Staff Memorandum No. 385

CONTAINS CONFIDENTIAL INFORMATION

INTERNATIONAL MONETARY FUND

August 3, 1949

TO: Members of the Executive Board

FROM: The Secretary

SUBJECT: Estimates of Russian Gold Production

Attached for the information of the Executive Board is a memorandum prepared by the staff, regarding estimates of Russian gold production.

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CONTAINS CONFIDENTIAL INFORMATION

INTERNATIONAL MONETARY FUND

Research Department

Estimates of Russian Gold Production

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1. Production Prior to 1938

The production of gold within the boundaries of greater Russia is believed to have begun many hundred years ago, but the output was not significant until the early part of the eighteenth century, when important discoveries were made in the vicinity of Archangel, in Bukhara, and in the Urals.

The total production of gold in Russia from 1741 to 1921 has been estimated at approximately 85 million ounces. From about 1820 until 1848, Russia was the world's premier gold producer. This development was due primarily to the discovery in 1829, of rich Siberian placer deposits and to their subsequent exploitation. Thus, during the ten-year period 1841-50, Russia's average annual gold production was 724,000 ounces, compared with only 108,500 ounces in 1821-30. A further expansion of gold mining activity followed, and by 1880 output reached 1,380,000 ounces. After this, there was a decline and a subsequent recovery which culminated in an all-time high of 1,721,000 ounces in 1910. After the outbreak of war, in 1914, Russian gold output declined sharply. Production fell to 871,000 ounces in 1917, to 532,000 ounces in 1919, and to an estimated 57,000 and 43,000 ounces in 1920 and 1921, respectively.

A summary statement of Russian gold production during the period 1801-1921 is given in Table 1, below.

Table 1.

Russian Gold Production, 1801-1921
(fine ounces)

Period	Average Annual or Annual Output
1801-1810	5,305
1811-1820	10,128
1821-1830	108,509
1831-1840	226,663
1841-1850	723,874
1851-1855	795,088
1856-1860	854,245
1861-1865	774,318
1866-1870	966,130
1871-1875	1,133,044
1876-1880	1,303,137
1881-1885	1,112,686
1886-1890	1,057,258
1891-1895	1,255,863
1896-1900	1,089,057
1901	1,105,475
1902	1,090,116
1903	1,191,678
1904	1,199,857
1905	1,078,384
1906	943,142
1907	1,290,854
1908	1,357,027
1909	1,566,443
1910	1,721,163
1911	1,555,333
1912	1,073,875
1913	1,282,357
1914	1,382,867
1915	1,273,362
1916	1,088,437
1917	870,750
1918	580,500
1919	532,115
1920	57,225 1/
1921	43,177 1/

1/ Approximate output

Source: R. H. Ridgway, Summarized Data of Gold Production, U.S. Bureau of Mines Economic Paper 6, Washington, D.C. 1929.

It should be observed that, even for the period prior to the overthrow of the Kerensky Government in October 1917, there are significant divergencies between published data relating to Russian gold production. Thus, according to the United States Bureau of Mines (see Table 1, above), Russian gold output in 1913 was 1,282,000 ounces. But other sources publish figures which vary all the way from 1,206,000 to 2,090,000 ounces.

The period of the civil war was marked by a complete disorganization of industry and transport. Statistical data relating to gold production during the early years of the Soviet regime, including the period of the civil war, suffer from this confusion, and should be accepted only as crude approximations. Much of the gold mined at this time became the loot of individuals, gangs, or armed detachments fighting to preserve the regime overthrown by the revolution. In any event, gold mining operations were at a virtual standstill in 1920-21. Thereafter, as conditions became more stabilized under the new Government, gold production increased.

An official series published by the Central Bureau of Statistics of the Soviet Union (Moscow, 1928) states that production was 450,000 ounces in 1924, compared with an estimated 84,000 ounces in 1921. This upward trend in production appears to have been maintained at least until 1936 or 1937. In the absence of official figures stating the absolute amount of gold produced annually after 1924, a number of estimates have been made on the basis of Soviet data (in some cases, conflicting with other data) relating to successive percentage increases in output over that of a designated base period. However, since all or nearly all of these estimates refer back to production in the base year 1913, for which the highest published figure exceeds the lowest by about 900,000 ounces (or 75 per cent), they reveal discrepancies which in some years exceed 2,000,000 ounces.

Some of these estimates of Russian gold production during the period 1913-37 are given in Table 2, below.

Table 2.

