

WORLD BUSINESS

CONCISE REPORTS ON WORLD OIL AND GENERAL INTERNATIONAL
DEVELOPMENTS OF INTEREST TO THE PETROLEUM INDUSTRY

Published monthly by the PETROLEUM INDUSTRY RESEARCH FOUNDATION, 122 East 42nd Street, New York 17, New York • Telephone: OXford 7-3774

1 - 12

October 15, 1956

SPECIAL REPORT:

THE ROLE OF OIL IN THE SOVIET ECONOMY

Page

NEW SOURCES OF INFORMATION MAKE MORE COMPREHENSIVE STUDY POSSIBLE.....	1
THE MEANING OF SOVIET OIL DEVELOPMENTS TO THE WEST.....	1
Soviet strategic planning;	
Self-sufficiency or need to acquire outside supply sources;	
Russia's traditionally dominant position in world oil industry;	
Potential competitor of Western companies in world oil market.	
THE DEVELOPMENT OF SOVIET OIL PRODUCTION SINCE PRE-WORLD WAR I.....	2
Comparison with output and growth rate in Free World;	
Production growth since 1945 beyond expectations of Soviet planners.	
RUSSIAN OIL RESERVES.....	4
Proved reserves considered small in relation to potential reserves.	
GEOGRAPHIC DISTRIBUTION OF SOVIET OIL DEPOSITS.....	5
Major switch from southwestern to eastern regions;	
Decline of the <u>Baku</u> fields, off-shore production gain insufficient	
to compensate for losses at inland fields;	
Production increases in <u>Turkmenian</u> Republic (s.e. shore of Caspian Sea);	
" <u>Second Baku</u> " (Volga-Ural area) mainly responsible for postwar oil growth.	
OTHER SOVIET OIL DEPOSITS.....	8
Arctic area;	
Emba region (Kazakh Republic);	
Central Asia (Fergana Valley, Afghan border);	
Western Siberia;	
Sakhalin Island.	
SOVIET DRILLING METHODS.....	8
Use of <u>turbo-drills</u> ;	
Experiments with <u>no-bit</u> drill;	
High degree of secondary recovery methods.	

EFFICIENCY OF PRODUCTION.....	9
Differences in 'work-orientation' of Eastern and Western Oil men;	
Use of tracer atoms and radioactive isotopes.	
THE TRANSPORTATION OF SOVIET OIL.....	10
Pipeline transportation relatively unimportant until 1950;	
Growth of pipeline system under Fifth and Sixth Five Plans;	
Railroads to be relieved of oil traffic.	
RUSSIA'S TANKER FLEET.....	12
Tanker construction to rise sharply in new Five Year Plan;	
Need to ship more oil by tanker to East Siberian provinces.	
SOVIET REFINERIES.....	12
Refinery capacity to rise slower than crude oil production;	
Better utilization of refinery capacity scheduled;	
More emphasis on cracking capacity.	
LOCATION OF SOVIET REFINERIES.....	14
Eastward shift in refinery building in line w/industrialization	
of Siberia.	
OIL CONSUMPTION IN THE SOVIET UNION.....	15
No consumption figures available;	
Consumption assumed to equal domestic production;	
<u>Per capita</u> oil consumption in the USSR close to Western Europe's;	
Share of oil and gas in Soviet total fuel production growing;	
<u>Total</u> Soviet energy consumption far behind Western Europe and U.S.;	
<u>Per capita</u> Soviet energy consumption nearing Western Europe's;	
Temporary fuel shortage in European Russia despite overall	
self-sufficiency.	
OIL CONSUMPTION BY SECTORS.....	19
Use of oil in agriculture to rise, higher tractor utilization;	
Use of oil in industrial sector to rise, switch from coal to oil;	
Use of oil in transportation sector to rise, dieselization of	
railways;	
Use of oil in household sector to decline;	
Use of oil in military sector to decline, reflecting national policy;	
Planned industrial output for 1960 can be reached with less than	
planned energy target for 1960;	
Oil target for 1960 not excessive due to planned coal-to-oil shift.	
SOVIET OIL IMPORTS.....	22
Soviet Union not dependent on oil imports, could not use Middle	
East oil;	
Austrian oil shipments to USSR mostly resold to satellites;	
Oil imports from Rumania fairly substantial, largely re-exported;	
Rumania becoming major oil supplier of Soviet Far East;	
Soviet Far East could switch to non-Communist supply source.	

SOVIET OIL EXPORTS.....	24
Shipments to other Communist countries not very significant;	
Shipments to the Free World shared with Rumania;	
Soviet Bloc oil exports not important for total Free World but significant in several Free World countries;	
Trend of Soviet Bloc oil exports rising; preview of 1956/57 exports.	
STATISTICAL TABLES.....	29
Soviet bloc oil exports to Free World;	
Russian oil production by Union Republics;	
Soviet bloc crude oil productions.	
OIL MAP OF THE SOVIET UNION.....	31

