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SECRET*Control***U.S. OFFICIALS ONLY****PRODUCTION OF CHARCOAL PIG IRON IN THE URALS**

In the USSR, high-quality pig iron is produced in the Urals. Some particularly pure types of charcoal pig iron can be produced there since the region contains both highly-pure iron ore and large forests. However, efforts to develop charcoal metallurgy in the Urals were made only after 1930. Toward the outbreak of the war, production of charcoal pig iron totaled 500,000 tons, including 200,000 tons of top quality pig iron. An output of from 700,000 to 800,000 tons of charcoal pig iron, involving the production of 1.5 million tons of charcoal, was planned for the last year of the third Five-Year Plan (1942). In 1938 and 1939, steel plants using charcoal were consuming 3 - 3.5 million cubic meters of this fuel.

After the war, the production of charcoal pig iron could not match its prewar levels. Present output can be estimated at 300,000 to 400,000 tons, which is not sufficient to ensure the planned development of high-quality steel production.

The total forest area of the Urals amounts to 80 million hectares, providing a potential annual supply of 40 million cubic meters. The distribution of forests, however, is not very favorable. In the South, numerous cuts were made, and for this reason, charcoal for industry in the Chelyabinsk region must be shipped from the northern forests, hundreds of kilometers away. The better preserved forests and the best prospects for charcoal production lie in the districts of Serov,

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Ivdel' (Northern Urals), in the area of the Upper Kama River, in the Chusovoy region, and in the industrial center of Alapayevsk (northeast from Sverdlovsk).

The Schwartz furnace, which is far from perfect, is the most extensively used for charcoal production. Before the war, its replacement with American retorts, with Russian furnaces of the Koslov or Smol'nikov type, or with a type developed by Professor Ishevskiy, was contemplated. In forests where conditions are unfavorable and floatage difficult, Soviet technicians favor the use of portable Swedish furnaces. But these projects have remained on paper, and one can say that the Ural charcoal industry of today is still at a rather primitive stage.

The ore supply for furnaces using charcoal presents no problem, since many regions in the Urals have ample deposits of both pure and mixed iron ore. But although it is possible to organize the production of ores specifically for charcoal smelting, Ural high-quality metallurgy still suffers because of the chronic lack of quality of these ores. In 1939, the output of iron ore designed for use with charcoal was only 260,000 tons, a part of which was actually smelted in coke-burning furnaces. It is strongly believed that present output does not equal this level, although the development of high-quality metallurgy demands it.

The foremost among iron ore deposits designed to supply high-quality metallurgy is the Bakal deposit (southwest from Zlatoust), the high-grade ore of which is used for charcoal pig iron production and the yield of which can be increased to 40 percent (at present it is no higher than 30 percent). This deposit primarily supplies the Satka steel plants (southwest from Zlatoust, near Bakal) and the new steel combine in Chelyabinsk.

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Among various other ores suitable for charcoal smelting are: certain ores high in chromium and nickel from the Yelizavet mines; ore, low in nickel, from the Resh deposit (northeast from Sverdlovsk); magnetite and titanium sinters from Kusa; and ore from the Alapayevsk, Auerbach, Pokrovsk, Beloretsk (southwest from Zlatoust), Bayanovka, and other deposits.

The best Soviet pig iron is produced with the charcoal-smelted Bakal ores. The phosphorus content of this pig iron is under 0.03 percent and it is well suited for acid open-hearth smelting into steel. The Satka plants also have success using the nickel ore from the Akkerman deposit, mixing it with martite from the Gornoblagodatskiy deposit (east-northeast from Molotov). By smelting the powdered ore from the Akkerman deposit with coke, it has been found possible to obtain a natural alloy of iron (or steel) and nickel with a nickel content as high as 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.

Among the Alapayevsk plants, those using the charcoal process (the Alapayevsk, Sinyachikhinskiy, and Staroutkinsk steel plants) produce both ordinary metal (sheets for roofing) and high-grade pig iron (for rolling mill shafts). The Ministry of Metallurgy called for an increase in the output of the high-grade pig iron, but the order was rather inefficiently carried out.

The Alapayevsk district has long been known for its high-grade roofing sheets which have a high resistance to atmospheric corrosion. This property is due to the nickel, chromium, and copper content of the ore. Pig iron produced in this district has an average content of 0.3 - 0.5 percent nickel,

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0.2 - 0.4 percent chromium, and about 0.5 percent copper. To obtain a pig iron with a lower content of these metals, it is necessary to add to the blast-furnace charge a rather large quantity of complex ores (e. g., ore from the Yelizavet or the Resh deposits, the latter having a low nickel content). However, Yelizavet ore, being in powder form, must first be converted into briquettes or sinter and this step entails some organizational difficulties.

The region which presents the greatest possibilities for high-quality charcoal metallurgy is the Serov district (Northern Urals), where the largest forests are located. The Serov plant's blast furnaces play an important part in charcoal pig iron production.

The established norm for consumption of hard wood (birch) charcoal is 4.5 - 5 cubic meters per ton of pig iron. However, the actual consumption was never under 6 - 7 cubic meters per ton of pig iron; during the war it went as high as 7 - 8 cubic meters, and despite later improvements, is still 6 - 7 cubic meters per ton. The cost of one ton of charcoal was 25 rubles in 1935 - 1937 prices, resulting in a minimum cost of 150 rubles (using 6 cubic meters of charcoal) per ton of pig iron. Smelting with coke costs only one-third as much, since only 1.1 - 1.2 tons of coke, at 50 rubles per ton, are required per ton of pig iron.

The Ural region is the only place in the entire USSR where high-grade charcoal pig iron is produced. Its production, however, is far from adequate to meet the demands for high-grade metals. For this reason, the use of coke in producing high-grade metal has become a current problem.

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