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NONFERROUS METAL SCRAP PROCUREMENT IN THE USSR

Approximately half of all the copper consumed in the USSR, more than one third of the aluminum, and more than one third of the zinc is obtained from processed scrap and waste metal. Procurement of nonferrous scrap has continually increased each year, and in 1943, had already exceeded the prewar, 1940 level. The increase in the procurement of nonferrous scrap and waste metals in the USSR, in percent of 1926 - 1927 figures, is as follows:

Year	Percentage
1926-1927	100.0
1928-1929	120.5
1932	205.9
1937	355.9
1938	475.1
1939	541.7
1940	625.4
1943	639.0
1944	673.8

Expenditures of basic raw materials, auxiliary materials, and fuel in processing scrap are considerably lower than in smelting primary metal from ore. Consumption of fuel in smelting copper scrap is one-fifth as much as for one ton of primary metal. In processing aluminum scrap, several hundred times less electric power is consumed than in producing one ton of aluminum from bauxite. Transport needs are also reduced. Thus, for smelting one ton of aluminum from cuttings, only 1,400 kilograms of raw and auxiliary materials need be transported as compared with 7,260 kilograms for production of one ton of primary aluminum from bauxite. The differences in consumption of fuel, raw materials, etc., between secondary and primary aluminum is illustrated in the following table (from selected data):

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Materials:	Unit of Measure	Per ton of Primary Aluminum	Per ton of Secondary Aluminum
Basic	kg	6,140 (bauxite)	1,200 (cuttings)
Auxiliary	kg	1,120	200
Electric power	kwh	20,000	50
Generator gas (calorific value of 1,200 cal/cu m)	cu m	2,300	1,600
Steam	ton (Pressure of 7 and 15 atm)	24.5	---

The scrap salvaged from waste products of industry can be divided into the so-called turnover waste products and commercial waste. Turnover waste products are those occurring in metallurgical plants and rolling and foundry shops which are re-used by these enterprises. Utilization of these wastes for the needs of the enterprise must be provided for in its schedule of metal reserves. Commercial wastes include all the remaining waste products, which are delivered to offices of "Glavvtortsvetmet" (Main Administration of Secondary Nonferrous Metals). Only certain ministries are allowed to return these waste metals to their own enterprises, and the list of these ministries is established by the government.

On the whole, waste products and nonferrous metal scrap fall into two basic groups -- full-value and unclassified (established as such by definition of the State All-Union Standard 1639 - 42). Full-value scrap includes all wastes which can be reprocessed directly into standard secondary nonferrous metals, and alloys without preliminary metallurgical conversion. Unclassified scrap includes waste products and scrap which do not have the necessary metallic properties or are highly impure, needing preliminary metallurgical conversion. This group includes slags, rubbish, scale, ash, impure scrap, scrap containing less than 55 percent copper, and others.

The resources of waste products of current production are determined by the total amount of work done in processing nonferrous metals, by the nature of consumption, i.e., the way they are used and the specific methods of processing employed, and by the coefficient of waste products in various stages of processing individual metals. The coefficient expresses the relationship between the quantity of metal consumed in a given product (semimanufacture), and the weight of the finished product (semimanufacture). Thus, if the consumption of metal is 1,000 kilograms and the weight of the product is 900 kilograms, then the coefficient is one tenth or 10 percent. The coefficient is sometimes reckoned not by the quantity of consumed metal but by the weight of the product, as in metallurgical production, so that the coefficient in the above product would be 11.1 percent. The coefficient also depends on the organization of supply and on the nature of the technological process, which, if it permits defective production, will result in an increased coefficient. It can truthfully be said that the work of an enterprise is characterized by its coefficient of waste products.

The relationship between scrap and waste metal products determines the nature of the resources of nonferrous metals. The following table shows the change in the nature of these resources in the USSR during the war years:

Secondary Nonferrous Metal Resources of USSR
(percentage of the total)

	1942	1944
Current wastes	73.6	68.5
Scrap	26.4	31.5

The increase in the relative proportion of scrap in total resources developed as the result of intensive collection of military scrap, which in 1944 increased almost three times over 1941.

The collection of scrap in the USSR is carried out in accordance with government-approved annual and quarterly plans for scrap procurement. Compulsory quotas for delivery of scrap and waste products to "Glavvtortsvetmet" are established for ministries and organizations. Only certain ministries, listed with government approval, are allowed to distribute part of the waste metal products from the place of their origin to other enterprises within the ministry. All other branches of the national economy are compelled to deliver scrap and waste products to "Glavvtortsvetmet" exclusively. At the same time, scrap and wastes above the set quotas must also be delivered to "Glavvtortsvetmet." In this way, all reserves are channeled into a single procurement system and are allotted according to the state plan for distribution of nonferrous metals.

"Glavvtortsvetmet" operates through a network of procurement offices which collect scrap throughout the USSR. Each office or department has procurement centers, to which its agents or representatives are attached, in the region of its operation.

