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ECONOMIC COMMITTEE

THE LEAD AND ZINC INDUSTRY IN THE SOVIET UNION

Note by the Secretary

Members of the Committee will find attached a report by the German Delegation concerning the situation and prospects of the Soviet lead and zinc industry as at March 1974, and giving some consideration to the probable development of the Soviet foreign trade in this sector, taking into account the supply situation for lead and zinc in the European countries.

(Signed) M. van den BULCKE

NATO,
1110 Brussels.

This document includes: 7 Annexes

The Lead and Zinc Industry in the USSR

Note by the German Delegation

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The Lead and Zinc Industry in the USSR

The Soviet lead production for which only two plants existed in 1913 increased from 1,5oo tons in 1913 to 48,7oo tons in 1936. At that time four plants were already in operation: Chimkent and Leninogorsk in Kazakhstan, Ordzhonikidze in the Caucasus and Dalnegorsk in the Far East. During the second world war the Soviet lead production stagnated and declined. In 1955, however, the Soviet Union reached - after the plants in Karlyuk, in Uzbekistan and at Ust'-Kamenogorsk in Kazakhstan started operation - a share of 9.7 % (22o,ooo tons) in world production. This share could be increased to 13 % (521,ooo tons) in 197o. A production of 73o,ooo tons can be expected in 1975.

The Soviet zinc production which in 1913 was concentrated in one plant only increased from 2,9oo t to 63,2oo t in 1936 at which time already four plants were in operation: Belovo in West-Siberia, Chelyabinsk in the Ural mountains, Konstantinovka in the Ukraine and Ordzhonikidze in the Caucasus. During the second world war the production dropped considerably. After the zinc plant at Ust'-Kamenogorsk, Kazakhstan, started operation (1948) the Soviet Union produced about 256,ooo t of zinc in 1955, i.e. 9.4 % of the world production. She succeeded in increasing this share to 14 % (75o,ooo t) in 197o. A production of 1 o5o,ooo t can be expected in 1975.

A major part of the lead-zinc deposits in the Soviet Union is in genetic connection with the paleozoic orogenesy. They are mostly mined underground. Total reserves which can be mined profitalby at present are estimated at least at 17 million tons of Pb metal and at least 22 million tons of Zn metal. Intensive

prospecting and exploration have been carried out continuously since 1959. During these works the largest lead-zinc deposit of the Soviet Union was discovered at the confluent of the Angara and Yenisei rivers in 1968.

Lead production in the USSR is concentrated in four regions:

- The Kazakhstan SSR with the plants at Chimkent, Leninogorsk, Ust'-Kamenogorsk,
- the Caucasus with the plant at Ordzhonikidze,
- the Sikhote-Alin mountains in the Far East with the plant at Dal'negorsk,
- Uzbekistan with the plants at Karlyuk and Almalyk.

The most important region is the Kazakhstan SSR with 65 % of total Soviet production.

The zinc production in the USSR is concentrated in six regions which are partly identical with the lead districts:

- The Kazakhstan SSR with the plants at Ust'-Kamenogorsk and at Leninogorsk,
- West-Siberia with the plant at Belovo,
- the Caucasus with the plant at Ordzhonokidze,
- the Ural with the plant at Chelyabinsk,
- the region around Moscow with the plants at Podol'sk and Ryasan,
- the Ukraine with the plant at Konstantinovka.

In this case also the Kazakhstan SSR with 4o % of total Soviet production is the most important region.

The most successful measures of technological progress were the introduction of oxygen in the smelting process and the increased metal extraction from the ores.

During recent years the Soviet Union concluded supply and cooperation agreements as well as agreements on technical-scientific cooperation with Zambia, Yugoslavia, Italy, and Bolivia.

During recent years the Soviet Union exported annually an average of 93,ooo t of lead and imported about 39,ooo t. About 9o % of the export went to the COMECON countries, first of all the GDR and the CSSR. Imports came mostly from Bulgaria, Yugoslavia, and North Korea.

Until 1966 annual average zinc exports amounted to 1o8,ooo t, of which approximately one third went to the COMECON countries, the rest to western countries, primarily the Netherlands and Great Britain. Due to the large offer on the world market exports in 1967 - 197o amounted to only 86,ooo t annually. Of these 75 % were exported to the COMECON countries, primarily the GDR, the CSSR, and Hungary.

Since in the Soviet Union the lead and zinc consumption is increasing more slowly than the production it can be expected that the export offer will grow during the next years. The share of the COMECON countries and Yugoslavia in the lead-zinc production of the Soviet bloc amounts to 36 % and 33 % respectively.

Yugoslavia, Poland, and Bulgaria are of particular importance. For some years, Yugoslavia's production has shown a downward trend, Poland's an upward trend and Bulgaria's has remained constant.
The per capita lead consumption in the USSR was 2.4 kg in 197o. The cable industry has a great share in the consumption (17.4 % in 197o); a relatively large quantity of lead is being used for semifinished products.

The per capita zinc consumption was 3.4 kg in 197o and this is only half the consumption in western countries. Due to obsolete technological procedures a relatively large amount of zinc is used for galvanization.

1. Development of the Soviet Lead and Zinc Industry

1.1 The Soviet Lead Industry up to the End of the 8th Five-Year Plan (1970)

The Soviet lead production* was completely insignificant right before World War I. From 1913 to 1936 it increased as follows according to official data:

1913:	1.500 t	1933:	13.700 t
1930:	11.500 t	1934:	27.200 t
1931:	15.500 t	1936:	48.700 t
1932:	18.700 t		

While these figures are still based on official Soviet information, all production figures for later years are estimates based on data regarding plans, plan fulfilment, rates of growth and proportions provided at the level of plants, provinces and countries.

Before World War I only the lead foundries at Ordzhonikidze in the Caucasus and at Dal'negorsk in the Far East existed. In 1936 production was already shared by four plants:

Chimkent (Kazakhstan)	21.510 t (44,3 %)
Leninogorsk (Kazakhstan)	12.440 t (25,5 %)
Ordzhonikidze (RSFSR/ Caucasus)	7.984 t (16,4 %)
Dal'negorsk (RSFSR/Far East)	6.730 t (13,8 %)
	48.664 t (100 %)

* Throughout this report the term "lead" comprises electrolyte, soft and fine lead.

Due to war effects - especially the German advance in the Caucasus, the loss and the transfer of the plant at Ordzhonikidze - Soviet lead production stagnated and declined during World War II. During the war years there was no mention of lead plants in the numerous reports on the success of production competitions among non-ferrous metal plants.

The fourth five-year plan (1945-195o) provided for an increase of the lead production to 26o %; 237 % were achieved. Two further lead plants were constructed until 1955: Karlyuk in Uzbekistan (about 1947) and Ust'-Kamenogorsk in Kazakhstan (1953). In 1955 the Soviet lead production and its regional distribution was as follows:

Chimkent	97.ooo t	
Leninogorsk	65.ooo t	
Ust'-Kamenogorsk	3.ooo t	this means: Kazakhstan 165,ooo t
Ordzhonikidze	27.ooo t	
Dal'negorsk	18.ooo t	
Karlyuk	1o.ooo t	
	22o.ooo t	

In 1955 the USSR produced 22o,ooo t of refined lead and reached 9.7 % of world production. In 197o she produced 521,ooo t (13 % of world production) and a production of 73o,ooo t can be expected in 1975.

The increase in production was achieved by extending the capacity of the existing six plants and by improving processes. (in the six years since 1965 the lead output of the Soviet Union increased in the average from 72.8 % to 82.5 %). The introduction of oxygen in the smelting process and automation essentially contributed to the improvement of processes.