TABLES

Russian and World Crude Oil Production, 1900-1955, Selected Years.....	2
Estimated World Crude Oil Production, by Semesters, 1955-56.....	3
Soviet Oil Production by Major Regions, 1940-1960, Selected Years.....	5
Oil's Share in Soviet Railroad Freight Turnover.....	11
Soviet Oil Refineries, Throughput and Cracking Capacity.....	13
Per Capita Oil Consumption in the USSR, Western Europe, the U.S.	16
Production of Mineral Fuels in the USSR - in percentages.....	16
Total Energy Production in the USSR, By Sector.....	17
Indicated Energy Consumption, By Sector (USSR, W. Europe, U.S.).....	18
Per Capita Total Energy Consumption (USSR and Selected Other Areas).....	18
Production of Oil-Consuming Equipment in the USSR, 1955, 1960.....	20
USSR Oil Imports from Rumania, 1948-1952.....	23
Tanker Traffic from Black Sea to Russia's Pacific Coast.....	24
Soviet Bloc Oil Exports to Free World, 1952-1955.....	25
Soviet Bloc Oil Exports to Free World, by Origin and Destination.....	29
Russian Oil Production by Union Republics, Selected Years.....	30
Soviet Bloc Crude Production, by Country - 1950, 1955, 1960.....	31

THE ROLE OF OIL IN RUSSIA'S DOMESTIC AND FOREIGN ECONOMY

NEW SOURCES OF INFORMATION

Until 1953, data on the Soviet Union's Oil Industry, like most of its other economic facts were "a riddle wrapped in a enigma", to use Winston Churchill's famous description of Russia. However, in the last three years, the great "thaw" has unfrozen, among other things, many hitherto secret data concerning the Soviet economy. For the Oil Industry this means that we have now for the first time since 1937 enough official facts and figures available to form a comprehensive picture of that sector of the Soviet economy. The so called peoples' democracies of Eastern Europe and Communist China have also somewhat lifted the post-war curtain of secrecy which in the past has made their economic progress largely a matter of guesswork for the West, based upon circumstantial evidence of varying reliability.

Of course, we have no way of ascertaining that the officially released information on the state of the economy is really correct. It does, however, generally correspond to the independent estimates of Soviet experts in the West, as well as the figures brought to us by Soviet refugees who at one time had access to them. Furthermore, in a modern economy the various sectors are so inter-dependent that it would be very difficult to willfully distort the achievement of any one major sector without similarly distorting the entire economy. Since we do have sufficient evidence that this is not the case, it is possible to accept the official Soviet figures as essentially correct.

THE MEANING OF SOVIET OIL DEVELOPMENTS TO THE WEST

In the world oil industry we are continuously improving our state of knowledge on oil in the Free World but are relatively unconcerned with oil developments behind the Iron Curtain. From an immediate commercial point of view, this attitude is justifiable. For the Soviet Bloc does not purchase oil from the Free World in significant quantities nor is it an important supplier of oil to the Free World. Yet, the Soviet oil situation is of direct importance to us for several reasons: (1) An adequate oil supply is a basic requirement for economic progress, military security and the ability to wage foreign wars. Soviet policy -- and thus world policy -- is bound to reflect this fact, either passively if internal oil self-sufficiency exists, or actively if foreign oil is, or will be, needed to fuel the area's growth process; thus, a knowledge of the Soviet Bloc's oil potential helps us to determine Soviet intentions towards the Free World's oil producing areas of which the richest -- the Middle East -- lies directly on Russia's doorstep. (2) The Soviet Union is today the world's third largest oil producer and has been a major oil nation for nearly 100 years. This gives her the tradition and technical know-how of long experience and makes her an important factor in world oil technology. To a smaller extent, the same is also true of Rumania which today produces more oil than all of non-communist Europe combined.

(3) Since Soviet Bloc economics is not based upon the free play of supply and demand but on centralized planning, it is important to know how much oil, if any, could be diverted from the home market into foreign trade. In the early thirties, the Soviet Union exported nearly a quarter of her oil production and gave British and U.S. oil companies some very stiff competition, resulting in frequent price wars. The repetition of this situation could be very costly to the Western oil companies. Rumanian oil production of which 70%-80% is traditionally exported, could also become an important competitor of Western oil, particularly in the Mediterranean market.

THE DEVELOPMENT OF SOVIET OIL PRODUCTIVE CAPACITY

The table below gives Soviet oil production figures in their relation to world production from 1900 to 1955, for selected years.

RUSSIAN AND WORLD CRUDE OIL PRODUCTION 1900-1955, Selected Years

<u>Year</u>	<u>Russia</u> (in million tons)	<u>World</u> (in million tons)	<u>Russia's Share of World Total</u> (In per cent)
1900	10.4	20.5	50.7
1901	11.7	23.0	50.9
1905	7.6	29.6	25.7
1910	9.7	45.1	21.5
1915	9.4	59.5	15.8
1918	3.7	69.3	5.3
1920	3.5	94.8	3.7
1922	4.9	118.2	4.1
1924	6.3	139.6	4.5
1926	8.9	150.9	5.9
1928	11.6	182.3	6.4
1930	18.5	194.1	9.5
1932	21.4	180.2	11.9
1934	24.2	209.5	11.6
1936	27.4	246.6	11.1
1938	30.2	273.6	11.0
1940	31.1	295.2	10.5
1945	19.4	357.1	5.4
1946	21.7	378.0	5.7
1947	26.0	415.9	6.3
1948	29.2	568.0	6.2
1949	33.4	468.0	7.1
1950	37.9	522.8	7.2
1951	42.3	589.3	7.2
1952	47.3	619.9	7.6
1953	52.8	656.7	8.0
1954	59.3	691.6	8.6
1955	70.8	775.5	9.1

According to these figures, Soviet oil production was fairly stable during the fifteen years preceding the Communist revolution in October 1917. It dropped sharply when the new regime took over and did not return to the pre-war level until 1926. From then on there was rapid and steady expansion until 1940. For the next four years the penetration of the German Armies caused a sharp decline in output and in 1945 production had declined to 62% of the pre-war record figure. The latter was not surpassed until 1949. Since then there has been a steady sharp increase, with every year bringing a new all-time record. The annual rate of growth since 1950 has been 13.3%, compared to about 8% for the non-communist world.