Scrap collection in rural areas and from the public in cities is accomplished through a network of usable-junk procurement organizations ("Tsentroutil'," "Soyuzutil'," Industrial Cooperatives, and others). Special scrap collection programs are established for these organizations, which are contractors of "Glavvtortsvetmet." All metal procured by these contracting agencies is delivered to bases of "Glavvtortsvetmet."

The government has also approved the following measures in connection with scrap procurement: (a) Fixed quotas for storage of scrap and nonferrous wastes in enterprises have been established, and accumulation of reserves above the norm is forbidden; (b) Transport of scrap to railroad stations and docks must be handled by the enterprise's own transport facilities; it also must provide necessary manpower and facilities for loading scrap into railroad cars at plant sidings; (c) A system of awards has been set up to encourage plant workers employed in collecting and delivering scrap in enterprises.

Contracts concluded between the enterprises and the offices of "Glavvtortsvetmet" provide for certain sanctions to be enforced against any enterprise which fails to observe the laws regarding collection, storage, and utilization of scrap and waste products. The minister is responsible for fulfillment of the fixed plans for scrap collection and delivery within the ministry. Chairmen of oblast or kray executive committees, and chairmen of the councils of ministers of the Union and autonomous republics bear the responsibility for fulfillment of the procurement plans in oblasts, krays, and republics. Party and soviet agencies give constant assistance to "Glavvtortsvetmet" offices in carrying out the procurement program. These agencies observe the fulfillment of the plans by individual enterprises, and take necessary measures against plants which are not meeting plans.

The government has also set up special standards which strictly regulate the collection, storage, and delivery of scrap in an effort to maintain its quality. It is not allowed, for example, to mix waste products of different alloys, and storage must not be permitted under conditions which result in losses of metal. A system of scrap delivery accompanied by a document (passport) indicating the chemical content of the scrap has been established. The increasing number of alloys makes it necessary to observe particularly careful collection of wastes at the point of origin. In enterprises, shops, and at individual machine tools, scrap collection must be so organized that there is absolutely no mixing of various types of wastes, thereby preventing mass

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deterioration of different groups of alloys by harmful elements. Mixed waste products also cannot be utilized for production of analogous or closely related alloys.

The All-Union Committee on Standards, which has clearly outlined the principles and methods of correct collection and storage of scrap and waste produced in current production, has ordered compulsory marking of nonferrous metal parts, making it easier to discern the alloy composition of worn-out parts in the total mass of scrap.

Primary processing of scrap and waste products includes all conversion processes preparatory for resmelting. Almost all scrap undergoes primary processing as do those waste products which are contaminated, those which contain oil and moisture, and those which cannot be transported.

Primary processing by machine methods includes magnetic separation, crushing, degreasing in centrifuges, cutting on mechanical saws, separating by gasoline-oxygen cutters, and pressing. Processing of the so-called unclassified wastes by concentration (screening, washing) occupies a particular place. Primary processing also includes sorting, weeding out the nonmetallic from the metallic, breaking the scrap into necessary dimensions, and determining different metal and alloy contents in machine parts by spot tests, etc.

Primary processing is carried out in special bases, at the point of origin of the scrap and waste products, and in the charging shops of the secondary nonferrous metal plants. The special bases chiefly handle scrap from public or military sources, while nontransportable scrap (airplane scrap) should undergo resmelting where conditions permit. Enterprises which continually amass large quantities of waste products should have such machines as crushers, magnetic separators, packet-presses, centrifuges, etc. They should also provide for the removal of oil, emulsions and moisture, where the content of these impurities averages 10-12 percent of the total weight, from metal cuttings. The government has given enterprises the right to spend up to 10 percent of the proceeds from delivering scrap and nonferrous wastes for such equipment as is necessary for collection, primary processing, and storage of scrap.

Prices on scrap and wastes are regulated according to classifications set by the All-Union Standard No 1639-42, and are so fixed as to provide the maximum incentive for delivery of high-quality scrap. Pure wastes, delivered with the document indicating their chemical composition command a much higher price than the same wastes which have been allowed to deteriorate and have no such documentation. The differences in prices paid for the two is shown in the following table:

	Procurement Price per Ton in Current Prices (rubles)		Difference in Price per Ton (rubles)
	Pure Waste With Document	Impure Waste Without Document	
Duralumin cuttings	2,230	1,440	790
Silumin cuttings	2,380	1,440	940
L68 brass cuttings	2,180	1,550	630
LS-59-1 brass cuttings	1,950	1,550	400
Copper cuttings	3,000	2,650	350
Bronze (tin) cuttings	3,800	2,710	1,090

Part of the scrap collected by "Glavvtortsvetmet" is sent to be reprocessed in secondary nonferrous metal plants and part is sent directly to metalworking plants (metallurgical and foundry enterprises, chemical plants). Almost all aluminum scrap, and the greater part of bronze and lead scrap is reworked in secondary alloy plants of "Glavvtortsvetmet." Supplies of scrap and waste products and also of secondary alloys are allotted to industry in strict accordance with the state plan for distribution of nonferrous metals.

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