.

C-O-N-F-I-D-E-N-T-I-A-L

The principal developments in the iron ore industry of the USSR in 1960 occurred in the Ukrainian SSR, which was the source of 55 percent of the total production of usable iron ore in the USSR in 1960; at the Kursk Magnetic Anomaly (KMA) in the RSFSR; and at Kustanay in Kazakh SSR. More than the 18.5 million tons of ore mining capacity planned for construction in the Ukrainian SSR was commissioned in 1960, ^{46/} and the actual production of 59.1 million tons of usable ore ^{47/} was about 1.1 million tons above the plan. In 1961, 20.7 million tons of mining capacity are to be commissioned in the Ukrainian SSR, ^{48/*} and production of usable ore is planned at 61.5 million tons. ^{49/} The major development in the Ukraine is in the Krivoy Rog Basin, which supplies more than 50 percent of Soviet iron ore. In this area, 71 million tons of iron ore mining capacity and five concentrating plants, with an aggregate capacity of 25.3 million tons of concentrates, are to be constructed during 1959-65. In 1959 the first section of the Novo Krivoy Rog Ore Concentrating Combine began production, and the Southern Ore Concentrating Combine No. 2, which is capable of producing 4.5 million tons of concentrates annually, began production according to plan in the last few days of 1960. The first section of the Central Ore Concentrating Combine, which was to be in production in 1960, began operating in March 1961, and another larger section is scheduled to be in production in 1961. Work on the Northern and the Ingulets Ore Concentrating Combines is to begin in 1961, the former scheduled to begin producing in 1962-63 and the latter in 1965.

Elsewhere in the Ukrainian SSR the construction of two other large combines was underway by the end of 1960. The Dneprovsk Ore Concentrating Combine, working the Kremenchug iron ore deposit, is to have its first section with an annual capacity of 4.9 million tons of concentrates, in operation in 1963. Construction of the Zaporozh'ye Iron Ore Combine, based on the Belozerka deposit, also was begun late in 1960. The first mine of this combine is to be in operation in 1964 with an annual capacity of 1 million tons of high-grade ore.

In the RSFSR, although development of the iron ore deposits at the KMA (which are said to contain 5.6 billion tons of rich ore requiring little or no concentration) continued during 1960, progress was far from satisfactory. The first section of the Mikhailovsk Mine and its crushing plant, with an annual capacity of 2.5 million tons of ore, were commissioned, but only one-half of the overburden planned for removal in 1960 was stripped, and the actual production of ore amounted to less than one-third of the 700,000 tons planned for the year. ^{50/} These shortfalls were caused by the failure to deal adequately with

* Officials of the Ukrainian SSR claim that the investment funds allocated for this purpose are insufficient to assure the achievement of these objectives. See III, p. 18, below.

C-O-N-F-I-D-E-N-T-I-A-L

water seepage (a major problem at the KMA) as well as by the inadequacy of facilities and equipment for extracting and removing the ore from the pit. The continued existence of these deficiencies in the first quarter of 1961 casts doubt on the feasibility of the plan to increase the extraction of ore at the Mikhailovsk Mine to 1.65 million tons in 1961.

The second section of the Lebedinsk pit, which was opened during 1960, increased the capacity of the mine to 3 million tons a year, and by 1964 the mine is expected to be producing at an annual rate of 6 million tons of crude ore. Preparation of the construction site has begun at the Stoylensk pit, which is scheduled to be in production by the end of 1962, and at the Yakovlevsk mine, where production is not expected until 1965.

In Kazakh SSR, top priority is being given to the expansion of operations at the Sokolov-Sarbay Concentrating Combine in the Kustanay Basin. Production of usable ore at the combine in 1960 was 4.3 million tons, almost twice that in 1959. Development of the deposit of limonite ore at Lisakovsk in the Kustanay Basin is to begin in 1961.

Elsewhere in the USSR, construction of new iron ore mining capacity is behind schedule. Construction of the Kachkanar Ore Concentrating Combine, which will supply ore for the iron and steel plants of the northern and central Urals, lagged throughout 1960, and efforts to complete the first section of the combine by the end of 1961 are being intensified. When completed, this section will have an annual capacity of 7.5 million tons of crude iron ore yielding 1.6 million tons of concentrates. Also well behind schedule is the development of the Altay-Sayan region in West Siberia and the mine and concentrating plant at Korshunovsk in the Angara-Ilimsk Basin in East Siberia that is scheduled to be in operation in 1961. The latter will be the initial source of ore for the West Siberian Metallurgical Plant being built near Stalinsk.*

III. Investment

According to preliminary Soviet data, the annual investment in productive facilities for ferrous metallurgy in the USSR amounted to 12.5 billion rubles in 1960, but, as in 1959, this investment was less than the plan (see Table 5**). As a result of these two shortfalls

* The first blast furnace at this plant was put under construction early in 1961 and is to be in production in 1962. As ore deposits located nearer the West Siberian Metallurgical Plant are developed, those at Korshunovsk will be used to supply the steel plant to be built at Tayshet in East Siberia.