Estimate of Russian Gold Production, 1913-37
(thousands of ounces)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1913	1,282	1,583	1,929						
1921	43	66	84						
1922	147	192	145						
1923	251	305	251	438					
1924	958	546	450	594					
1925	985	535	740	693					
1926	992	761	836	895					
1927	1,061	688	965	810					
1928		386	1,158	899					
1929		707	1,383	1,085					
1930		1,501	1,704	1,501	1,434			1,305	3,600
1931		1,656	2,025	1,656	1;750			1,646	
1932		1,938	2,347	1,938	1,950			1,897	
1933		2,700	3,376	2,700	2,650	2,810	2,700	2;202	
1934		3,358	4,855	3,858	3,800	4,012	3,864	4,276	
1935		4,784	6,013	4,500	4,500	4,977	4,713		
1936		5,173	7,588	5,280	5,400	6,874			
1937		5,359	7,878	5,000	6,000	5,900			

Sources:

(1) R. H. Ridgway, Summarized Data of Gold Production, U.S. Bureau of Mines Economic Paper 6, 1929.

(2) Banking and Monetary Statistics, Board of Governors of the Federal Reserve System, 1943, p.543.

(3) G. Davidoff, "La Production d'Or Sovietique et la Production d'Or Mondiale," La Revue Economique et Sociale, Paris, Feb. 1946, pp. 56-68.

(4) Bank for International Settlements, 6th and 8th Annual Reports, (reprinted in Etudes et Conjoncture Economie Mondiale, Paris, March/April 1949, p.46).

(5) Samuel Mongagu & Co., London (reprinted in Etudes et Conjoncture Economie Mondiale, op. cit., p. 46).

(6) Prokopovich series (reprinted in Etudes et Conjoncture Economie Mondiale, op. cit., p. 45).

(7) Gachkel series (reprinted in Etudes et Conjoncture Economie Mondiale, op. cit. p.45).

(8) Nikitine series (reprinted in Etudes et Conjoncture Economie Mondiale, op. cit., p.45).

(9) The Great Soviet Encyclopedia (quoted in D. J. Dallin and B. I. Nicolaevsky, Forced Labor in Soviet Russia, Yale University Press, 1947, p. 146). Refers to fiscal year 1929/30.

2. Production since 1937

Since 1937, the Soviet authorities have maintained a more or less complete blackout of information on all aspects of Soviet gold production. Consequently, in the absence of official data, published estimates vary widely. The lowest, and perhaps the best known, estimates presently available are those of the Union Corporation, of Johannesburg (reprinted in Samuel Mongagu and Company's Annual Bullion Review, London, 1948 and preceding years), and of the Bank for International Settlements. According to the former, Soviet gold production, after achieving a maximum of 6,000,000 ounces in 1937, declined continuously until 1943, in which year it was stabilized at an annual rate of approximately 2,000,000 ounces. The B.I.S. estimate differs only in degree: that is, 5,000,000 ounces a year in 1937-39 (compared with a maximum of 5,280,000 ounces in 1936), and 4,000,000 ounces in 1940 and all subsequent years. Both of these estimates are based upon the assumption that during the years immediately preceding the outbreak of World War II, and throughout the war, the Soviet authorities were compelled to curtail gold mining operations in order to divert scarce resources — labor and equipment — to the armed forces and to war production. It is also assumed that the decline in the real value of gold has made it "uneconomic" to increase gold production since 1945.

The United States Bureau of Mines has published a substantially higher estimate of Russian gold production. According to this source, output declined from 5,359,000 ounces in 1937 to 4,000,000 ounces in 1942-44, but thereafter increased to 6,000,000 ounces in 1946, and 7,000,000 ounces in 1947. This estimate, which is in close agreement with the view expressed by Professors Bergson and Gerschenkron that the present gold output of the Soviet Union may "amount to something between 6 and 7 million ounces per year,"[1] is based principally upon one by a Russian engineer (and former exiled political prisoner), Vladimir Petrov, of a current annual output of "not less than" 6,400,000 ounces.[2]

Even higher estimates have appeared in the press and elsewhere. The former New York Times correspondent in Moscow, W. H. Lawrence, cites estimates of 8,000,000 ounces for 1945[3], while the Annual Report of the Bank for International Settlements for 1943/44 refers to press reports of Russian gold production running as high as 12,000,000 ounces per annum. "Silvester Mora", in a detailed account of the Siberian gold mining industry, reaches the conclusion that more than 11,500,000 ounces of gold were produced in the U.S.S.R. in 1946.[4] This figure lends support to Georges Davidoff's estimate of 12,000,000 ounces per annum in 1943-45,[5] (compared with 7,878,000 ounces in 1937) which, he alleges, has been confirmed by a high official of the Soviet gold mining industry, Alexander P. Serebrovsky, in a statement to the press. The available data are summarized in Table 3:

1/ Alexander Gerschenkron, Economic Relations with the U.S.S.R., Carnegie Endowment for International Peace, 1945; also see letter from Abram Bergson to E. D. W. Spingarn dated August 10, 1948.

