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CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

1 FEB 77

MICROFILMED

MEMORANDUM FOR: Mr. J.D. Morgan, Associate Director
Mineral & Materials Supply/Demand Analysis
Bureau of Mines
Department of the Interior

SUBJECT : Production of Nonferrous Metals in the USSR

We are looking forward to the detailed discussions on Soviet production of nonferrous metals recently arranged by Bureau of Mines officials and one of our analysts.* Hopefully the discussions will help resolve differences in estimates made by our respective agencies concerning Soviet output of these metals. In anticipation of our meetings we are attaching notes on the nature of the differences, especially with respect to aluminum, the subject of our first meeting.

[redacted]

MAURICE C. ERNST
Director
Economic Research

Attachment:
as stated.

* At meetings held on December 14, 1976 (participants -- Mr. Carl H. Cotterill and Dr. V.V. Strishkov of the Bureau and [redacted] of OER) and on January 6, 1977 (participants -- Mr. Cotterill, Mr. D.S. Colby, Mr. George Markon, and Mr. William B. Hall of the Bureau and [redacted]).

[redacted]

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(20)

(1 Feb 77)

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

APPENDIX A

Differences in Estimates of Soviet Production of Nonferrous Metals

1. The degree and importance of differences in estimates made by the Bureau of Mines and the Office of Economic Research vary considerably. In several cases -- mercury, cadmium, tungsten, and antimony -- the differences are slight, but in other cases, they are significant or substantial. The attached graphs and tables illustrate the differences. Although we are concerned mainly with nonferrous metals, we have also included chromite, a ferrous ore, because of significant differences in our respective estimates of Soviet production.

2. We believe a cooperative effort to reconcile estimates is worthwhile for several reasons:

a. Individually, the various metals are important because of their civilian, military, and strategic uses in the domestic economy of the USSR. In a number of cases, they also are important in Soviet foreign trade and, in turn, in world trade. Gold, for example, is relied upon by the Soviets as a major earner of foreign exchange and a balancing item in foreign trade.

b. Collectively, nonferrous metals make up an important branch of Soviet industry. For many years we have

made independent estimates of Soviet industrial production as a crosscheck on Soviet claims and to eliminate any bias attributable to industrial accounting in a planned economy. We have developed an index of Soviet industrial output by aggregating the output of individual branches of industry using the best available information on the physical volume of production and on the corresponding Soviet prices for weighting such production. In the case of nonferrous metallurgy we are at present using a 13-metal sample.* The sample excludes minor metals, which are not statistically significant, as well as some other important items, such as diamonds, precious metals, and rare and rare earth metals, because we lack sufficiently reliable production estimates and/or price weights.

3. Apart from the problem of the size of the sample for nonferrous metallurgy, we are interested in using the best possible estimates of production of the metals included in the sample. We have compared the results obtained with the 13-metal sample using both Bureau of Mines estimates and our own. For the period 1968-1975 the Bureau estimates for these metals yield an aggregate increase in output of 38% whereas our estimates yield an increase of 51% or the

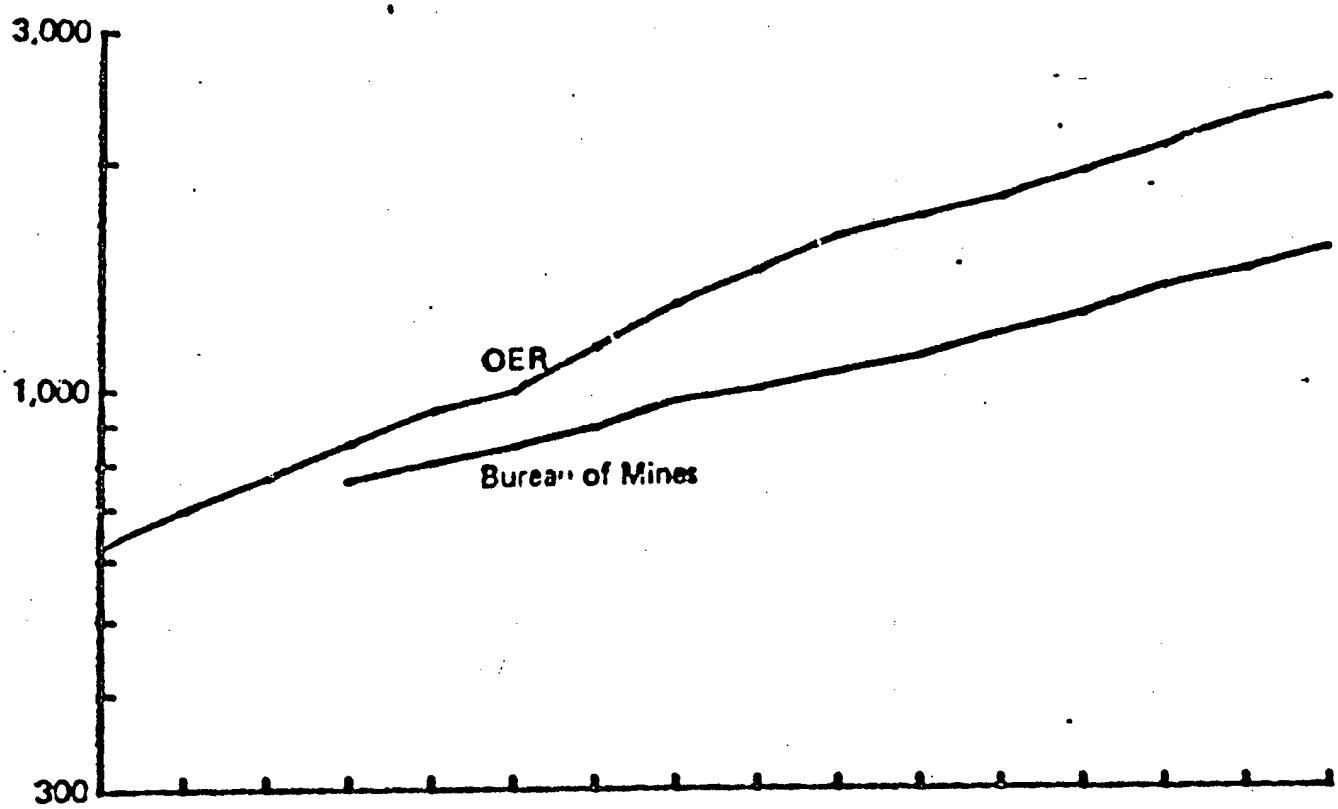
* Copper, lead, zinc, tin, aluminum, magnesium, titanium, nickel, antimony, mercury, cadmium, tungsten, and molybdenum.

same increase reported by the Soviets.