** Table 5 follows on p. 19.

C-O-N-F-I-D-E-N-T-I-A-L

C-O-N-F-I-D-E-N-T-I-A-L

Table 5

Estimated Investment in Ferrous Metallurgy in the USSR
 1956-65

Year	Billion Rubles ^{a/}					
	Total ^{b/}		Productive ^{c/}		Iron Ore ^{d/}	
	Plan	Actual	Plan	Actual	Plan	Actual
1956	N.A.	8.7 ^{e/}	N.A.	5.618 ^{f/}	N.A.	1.546 ^{g/}
1957	10.8 ^{h/}	8.8 ^{i/}	N.A.	5.967 ^{f/}	N.A.	1.768 ^{g/}
1958	12.1 ^{i/}	11.3 ^{j/}	N.A.	8.2 ^{k/}	N.A.	2.7 ^{k/}
1959	15.0 ^{l/}	N.A.	10.98 ^{k/}	10.7 ^{m/}	4.0 ^{k/}	N.A.
1960	N.A.	N.A.	13.2 ^{n/}	12.5 ^{o/}	4.22 ^{p/}	N.A.
1961	N.A.	N.A.	16.4 ^{q/}	N.A.	N.A.	N.A.
1952-58	N.A.	N.A.	N.A.	40.8 ^{r/}	11.5 ^{s/}	N.A.
1959-65	130 ^{t/}	N.A.	100 ^{r/}	N.A.	31.6 ^{s/}	N.A.

- a. Adjusted to 1 July 1955 prices. Amended by the new uniform evaluations of 1956.
 b. Centralized capital investment in ferrous metallurgy.
 c. Excluding such capital investments as those for housing and social welfare facilities.
 d. Productive investment, probably including investment in the mining of manganese and chrome ore.
 e. Planned investment (in uncorrected 1955 rubles) of 10.0 billion rubles in 1957 was 1.7 billion more than actual investment in 1956. ^{51/} Investment of 8.3 billion rubles, when adjusted by a factor of 1.045, gives 8.7 billion rubles for 1956.
 f. ^{52/}. Investment in 1957 also was given elsewhere as 6 billion rubles, an increase of 0.35 billion rubles above that in 1956. ^{53/}
 g. ^{54/}
 h. ^{55/}. Revised plan.
 i. Investment in 1958 was 12.1 billion rubles, or 3.3 billion rubles larger than actual investment in 1957. ^{56/}
 j. ^{57/}
 k. ^{58/}
 l. Estimated.
 m. Revised figure, based on a statement that investment in 1960 (preliminary data) was 17 percent larger than in 1959. ^{59/} However, the planned investment for 1961 (see footnote q, below) reportedly is 1.5 times actual investment in 1959, indicating that actual investment in 1959 may have approached 10.9 billion rubles.
 n. Reported as 26 percent larger than the preliminary estimate of investment of about 10.5 billion rubles in 1959. ^{60/}
 o. Probably a preliminary estimate of investment expected in 1960. ^{61/}
 p. Thirty-two percent of the total investment planned for 1960 was allocated for construction of mining enterprises. ^{62/}
 q. Plan as reported. ^{63/}
 r. ^{64/}
 s. ^{65/}
 t. ^{66/}

C-O-N-F-I-D-E-N-T-I-A-L

(that of 1960 apparently approximated 700 million rubles), investment in the industry during the first 2 years of the Seven Year Plan was roughly 1 billion rubles less than was planned.