For 1956, Soviet Oil Production is slated to increase another 16% to 82,000,000 tons (1,640,000 b/d). This would be less than last year's growth which was 19.4% but much more than the contemplated increase for the non-communist world. According to official statements, the increase in production during the first six months of 1956 amounted to about 20% over the same period of last year which was more than the increase registered in any other major oil area of the world and also represented the highest increase among the world's five largest oil producers (U.S., Venezuela, USSR, Kuwait, Saudi Arabia). If the Soviet Union can reach its 1956 goal it will account for 10% of world production. In judging the magnitude of this share, it should be compared to Venezuela, the world's largest oil exporter, which currently accounts for about 14% of world production.

ESTIMATED WORLD CRUDE OIL PRODUCTION
(thousand tons)

	Jan.-June 1955	July-Dec. 1955	Jan.-June 1956	Jan. June 1956 % increase over Jan.-June 1955
U.S.	165,326	169,605	174,020	
Other	<u>7,643</u>	<u>9,783</u>	<u>10,450</u>	
Total North America	<u>172,969</u>	<u>179,388</u>	<u>184,470</u>	6.6
Venezuela	54,499	57,880	60,000	10.1
Other	<u>14,882</u>	<u>15,279</u>	<u>15,995</u>	7.5
Total Latin America	<u>69,381</u>	<u>73,159</u>	<u>75,995</u>	
Kuwait	27,558	27,198	29,600	7.3
Saudi Arabia	23,450	24,085	25,279	7.8
Other	<u>28,504</u>	<u>31,673</u>	<u>35,310</u>	
Total Middle East	<u>79,512</u>	<u>82,956</u>	<u>90,189</u>	13.4
Total Far East	<u>9,103</u>	<u>9,593</u>	<u>9,692</u>	6.5
Total Non-Communist Europe	<u>4,493</u>	<u>4,892</u>	<u>4,958</u>	10.3
Western Hemisphere	242,350	252,547	260,465	7.5
Eastern Hemisphere	<u>93,108</u>	<u>97,441</u>	<u>104,839</u>	12.6
Total Free World	<u>335,458</u>	<u>349,988</u>	<u>365,304</u>	8.9
USSR	33,800	36,993	40,560	20.0
Other	<u>6,740</u>	<u>7,091</u>	<u>7,430</u>	
Total Communist Countries	<u>40,540</u>	<u>44,084</u>	<u>47,990</u>	18.4
Total World	<u>375,998</u>	<u>394,072</u>	<u>413,294</u>	9.9

In understanding the very sharp post-war rise in Soviet oil production it is important to keep in mind that it was almost as much of a surprise to the Soviet Planners as to the outside world which had concluded from the urgency with which Russia attempted to gain access to the Iranian oil fields just after World War II and from her eager insistence on exclusive exploitation of the Austrian oil fields that she was faced with an imminent oil shortage.

Stalin, in a famous policy speech in 1946 had set 60,000,000 tons of crude oil as the annual target to be reached by 1960. In general, these long-term targets -- which Stalin considered necessary "to assure our homeland against all possible accidents" -- were based on reasonable growth rates, as is shown by the following targets Stalin set for four major basic commodities:

<u>Commodity</u>	<u>Stalin's Goal for 1960</u>	<u>Actual Achievements by 1955</u>
Coal	500 million tons	390 million tons
Steel	60 " "	45 " "
Pig Iron	50 " "	33 " "
Petroleum	60	71 " "

The above figures show that Stalin's goal was fairly realistic for the three other commodities, their rate of growth being such that by 1960 they can be expected to surpass the original targets by only about 10 to 20%. However, he was completely off on oil which is scheduled to reach 135,000,000 tons, or 2-1/4 times the Stalin target, by 1960. The reason for this difference lies largely in the unexpected success in locating new oil reserves.

SOVIET UNION OIL RESERVES

The well known geologist William Pratt declared that "the potential oil reserves of Russia are doubtlessly larger than that of any other country". A recent article in the British publication Petroleum Times also makes this point: "the USSR has more than 1/7 of the world's total dry land -- over eight million square miles. Of this total, about four-and-a-half million square miles is sedimentary and perfectly capable of holding oil; it contains dozens of recognizable petroleum bearing basins of varying sizes. The area where the present big producing fields are located is only one of the potentially interesting regions -- and it may quite well not be the best: beyond the Urals there are vast unexplored areas.

"Compared with most producing countries, exploration in Russia is, so far, the least complete...(It is) the only area comparable with the Middle East -- and particularly Saudi Arabia -- as a probable scene of future discoveries on the very largest scale..." The view that the Soviet Union is only now locating its major oil deposits is also substantiated by oil industry minister Yevseyenko who stated in a recent article in Pravda that "prospected and surveyed oil reserves in the USSR have increased more than five fold in the last ten years." Since the Soviet Union has now a staff of 25,000 trained geologists, the discovery of new oil deposits may well continue at such a rate. For this reason "proved" reserve figures are not necessarily a good guide to the Soviet Union's oil potential.