USSR: Production Estimates of Nonferrous Metals

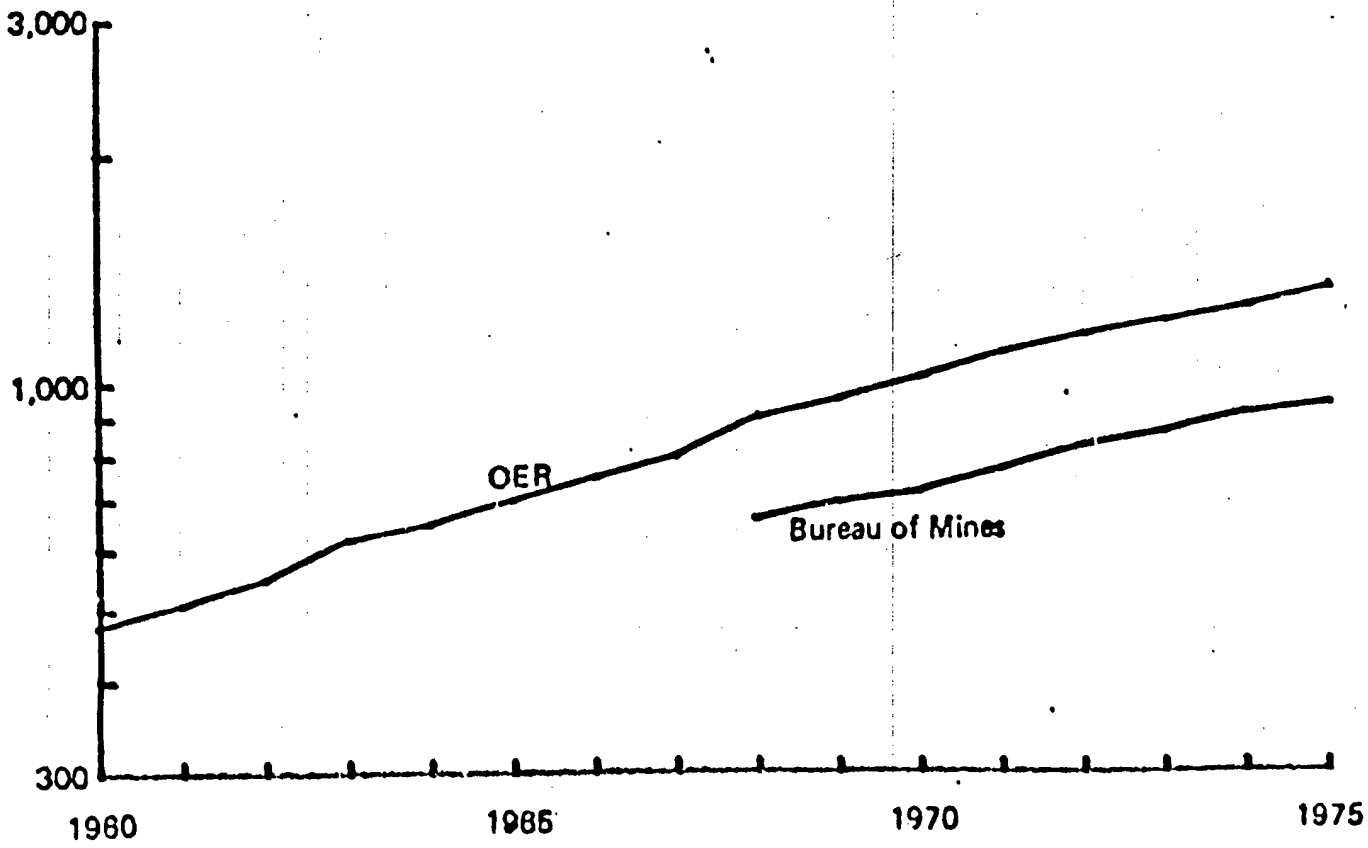
PRIMARY ALUMINUM

Thousand Metric Tons

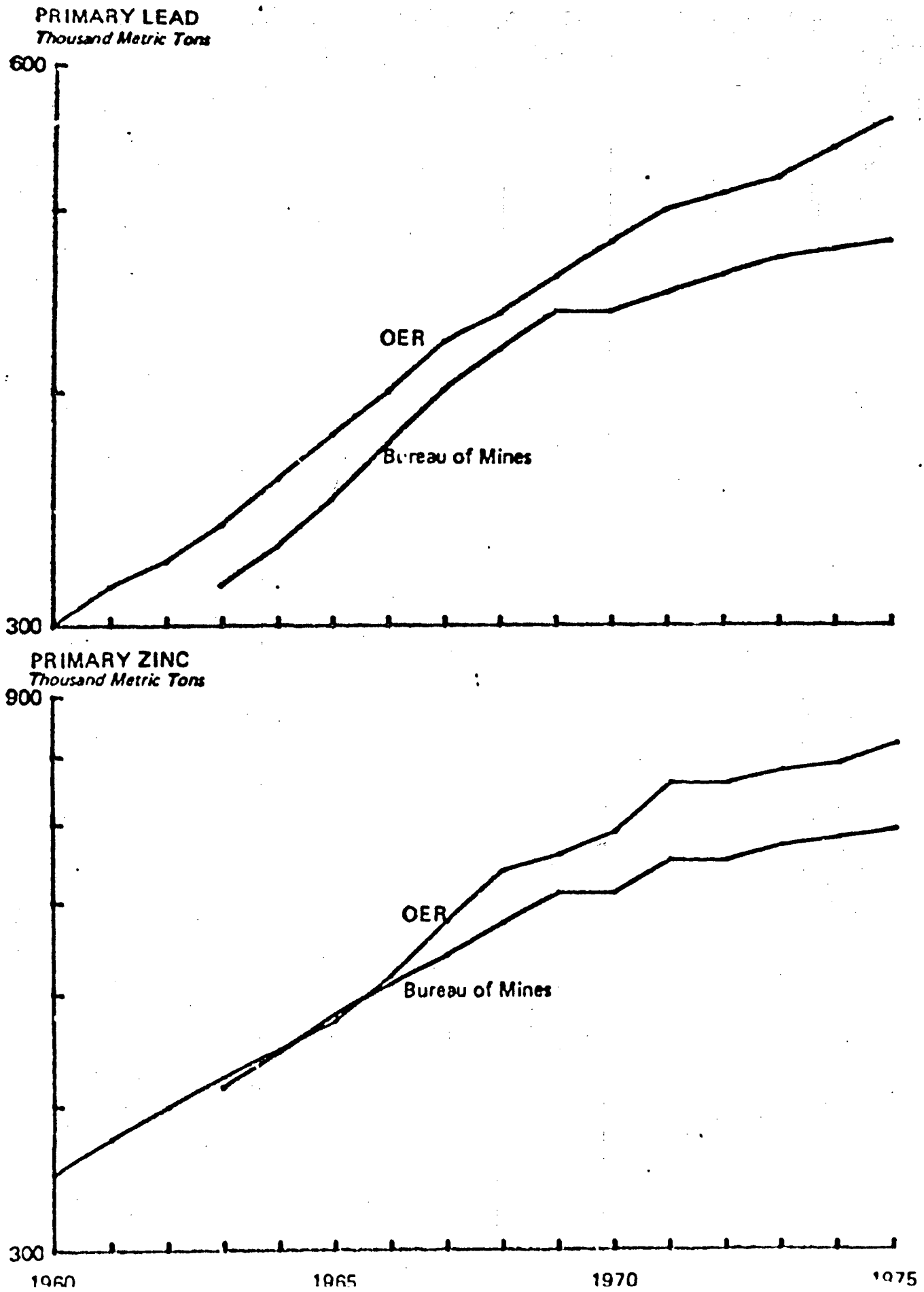