2/ Vladimir Petrov, "I Escaped Alive," in New York Herald Tribune and Washington Star, July 11, 1948.

3/ New York Times, January 9, 1946.

4/ Silvester Mora (pen name of K. Zamorski, Kolyma: Gold and Forced Labor in the U.S.S.R., Foundation Pamphlet No. 7, Foundation for Foreign Affairs, Washington, 1949. It should be noted that an estimate of 11,500,000 ounces is cited by Emil Lengyel, Siberia, New York, 1943, p. 299.

5/ G. Davidoff, op. cit.; also see Etudes et Conjonctures Economie Mondiale, op. cit., pp. 46, 49; and B.I.S. Press Review, Basle, June 21, 1944.

Table 3.

Estimates of Russian Gold Production Since 1937
(million ounces)

	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
Union Corporation	610	5.0	4.9	4.8	3.5	3.0	2.0	2.0	2.0	2.0	2.0	2.0
Bank for International Settlements	5.0	5.0	5.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
U.S. Bureau of Mines	5.4	5.2	falling		to	4.0	4.0	4.0	5.0	6.0	7.0	
A. Gerschenkron									6.0-7.0			
A. Bergson											6.0-7.0	6.0-7.0
V. Petrov	6.4	8.0	6.4	5.8	3.9	2.3	rising		to		6.4	
W. H. Lawrence									8.0			
G. Davidoff	7.9	8.0	8.8	rising		to	12.0	12.0	12.0			
A. P. Serebrovsky[1]							12.0					
"Silvester Mora"									11.5+			
D. J. Dallin and B. I Nicolaevsky				11.0[2]							16 -18[2]	

1/ As reported by G. Davidoff, and B.I.S. Press Review, Basle, June 21, 1944.

2/ Kolyma production only (see p. 7, below).

With the information now at hand, it is not possible to analyze all these estimates in detail. Those of "Mora" and Petrov, however, are based upon personal experience, and reveal a fairly intimate knowledge of the Soviet gold mining industry. Much useful information is also contained in the work of Dallin and Nicolaevsky. It is, therefore, proposed to describe the methods employed by those authors, in the hope that by comparing them it may be possible to reconcile the principle differences and arrive at reasonable conclusions.

3. Production at Kolyma

There is a considerable body of evidence which indicates that most of the gold produced in the U.S.S.R. during the past ten or fifteen years comes from the Kolyma region, in Northeastern Siberia. Other important gold mining areas include the Aldan River region, the Altay Mountains, Kazakstan, the Lena-Vitimsk basin, the Urals, and the Yenisei River valley (see Chart I and Appendix I). But from the standpoint of gold production, Kolyma is reported to be to the Soviet Union what South Africa is to the British Commonwealth and Empire. Probably the highest estimate of Russian gold production is that of D. J. Dallin and B. I. Nicolaevsky, who state that in the Kolyma region alone, gold production was 11,000,000 ounces in 1940, and that since 1945 it has risen to approximately 16,000,000 to 18,000,000 ounces per annum.1/

Petrov's estimates.

Petrov's estimate of an annual output of "not less than" 6,400,000 ounces (page 5, above) refers to the U.S.S.R. and not to any one region. Of this amount, however, he states that "not less than" 75 per cent (i.e. 4,800,000 ounces) was produced in the Kolyma region.2/ It is not clear how he arrives at his over-all figure. More weight should be given to his account of gold mining operations in Kolyma itself in view of his special knowledge of the industry in that area. As an exiled political prisoner, Petrov spent six years (1936-1941) in Kolyma. His assignments included clerical work in a construction office and in the Northern Gold Fields Administration, as well as manual work in the mines. His estimate of Kolyma production is based principally on first-hand knowledge of the number (and capacity) of wooden boxes, manufactured locally, in which the gold was packed and shipped to Moscow for refining. We are told that "The gold was mostly in fine particles, a few solid nuggets, and was about 95 per cent pure."

It should be observed that this estimate is based upon information which is at least eight years old. Although it may be indicative of the actual output of Kolyma mines in the six-year period 1936-41, it does not necessarily follow that their present output is the same as it was at that time. Elsewhere Petrov has estimated that Kolyma production was as high as 6,400,000 ounces in 1938, but subsequently fell to 4,800,000 ounces in 1940, and to only about 1,600,000 ounces in 1942. His over-all estimate for the U.S.S.R. for this period follows roughly the same pattern -- that is, 8,000,000 ounces in 1938, 5,800,000 ounces in 1940, and 2,300,000 ounces in 1942.