An official State estimate of proved reserves has never been given but there are a number of semi-official and private estimates. Russia's chief geologist Gubkin is reported to estimate current proved reserves at over one billion tons and probable reserves at 4.5 billion tons. Another recent Russian semi-official estimate puts proved reserves at 900 million tons, probable reserves at 4 billion tons and possible reserves at another 4 billion. A recent U.S. estimate and an independently arrived German estimate both give Russia's "published proved" reserves at the end of 1955 at 1.33 billion tons. If proved reserves are therefore assumed to range around 1.2 billion tons (although some other estimates are considerably higher) they would be equivalent to about 16 years of production, at the 1955 level, and would account for 5.3% of proved world reserves, as of January 1, 1956.

GEOGRAPHIC DISTRIBUTION OF SOVIET OIL DEPOSITS

The Geographic Distribution of the major oil deposits is as follows, in order of size: Volga-Ural area ("Second Baku"); Caucasus (Baku, Grozny, etc.); Emba region (Northern shore of the Caspian Sea). Smaller deposits are found in the Central Asian part of Russia in the Turkmenian, Usbekistan and Kirgiz Republics where about forty separate fields were exploited last year. Further east are the small but locally important deposits of Sakhalin Island where six fields are currently operated. At the other extreme, in Russia's Western provinces, lie the West Galizian oil fields and the Estonian shale oil deposits.

Together these areas produced about 71.7 million tons of oil (inclusive shale oil) last year. Of great interest are the changes in the geographic distribution of the oil production which have taken place since World War II. The following table shows the relative decline of the old Southern and Western regions and the sharp rise of the Eastern Region. (For a more detailed geographic break-down see table on p. 30 which gives production in each of the 16 constituent Socialist Soviet Republics)

	(in million tons)			
	1940	1950	1955	1960 (Plan)
<u>Western & Southern Regions</u>	<u>28,257</u>	<u>21,436</u>	<u>26,967</u>	<u>34,160</u>
Ukraine, Estonia*	533	750	1,431	3,017
Caucasus & Caspian Sea	27,724	20,686	25,536	31,143
<u>Eastern Regions</u>	<u>3,059</u>	<u>16,884</u>	<u>44,974</u>	<u>101,984</u>
East European Russia ("Second Baku")	1,601	13,216	41,000	96,100
Central Asia	870	2,468	2,774	4,384
Sakhalin Island	588	1,200	1,200	1,500
<u>Total USSR</u>	<u>31,316</u>	<u>38,320</u>	<u>71,941</u>	<u>136,144</u>

* Shale oil

The main reasons for the relative decline of the South-Western area are, of course, the Baku fields in Azerbaidjan. In 1940 these fields still accounted for about 75% of the Soviet Union's total oil output and as late as 1947 Stalin told U.S. Ambassador Walter B. Smith, "the oil fields of Baku are our main source of raw material in this regard." Last year, however, they contributed less than 25% to the country's total output, and by 1960 their share will have been reduced to around 10 to 12%.

Though Baku's total output has remained approximately stationary since 1950, at 2/3 of the highest pre-war production, an interesting shift in production from land to sea is taking place. Last year 26.5% of Baku's 15.3 million tons of oil came from off-shore drilling in the Caspian Sea coastal area. This is more than 2-1/2 times as much off-shore oil as was produced in 1950. By 1960, off-shore productions will account for 40% of Baku's total output. In the exploitation of off-shore oil deposits, action on the strata by artificial methods is of decisive importance. Right now artificial methods are being employed at 70% of the off-shore fields. During 1956 the flooding of strata at Baku off-shore fields will be increased by another 28%, under the FIVE YEAR PLAN DIRECTIVE which calls for 82% increase in the quantity of oil extracted under artificial methods throughout the Soviet Union. Soviet geologists are of the opinion that these submarine oil deposits are a continuation of the known main-land fields which probably stretch out extensively under the bottom of the Caspian Sea. At present about 300 off-shore drillings are in production with an average daily output of up to 1,800 barrels in some wells. The drillings are carried on from firm platforms up to a sea-level of 80 feet. Plans are now being made for driving pilings into considerably deeper water and for floating drilling rigs. One of these off-shore fields, Neseyanya Kamny, is reported to look like a modern pile-dwelling settlement with a pillar-supported net of streets connecting the various drilling platforms. Since Baku's total production is expected to remain stationary despite the sharp increase in off-shore output, it is obvious that the main-land fields are in a rapid state of decline. According to most experts, this decline is of a permanent nature although by means of the most modern secondary recovery methods it has been possible to keep most of its 3,000 wells productive.