COPPER

Thousand Metric Tons



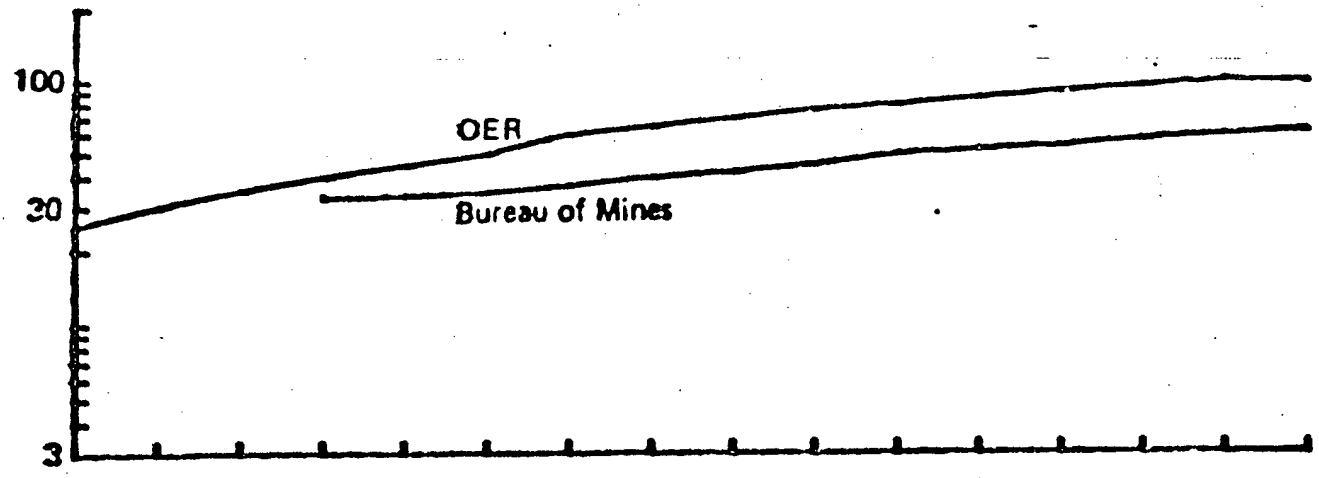
USSR: Production Estimates of Nonferrous Metals



USSR: Production Estimates of Nonferrous Metals[1]