During recent decades the opening up of new lead-zinc deposits and the extension of existing mines has continuously advanced and this safeguarded the raw material supply of the smelting plants. Only the supply of Chimkent was very slow in 1954/55.

List of plants see Annex 3
Regional distribution of plants see Annex 8 (map)
Production estimates see Annex 1.

1.2 The Soviet Zinc Industry up to the End of the 8th Five-Year Plan (197o)

As for lead, official Soviet production data for the zinc industry exist only up to 1936 *. The production increased as follows from 1913 to 1936:

1913:	2.9oo t	1934:	27.1oo t
1931:	9.2oo t	1935:	46.2oo t
1933:	16.6oo t	1936:	63.2oo t

All further figures are estimates based on data regarding plans, plan fulfilment, rates of growth and proportions provided at the level of plants, provinces and countries.

Before World War I only the zinc smeltery at Ordzhonikidze in the Caucasus existed. The following four plants were producing in 1936:

Belovo (RSFSR/West Siberia)	15.2oo t	(24,o %)
Chelyabinsk (RSFSR/Ural)	13.53o t	(21,4 %)
Konstantinovka (Ukraine)	11.8oo t	(18,7 %)
Ordzhonikidze (RSFSR/Caucasus)	22.67o t	(35,9 %)
	63.2oo t	(1oo %)

* Throughout this report the term "zinc" comprises all commercial degrees of purity.

During World War II the production, which had further increased until 1940, dropped considerably because the zinc plant at Konstantinovka was destroyed and that at Ordzhonikidze transferred. However, about five years after the war the production exceeded its pre-war level. This was due primarily to the zinc plant at Ust'-Kamenogorsk in Kazakhstan which started production in 1948. This plant had a share of 40 % in Soviet zinc production until the mid-1950ies. The following plants contributed to the Soviet zinc production in 1955:

Belovo	44.000 t
Chelyabinsk	35.000 t
Konstantinovka	26.000 t
Ordzhonikidze	49.000 t
Ust'-Kamenogorsk	102.000 t
	256.000 t

With an annual production of 256,000 t of zinc the USSR's share in world production was 9.4 % in 1955. In 1970 she produced 750,000 t; which represents about 14 % of the world production. The 300 % increase of production was essentially achieved following the start of operations in three new plants at Podolsk and at Ryazan near Moscow (in 1954/56) as well as the substantially larger plant at Leninogorsk in Kazakhstan (1965). At the same time existing capacities were extended, the metal output from the ores increased (during the six years before 1965 the average zinc output in the Soviet Union grew from 67.4 to 72.1 %), the smelting technology improved and automation introduced.

The raw material supply of the zinc plants was safeguarded throughout this time.

List of the plants see Annex 3.
Regional distribution of plants see Annex 8 (map).
Production estimates see Annex 2.

1.3 Probable Development of the Soviet Lead and Zinc Industry in the 9th Five-Year-Plan (1971-75)

The current five-year plan provides for an increase of 1.4 times in the production of non-ferrous metals - with special mention of the lead and zinc industry. In 1971, 1972 and 1973 rates of growth of 7% were reported. If this development continues it can be expected that the plan will be fulfilled and that the Soviet Union will produce about 730,000 t of lead and about 1 050,000 t of zinc in 1975.

The main emphasis of investments is to be given to the reconstruction and technical reorganization of the plants in operation.

It is planned to develop the smelting plant at Chimkent into the largest lead plant in Europe by doubling its output. In 1972 the first section of the new melting complex was put into operation.

In October 1970 a zinc plant started operation at Almalyk (Uzbekistan). It has an annual capacity of 50,000 - 100,000 t and will contribute essentially to the fulfilment of the plan after overcoming the usual starting difficulties. A lead plant has been under construction at Almalyk for several years; it was still uncompleted in the summer of 1973.

2. Lead-Zinc Deposits in the USSR and Possibilities of their Utilization

2.1 Geology and Information on Deposits

A major part of the lead-zinc deposits in the Soviet Union is in genetic connection with the paleozoic orogenesy.

Sedimentary Lead-Zinc Ores

They are sulphidic ores in green extrusive rock. In addition to Pb and Zn they also contain Cu, S, Cd, Au, Ag and trace elements. Up to now they have been found in the Altay and Ural mountains (copper-zinc ores), in Central Kazakhstan, in Dzhungary's Ala-tau, in Northern Armenia and East Siberia (Rayon Salair).

Lead-Zinc Ores in Carbonates

The deposits of lime, dolomitic lime and dolomite rock known in the Soviet Union have lower metal contents than the sulphidic ores. The country rock is in general barytic and silicified. Such deposits have become known especially in Central and South Kazakhstan, the Trans-Baikal region and Central Asia.

Lead-Zinc Ores at Contacts of Lime and Granite Rocks

These are mineralizations at faults in the contact area of lime and granite rocks. They are vein ores containing Pb, Zn, S, Au,Ag and trace elements. This type has been found in Central Asia, Central Kazakhstan and the Far East (Primorskiy region).

Other Lead-Zinc-Ores

The following further deposits have become known: lead-containing sandstones, lead-zinc ore in erruptive rocks, lead-zinc ore in sandstones, in foliated sandstones, gneiss, crystalline slate. These deposits contain less zinc but they contain also S, Au, Ag and trace elements. Nothing is known about the economic importance of these deposits. The major part of lead-zinc metals is extracted from sulphidic ore. The Pb contents vary between 1% and 8%, the Zn contents between 1.5% and 15% +).

Most of the lead-zinc ore is mined underground. Open-work mining exists only in a few cases :

Leninogorsk : Anreyevskiy and Tishinskiy mines
Aktyuz : partly open-work mining
Achisay : Mirgalimsay mine, partly open-work
Zyryanovsk : partly open-work mining
Altyn-Topkan : " " "

It is known that some of the deposits which are being mined at present still have very extensive stocks of ore. Thus the deposits of the Tishinskiy mine (Leninogorsk) are large enough to be mined beyond the year 2000. The same can be said for Aktyuz. Especially large stocks of ore, apart from the Gorevskiy deposits at the confluent of the Angara and Yenisei rivers are available in the Achisay deposit.

The present USSR reserves which can be profitably mined are estimated at 17 million t of Pb metal and 22 million t of Zn metal.

2.2 Prospecting and Opening up of New Lead-Zinc Deposits after 1965

The intensive prospecting and exploration works which started under the seven-year plan (1959-1965) continued also under the eight five-year plan (1966-1970). More than 50% of the capital investments in the non-ferrous metals industry amounting to 7,000 million rubles were used for the exploration of new ore deposits during this period. Prospecting activities continue under the current five-year plan (1971-75). Many new lead-zinc deposits of various sizes have been discovered:

+) For comparison :

Federal Republic of Germany - Bad Grund 5-6% Pb, 3-4% Zn
Yugoslavia - Trepca 7,1 % Pb, 5,5% Zn
Zambia - Broken Hill (now Kabwe) 15,4% Pb, 26% Zn

Kazakhstan

Important lead and tungsten ore deposits were discovered near Alma Ata in the Saryshak ore region in 1966. East of the Caspian Sea, in the Mangyshlak mountains, new lead-zinc deposits were found in 1970. Prospecting in the Tekeli region was intensified in 1973.

Uzbekistan

In the south of Uzbekistan, in the Gissar mountains, lead-zinc and copper deposits were discovered in 1969. They are spread over several thousands of square kilometers and are considered the richest in Uzbekistan. The most important deposit at Chandisinskoye is located at an altitude of 1,500 m.