Most of the actual increases achieved in the Western and Southern regions since the end of World War II are due to increases along the South-Eastern shore of the Caspian Sea in the Turkmenian Republic, just north of the Iranian border, and to higher output from the Estonian oil shale deposits. According to the Soviet Minister of Geology and Mineral deposits, the Turkmenian oil deposits are very considerable. They are part of the same geological structure than the Baku fields on Apsheron Peninsula, on the opposite shore of the Caspian Sea. The Estonian shale deposits are one of the world's richest in oil; when distilled industrially, they yield up to 18-20% crude oil. The oil thus obtained is suitable for refining into fuel oil, lubricating oil, gasoline and asphalt. Total oil-shale reserves are estimated at 6 billion tons. Over the next five years, oil production from Estonia is scheduled to rise by about 70% and from the Turkmenian shore of the Caspian Sea by 30%. Also of increasing importance in Western Russia are the recent new finds at Grozny, one of the country's oldest fields and the growing oil and gas production in the Ukraine which lies in the center of a heavily industrialized area. The main fields here are in Galicia which belonged to Poland until that country's dismemberment in September 1939. Under the new Five Year Plan, the Ukrainian oil production target is slated for a 180% increase over 1955. It appears, from a recent article in Izvestia, that it could be increased even further but that at present it is considered more economical to ship oil into the Ukraine from Eastern Russia where there is an abundance of cheap oil than to undertake the more costly exploitation of some of the newly found Ukrainian deposits. Local Ukrainian oil administrators have, however, voiced criticism of this policy.

THE " SECOND BAKU " AREA

The most important post-war occurrence in the Soviet oil industry is the development of the so-called "Second Baku", roughly the area between the Ural Mountains and the Volga River. Most of the increase in Soviet oil production in the past ten years comes from this one area which is located in the eastern-most European part of the Russian Federated Soviet Republic, the largest of the sixteen constituent republics of the U.S.S.R. This area accounts today (second half 1956) for 62% of Russia's total oil output, compared to

about 5% in 1940. By 1960, Russia will rely for over 71% of its total oil output on the "Second Baku" area.

The main oil areas within the "Second Baku" are, in order of importance: The Tartarian and the Bashkirian Autonomous Republics and the provinces Kuibyshev, Molotov, Chkalov and Saratov and Stalingrad. The Tartarian oil deposits are located between the Volga and the Belaya rivers. Between 1950 and 1955 their output was raised 17 times and last year it was about equivalent to that of the original Baku fields (15.3 million tons). By 1960, the Tartarian fields are slated to supply about 47 million tons, or about half of the total output of the "Second Baku". However, unlike Baku itself which has some 20 different oil layers, the Tartarian fields have only 4 different layers. Next to Tartaria, the biggest fields are in the Bashkirian Republic. Here lies the famous Ufa oil field, the Soviet Union's largest single field. It is slated for 120% increase under the current Five Year Plan. The potential of the Bashkirian oil deposits is still undetermined since many of its fields have only been discovered within the last couple of years. Thus, one of its biggest discoveries was made in 1955 when four drillings reportedly turned into gushers at a depth of 7,200 feet with a daily production of over 2,000 barrels per well. Another new discovery is the Saratov oil deposit. Saratov's natural gas deposits have been exploited for a number of years but it was only in 1955 that large-scale commercial oil production began. The southern-most point of the "Second Baku" area seems to be around Stalingrad where oil and gas production is also of fairly recent date.

The favorable location of the "Second Baku" is as important as its oil richness. Most of the fields are only 500-700 miles east and south-east of Moscow, compared to the 1200-mile distance between Moscow and Baku which formally had to supply most of the capital's oil needs. Furthermore, a number of important industrial centers are located right in the new oil area such as Magnitogorsk, Sverdlovsk, Kuybishev, Stalingrad, etc. In this connection it is worth noticing that lately the majority of new discoveries in the "Second Baku" are seems to have been along the Volga river, its western-most limit. During the first seven months of 1956, over 100 new wells were put on production at or near such Volga cities as Stalingrad, Kuybyshev, Saratov, Stavropol.

The proximity of the new oil fields to Moscow has also affected the price of the oil. According to an article in a Soviet economic journal, a ton of oil from Baku cost 92.6 rubels (4 rubels equal \$1.00) in Moscow in 1950 while from Kuibyshev or Ufa it cost only 67-70 rubels, the difference being due only to transportation costs, since production costs in the old Baku area were much less than in the "Second Baku". In fact, the production of a ton of oil cost 16.6 rubels in Baku, 37.9 rubels in Kuibyshev and 24.1 rubels in the Ufa fields. However, it must be remembered that these price differences refer to 1950. The Soviet Union claims to have made sharp cost reductions since then and now calls production costs in Ufa "the lowest....in the U.S.S.R.". If true, this would further increase the importance of the Volga-Ural oil fields.

Quality-wise, the oil from the "Second Baku" contains considerably more sulphur (up to 4%) than the Caucasian oil and also has a high content of tar-like residues. This has created many new processing problems for Soviet refineries.

OTHER SOVIET OIL DEPOSITS

Outside of the Volga-Ural area, oil in East European Russia is also found in the far North in the Pechora-Ukhta area, near the Arctic Circle but the quantities are not very large. According to Dr. L. Smirnov, a former Soviet Geologist now in the United States, commercial oil production is also taking place in Franz Joseph Land, an island in the Arctic Ocean close to the North Pole, but there is no Soviet confirmation of this.

To the South of Ural-Volga region, just east of the hypothetical borderline between Europe and Asia is the Emba region. It is located in the western-most part of the Kazakh Republic. Its fields follow the Emba river to the Caspian Sea and there cluster around the Emba and Ural river estuaries. The oil found there is of a very high quality, similar to Pennsylvania oil. Total production at present is about 1.4 million tons annually. Most of the Emba oil is taken by pipeline to Orsk in the Southern Urals where it is processed.