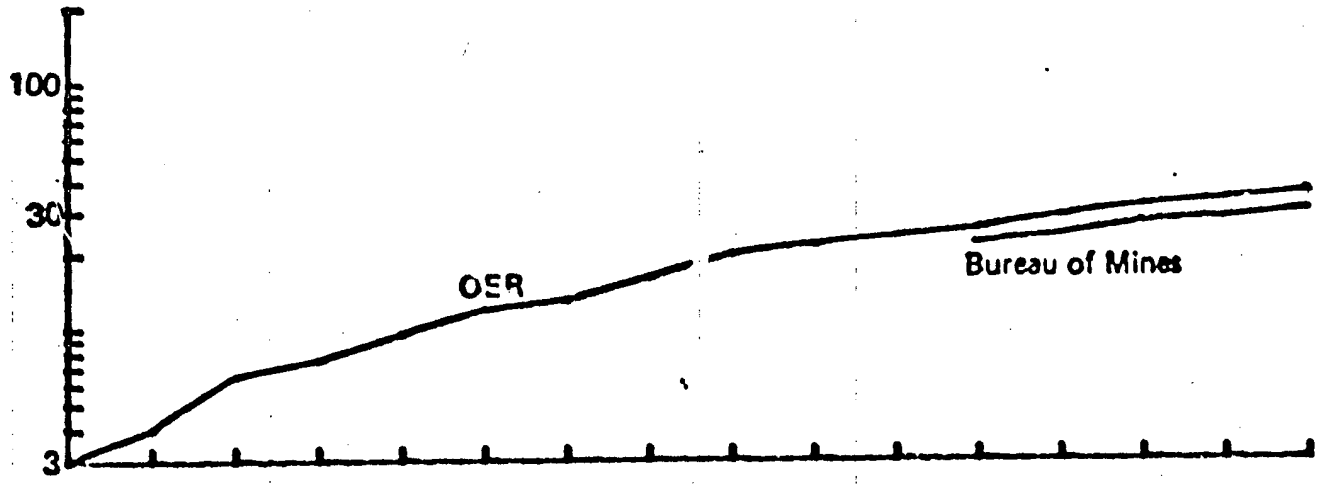
MAGNESIUM

Thousand Metric Tons



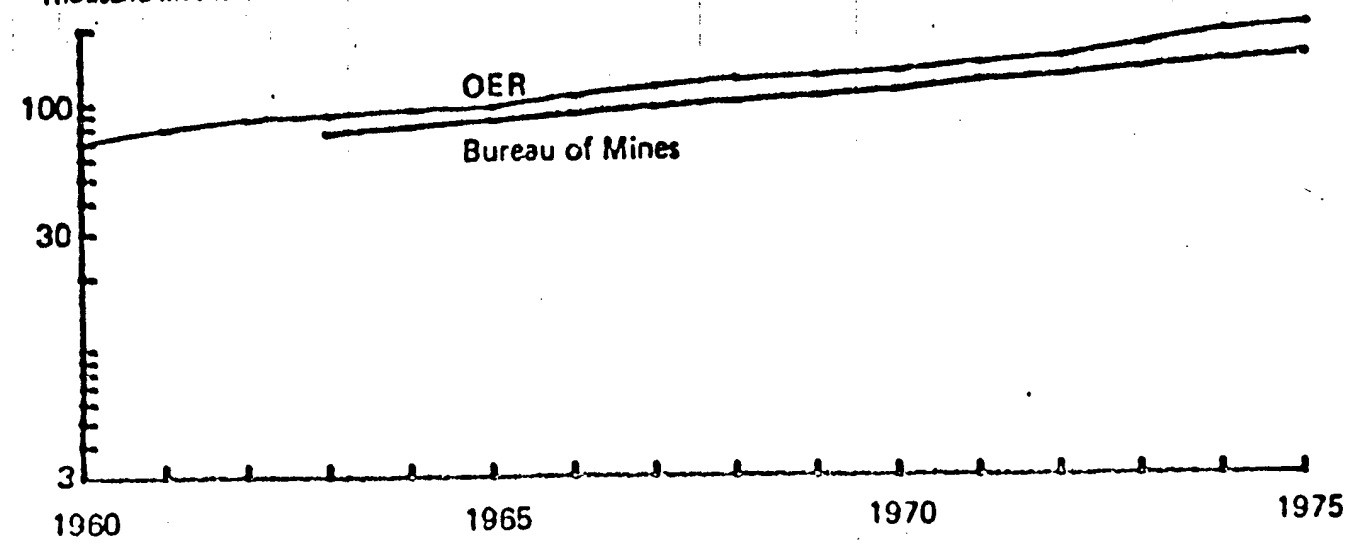
TITANIUM

Thousand Metric Tons

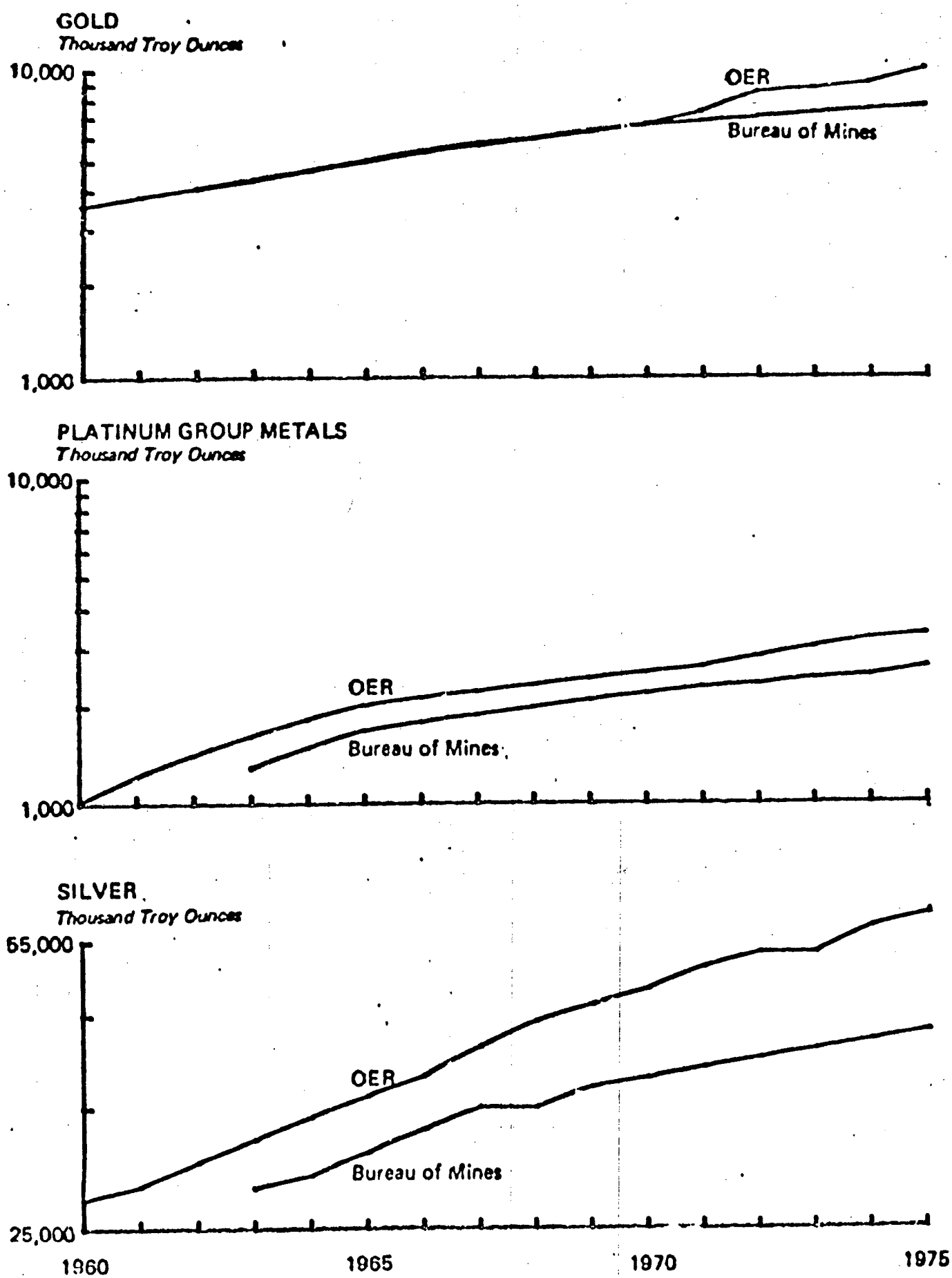


NICKEL

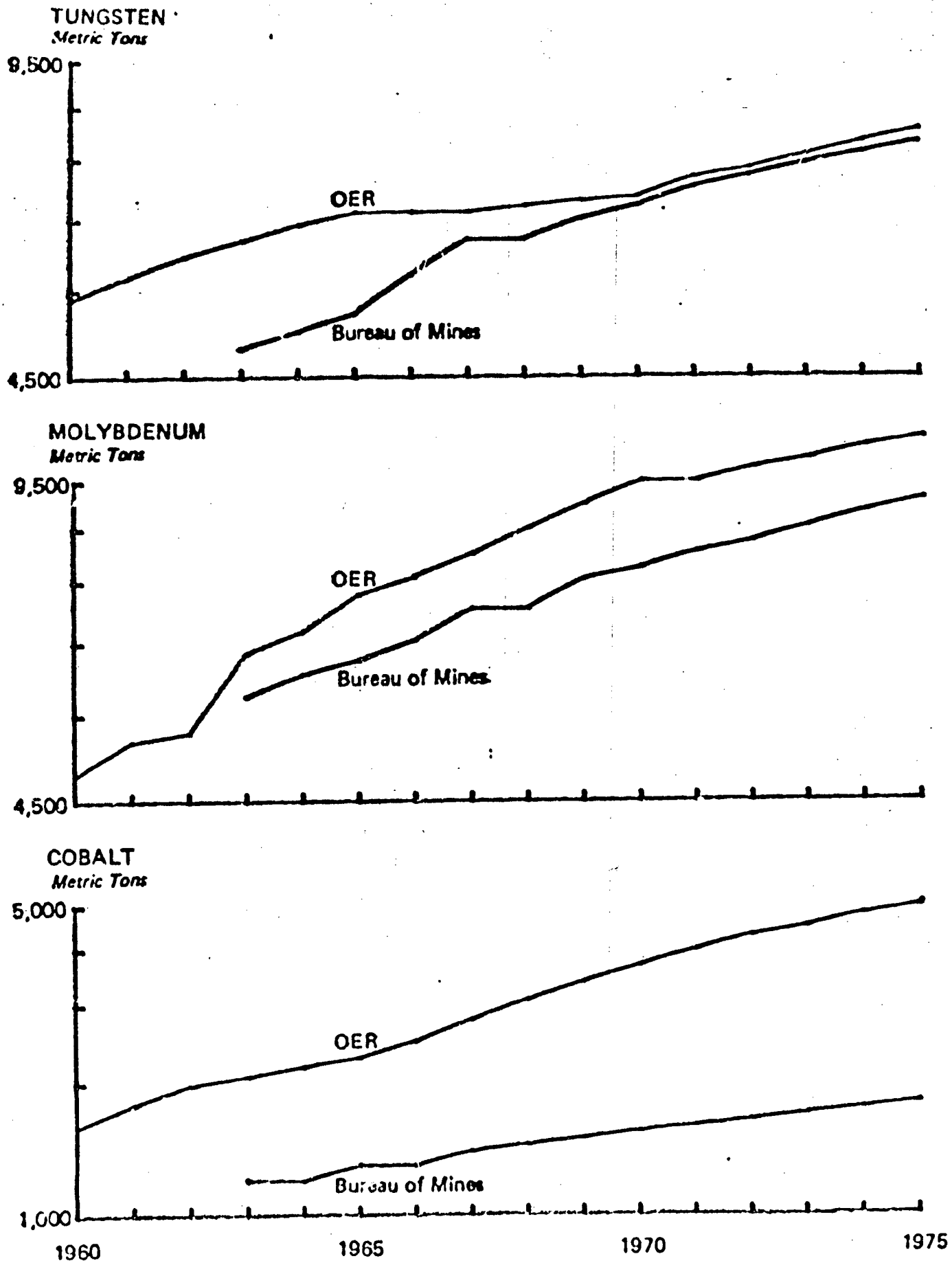