Buryatic ASSR - Baykal Region

New rich lead-zinc deposits were discovered near Ozernyy in 1971. They contain cadmium-containing zinc blende (ore with 5 - 15 % Zn), galena (ore with 4 - 8 % Pb), pyrite, copper pyrites, arsenic pyrites. In the southern part of the Buryatic ASSR promising lead and zinc ores were found in 1973.

Armenia

In north-eastern Armenia lead, zinc and copper ore deposits were discovered in 1973.

East-Siberia - Angara Region

The largest lead and zinc ore deposit in the Soviet Union was discovered at the confluent of the Angara and the Yenisei rivers in 1968. One third of this Gorevskiy deposit which extends over 12,000 sq.km is located below the Angara river. It is considered in the USSR as the best in the world in quantity and quality as far as the lead contents are concerned.

North-east of the Yenisei-Angara confluent, on the Priangarskoye plateau, a large lead-zinc province was examined in recent years. It was found that most of the zinc ore had a high Fe content. These contents can have very negative effects on the zinc production. This zinc province may therefore be used only as an additional raw material basis for the future Gorevskiy combine.

3. Production Districts of the Lead Industry in the USSR

The lead industry in the USSR is concentrated in four regions:

- the Kazakhstan SSR (Chimkent, Leninogorsk, Ust'-Kamenogorsk)
- the Caucasus (Ordzhonikidze)
- the Sikhote Alin mountains in the Far East (Dal'negorsk)
- Uzbekistan (Karlyuk, Almalyk).

These locations were selected according to the distribution of lead and lead-zinc ore deposits.

List of plants see Annex 3.

Distribution of plants see Annex 8 (map).

3.1 The Lead District in the Kazakhstan SSR

Kazakhstan with the three lead melting plants at Chimkent, Leninogorsk, Ust'Kamenogorsk is the most important lead producer in the Soviet Union. However, its share in the total production dropped from 75 % in 1955 to 65 % in 1970.

The lead plant at Chimkent (named KALININ) is the largest in the Soviet Union. It started operation in 1934, has been continuously improved since and is to be automated by 1975. Apart from lead it produces sulphuric acid, cadmium, bismuth, indium, copper, silver, gold, lead rolling material and lead pipes.

The combines at Achisay and Tekeli supply the raw material; both have mines and processing facilities. The facilities at Achisay started operation in 1934. They are processing ore containing galena, zinc blende, pyrite and copper pyrites which are mined at the mines of Miryalimsay, Khatangi, Karatau, Sapadny, Kentau (with its own enrichment facilities), Bayshansay, Glubokiy and others.

The mines and processing facilities at Tekeli have been in operation since 1944 and were extended in 1965 (it is expected that the deposits in Tekeli will be exhausted in 1974). Ores containing galena, zinc blende, pyrite and copper pyrites are being mined at Koksu, Tuyukskiy, Rudnichny, Zapodnoye, Taldi-Kurgan and others.

New mines for the supply of Chimkent have been opened in South Kazakhstan, the Kirgese SSR (Aktyuz) and the Tajic SSR (Kanasay).

Kazakhstan's second largest lead plant is in Leninogorsk. It has been producing since 1927, was named RIDDER until 1939 and is being further improved. Leninogorsk produces apart from lead primarily zinc (since 1965), but also sulphuric acid, zinc sulphate, copper, bismuth, tungsten, antimon, selen and cadmium.

Raw material is supplied by its own mines, the lead combine at Zyyanovsk and the processing plant at Belousovska. New mines have been opened at Tishinskiy and Skipovaya.

Zyryanovsk has been operating since before 1928 and has been extended several times; in 1956 an open-work mining area and in 1969 a new underground mining area were opened up. Ores containing zinc blende, galena, copper pyrites and pyrite are mined underground at Maslyanskaya, Putinovskoya, Severnaya, Tsentralnaya and other mines. Metal contents are 14 % Zn, 7 % Pb, 3 % Cu.

The lead, zinc and copper concentrates are supplied to Leninogorsk and also to Ust'-Kamenogorsk. The polymetal mine at Belousovska which has been operating since 1932 and was extended after 1966 enriches its own ores with zinc blende, galena, copper pyrites which are mined at Kapitalnaya, Berezovska, Skipovaya, and it supplies almost all smelting plants in the Altai mountains with the concentrates. Metal contents are 8 % Zn, 1.6 % Pb, 3.4 % Cu.

Kazakhstan's smallest and youngest lead plant is in the combine W.I. Lenin at Ust'-Kamenogorsk. It was built in 1950/53. In 1966 it was provided with a facility for slag and exhaust-gas processing. The combine is the largest zinc producer in the USSR and also produces sulphuric acid, cadmium, white lead, white zinc, silver, gold, crude copper, thallium, antimon, mercury, white vitriol. The lead plant at Ust'-Kamenogorsk is supplied with concentrates by the lead and mining combine at Zyryanovsk and, since 1972, has also received the concentrates from the polymetal mine and processing plant at Karagayly.

The mining and processing combine at Gornyak which has been operating since 1967 and processes ores containing galena,

zinc blende and copper pyrites and produces primarily lead concentrate cannot be associated with any particular smelting plant. The metal content of its ore is 2.9 % - 35 % Zn, 1.4 % - 2.3 % Pb and 0.8 % - 1.2 % Cu. The lead concentrate of the copper processing plant at Dzezkazagan cannot be associated with any other lead processing plant either.

3.2 The Lead District in the Caucasus

The only lead plant in the Caucasus is the lead-zinc smelting plant at Ordzhonikidze (named ELEKTROZINK) Lead production started already in 1898. Before the German occupation of the Caucasus during World War II parts of the smelting plant were transferred to Chelyabinsk and Belovo. The remainders of the plant were 80 % destroyed. In 1946 the plant started producing again on a small scale. The pre-war production of 10,000 to 12,000 t was not reached again before 1950, but was more than doubled already by 1955. Apart from lead the plant produces primarily zinc but also sulphuric acid, cadmium, gold, silver, antimon and copper sulphate.

It processes concentrates from nearby mines and the processing plant at Mizurskiy which belongs to the lead-zinc combine at Sadon. Concentrates from the Altay mountains and Dal'negorsk were processed temporarily and others imported from North Korea and Iran. The Sadon combine processes ore with 13.5 % Zn contents and 5 % Pb contents. Other deposits with different metal contents in the neighbourhood of Sadon are not included in the output.

The production of lead concentrate mined and processed in the facilities at Alaverdi and Agarak cannot be associated with any particular smelting plant.

3.3 The Lead District in the Far East

The only lead smelting plant (named SIKHOTE ALIN) in the Far East is located at Dal'negorsk (formerly Tetyukhe) in the Sikhote Alin mountain range. It was constructed already in 1897, shut down temporarily, and purchased and extended by foreigners in 1924. In 1931 it was taken over by the Soviet Union which increased the number of mines and processing facilities. SIKHOTE ALIN produces lead as well as sulphuric acid, bismuth, silver and zinc concentrates. The required concentrates are produced by own mines and processing facilities, i.a. at Dal'negorsk, Krasnoreshensky, Kavalerosk, Nikolayevsk and Khrustalny.

The ores contain zinc blende, galena, copper pyrites, pyrite, cadmium and bismuth. They contain 8-15% Zn, 4-9% Pb, 0.5% Cu, 0.06% Cd, 0.5% Bi.

3.4 The Lead District at Uzbekistan

In this district there is also only one plant for lead production, i.e. the smelting plant at Karlyuk which is the smallest plant of the Soviet lead industry.