Data relating to the Tumany field, in which Petrov worked, and the entire Kolyma region are summarized in Table 4, below. In addition, the table contains a series of estimates of the aggregate gold production of the U.S.S.R. during the period 1936-42. It should be noted, however, that information for 1941 and particularly 1942 is less reliable than the rest of the data.

1/ D. J. Dallin and B. I. Nicolaevsky, op. cit.; also see The Economist, London, May 29, 1948.

2/ On the other hand, Lengyel, op. cit., expresses the opinion that the Kolyma mines contribute approximately one-third of a total annual output of nearly 11,500,000 ounces (i.e. approximately 3,800,000 ounces). Conceivably his calculation is based on a narrower delimitation of the area called "Kolyma".

Table 4.

Russian Gold Production: Estimates of Labor Force, Output, and Cost of Production, 1936-42.

	1936	1937	1938	1939	1940	1941	1942
Tumany Field							
Labor force[1]	---	---	5,000	6,000	4,000	3,000	---
Output in tons	---	---	9	8	5	----	---
Actual cost, rubles per gram	2/	2/	15	18	20	---	---
Daily assignment per worker, in cubic meters[4]							
Summer washing	1.2-2.5	1.2-2.5	2 - 4	2 - 4	1.5-3.0	1.5-3.0	1.5-3.0
Winter digging	3 - 6	3 - 6	5 - 9	5 - 9	4 - 8	4 - 8	4 - 8
Total Kolyma							
Labor force[1]	40,000	60,000	110,000	130,000	120,000	70,000	50,000
Output in tons	100	140	200	175	150	100?	50?
Output in million ounces	3.2	4.5	6.4	5.6	4.8	3.2	1.6
Planned cost, rubles per gram	20	20	18	18	22	22	22
Actual cost, rubles per gram	20 -22	20 -22	25	27 -28	30	25[3]	30 or more
Total USSR Output in tons	180	200	250	200	180	120	70?
Output in million ounces	5.8	6.4	8.0	6.4	5.8	3.9	2.3

General Note: Margin of error should not exceed 10 per cent.

1/ The number of workers refers only to those engaged in gold mining as their "principal activity."
2/ Actual cost in other gold fields of Northern Administration, 18 rubles per gram.
3/ Cost was brought down because of considerable capital investment.
4/ Average gold content approximately 20 grams per cubic meter.

Source: Russian Gold: Information Supplied by Vladimir Petrov, Board of Governors of the Federal Reserve System, July 27, 1948 (confidential).

Petrov believes that parallel with the expansion of Kolyma output, prior to 1939, there was a contraction of gold mining operations elsewhere in the U.S.S.R. This was due to the relatively high level of costs prevailing in other regions. The principal reasons for the decrease in output after 1938, according to Petrov, were the reduction in working hours[1] and the transfer of a considerable number of workers from the Kolyma gold mines to construction jobs several hundred miles away. In 1941, after Russia's entry into the war, about 50 per cent of the Kolyma prisoners were assigned to tin mines and road building projects.

The production estimates given in Table 4 are based upon a number of important assumptions. According to Petrov, most of the gold mined in Kolyma was alluvial gold. As a general rule, mining was on the surface -- in the beds of streams which flowed into the Kolyma River, the creek water having been diverted by dams and canals. There were also a few shallow mines where gold was extracted from depths of 45 feet or more. About 10 per cent of the total output of the region was recovered from a quartz field (i.e. from lode mines) where there was a special mercury amalgamation plant. In placer mines, it was necessary first to remove three or four meters (10 to 13 feet) of so-called "empty earth" which was done in winter by drilling or dynamiting. The next layer, the so-called "shirt", which consists of gravel and slime, was about one foot in depth, and was removed carefully with the help of tools. This was done in the summer only. Underneath was a layer of gold-bearing sand, varying in depth from eight inches to five feet. The average gold content of the sand was 20 grams per cubic meter, although in some places it was five to ten times as high. Sands containing less than 5 grams of gold per cubic meeter were not worked.[2]

We are told that the gold was washed in riffle boxes of primitive construction, where about 20 to 25 per cent of the gold was lost. This type of work was done during the summer months, a period of approximately 100 days.[3] During this period, about 90 per cent of the Kolyma prisoners were engaged in the actual mining of gold. However, according to Petrov, only about 80 per cent of this "labor force" was engaged directly in gold washing. Daily assignments (per worker, in cubic meters) represent theoretical norms: in practice, output was only about 60 per cent of the assigned quota. It is further estimated that removal and treatment of the gold-bearing layer accounted for only about 70 per cent of the total assignment.

1/ In December 1937, the working day in Kolyma gold mines had been increased to 12 hours in winter, and 14 to 16 hours in summer. In 1939, it was reduced to 10 hours in winter, and 12 hours in summer.