Besides the Emba region and the east shore of the Caspian Sea (discussed in connection with the Baku fields), the only other major oil fields on Russia's Asian main land are in Central Asia. These fields are clustered around the Fergana Valley, near the Chinese border and the Amu Darya river, just across the border from Afghanistan. The total output of these fields was 1.38 million tons last year and is expected to rise to 2.43 million tons by 1960. However, the recent discovery of four new oil fields in the Fergana Valley (with one well reported to flow at a rate of 850 barrels daily), all from a lower geological formation than the existing deposits, is expected to result in an over-fulfillment of the 1960 target.

In the vast spaces between Central Asia and the Pacific Ocean - an area of nearly 3,000 miles in length and 1,600 miles in width -there is only one small recently discovered oil field. It is located at the upper Lena river, north of the Outer Mongolian Republic. However, oil search activities are currently going on in many parts of this area and some success has already been reported. In the Western Siberian lowlands, along the Ob river basin, an abundant concentration of natural gas has been discovered and there are reasons, according to a statement by the Soviet Minister of Geology and Mineral Deposits, "To assume that oil will be found there". Natural gas wells have also been located at Berezovo in the Tyumen province of west Siberia and geologists are optimistic about finding oil there too.

The next and last oil field in our eastward trip through Russia is located on the Island of Sakhalin in the Pacific. Its production is of very great regional significance. From its northern fields a pipeline goes to the main land where it connects with the Trans-Siberia railway at Khabarovsk near the Manchurian border. Another branch goes to Vladivostok. Most of Sakhalin's oil fields are located in the north around Okha which has belonged to Russia since 1905 but commercial deposits have also been discovered in the southern part of the island which was Japanese until 1945. Undoubtedly, this is one of the chief reasons for the Soviet Union's refusal to return Southern Sakhalin to Japan. According to the chief of the Far East Oil Union, "Great untapped resources have been revealed in Sakhalin", not only of oil but also of natural gas. This year, 1.1 billion cubic feet of natural gas will be produced on Sakhalin and about 1.3 million tons of oil.

SOVIET DRILLING METHODS

Russian officials ascribed their post-war success in oil drilling to a large extent to the method of turbine drilling which, so far, is not used anywhere outside the Soviet Bloc. According to the former minister for the oil industry, turbine drilling developed as follows in the last five years:

1951.....30% of all drilling

1952.....41% " " "

1954.....65% " " "

1955.....83% " " "

In the "Second Baku" area it is now virtually the only drilling method employed. The advantage of turbine drilling over rotary drilling has been discussed at great lengths by Western oil experts. Not all of them agree that the Soviet Union has necessarily a better all-around drilling system. However, the President of Dresser Industries, America's largest rotary drill manufacturer, stated after a three day visit to an oil field in the Central Urals, "Their turbo-drill is ten times as fast as our conventional rotary drill because the source of power is just above the bit instead of at the top of the well." Austrian oil experts who gained extensive experience with the turbo-drill during the ten years of Soviet management of the Austrian oil fields and who took twenty turbine drilling rigs over from the Russians have also called it "an undoubted improvement over Western drilling methods".

Some idea of the drilling speed in the Soviet Union can be had from a recent announcement that it now takes only from three to five months to drill a 6,600 - 8,200 foot well in the Stalingrad area where as only a few years ago it had taken years. Drilling speed per well is to reach 1,430 foot per month in most "Second Baku" areas under the new Five Year Plan. (According to the Soviet newspaper TRUD, an even more revolutionary type of drill is presently undergoing tests in one of the "Second Baku" fields. This drill has no bit. Instead, controlled blasts are set off by means of explosives at regular intervals at the bottom of the drill hole and the rocks and stones loosened thereby are flushed up through water pressure. TRUD says the experiments show this drill to be ten to fifteen as fast as any other.)

Besides the turbine drill, Russian oil production is also characterized by a very high degree of secondary recovery methods. Last year about 60% of all oil was produced by means of artificial pressure created by water flooding or air or gas injections, according to an official announcement. The reason given for the extensive use of such measures is that it permits large scale production without the need to pump the oil to the surface.

EFFICIENCY OF PRODUCTION

An over-all estimate of the real efficiency of Soviet oil production is difficult to form since only very few Western observers have had access to the Soviet fields. However, Soviet oil activities in Austria give at least some idea of the work-orientation of Soviet oil men. In a recent lecture, the administrator of the Austrian Oil Administration who has had ample opportunity to study Soviet methods, summed them up as follows:

"The difference between Eastern and Western methods can perhaps be characterized best by the never ending striving of the West for refinement and perfection of working tools and the greatest possible mechanization and automatization of the work processed. The East, on the other hand, looks more for robustness of machines and tools and de-emphasizes refinements since they usually introduce new complications in construction and design. Thus, job requirements in the East are more on the physical side than in the West and on developing a gift for improvisation (there is no doubt that Soviet technicians are better

improvisors than their Western colleagues) while in the West the emphasis is more on training to handle the machines and thereby to a better overall maintenance service. For instance, the Soviet motors or winches found in the oil fields are quite robust but when, after a relatively short time, they are in need of repair it does not pay to undertake it, while American or European machines of the same type are kept in running condition much longer. An illustration of this attitude are the seven Soviet drilling rigs put into production in Austria in 1948 which had to be scrapped by 1953 after only 44,000 drilling feet per rig. Similar types of West European equipment are still in good condition after ten years of continuous service.