It started operation around 1947. In 1944 the deposits which were already exploited in the antiquity were rediscovered and prepared for mining. Sulphuric acid is produced in addition to lead. The raw material is supplied by several mines with processing facilities. The metal content of the ore is not known, they are probably Pb-Zn-Cu ores.

A lead smelting plant within the copper-zinc combine at Almalyk has been under construction for several years but had not started operation in 1973.

It cannot be determined with certainty where the lead concentrate producing mine and processing combine at Anzob (Svintsovyy Rudnik) belongs.

4. Production Districts of the Zinc Industry in the USSR

The zinc industry in the USSR is concentrated in six regions which are partly identical with the lead districts (Kazakhstan, Caucasus):
- the Kazakhstan SSR (Ust'-Kamenogorsk, Leninogorsk)
- West Siberia (Belovo)
- the Caucasus (Ordzhonikidze)
- the Ural (Chelya Binsk)
- the region around Moscow (Podol'sk, Ryasan)
- the Ukraine (Konstantinovka)

There are eight zinc smeltingpplants, two more than for lead. Three smelting plants produce both zinc and lead, i.e. Ust'-Kamenogorsk, Leninogorsk, Orzhonikidze. Whereas the number of lead plants remained unchanged compared with 1955, the zinc plants increased by threee - the plants at Podolsk, Ryasan and Leninogorsk - between 1955 and 1965.

Apart from the slag-processing plants at Podolsk and Ryasan as well as the smelting plant at Konstantinovka the zinc plants are located near the deposits of zinc and/or lead-zinc ores.

The production of lead and zinc concentrate of the Akatuy combine and that of zinc concentrate of the Nerchinsk combine, both in the Transbaykal region cannot be clearly associated with any of the a/m districts.

List of plants see Annex 3.

Distribution of plants see Annex 8 (map).

4.1 The Zinc District in the Kazakhstan SSR

The Kazakhstan SSR is the largest zinc producer in the Soviet Union. Its share in total production has been about 40% since 1955. The older of the two existing zinc smelting plants is located at Ust'-Kamenogorsk where zinc production was started in 1948. The plant at Leninogorsk has been producing zinc since 1965. (The combine W.I.LENIN at Ust'-Kamenogorsk is described in chapter 3.1 "The Lead District in the Kazakhstan SSR").

A second residue-processing facility for zinc production was built shortly after World War II, the first was restored and enlarged. In 1951-1955 the refinery capacity was extended by using equipment from the GRIESCHE factory at Magdeburg (GDR), which had been dismantled. The zinc plant at Ust'-Kamenogorsk is the most profitably producing plant in the Soviet Union. Raw Material in the form of zinc concentrates is supplied from processing facilities supplying also the lead-zinc plant at Chimkent, and from the polymetal combines at Zyryanovsk and Karagayly. More details regarding these two polymetal combines are given in chapter 3.1.

The second zinc plant in Kazakhstan, at Leninogorsk, is also described in chapter 3.1. A slag utilization facility for zinc production is planned there.

At the Irtysh polymetal combine at Glubokoye which mainly produces copper, zinc has been produced from residue slag in a special electro-thermic section since 1967.

The mining and processing facilities at Karaganda and Bordunsky can not be clearly associated with any smelting plant.

4.2 The Zinc District in West-Siberia

The zinc smelting plant at Belovo in West-Siberia started operation in 1931; it was constructed by German engineers from 1928-2932. During World War II it was extended with parts of the Ordzhonikidze plant transferred from the Caucasus. In 1965 the replacement of the old distilling furnaces with electro-thermic facilities was started.

Belovo produces zinc and sulphuric acid. The plant receives its concentrates from the mine and processing plant at Salair where ores containing zinc blende, galena, copper pyrites and pyrite are mined. The metal contents are 6 - 10% Zn, 1.6% Pb and 0.5 - 1% Cu.

4.3 The Zinc District in the Caucasus

The only lead-zinc plant in the Caucasus, at Ordzhonikidze, is described in chapter 3.2 "The Lead District in the Caucasus". The zinc refinery of this plant was not built before 1934 with American aid. Lead-zinc mining in the Caucasus started 1839 in the North Caucasus. The first smelting plant for the production of lead and silver was built at Alagir in 1859. Although the zinc content of the ore was twice as high as the lead content, no zinc was produced at that period and the material was thrown on the waste dump. After 1891 this material was exported to Belgium, Great Britain and the Netherlands.

The mining and processing facilities at Kvaisi and Madneuli cannot be clearly associated with any smelting plant.

At Kvaisi lead and zinc concentrates have been produced since 1948, at Madneuli copper, lead and zinc concentrates since 1972.

4.4 The Zinc District in the Ural

In the Ural there is also only one zinc-producing plant, the zinc smelting plant S.M. KIROV at Chelyabinsk. Planned by Germans, it started production in 1935. As at Belovo, the smelting plant at Chelyabinsk was extended during World War II with parts of the transferred plant from Ordzhonikidze. Apart from zinc, Chelyabinsk produces sulphuric acid, cadmium, indium and copper. Concentrations are supplied by Leninogorsk from mines and processing facilities at Zolotishinsk, Tekeli, the lead plant at Dal'negorsk and the Krasnouralsk deposits. Ores containing copper pyrites, zinc blende and pyrite are mined in the latter. They contain 2 - 3 % Cu and 1 - 2 % Zn. The zinc concentrates are supplied exclusively to Chelyabinsk.

Further production facilities which cannot yet be clearly associated exist in the southern Ural, such as the zinc mine at Karpinsk which is under construction, the mining and enrichment combine at Uchaly and the polymetal combine at Ognevskoye which has been operating since 1965. More details are known about the Uchaly combine; it produces zinc and copper concentrates. The plant started operation in 1972 but is being further extended. The processing facility has an annual capacity of 1 000 000 t of ore.

4.5 The Zinc District around Moscow

From 1954 - 1956 the two slag-processing zinc plants at Podolsk and Ryazan were established in the wider surroundings of Moscow. Little details are known about

these electro-thermic plants. They process Cu-Pb-Zn residues which contain 12 % Zn. It is not known who supplies them with raw material. *)

Similar plants are at Ust'-Kamenogorsk, Almalyk, Leninogorsk and Chimkent.

4.6 The Zinc District in the Ukraine

A single zinc plant, UKRZINK at Konstantinovka, is operating in the Ukraine. It was built in 1929/193o and destroyed in war actions in 1941. Reconstruction progressed only slowly. Production was not resumed before 1955, using the standardized electrolysis system which the Soviet Union introduced in all newly established plants after World War II. In addition to zinc the Konstantinovka plant also produces sulphuric acid, cadmium, indium, zinc sulphate, zinc oxide, copper sulphate and lead from scrap.
This smelting plant is the only one in the USSR whose location is not determined by ore deposits. It receives its concentrates from Dal'negorsk in the Far East. Temporarily concentrates were also imported from Bulgaria.

4.7 The Zinc District in Uzbekistan

In the mining-metallurgical combine LENIN at Almalyk which in the beginning produced only copper, a zinc smelting plant started operation in October 197o. Of the planned three construction sections the second was under construction at the end of 197o, the third in preparation. The final capacity will

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*) Podolsk is primarily a plant for the production and processing of remelt lead and zinc.

be about 5o,ooo - 1oo,ooo t of zinc per year. Although parts of it are automated the plant lags 15 to 2o years behind the latest western standards in terms of technological equipment.

The zinc-lead reserves known at present are sufficient for about 15 years. They are being mined in the deposits of Altyn-Topkan and Kurgashimkan which were discovered in 1949. They are mixed oxide-sulphide ores with varying metal contents (in the average 1.25 % Pb, 1.5 % Zn, 0.08 % Cu) which are processed in the combine of Altyn-Topkan.