Thousand Metric Tons



USSR: Production Estimates of Nonferrous Metals



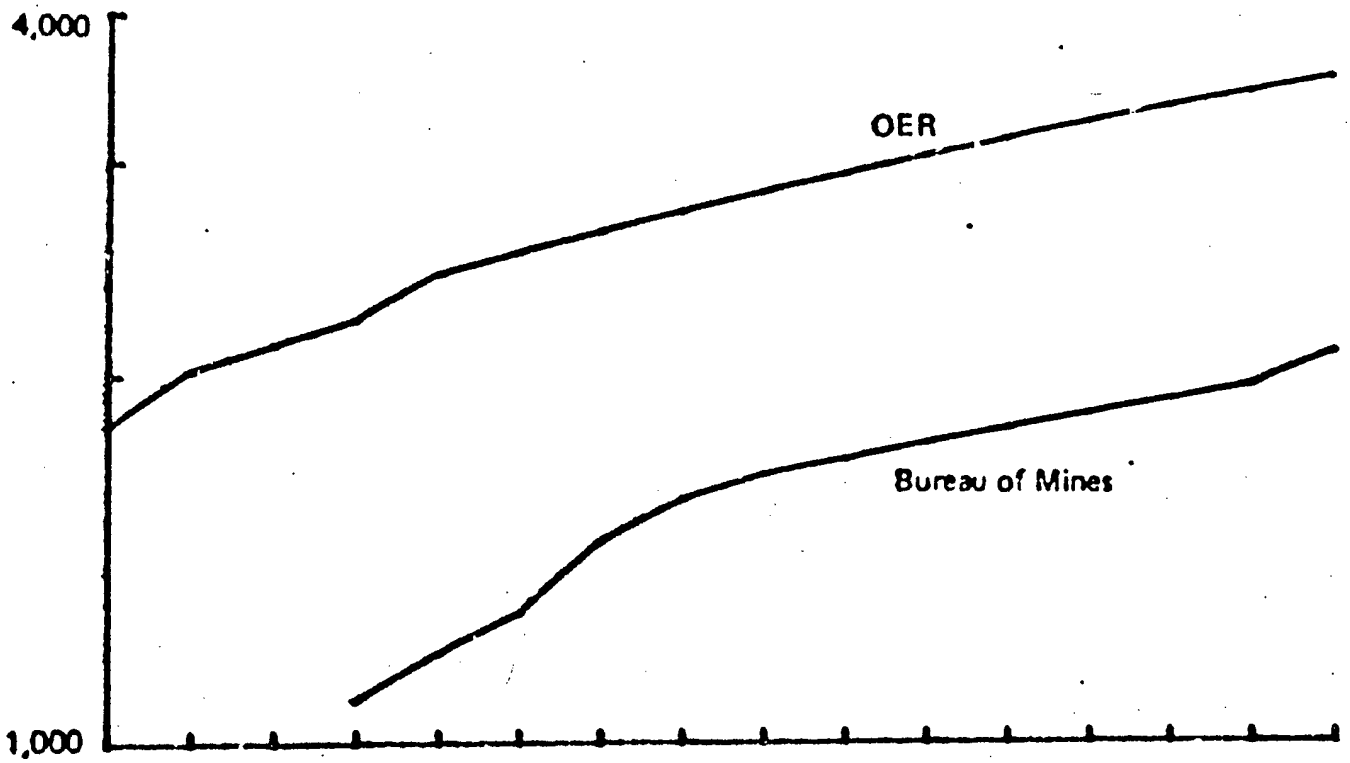
USSR: Production Estimates of Nonferrous Metals



USSR: Production Estimates of Nonferrous Metals