2/ Equivalent to 3.82 grams per cubic yard. This may be compared with an average gold content of .0964 grams per cubic yard for the Natomas Company (California, U.S.A., 1947); of .117 grams per cubic yard for Aznazu Gold Dredging Ltd., (Colombia, 1949); and of .1296 to .1555 grams per cubic yard for Bremang Gold Dredging Ltd., (Gold Coast Colony, 1949).

3/ In 1938, an attempt was made to wash the gold in winter with the help of steam and special riffle boxes, but so much of the gold was lost that the attempt was abandoned.

The relationship between Petrov's estimate of current output ("not less than 6,400,000 ounces, of which "not less than" 4,300,000 ounces were produced in Kolyma) and his estimates for 1936-42 (see Table 4, above) is nowhere explained. It would seem that there is an implicit assumption that some time after 1944, or 1945, there was a substantial increase in the supply of labor, particularly penal labor, available to the gold mining industry, so that it could expand output and recover most of the ground lost during the war. There is some evidence in "Mora's" work, as well as in that of Dallin and Nicolaevsky, which points in this direction, and which may be taken to indicate that, since the end of the war, the Soviet authorities have been endeavoring to increase their gold production, but it is extremely meager and by no means conclusive.

"Silvester Mora's" estimates

As has been stated above, "Mora's" estimates are higher than those of Petrov. "Mora's" analysis deals principally with Kolyma, and only to a lesser extent with gold production in other parts of the Soviet Union. It is based on the stories of 62 Polish political prisoners who spent from several months to a year and a half in Kolyma between May 1940 and July 1942. Estimates of Kolyma output for the fifteen-year period 1932-46 are given in Table 5, below.

Table 5

Kolyma Gold Production: Estimates of Labor Force and Output, 1932-46

Year	Number of workers engaged in gold mining	Daily Output (in grams) Summer (70 days)	Winter (295 days)	Total Output (tons)	Total Output (Million Ounces)
1932	40,000	5	1	20	.6
1933	90,000	7.5	1.5	70	2.3
1934	150,000	10	2	150	4.8
1935	225,000	10	2	225	7.2
1936	275,000	10	2	275	8.8
1937	275,000	12	2.4	325	10.4
1938	300,000	12	2.4	350	11.3
1939	275,000	12	2.4	325	10.4
1940	275,000	15	3	400	12.9
1941	250,000	15	3	375	12.1
1942	200,000	15	3	300	9.6
1943	175,000	15	3	250	8.0
1944	175,000	15	3	250	8.0
1945	200,000	15	3	275	8.8
1946	200,000	15	3	300	9.6

Source: "Silvester Mora," op. cit., p.50.

It will be observed that "Mora's" estimate for 1946 is identical with his estimate for 1942. The 1942 figure is based upon an estimated labor force of 300,000 for "the gold yielding regions of Kolyma alone." This calculation is made on the basis of the carying capacity of nine ships employed to transport prisoners from Vladivostok to Magadan, and the number of trips made during a season (April to November), as well as on the basis of supplementary information concerning the average number of prisoners concentrated in the "Kolyma Zone " staging area on Nakhodka Bay, near Vladivostok, on-the-spot estimates, etc. Although some of these sources state that as many as 2 to 8 million prisoners were held in Kolyma, "Mora" concludes that these figures are probably too high, and that the average number of prisoners employed in gold mining in Kolyma never exceeded 600,000 in any one year, but varied from 300,000 to 400,000 "in the period up to 1942."[1] However, even with a labor force of 300,000, "Mora" explains, only about 65 per cent, or 200,000, were engaged directly in gold mining.

This figure of 200,000 is used in conjunction with an estimate of 15 grams of gold recovered per man-day during the summer months (70 days), while a figure of 100,000 is used in conjunction with an estimate of 3 grams per man-day during the remainder of the year (295 days). It will be noted that, although "Mora's" estimate of the number of workers engaged directly in gold production is substantially higher than Petrov's, his estimate of average output per man-day in summer is considerably lower. After a brief discussion of manual panning and other mining methods, including the use of the mechanical sluicer, "Mora" remarks that assigned production quotas varied from 15 to 50 grams per man-day, depending upon the method employed, but that the average was 37 grams. In the case of gold produced by manual panning, this quota averaged 25 grams of gold for a prisoner, and 31 grams for a free worker. However, "Mora" assumes that actual output was about 40 per cent below the assigned quota of 25 grams per prisoner engaged in manual panning (mechanical operations are arbitrarily excluded) -- that is, about 15 grams per man-day for prisoners -- and it is this minimum figure which he uses in all calculations of summer production for the period 1940 through 1946.[2]

Unlike Petrov, "Mora" estimates that, in spite of the severe climate,[3] about 30 per cent of total output was produced in winter (295 days). In underground mines, he states, the cold was no problem, while in certain surface mines it was possible to continue operation with the help of so-called boilers, or

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1/ According to Dallin and Nicolaevsky, op. cit., pp. 136-40, there were at least 66 gold fields in Kolyma, each employing from 5,000 to 10,000 workers. On the basis of ship sailings, carrying capacity, etc., they conclude that "the importation of from 400,000 to 500,000 slave colonists each year appears credible."