In the Gissar mountains, north of Karlyuk, a lead-zinc mine is being developed at Khandiza; its future association is still uncertain.

5. Technological Progress in the Soviet Lead-Zinc Industry

One of the main successes of the technical progress was the introduction of oxygen in the lead (and copper) production which increased the output of the mines' furnaces substantially, reduced losses of lead in the slag and cut down fuel consumption. The lead-zinc combine at Ust'-Kamenogorsk has thus been able to reduce its coke consumption by 35 % and that of admixtures by 54 %. The total savings due to the use of oxygen at Ust'-Kamenogorsk during the first nine years (1958-1966) amounted to 13 million rubles. By 1971 the Institute for Organic Catalysis and Electrochemistry of the Kazakhstan Academy of Science developed a technology for the production of purest lead. The technology of lead refining by amalgamation was tested industrially with success and is to be introduced into the production.

The scientific research institute for non-ferrous metals (W N II ZWETMET) in cooperation with specialists from the Ust'-Kamenogorskiy lead and zinc combine worked out a method to extract tellurium from concentrates and introduced it by 1969.

Information was received in 1973 that a facility for the production of zinc dust had been developed in the Soviet Union; it works with whirling compressed air and intensive supersonic wave vibrations. The liquid metal runs directly from the electric furnace into the facility and is pulverized by air twirls and supersonic waves. Vacuum procedures, inter alia for lead dezincking, are being examined and tested industrially at present.

Especially remarkable is the continuing increase of metal extraction in most plants. The lead plant at Chimkent has to be mentioned here as an outstanding example. It succeeded in increasing the lead output from 90.5 % (1970) to 94.2 % (1973). The reduction of the losses of lead has been achieved by cleaning the entire gas volume and by putting a slag sublimation furnace into operation.

6. Soviet Activities in the Lead-Zinc Sector Abroad

As in the case of other non-ferrous metals, Soviet efforts to cooperate in the technical-scientific field with other countries and to participate, if possible, in the exploitation of deposits, especially in the developing countries, have been observed also in the lead-zinc sector.

Zambia: in 1971 the Soviet Union and Zambia signed an agreement which provides i.a. that Zambia will supply the USSR with lead and zinc in exchange for Soviet machines and technical equipment.

Yugoslavia: in 1972 it was decided to extend several Yugoslav lead-zinc mines with Soviet aid. Before, the Soviet Union had already supplied processing facilities for two mines as well as production facilities for lead-zinc concentrates.

Italy: further to an agreement on technical-scientific cooperation concluded in 1965, close cooperation in the development of new zinc production procedures was agreed in 1972 between Italy's MONTECATINI EDISON SpA and a Soviet organization.

France: in 1973 the Soviet Union and France agreed on increased scientific-technological cooperation in the non-ferrous metals sector, especially as regards the improvement of lead and zinc production procedures.

In 1974/75 the Bolivian firm of COMIBOL will probably buy in the USSR a facility for the production of 6o,ooo tons of zinc per year. Soviet experts will install it and put it into operation.

7. Foreign Trade with Lead and Zinc

7.1 Foreign Trade with Lead *)

In recent years the USSR exported annually an average of 93,ooo t of lead and about 39,ooo t of zinc. While imports showed a rising trend, exports remained almost at the same level. Net exports therefore decreased from one year to another. About 9o % of the lead exported went to the European COMECON countries; on top of the list of importing countries was the GDR and the CSSR. The GDR alone received almost half of the total Soviet lead export in recent years.

*) See Annexes 4 and 6

Exports to western countries are insignigicant. Only Finland is worth mentioning as a buyer since 1967. The USSR imports rather large quantities of lead, especially from the Communist countries Bulgaria, Yugoslavia and North Korea.

The prices asked and paid by the USSR for lead exports and imports are at the level of world market prices but the COMECON countries had to pay a higher price for their lead purchases than Finland.

7.2 Foreign Trade with Zinc **)

Soviet exports varied in accordance with the situation on the zinc market during the past years. Until 1966 an annual average of 1o8,ooo t of zinc was exported, about one third to the European COMECON countries, the rest to western countries. The most important western buyers were the Netherlands and Great Britain. The zinc shortage on the world marked which lasted for years caused an accelerated extension of zinc production in western countries so that after 1966 there was an excess offer of zinc on the world market. This excess had an unfavourable effect on the zinc export of the USSR which exported annually only 86,ooo t of zinc in the average from 1967 - 197o, about three quarters of it to the European COMECON countries. The share of the Western countries in the zinc exports dropped from approximately 7o % during the years until 1966 to about 25 % from 1966 - 197o. The zinc quantities exported to Great Britain during that period were no longer worth mentioning.

Since the Soviet zinc production showed a constantly rising trend also in the years after 1967, it can be assumed that the USSR used its excess production to create stocks which were reduced after 1971 when zinc exports rose steeply again.

**) See Annexes 5 and 7

The most important buyers of Soviet zinc in the communist sphere are the COMECON countries GDR, CSSR and Hungary. As in the case of the lead exports, the GDR absorbed almost 40% of Soviet zinc exports in recent years.

The major part of zinc exports to the West goes to the EEC countries which absorbed about 85% of Soviet zinc in recent years. The zinc offered to the West is, as a rule, sold below world market prices.

The USSR imports zinc almost exclusively from Poland and North Korea. The drop of zinc imports after 1965 is due to the fact that North Korea has been exporting only minor quantities (less than 10,000 t) to the USSR since 1965.

8. Probable Development of Soviet Foreign Trade with Lead and Zinc taking into Consideration the Supply Situation for Lead and Zinc in the European Countries

It can be expected that the Soviet offer of lead and zinc on foreign markets will slowly rise during the coming years since the lead and zinc consumption will not increase to the same extent as the production of these metals.

Foreign trade with semi-finished lead and zinc products, zinc dust and zinc alloys will remain insignificant during the next years.

The USSR adjusted its entire non-ferrous metal production to a supply concept which includes the supply of the other COMECON countries. The major part of lead and zinc exports will therefore continue to be used to supply the COMECON countries. The question what quantities of lead and zinc will be exported to western countries will depend on the future raw material supply situation in the European communist countries.

The shares of the COMECON countries and Yugoslavia in the lead and zinc production of the Soviet bloc (USSR, European communist countries without Albania) are 36% and 33% respectively. Of importance for the lead and zinc supply situation in the COMECON countries is the future development of the lead and zinc production in Yugoslavia, Poland and Bulgaria. In these countries, on the basis of extensive lead and zinc deposits, a mining industry could develop whose production would exceed their requirements.

Yugoslavia exports about half of its lead production.+) The major part is exported to the USSR, Poland and the CSSR. About 39% of the zinc production ++) is exported, almost half of it to the CSSR and the GDR. However, Yugoslavia's lead and zinc production has shown a backward trend for years. To what extent she will remain a net exporting country will depend on whether the investments for the increase of the lead and zinc production planned under the current five-year plan (1971-1975) will succeed. Already in 1973 it was possible to increase Yugoslavia's production capacities to 155,000 t of lead and 135,000 t of zinc by putting the lead-zinc plant at Titov Veles into operation.

Poland's zinc exports grow continuously; in 1972 47% of the zinc production +++) were exported, two thirds of it into socialist countries, a major part of which into the USSR which re-exported this zinc. Lead exports have not become known up to now. Only lead concentrates were supplied to western countries.

Poland's lead and zinc mines are very obsolete and require extensive modernization. However, no plans for such modernization have become known.