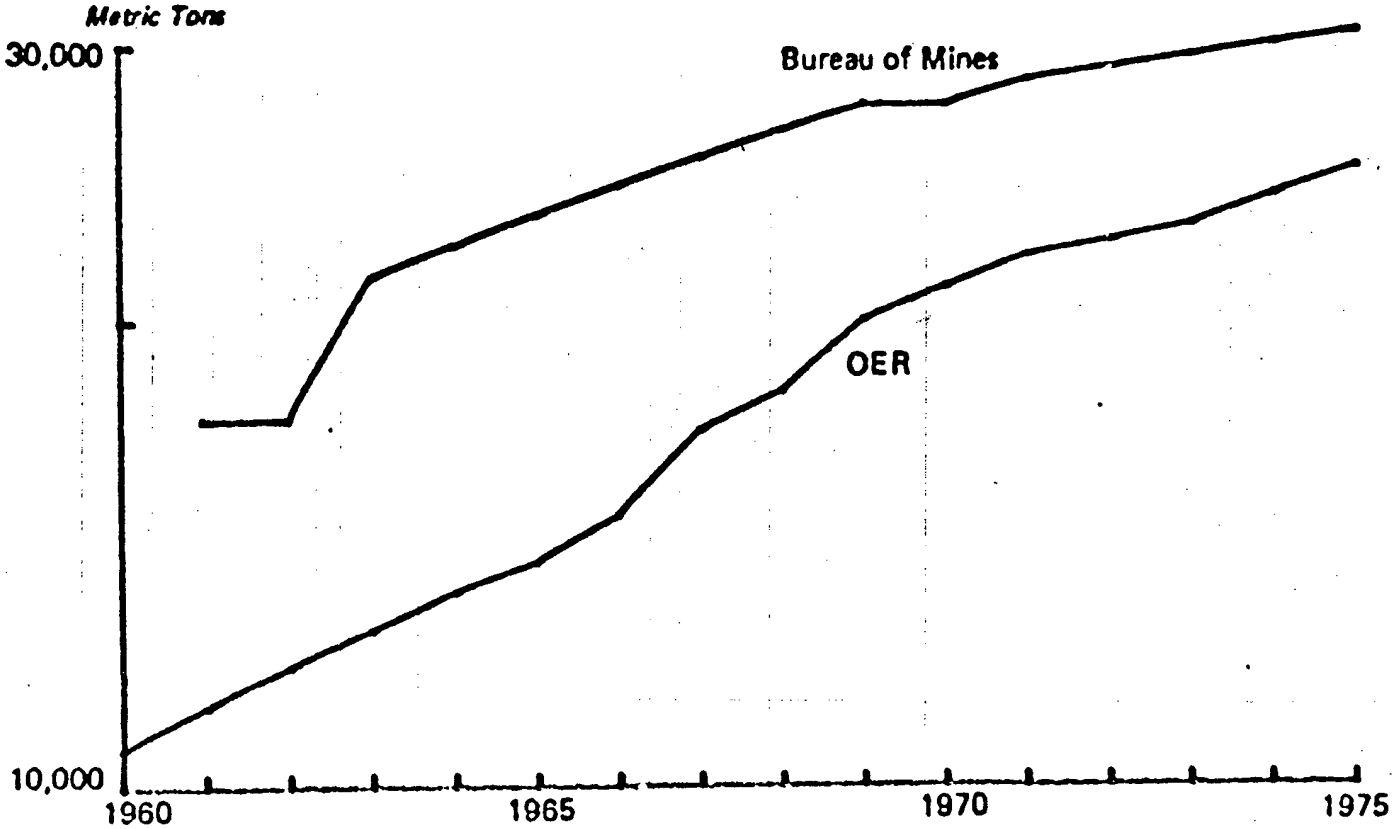
CHROMITE ORE

Thousand Metric Tons



PRIMARY TIN

Metric Tons



Bureau of Mines (BoM) and Office of Economic Research (OER) Estimates of Production of Nonferrous Metals, USSR