"Nevertheless, it is absolutely wrong to say that Russia's working and managerial methods are of the "gypsy" type, as is sometimes charged. Their methods are different from ours. External aspects of production are often neglected by them. Roads and paths in the oil fields are in a pitiful state, the material is often obsolete and badly maintained. The blame for this must be found not in the personnel but in the Soviet system which is concerned only with fulfillment, or possibly over-fulfillment, of the prescribed plans and production targets. All attention and all financial resources are devoted to it, to the exclusion of all matters not immediately connected with it.....This insistence to keep to prescribed norms in time and costs means a pressure which does speed up production but leads to a neglect of details, care and thoroughness."

It would also appear that the Soviet oil industry is fully familiar with such recent advances in oil technology as the use of tracer atoms and radio-active isotopes. At a special conference on this subject in Moscow earlier this year, it was announced that "in the Soviet oil industry radio-active substances are used on a mass scale for the coring of wells and the study of the structure of rock in wells which have been sunk. Radio active isotopes and tracer atoms are being used at many oil fields in Bashkiria and Tartaria to determine the capacity of oil and gas bearing seams."

THE TRANSPORTATION OF SOVIET OIL

Information about the transportation and processing of Soviet oil is still somewhat scanty but several basic facts have recently become available in the West. We know that the Soviet Union's economic Plan for 1941 (based on the assumption of continued peace) foresaw the transportation of oil by the following means:

Railroads.....43.2%

Maritime.....29.1%

River.....14.4%

Pipelines.....13.3%

100.0

By 1950, pipelines still accounted for only about 15% of all oil transports. Between 1950 and 1955 the size of the pipeline network was increased by approximately 400% while oil production rose by only 87%. This was necessary to relieve the already overloaded and partly antiquated Soviet railroad system of some of its burden. It also reduced somewhat the disproportionate share of transportation in the cost structure of Soviet oil. At the beginning of 1956, major pipeline systems (see also map on page 33) existed

between Sakhalin and the Russian mainland, the Bashkirian oil center of Tuimazi and the refinery at Omsk, Siberia, (a distance of 800 miles), the Baku fields and the Black Sea port of Batumi, the Grozny and Maykopp fields and the industrial cities of Rostov, Stalino and Dnepropetrovsk in the Donets Basin. Grozny and Maykopp are also linked with the Black Sea port of Tuapse. The oil from the Emba region is piped to the refineries at Orsk in the south-eastern Urals while most of the Bashkirian oil fields have pipelines to Ufa. Altogether, almost 145,000 tons of crude oil and refined products are pumped everyday through the underground pipeline network of the U.S.S.R. The Sixth Five Year Plan (1955 - 1960) envisages an increase of 500% which would mean a rise from 8.6 to 51.5 billion ton-miles per year. This will necessitate the building of more than 9,000 miles of trunk-lines, according to a report by Prime Minister Bulganin. This will raise the share of pipeline transports in the total volume of petroleum transport by over 2.5 times within the next five years. Another planned feature is the automatization of pipeline transport. Over the next five years, 8,000 miles of pipeline are to be transferred to automatic control " and a dispatcher at the central panel at Ufa will be able to operate the flow of oil in these pipelines."

The emphasis on pipeline building is a reflection of the rapidly increasing share of oil carried by the railroads, as follows:

FREIGHT TURNOVER OF RAILROAD TRANSPORT
(billions of Revenue ton-miles)

	<u>1928</u>	<u>1940</u>	<u>1950</u>	<u>1954</u>	<u>1955</u>
Total Freight	57.9	257.3	373.4	531.2	602.0
Petroleum	3.9	22.6	32.2	52.4	63.0
Petroleum's share in total freight (in %)	6.7	8.8	8.6	9.9	10.5

On a straight tonage basis the railroad carried nearly 78 million tons of oil last year which was about 6% of their total freight haulage.

Among pipeline projects currently underway (see also map page 32) the most ambitious is the extension of the 750-mile Bashkiria-Omsk pipeline across Siberia to Irkutsk, a distance of nearly 1,100 miles. This will make the total length of the pipeline 2,000 miles. Its major purpose will be to relieve the Trans-Siberian railroad. The first section of the project, from Omsk to Novosibirsk, is nearly half finished. The Omsk-Irkutsk line will be extended to the Armur River in 1965 and eventually to the Pacific Coast which would make it 3,200 miles long, measured from Ufa. Its construction reflects the Government's plan to speed up the industrialization of Siberia. Omsk has been given the role of oil supply center for this entire region. For this reason two additional pipelines are planned from Ufa and Tuimazi, in the Bashkirian fields, to Omsk within the next five years.

Two main trunk lines are also under construction from Almetyevsk, near Kazan, the center of Tartarian oil industry to the industrial cities of Molotov in the Urals and Gorkiy on the Volga River. From Gorkiy it is planned to extend the pipeline to Moscow. A long-distance pipeline is planned from Kuibyshev in the "Second Baku" area to the Ukraine, an indication that Ukrainian local production is not expected to become regionally self-sufficient. Baku in the Caucasus will only get additional gathering pipelines to take care of its increasing off-shore production. However, the overall pipeline

system in South-West European Russia will not be expanded.