Because of her very high per capita production figures (1970: 11.7 kg of lead and 9.5 kg of zinc per capita) Bulgaria ranges among the first lead and zinc producing countries

of the world. Her lead and zinc production+) can even be further increased since the production capacities are not fully exploited.

Because of the growing domestic consumption lead exports have dropped while zinc exports remained almost constant since 1965. About one third of the lead exports go to the European communist countries. The share of these countries in total zinc exports on the other hand is only 15%.

Romania's lead and zinc production ++) is equal to her consumption so that there is no evidence of lead-zinc exports or imports. Only lead and zinc concentrates are imported to a minor extent. Development projects in the field of lead and zinc production are approximately corresponding to the expected increase of domestic consumption so that Romania will neither be an importing nor an exporting country for lead and zinc in the coming years.

Apart from the production of lead-zinc concentrates which are supplied to Poland for smelting purposes Hungary has only a very insignificant lead and zinc production on a scrap basis. The entire lead and zinc requirement has to be met by imports, mainly from the USSR as well as Poland and Bulgaria. The construction of a lead-zinc plant has been planned in Hungary for years but has never been realized. This would reduce the strong dependence on the imports of crude metals.

Due to the lack of an adequate ore basis the necessary conditions for the development of a lead-zinc industry do not exist in the GDR and the CSSR. The CSSR produces lead

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+) Yugoslavia's lead production 1971: 99,100 t
1972: 87,500 t

++) Yugoslavia's zinc production 1971: 53,100 t
1972: 48,600 t

+++)	Poland's lead production	1971: 60,200 t 1972: 62,000 t
	Poland's zinc production	1971: 220 ,100 t 1972: 215,600 t

+)	Bulgaria's lead production	1971: 102,000 t; 1972: 102,000 t
	Bulgaria's zinc production	1971: 78,400 t 1972: 80,000 t
++)	Romania's lead production	1971: 40,000 t 1972: 40,000 t
	Romania's zinc production	1971: 60,000 t 1972: 60,000 t

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and zinc almost exclusively from imported concentrates; the GDR produces lead only on a scrap basis and is importing concentrates for the zinc production from the Federal Republic of Germany and Great Britain.

However, the lead and zinc requirements of the CSSR and the GDR are very high because of their well-developed metal-processing industry. The demand gap has to be closed by extensive imports, especially from the USSR, Yugoslavia, Poland and Bulgaria. It will probably be necessary to increase these imports during the coming years since the difficult procurement of concentrates from the west is an obstacle for the domestic metal production.

In conclusion it can be said that the USSR will have to supply the European COMECON countries, especially the GDR, the CSSR and Hungary, with greater lead and zinc quantities in future than before. Great efforts will have to be made to create new production capacities, to modernize and introduce new technological procedures in the production

process in Poland, Bulgaria and Yugoslavia in order to enable them to contribute, apart from the USSR, to the supply of the COMECON with lead and zinc also in future. Only under this condition will the USSR be able to sell increasing quantities of lead and zinc in the West.

9. Lead and Zinc Consumption in the USSR

Data on total Soviet lead and zinc consumption as well as consumption in the most important consumer groups are kept even more secret than production data. Unfortunately, no conclusion regarding the structure of the lead and zinc consumption can be drawn from the range of production of the lead and zinc processing industry since almost no information has been received on this industrial branch. Most of the enterprises where lead and zinc is processed into semi-finished products, used as alloy metal or processed into other products are not even known. Therefore the total lead and zinc consumption has to be determined by other means.

9.1 Lead Consumption

The quantitative value computed as the difference between the lead production +) (refined lead) and the net lead export ++) represents the consumption of refined lead in the USSR. It was 467,400 t in 1970. Compared with 1965 consumption increased by 150,000 t (refined lead consumption in 1965: 317,400 t). Thus the average annual rate of growth was around 8 %; it is very high compared with the average annual rate of growth in the western world from 1958-1969, i.e. 4.4%, and can be explained by the strong pent-up demand of the lead-consuming industrial branches. Nevertheless, the per capita consumption of refined lead in the USSR is still small compared with the western industrial countries. It was only 1.9 kg in 1970 (per capita consumption of refined lead 1970: Federal Republic of Germany 5.3 kg, Great Britain 4.7 kg, France 4.1 kg, USA 4.0 kg, Italy 3.3 kg, Japan 1.9 kg).

+) See Annex 1 ++) See Annex 4

However, apart from refined lead, the industrial countries also consume lead which is mainly produced from lead scrap in remelting plants co-located with lead alloy plants. As mentioned before, the number of Soviet remelting and alloy plants which, as a rule, from a unit with the processing plants, is not known. The quantity of Soviet remelt lead can therefore not be estimated.

According to Soviet information 1 million t of non-ferrous metal scrap were re-used for the entire non-ferrous metallurgy in 1970. It can be assumed that this is also the quantity produced as remelt metal in the USSR in 1970. During the same year an estimated 4 million tons of non-ferrous smelting metal were produced, thus resulting in a total of 5 million tons of non-ferrous metal (80% of smelting metal and 20% of remelt metal).

Assuming that the share of remelt metal is the same for all non-ferrous metals the total lead metal production in 1970 can be calculated at 651,250 t. Total lead consumption (smelting plant production + remelt metal - net export) is 597,650 t.

Another estimate is based on the share of remelt lead in the total lead consumption of the western world. In 1970 it was around 15.2 %. By using this percentage a total lead consumption of 551,200 t has been computed for the USSR. The medium value between these two figures is probably the most correct figure. It can thus be said that the total lead consumption in the USSR was around 574,400 t in 1970, the total per capita consumption around 2.4 kg.

In the western industrial countries the major part of the lead is consumed in the battery accumulator industry (an average of 35.9 % of total consumption), for semi-finished and casting products (16.5 % in the average), for the production of tetraethyl lead (12 %), for the cable industry (1o.9 %) and the chemical industry (1o.9 %).

In the USSR lead is consumed by the same industrial branches. However, the proportion of useage in the various branches is different from that in western countries.

In spite of the large truck production in the USSR the overall motor vehicle industry is still little developed. Therefore the lead consumption in the battery industry is still relatively insignificant. In 197o the lead consumption for that purpose was apparently about 6o,ooo t (about 1o.5 % of total consumption).

A high quantity of lead is used in the Soviet cable industry. For 1965 the USSR reported a consumption of 1oo,ooo t for the production of lead sheath cables. Notwithstanding the growing cable production it appears likely that this quantity was not exceeded in 197o since, similar to the West, in the Soviet Union lead has also been substituted by other materials such as plastics or aluminum in recent years. Thus, the proportion of lead used in the cable industry in the total lead consumption was probably about 17 % in 197o.

The production of tetra-ethyl in the USSR is relatively unimportant compared with the petrol production. The reason is the very low admixture of lead additives in the petrol industry. Soviet petrol production figures for 197o can only be roughly estimated. The production was around 1oo million tons, half of it super petrol. Since even super petrol has

a substantially lower octane rate than in western countries, the maximum lead consumption for antiknock purposes can only have been 2o,ooo t (= 3.5 %).

Hardly anything is known about lead consumption in the semifinished products industry and for alloys. This entire branch is very obsolete, most of the production facilities are working with antiquated technological procedures. The Soviet press contains frequent complaints about the high specific use of lead per ton of finished product compared with western countries. It can therefore be assumed that relatively large quantities of lead are used for semifinished products (lead pipe, especially for the building industry, sheets, bands, foils etc.) and for alloys.