(1,000 metric tons unless otherwise indicated)

Year	Primary Aluminum		Copper*		Primary Lead		Primary Zinc	
	BoM	OER	BoM	OER	BoM	OER	Bom	OER
1960	-	630	-	475	-	300	-	350
1961	-	700	-	510	-	315	-	375
1962	-	770	-	550	-	325	-	400
1963	760	855	-	600	315	340	415	425
1964	800	945	-	650	330	360	445	450
1965	840	1,000	-	700	350	380	480	475
1966	890	1,140	-	750	375	400	510	520
1967	965	1,300	-	800	400	425	540	580
1968	1,000	1,440	655	900	420	440	575	640
1969	1,050	1,600	690	950	440	460	610	650
1970	1,100	1,700	710	1,015	440	480	610	690
1971	1,180	1,800	760	1,090	450	500	650	760
1972	1,250	1,950	815	1,150	460	510	650	760
1973	1,360	2,100	850	1,200	470	520	670	780
1974	1,430	2,300	900	1,250	475	540	680	790
1975	1,530	2,450	925	1,320	480	560	690	820

* BoM -- blister, primary and secondary. OER -- refined copper.

Bureau of Mines (BoM) and Office of Economic Research (OER) Estimates of Production of Nonferrous Metals, USSR

(1,000 metric tons unless otherwise indicated)

Year	Primary Tin		Magnesium		Titanium		Nickel	
	BoM	OER	BoM	OER	BoM	OER	BoM	OER
	(tons)							
1960	-	10,600	-	25	-	3	-	72
1961	17,270	11,300	-	30	-	4	-	82
1962	17,270	12,000	-	35	-	6.5	-	90
1963	21,334	12,700	33	40	-	7.5	75	93
1964	22,350	13,400	34	45	-	9.5	80	97
1965	23,366	14,000	35	50	-	12	85	100
1966	24,382	15,000	37	60	-	13	90	111
1967	25,398	17,000	40	65	-	16	95	120
1968	26,413	18,000	42	70	-	20	100	128
1969	27,429	20,000	45	76	-	22	105	132
1970	27,429	21,000	50	80	-	24	110	137
1971	28,445	22,000	52	85	22	26	120	148
1972	28,953	22,500	54	90	24	29	125	156
1973	29,461	23,000	57	95	27	32	135	175
1974	29,969	24,000	60	100	28	34	145	200
1975	30,477	25,000	63	100	30	36	152	210

Bureau of Mines (BoM) and Office of Economic Research (OER) Estimates of Production of Nonferrous Metals, USSR

(1,000 metric tons unless otherwise indicated)

Year	Tungsten		Molybdenum		Gold		Silver	
	BoM	OER	BoM	OER	BoM	OER	BoM	OER
	(metric tons)		*(metric tons)*		*(1,000 troy oz.)*		*(1,000 troy oz.)*	
1960	-	5,424	-	4,800	-	3,540	-	27,000
1961	-	5,710	-	5,200	-	3,800	-	28,000
1962	-	5,995	-	5,300	4,080	4,050	-	30,000
1963	4,800	6,233	5,700	6,370	4,370	4,300	28,000	32,000
1964	5,000	6,470	6,000	6,700	4,650	4,630	29,000	34,000
1965	5,200	6,661	6,200	7,300	5,030	4,950	31,000	36,000
1966	5,700	6,661	6,500	7,600	5,370	5,300	33,000	38,000
1967	6,200	6,661	7,000	8,000	5,700	5,530	35,000	41,000
1968	6,200	6,756	7,000	8,500	5,900	5,850	35,000	44,000
1969	6,500	6,850	7,500	9,000	6,250	6,140	37,000	46,000
1970	6,700	6,900	7,700	9,500	6,500	6,530	38,000	48,000
1971	7,000	7,232	8,000	9,500	6,700	7,140	39,000	51,000
1972	7,200	7,375	8,200	9,800	6,900	8,300	40,000	53,000
1973	7,400	7,613	8,500	10,000	7,100	8,520	41,000	53,000
1974	7,600	7,850	8,800	10,300	7,300	8,840	42,000	57,000
1975	7,800	8,089	9,060	10,500	7,500	9,900	43,000	59,000

Bureau of Mines (BoM) and Office of Economic Research (OER) Estimates of Production of Nonferrous Metals, USSR

(1,000 metric tons unless otherwise indicated)

Year	Platinum-Group Metals		Cobalt		Chromite Ore	
	BoM	OER	BoM	OER	BoM	OER
	(1,000 troy oz.)		*(tons)*		*(1,000 tons)*	
1960	-	1,000	-	1,600	-	1,800
1961	-	1,200	-	1,800	-	2,000
1962	-	1,400	-	2,000	-	2,100
1963	1,300	1,600	1,200	2,100	1,080	2,200
1964	1,500	1,800	1,200	2,200	1,180	2,400
1965	1,700	2,000	1,300	2,300	1,270	2,500
1966	1,800	2,100	1,300	2,500	1,450	2,600
1967	1,900	2,200	1,400	2,800	1,510	2,700
1968	2,000	2,300	1,450	3,100	1 650	2,800
1969	2,100	2,400	1,500	3,400	1,700	2,900
1970	2,200	2,500	1,550	3,700	1,750	3,000
1971	2,300	2,600	1,600	4,000	1,800	3,100
1972	2,350	2,800	1,650	4,300	1,850	3,200
1973	2,450	3,000	1,700	4,500	1,900	3,300
1974	2,500	3,200	1,750	4,800	1,950	3,400
1975	2,650	3,300	1,800	5,000	2,080	3,500

APPENDIX B

Soviet Production of Aluminum

The basic methodology used by OER in estimating production of aluminum employs special classified material, but we also use alternative methodologies as crosschecks. The Soviets have published in unclassified sources indicators of output for successive plan periods, giving percentage relationships to previous years. As indicated in the tabulation below, those link relatives can be used to relate production of aluminum in 1937, the only year for which the USSR has released an official production figure, to production in succeeding years.