2/ It will be recalled that Petrov's estimates are based on an output of approximately 25 grams per man-day (i.e. 3 cubic meters containing 20 grams per cubic meter with a 42% recovery. On this, see pp. 9 - 10 above.

3/ The mean January temperature in Kolyma is -31 degrees F., compared with 45 degrees F. in July. In winter the temperature sometimes drops to -90 degrees F.

sluicers, for melting snow and ice, and thawing out the frozen soil by steam. Although in some sectors the daily quota for manual panning was 20 to 25 grams between October and May, compared with 40 grams in summer, in other sectors production stopped entirely during the winter months. For these reasons, "Mora" believes that an average output of 3 grams per man-day in winter from a number of workers engaged in gold mining half as great as in summer, is a reasonably safe assumption.

4. Production in other areas

Much valuable information on gold mining in other parts of the Soviet Union is contained in "Mora's" report.1/ It will be recalled that his over-all estimate of current gold production is somewhat higher than 11,500,000 ounces per annum. Since his estimate of Kolyma output, in 1946, is approximately 9,600,000 ounces, this would imply that other gold mining regions of the U.S.S.R. are producing at least 2,000,000 ounces of gold annually. This figure may be compared with Petrov's estimates (2,575,000 ounces in 1936, 1,600,000 ounces in 1938, and 645,000 ounces in 1942), as well as with the United States Bureau of Mines series for the period 1901-15 (annual average: approximately 1,270,000 ounces).2/

As has been mentioned, important gold mining properties are located in other parts of Siberia. Many of these mines are lode mines. "Mora" states that some of them are (or were) equipped with modern machinery. It would also appear that in some the ratio of free labor to penal labor is substantially higher than in Kolyma, where nearly all mine work is done by prisoners.

Unfortunately, "Mora" is never very explicit. Thus, we are told that, "Kazakstan is one of the richest gold-bearing territories in the U.S.S.R. ... . New mines are constantly being opened ... . The output of the Kazakstan mines varies. It is difficult to obtain exact data ... ." The impression one gets is one of furious activity. Again, "The gold deposits of the Yenisei taygа appear to be as inexhaustible as those along the Lena River," while near Lake Baikal, "In 1930, new mines, wholly mechanized and provided with excellent equipment, were already in operation." A Soviet source is quoted to the effect that "due to the use of proper methods no less gold is mined /in the Yenisei region/ than was extracted in the time of the czars."3/ Gold mines in the Aldan River region (in Yakut territory) are stated to produce "up to 25 per cent of the entire Soviet output4/ and employ more than 15,000 people working with large mechanical equipment such as dredging machines, traction engines, and power stations." We are also told that in a part of the Vitimsk region gold production increased "two or threefold" by 1939 (compared with 300,000 ounces in 1913). On the basis of such information "Mora" concludes that a figure of 35 tons (1,125,000 ounces) "appears likely for the entire Lena-Vitimsk basin."

1/ On this, see Chart I and Appendix I, below; also see Etudes et Conjoncture Economie Mondiale, op. cit., pp. 49-53.

2/ See Table 1, above.