As regards lead consumption in the chemical industry it is only known that also in the Soviet Union lead has been replaced by other materials for the production of red lead, white lead and other paints.

9.2 Zinc Consumption

From the difference between the zinc production (foundry zinc) and the net zinc export it results that the USSR consumed 7o8,2oo t of zinc in 197o. This quantity does not represent the real consumption of foundry zinc since the USSR (as explained in chapter 7.2 above "Foreign trade with zinc"), due to an excess offer of zinc on the world market, exported only small quantities of zinc from 1966 - 197o and created stocks during these years . The real foundry zinc consumption was probably not higher than 675,ooo in 197o. Compared with 1965 consumption increased by 238,ooo t. The average annual rate of growth was thus 9.2 % and it exceeded the annual rate of growth of lead.

A comparison with the per capita consumption of foundry zinc in western countries will be difficult since most western countries publish only data on total zinc production (i.e. including the consumption of remelt zinc).

In the USSR remelt zinc from scrap is also consumed in addietion to foundry zinc. By using the method applied to determine the total lead consumption (see page 3o) the total Soviet zinc consumption has been calculated at 828,ooo t in 197o. The per capita consumption was 3.4 kg and thus clearly below that in western countries (per capita consumption in some western countries: Federal Republic of Germany 6.8 kg, Great Britain 6.6 kg, Japan 6.2 kg, France 6.o kg, USA 5.3 kg).

While it was possible to determine the structure of Soviet lead consumption based on some data from the lead-processing industrial branches, hardly anything can be said about the structure of the Soviet zinc consumption. Zinc is used in the following fields in western countries (mostly European countries):

- Galvanization of sheets, bands, pipes and wires (about 25 - 3o % of zinc consumption),
- Brass and bronze products (25 % in the average),
- Semi-finished zinc products (zinc sheets, zinc bands, zinc wires etc., 2o % in the average),
- Zinc alloys (2o % in the average),
- White zinc and zinc alloys (1o % in the average),
- other useage.

It appears likely that the structure of the zinc consumption in the Soviet Union - with certain limitations in some fields of utilization - is similar. The technical Soviet

press emphasizes that the USSR produces still more expensive brass and bronze products than western countries. The process of substituting these products by aluminum alloys, stainless steel and plastics is much too slowly. As in case of lead, the requirement of semi-finished zinc products and zinc alloys is only just being met but the entire zinc-processing industry is also obsolete. The specific zinc admixture per ton of product is high. The galvanization of sheets, bands, pipes and wires in the Soviet steel industry is also carried out using obsolete technological procedures and this requires a high zinc percentage per ton of steel. There is still a great shortage of white zinc and zinc alloys.

ANNEX I to
AC/127-WP/412

Estimate of the Lead Production in the USSR (1955-1970) (in tons)
(without remelt metal)

	1936 +)	1955	1958	1965	1970	expected in 1975
Kazakhstan SSR	(33.950 t)	(165.000 t)	(186.000 t)	(242.000 t)	(339.000 t)	
Chimkent	21.510 t	97.000 t	107.000 t	137.000 t	203.000 t	
Leninogorsk	12.440 t	65.000 t	75.000 t	100.000 t	130.000 t	
Ust'-Kamenogorsk	-	3.000 t	4.000 t	5.000 t	6.000 t	
Uzbekistan SSR		(10.000 t)	(15.000 t)	(24.000 t)	(32.000 t)	
Karlyuk	-	10.000 t	15.000 t	24.000 t	32.000 t	
RSFSR	14.714 t)	(45.000 t)	(64.000 t)	(106.000 t)	(150.000 t)	
Ordzhonikidze (Caucasus)	7.984 t	27.000 t	38.000 t	65.000 t	97.000 t	
Dal'negorsk (Far East)	6.730 t	18.000 t	26.000 t	41.000 t	53.000 t	
USSR	48.664 t	220.000 t	265.000 t	372.000 t	521.000 t	730.000 t

+) last official data

Estimate of the Zinc Production in the USSR (1955-1970) (in tons)

(without remelt metal)

	1936 +)	1955	1958	1965	1970	expected in 1975
Kazakhstan SSR		(102.000 t)	(130.000 t)	(204.000 t)	(307.000 t)	
Leninogorsk	-	-	-	-	47.000 t	
Ust'-Kamenogorsk	-	102.000 t	130.000 t	204.000 t	260.000 t	
RSFSR	(51.400 t)	(128.000 t)	(164.000 t)	(256.000 t)	(370.000 t)	
Belovo West Siberia)	15.200 t	44.000 t	50.000 t	80.000 t	116.000 t	
Chelyabinsk (Ural)	13.530 t	35.000 t	40.000 t	64.000 t	93.000 t	
Ordzhonikidze (Caucasus)	22.670 t	49.000 t	56.000 t	90.000 t	131.000 t	
Podol'sk (Moscow region)	-	-	9.000 t	11.000 t	15.000 t	
Ryasan' (Moscow region)	-	-	9.000 t	11.000 t	15.000 t	
Ukrainian SSR	(11.800 t)	(26.000 t)	(31.000 t)	(50.000 t)	(73.000 t)	
Konstantinovka	11.800 t	26.000 t	31.000 t	50.000 t	73.000 t	
USSR	63.200 t	256.000 t	325.000 t	510.000 t	750.000 t	1.050.000 t

+) last official data

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List of Lead and Zinc Plants in the USSR

I. Kazakhstan SSR

- Chimkent	KALININ
Start of operation	1934
Production in 1970	203,000 t of lead sulphuric acid, cadmium, bismuth, indium, copper, silver, gold; lead rolling material and pipes.
Raw material supply	Poly-metal combines at Achisay and Tekeli where galena, zinc blende, pyrite and copper pyrites are processed. Opening up of new mines in South Kazakhstan, the Kirgese (Aktyuz) and Tadshik (Kansay) region.
- Leninogorsk	POLYMETALLKOMBINAT (formerly RIDDER)
Start of operation	1927 (lead), 1965 (zinc)
Production in 1970	130,000 t of lead 47,000 t of zinc sulphuric acid, cadmium, bismuth, antimon, copper, selen, zinc sulphate
Raw material supply	Plant-owned mines, lead combine at Zyryanovsk, enrichment plant at Belousovska; zinc blende with 14 % Zn, galena with 7 % Pb, copper pyrite 3 % Cu, pyrite.
- Ust'-Kamenogorsk	Lead and Zinc Combine W.I. LENIN
Start of operation	1948 (zinc), 1953 (lead)
Production in 1970	6,000 t of lead, 260,000 t of zinc sulphuric acid, cadmium, crude copper, galena, white zinc, silver, gold, thallium, antimon, mercury, white vitriol.
Raw material supply	Polymetal combines at Achisay, Tekeli, Leninogorsk; combines at Zyryanovsk, Karagayily.