The USSR has allocated 16.4 billion rubles for investment in ferrous metallurgy in 1961. The value of construction-installation work, excluding the cost of equipment, is planned at 10.37 billion rubles, 50 percent of which will be spent at plants and mines in the RSFSR and one-third in the Ukrainian SSR. The remainder is for projects in Kazakh SSR, the Georgian SSR, and Azerbaydzhan SSR. 67/ Additional funds may be made available to enterprises in the Ukrainian SSR in 1961. During discussions of the plan the argument was that investment funds allocated to ferrous metallurgy in the Ukrainian SSR for 1961 "would not ensure completion of certain major projects essential for putting into operation capacity called for in the 1961 plan or for creation of a reserve for construction projects in the iron ore industry." 68/ The request for 210 million more rubles for iron ore mining was turned down, but agreement was reached to consider it again during the course of the year. 69/

In a few specific instances, delays in construction of new capacity can be attributed to inadequate allocations of investment, but in 1959-60 these delays more often reflected inefficiencies in and poor organization and coordination of construction work, all the way from the central planning level to the construction site. Such deficiencies in construction also have pushed construction costs of certain projects well above the planned levels. One example is the new Karaganda Metallurgical Combine being constructed at Temir Tau in Kazakh SSR. Although construction was behind schedule both in 1959 and in 1960, expenditures reportedly are some 70 million rubles larger than planned for the 2-1/2 years during which the plant has been under construction. 70/

At some major projects, total investment during 1959-65 will be larger than originally planned because of revisions in plans for the projects. Capital expenditures at the Sokolov-Sarbay Concentrating Combine, for example, reportedly will be considerably larger because of the increase in its planned capacity from 19 million tons to 26.5 million tons. 71/

In spite of the failure to complete all the new capacity planned for Soviet ferrous metallurgy in 1959-60, production has increased more rapidly than planned. That output of steel has exceeded the expectations of Soviet planners no doubt reflects, in part, the conservative character of the original production plan. However, it is also possible that improved technology (for example, the use of natural gas as a fuel in blast furnaces, the use of oxygen in open-hearth furnaces, improved operating practices, and the like), not only is resulting in increases in production larger than expected from existing facilities but also is

C-O-N-F-I-D-E-N-T-I-A-L

being applied at a somewhat faster pace than was anticipated. Increases in capacity and output resulting from the modernization and reconstruction of existing facilities also may be larger than were expected.

During the next few years the Soviet steel industry should continue to obtain significant increases in capacity and production by extending the use of modern technology and by modernizing existing facilities, many of which currently are producing at rates that are relatively low compared with those at the best Soviet plants. Moreover, such increases can be obtained for less investment, per ton of capacity or production, than is required to construct new capacity in new plants. The possibility that technology and plant modernization have returned larger benefits than anticipated, and perhaps the prospect that they will continue to do so during the next few years, may explain in part Khrushchev's indication that investment funds may be diverted from ferrous metallurgy to agriculture without jeopardizing the production goals of the steel industry for 1965.

In general, it appears that the sum of 100 billion rubles allocated to ferrous metallurgy during 1959-65 will be more than sufficient to provide for the increases in production of crude steel set forth in the Seven Year Plan. The extent to which production may exceed the goals for 1965 is likely to be determined mainly by whether the Soviet leaders do in fact divert investment funds from ferrous metallurgy to agriculture and by the amounts so diverted. There is little reason to believe that funds would be diverted in amounts jeopardizing the attainment of the planned production goals.

IV. Foreign Trade

Increases in exports of iron ore, coke, manganese ore, and chrome ore, none of which the USSR imports, and increases in both imports and exports of nickel, iron, and steel in 1960 are indicated by preliminary data*. Exports of iron ore -- almost all of which went to the European Satellites -- are estimated at 16 million to 17 million tons for the full year compared with 13.4 million tons in 1959. Exports of manganese probably were slightly larger than the quantity of 979,000 tons exported in 1959, and shipments of chrome ore may have amounted to about 300,000 tons compared with 272,000 tons in 1959.

Imports of nickel in 1960 are estimated to have been 10,000 tons, a sizable increase above the level of 4,600 tons imported in 1959.

* The most complete data now available on trade between the USSR and certain countries of the Free World cover only the first half of 1960, and data on intra-Bloc trade are even less complete.

C-O-N-F-I-D-E-N-T-I-A-L

C-O-N-F-I-D-E-N-T-I-A-L

These imports, which originated principally in Canada and in France, more than offset the estimated quantity of 7,000 tons exported to other countries of the Bloc and to Finland. Exports of nickel in 1959 amounted to 6,100 tons.

Soviet exports of semifinished and finished steel probably exceeded the quantity of 2.7 million tons exported in 1959, and some increase is indicated for imports that, in 1959, amounted to 1.2 million tons. As in recent years, the USSR continued to be a net importer of steel from the Free World -- mainly Western Europe -- and a net exporter to other countries in the Bloc, principally the European Satellites. On a tonnage basis, Soviet imports of steel from the Free World more than offset exports to underdeveloped countries outside the Bloc.

C-O-N-F-I-D-E-N-T-I-A-L

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