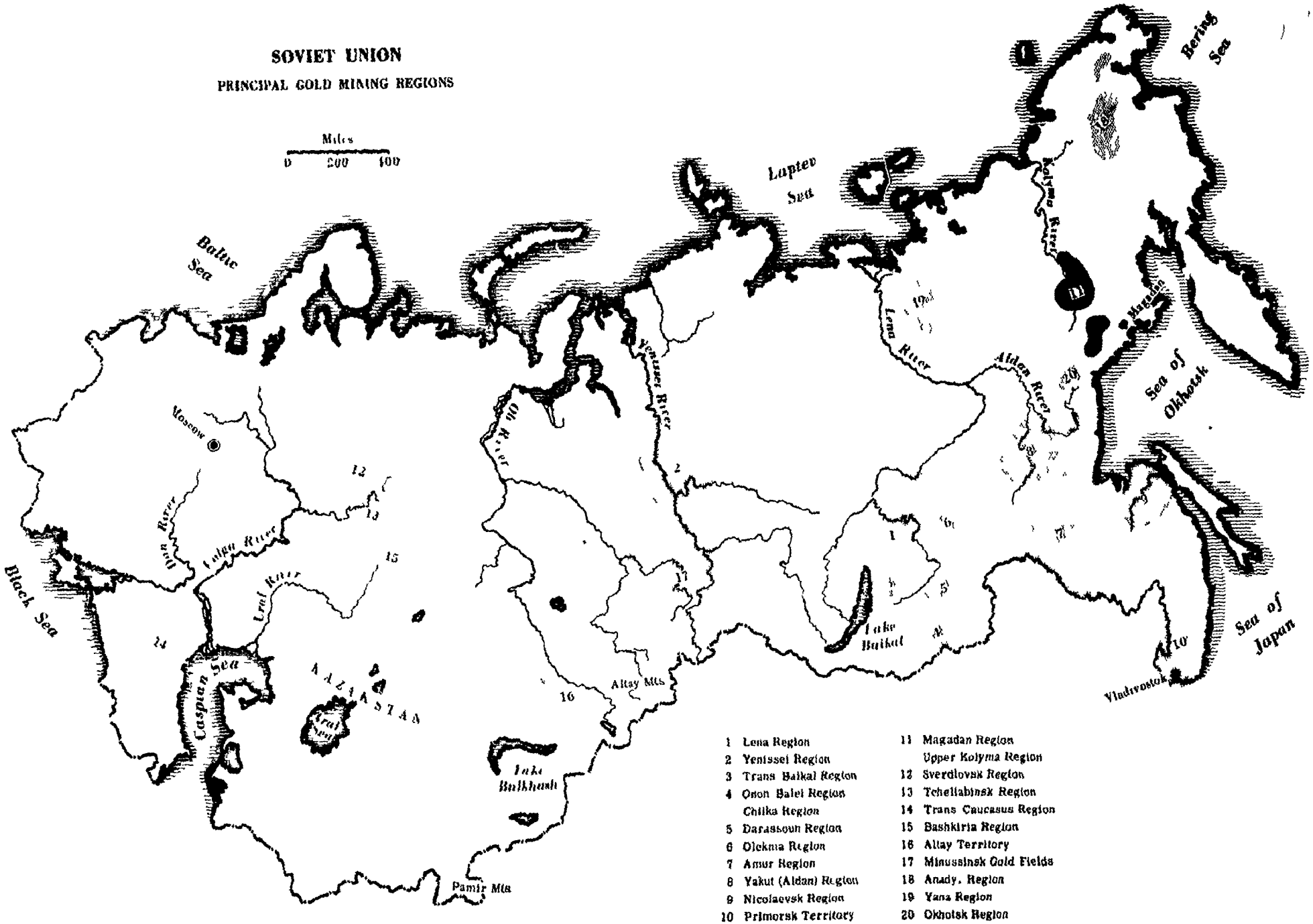
3/ Baransky, Ekonomicheskaya Geographia SSSR, Moscow, 1939, pp. 260-65.

4/ If we assume that the other 75 per cent was produced entirely in Kolyma, this would signify approximately 1,870,000 ounces (Petrov data) to 3,470,000 ounces ("Mora" data) for 1939, and approximately 3,200,000 ounces ("Mora" data) for 1946.

5. Conclusion

With the information now at hand, it is not possible to evaluate these statements. On the basis of Petrov's data, an output of 1,600,000 ounces for gold mining regions other than Kolyma does not seem unreasonable. On the other hand, "Nora" clearly implies that this figure is too low. Because of the lack of official data and secrecy surrounding the industry, particularly since 1937, it is necessary to make allowance for concealment. It is also necessary to bear in mind that, in the U.S.S.R., certain projects are decreed on the basis of over-riding State considerations, and in complete disregard of the marginal principle.[1] For these reasons, a figure of 2,000,000 to 3,000,000 ounces is by no means inconceivable. This would imply that a current output figure for the whole U.S.S.R. of around 7,000,000 ounces (United States Bureau of Mines; Bergson; Gerschenkron; Petrov) is a minimum figure, and that a total realized output of around 10,000,000 ounces is not impossible, which would give the U.S.S.R. an output approaching 50 per cent of that of the rest of the world.

1/ Therefore, factors of production are allocated to "key" projects, even though more profitable uses may be available elsewhere. For a discussion of this point, see Holland Hunter, " The Planning of Investments in the Soviet Union," Review of Economics and Statistics, February 1949.