II. RSFSR

- Belovo (West Siberia)	POLYMETALLKOMBINAT
Start of operation	1931
Production in 1970	116,000 t of zinc sulphuric acid
Raw material supply	Salair mine and enrichment plant Ores: zinc blende 6 - 10 % Zn, galena 1.6 % Pb, copper pyrite 0.5 - 1 % Cu
- Chelyabinsk (Ural)	S.M. KIROW
Start of operation	1935
Production in 1970	93,000 t of zinc sulphuric acid, cadmium, indium, copper
Raw material supply	Lead plant at Leninogorsk, Zolotishinsk mine and enrichment plant, Tekeli, lead plant Sikhote Alin, copper smelting plant Krasnoural'sk.
- Ordzhonikidze	LEAD-ZINC SMELTING PLANT ELEKTROZINK
Start of operation	1898 (lead), 1934 (zinc)
Production in 1970	97,000 t of lead 131,000 t of zinc sulphuric acid, cadmium, gold, silver, antimon, blue vitriol
Raw material supply	Enrichment plant at Mizur of the lead-zinc combine of Sadon. Ores with 13.5 % Zn and 5 % Pb.
- Podolsk (Moscow region)	POLYMETAL PLANT
Start of operation	1954/56
Production in 1970	15,000 t of zinc aluminum etc. Remelt lead and zinc and processing

Raw material supply	Cu-Pb-Zn residues from various other plants.
- Ryazan (Moscow region)	POLYMETAL PLANT
Start of operation	1954/56
Production in 1970	15,000 t of zinc white vitriol, tin
Raw material supply	Cu-Pb-Zn residues from various other plants
- Dal'negorsk (Far East)	POLYMETAL COMBINE SIKHOTE ALIN
Start of operation	1897
Production in 1970	53,000 t of lead sulphuric acid, bismuth, silver, zinc concentrates (for Konstantinovka, Ordzhonikidze, Chelyabinsk)
Raw material supply	Plant-owned mines and enrichment plants (Dal'negorsk, Krasnoveschenskyy, Kawalerosk, Nikalayewsk, Krustal'nyy). Ores: zinc blende 8 - 15 % Zn, galena 4 - 9 % Pb, copper pyrites 0.5 % Cu, pyrite, cadmium 0.06 % Cd, bismuth 0.5 % Bi.

III. Uzbekistan SSR

- Almalyk	MINING METALLURGICAL COMBINE LENIN
Start of operation	1964 (copper), 1970 (zinc)
Production in 1970	crude copper 240,000 t electrolyte copper 276,000 t zinc (amount not known) sulphuric acid lead concentrate
Raw material supply	Several mines with enrichment facilities (Kurgashimkan, Altyn-Topkan)

- Karlyuk	Lead smelting plant
Start of operation	about 1947
Production in 1970	lead 32,000 t sulphuric acid
Raw material supply	plant-owned mines and enrichment facility. Probably Pb-Cu ores.

IV. Ukrainian SSR

- Konstantinovka	Zinc smelting plant UKRZINK
Start of operation	1930
Production in 1970	zinc 73,000 t sulphuric acid, cadmium, indium, zinc sulphate, zinc oxide, blue vitriol, lead from scrap.
Raw material supply	Sikhote Alin at Dal'negorsk/Far East

Planned:

- Gorevskiy (East Siberia, confluent of Angara and Yenissey)

Opening up of the largest Pb-Zn deposits in the USSR; the first shafts were deepened in 1968. A lead-zinc combine is to be built at the confluent of the Angara and the Yenissey. Construction had not yet started in 1973.

ANNEX IV to
AC/127-WP/412

The USSR's Foreign Trade with Lead

(in 1,000 tons)

	1959-1963	1964-1965	1966	1967	1968	1969	1970	1971	1972
Export	434.2	198.6	87.9	86.9	90.9	97.9	92.4	93.2	92.6
Import	181.4	97.8	31.3	32.3	39.1	24.8	38.8	43.0	50.4
Net Import	-	-	-	-	-	-	-	-	-
Net Export	252.8	100.8	56.6	54.6	51.8	73.1	53.6	50.2	42.2
Export to the communist countries		137.1	76.4	80.2	82.2	90.9	85.5	85.1	84.0
Export to the European COMECON countries		137.1	75.4	79.3	81.2	89.8	84.3	83.9	82.8
Export to the western countries		61.5	11.5	6.7	8.7	7.0	6.9	8.1	8.6
Proportion of exports to the European COMECON countries in the total Soviet lead export (in %)		69.0	85.8	91.2	89.3	91.7	91.2	90.0	89.4

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ANNEX V to
AC/127-WP/412

The USSR's Foreign Trade with Zinc

(in 1,000 tons)

	1959-1963	1964-1965	1966	1967	1968	1969	1970	1971	1972
Export	470.9	282.5	86.3	74.1	78.7	97.4	95.1	136.6	133.1
Import	274.5	130.5	16.3	29.7	36.4	50.1	53.3	49.4	50.6
Net import	-	-	-	-	-	-	-	-	-
Net export	196.4	152.0	70.0	44.4	42.3	47.3	41.8	87.2	82.5
Export to the communist countries		86.1	55.2	57.7	61.3	73.4	70.6	86.2	79.2
Export to the European COMECON countries		86.1	54.7	57.1	61.0	72.9	70.1	85.7	78.7
Export to the western countries		160.4	31.3	16.4	17.4	24.0	24.5	50.4	53.9
Proportion of exports to the European COMECON countries in the total Soviet zinc export (in %)		30.5	63.4	77.0	77.5	74.8	73.7	62.8	59.1

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ANNEX VI to
AC/127-WP/412

The USSR's Lead Export according to Countries

(in 1,000 tons)

	1964	1965	1966	1967	1968	1969	1970	1971	1972
Total export	96.1	102.5	87.9	86.9	90.9	97.9	92.4	93.2	92.6
Communist countries:									
Hungary	11.2	8.4	9.8	9.5	10.6	10.5	11.1	11.2	9.7
GDR	35.2	38.1	41.3	41.6	41.4	49.8	44.4	46.4	45.0
Poland	6.3	7.4	4.6	4.0	4.0	4.5	3.9	4.0	3.6
CSSR	15.9	14.6	19.7	24.2	25.2	25.0	24.9	22.3	24.5
Cuba	1.7	0.7	1.0	0.9	1.0	1.1	1.2	1.2	1.2
Western countries:									
Finland	8.0	8.4	6.0	6.0	6.0	6.0	6.0	6.0	7.0
India			4.1	-	-	-	-	-	-
Netherlands	2.2	3.9	0.8						
Great Britain	1.0	10.2							
Other countries: (not specially mentioned in the foreign trade statistics)	14.6	10.8	0.6	0.7	2.7	1.0	0.9	2.1	1.6

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ANNEX VII to
AC/127-WP/412

The USSR's Zinc Export according to Countries

(in 1,000 tons)

	1964	1965	1966	1967	1968	1969	1970	1971	1972
Total export	149.8	132.7	86.3	74.1	78.7	97.4	95.1	136.6	133.1
Communist countries:									
Hungary	2.8	1.9	4.0	3.0	6.1	7.9	5.9	7.3	7.4
GDR	31.9	29.8	36.8	37.5	38.1	42.0	38.2	40.6	41.5
CSSR	11.9	12.5	13.9	16.6	16.8	23.0	26.0	37.8	29.8
Cuba	0.3	0.2	0.5	0.6	0.3	0.5	0.5	0.5	0.5
Western countries:									
India	7.9	8.7	10.3	6.3	5.7	9.8	12.0	12.5	14.8
Netherlands	26.4	25.8	11.1	3.6	5.4	6.1	6.8	17.-	28.7
Finland	2.0	3.0	2.0	2.5	2.5	2.5	1.4	1.1	0.7
Sweden	3.7	7.3	1.8	1.5	1.3	0.7	0.5	0.8	1.1
Egypt	1.5	1.5	1.5	1.8	2.5	2.3	2.7	3.0	2.7
Belgium	4.2	3.7	0.4	-	-	-	-	-	
Brazil			1.0	-	-	-	-	-	
Pakistan							0.5	0.7	0.4
Great Britain	31.1	30.7	2.2					12.7	3.3
Denmark	0.5	0.3							
Other countries (not specially mentioned in the foreign trade statistics)	25.6	7.3	0.8	0.7	-	2.6	0.6	2.2	2.2