1937:	37,700 metric tons	published figure
1940:	59,900 metric tons	59% greater than 1937
1945:	86,300 metric tons	44% greater than 1940
1950:	155,400 metric tons	80% greater than 1945
1958:	512,700 metric tons	3.3 times 1950
1965:	1,025,400 metric tons	2 times 1958
1970:	1,743,180 metric tons	70% greater than 1965
1975:	2,614,770 metric tons	50% greater than 1970

We have found the production series generated by the link relatives to be generally consistent with our estimates

although somewhat higher.

Apparent consumption of primary aluminum in the USSR has also been used as a crosscheck on our estimates of production. Apparent consumption is a derived figure representing estimated production less exports plus imports. The trend in consumption is shown below (in thousands of metric tons) using both Bureau and OER estimates of production:

Year	Production		Net Exports*	Apparent Consumption	
	Bureau	OER		Bureau	OER
1963	760	855	142	618	713
1964	800	945	203	597	742
1965	840	1,000	264	576	736
1966	890	1,140	310	580	830
1967	965	1,300	311	654	989
1968	1,000	1,440	366	634	1,074
1969	1,050	1,600	421	629	1,179
1970	1,100	1,700	498	602	1,202
1971	1,180	1,800	523	657	1,277
1972	1,250	1,950	569	681	1,381
1973	1,360	2,100	630	730	1,470
1974	1,430	2,300	643	787	1,655
1975	1,530	2,450	600	930	1,850

* Includes rolled products as well as ingots.

Our estimates of Soviet production of aluminum imply a steady growth in consumption of aluminum in the USSR and an even more impressive growth in exports. Consumption per capita has shown a steady increase from 3.2 kilograms in 1965 to 7.3 in 1975. In contrast, the Bureau's estimates of production imply very little change in Soviet consumption during 1963-72 but a substantial increase in 1973-75. The Bureau's estimates imply a per capita consumption of about 2.5-2.8 kilograms during the 1960s and early 1970s and an increase to 3.7 kilograms by 1975. Even with the higher OER estimates Soviet consumption continues to lag far behind that in the United States where per capita consumption ranged between 20 and 24 kilograms during 1971-74 before dropping to 16.5 kilograms in 1975.

Unfortunately, we do not have official Soviet data on Soviet consumption of aluminum to use as benchmarks for evaluating the levels of consumption described above. Bits and pieces of information suggest, however, that aluminum has been increasingly used in the USSR in the manufacture of tractors, passenger cars, pots, pans, and other household wares, in electric power transmission lines, and in aircraft construction. As indicated in Table 1 production of these items has grown rapidly since 1963. Perhaps the Bureau has evidence to support the alternative view implicit in its

production estimates of a prolonged period of stagnation in Soviet consumption of aluminum.

Raw material supplies provide another basis for judging the level of production of aluminum. We have not done enough work on Soviet mining of aluminous ores and production of alumina to gain a clear picture of domestic supplies of raw materials in the USSR, but plan to examine those matters more closely. The Bureau estimates of raw material supplies suggest several topics for discussion in our forthcoming meeting. These topics include non-metal uses of bauxite and alumina, possible Soviet stockpiling of raw materials, and possible inefficiencies in the extraction of alumina from aluminous ores. Our interests in these topics arose as a result of drawing up a balance of Soviet foreign trade statistics (see Table 2). The balance revealed large residuals of ores and alumina surplus to needs for production of aluminum. The data are presented in terms of alumina content using the med-range given in Bureau estimates of alumina content of Soviet bauxite, alunite, and nepheline ores and assuming a 40% alumina content for imported bauxite.

TABLE 1

USSR: INDEXES OF APPARENT CONSUMPTION OF ALUMINUM[a] AND INDEXES OF PRODUCTION OF SELECTED GOODS IN WHICH ALUMINUM IS USED[b]

(1963 = 100)

	Apparent Consumption		Production			
Year	Bureau	OER	Tractors	Passenger Cars	Household Wares	Transmission Lines
1963	100	100	100	100	100	100
1964	97	104	101	107	111	117
1965	93	103	109	116	125	133
1966	94	116	118	133	125	144
1967	106	139	125	145	119	157
1968	103	151	130	162	128	167
1969	102	165	136	170	144	179
1970	97	169	141	199	169	193
1971	106	179	145	306	214	206
1972	110	194	147	422	256	220
1973	118	206	154	530	278	232
1974	127	232	164	647	264	247
1975	150	259	169	694	250	262

a. Based on Bureau of Mines and OER estimates of production.
b. Based on official Soviet production statistics.

Table 2

Balance Sheet of Raw Materials
for the Soviet Aluminum Industry [a]

(Al_2O_3 content)

1,000 Metric Tons

	1970	1971	1972	1973	1974	1975
Ore Supply						
Domestic	1,870	1,980	2,020	2,080	2,110	2,150
Imports	619	565	686	589	649	1,391
Total	2,489	2,545	2,706	2,669	2,759	3,541
Ore Use						
In alumina	2,000	2,100	2,300	2,400	2,400	2,780
Residual	489	445	406	269	359	761
Alumina Supply						
Domestic	2,000	2,100	2,300	2,400	2,400	2,780
Imports	518	787	698	902	886	1,029
Total	2,518	2,887	2,998	3,302	3,286	3,809
Alumina Use						
In aluminum	2,200	2,360	2,500	2,700	2,860	3,060
Residual	318	527	489	582	426	749
Total alumina (including residual ore)	3,007	3,332	3,404	3,571	3,645	4,570
Residual ore plus alumina	807	972	895	851	785	1,510
Residual ore plus alumina as percent of total alumina	27	29	26	24	22	33

a. With the exception of import data, all data shown in the table are from Bureau of Mines' publications. Imports are from official Soviet sources.