SOVIET UNION
PRINCIPAL GOLD MINING REGIONS
Miles
0 200 400
Baltic Sea
Black Sea
Caspian Sea
Laptev Sea
Bering Sea
Sea of Okhotsk
Sea of Japan
Moscow
Ural River
Emba River
Volga River
Ob River
Yenisse River
Lena River
Aldan River
Kolyma River
Magadan
Vladivostok
Lake Baikal
Lake Balkhash
Aral Sea
KAZAKHSTAN
Altay Mts
Pamir Mts
1 Lena Region
2 Yenissei Region
3 Trans Baikal Region
4 Onon Balei Region
Chilka Region
5 Darassoun Region
6 Olekma Region
7 Amur Region
8 Yakut (Aldan) Region
9 Nicolaevsk Region
10 Primorsk Territory
11 Magadan Region
Upper Kolyma Region
12 Sverdlovsk Region
13 Tchellabinsk Region
14 Trans Caucasus Region
15 Bashkiria Region
16 Altay Territory
17 Minussinsk Gold Fields
18 Anady. Region
19 Yana Region
20 Okhotsk Region

APPENDIX I

Principal gold mining regions in the U.S.S.R.

1. Lode Gold

Finnish Karelia:

Gold reported in two spots.

Urals:

Goroblagodat north-west Sverdlovsk;
North and South of Magnitogorsk;
Kychtym deposits;
Beriozov (north);
Region of Miass (center);
Region of Kotchkar (center);
Region of Kychtym;
Baimar, Tanalyk (south);
Gubinskii Rudnik, Bashkiria;
Mundyak Combine.

Caucasus and Transcaucasia:

Karachai Region, south-east of Teberda in the Kabardino-Balkarsk autonomous republic, north of Mt. Elbruz, in Bulungu and Krugozor.

Western Siberia:

Olkhovka (Minussinsk gold fields);
Sarlinsk and Berikul groups;
Tarlinsk and Podlunnyi Goletz regions;
Atchinsk, Kommunar Mine;
Mines of Aiakhtinsk (northern group;
Mines of Sovietsk (southern group);
Mines of Tzentralnyi (east of Kemerovo);
Reef Manova Gora (Taiga of the Yenisei).

Central Asia:

Kulunda Region (Kilundzin);
Akdzhal, Baladzhal, Lailin regions: all in Kazakhstan near the Altay Mountains;
In North Kazakhstan, in Maikain;
Dzelarbet, Dzetygara; in Central Stepniak;
Zmeinogorsk and in Alkabek in the Semipalatinsk Region;
In the Northern Pamirs, east of Altynmazar;
In the Southern Pamirs, east of Rochtkala.

Transbaikal:

Balei Region and Balei
Darassun (Mine Dmitrievski);
Kliuchi;
Chilka Region (First Section of the Amur river);

The Far East:

Khomolkho: Lena Region - Belaia Goza;
North-West Nikolaevsk on the Amur;
Lake Chilia;
In the Upper Ussuri, Maritime Prov[illegible];
Askold Island, South East of Vladivostok.

2. Placer Gold

Caucasus and Transcaucasia:

In Northern Ossetia, Georgia and Ar[illegible];
In Dautu, on the Great Zelenchuk, in the Karachai Region;
In the Urup Region, tributary of the Kuban;
In the Tchegem, east of Mt. Elbruz, in the Kabardino-Balkarsk autonomous republic.

Western Siberia:

Gold fields of Minussinsk;
Gold fields of Kizir, Chinda;
Gold fields of Dzebi, Tchibidzek;
Gold fields of the Mid-Yeniss i, North of Krasnoiarsk;
Mariinsk, South-Eastern Tomsk.

Central Asia:

In Tajikistan, all the tributaries on the right of Amu Darya.

Eastern Siberia:

a) Barguzin Taiga

Groups of workings in Amalat
Groups of workings in Vitinkan
Groups of workings in Tsipikan
Groups of workings in Vitim
Groups of workings in Kozolon

b) On the Selenga, the Onon, the Chilka and the Chaktoma

c) Lena-Vitimsk gold fields, Mamakan;
Engagimo;
Bodaibo;
Artemovsk.

Yakut Republic:

Gold fields of Aldan-Tiumen, Nezamentny; Altak-Ioan, Tyrkanda;
Cold fields of the Tormot, the Tuten;
Gold fields of the Ochur 1933, the Upper-Alden 1933;
Gold fields of the Kabaktan 1933, Dzugdzur 1933;
Viliui gold fields.

The Far-East:

Amur gold fields;
Gold fields of the Zeia (Zolotaia Gora);
The Bureia, the Oldoi, the Bira;
The Selendza (Khordzinsk);
Groups of workings in Sutar;
Groups of workings in Khorg
Groups of workings in Giliui

The Far-North:

Gold fields of the Upper Kolyma (Seimchan, the mouth of Srednikan);
Okhotsk Region;
Anadyr Region;
Yana Region;

Source: "L'Evolution de la Production de l'Or dans le Monde," in Etudes et Conjoncture Economie Mondiale, Paris, March/April, 1949, pp. 51-52.