RUSSIA'S TANKER FLEET

The Soviet Union's tanker fleet operates in the Caspian Sea, the Black Sea, and also across the Pacific in order to supply its Eastern Siberian provinces. Statistics on the fleet are still very meager. In 1950 the Soviet Tanker Fleet was reported at only 21 units with a total weight of 150,000 dead-weight tons. Since then it has undoubtedly grown considerably. It accounts now for about 0.6% of the world's tanker fleet. Between 1953 and 1955 Soviet wharves reportedly built twenty tankers of the so-called "Leningrad"-class, i.e. diesel-engined ships with 10,000 tons dead-weight and a speed of 13.5 nautical miles per hour. It is not known how many tankers of other classes were built during this period. Soviet tanker construction over the next five years is set at 460,000 tons. This would be a 30% increase over tanker construction in the previous five years. Emphasis under the new program will be on ships with 20-25,000 dead-weight tons. This increase in the average size of vessels is in line with the world trend for larger tankers. It indicates the growing importance of maritime oil transport, as opposed land and river transport. The main reason for this change is the growing economic importance of Eastern Siberia which can no longer be supplied by the Trans-Siberian Railroad alone nor by the Sakhalin oil fields. In the 12-month period ending last June, about 570,000 tons of refined oil were shipped to Pacific Siberia by tanker from Russian and Rumanian Black Sea Ports (all via the Suez Canal), compared to only 250,000 tons in the preceding 12 months. In order to keep up with this rising demand, and perhaps also in anticipation of larger exports, the Soviet Union is considering the construction of several super tankers of the 42,000 dead-weight ton class.

An indication of the importance attached to tanker traffic is also shown by the Five Year Plan Directive that the utilization of oil tankers is to be increased by 25%. At present, Soviet tankers do an average of 98.1 dead-weight ton-miles per day.

REFINERIES

Soviet refinery construction has not quite kept pace with the increase in productive capacity. It is probably for that reason that so little information has become available on the subject. For one of the principles of Soviet statistical and economic information is still that the quantity of information published is directly proportional to how favorable it is. True, there is a continuous flood of public self-criticism and accusation which often uses statistics to show how this or that plant or branch of industry is lagging behind the rest. This criticism takes in part the place of private competition in non-communist countries where inefficiency is weeded out by economic rather than governmental pressure. The oil industry, for instance, was the subject of such criticism from the highest places and the biggest newspapers to such an extent in the last couple of years that one might easily have gotten the impression it was one of the country's most backward industries. Yet when the final results for the last Five Year Plan (1950 - 1955) were issued, it turned out to have been one of the industries which had actually over-fulfilled their target. Nevertheless, it would appear that full statistical information is available only on the more spectacular aspects of the industry's achievements.

The following unofficial and semi-official figures on Soviet Refinery through-put capacity are available:

SOVIET OIL-REFINERIES
(million tons)

<u>Year</u>	<u>Throughput capacity</u>	<u>Cracking capacity</u>	<u>Crude Oil Output</u>
1938	28.4	9.3	30.2
1940	31.3		31.1
1941	32.4	11.4	34.6
1949/50	36.3	13.5	37.9
1952	40.1	15.0	47.3
1953	47.0		52.8
1955	65.0	32.0	70.8
1960(Plan)	110.0	58.0	135.0

According to these figures, refinery capacity rose by some 133% between 1938 and 1955, about the same as crude oil output. During the Fifth Five Year Plan (1950-1955) refinery capacity and crude oil production also rose both by approximately the same percentage, namely 85%. However, under the current Five Year Plan (1955-1960), refinery capacity is to rise by only 69%, compared to almost 91% for crude oil output. Thus, by 1960, the Soviet Union is scheduled to produce 25 million tons more crude oil than it will be able to refine, according to the above figures. This surplus is likely to be divided between exports, storage and consumption in crude form. However, some of the lag between the increase in crude oil production and refinery construction will be taken up by better utilization of refining capacity. The new Five Year Plan target calls therefore for a doubling of refinery output, though new capacity is to increase by only 69% (see table, page 13), with the new plants designed for a higher yield of light products than the existing ones.

The present unsatisfactory state of refinery utilization is borne out by an editorial in Pravda of July 1956 which complains that "over 2 million tons of oil and petroleum products are lost at refineries for so-called technological reasons. It is true that half of these products are returned for second refining but labor and fuel are again used on them. It does not become the Soviet people to have such a negligent attitude towards national property". The editorial also states that while the oil industry as a whole fulfilled its target in the first six months of 1956, the plan for building oil enterprises and refineries was unfulfilled. "The lag in building may seriously affect further work of the oil industry". Another article complains that the number of new refineries, and especially cracking plants, which had gone on stream by the end of 1955 was far below the scheduled target. Nevertheless, cracking capacity of Soviet refineries has consistently increased at a considerably faster rate than refinery through-put and will continue to do so under the current Five Year Plan. Between 1938 and 1952 cracking plant capacity was equal to 30-35% of crude oil output. By 1955 however, the ratio had risen to about 45% and will apparently be maintained at this level.

This emphasis on cracking plant capacity reflects the facts that most Soviet oils yield only five to ten per cent gasoline by standard methods of distillation and that octane rating of Soviet gasoline is still extremely low (the average rating is now 66, according to oil industry Minister Yevseyenko). The poor quality of Soviet motor fuel represents not only a serious obstacle to its more efficient utilization but, reportedly, also shortens the useful life of Soviet vehicles.

LOCATION OF SOVIET REFINERIES

The location of Soviet refineries is currently undergoing an interesting shift. In 1955 the country had a total of seventy refineries. Only a small part of them was located in the Asian part of Russia. Since then, the big refinery at Omsk, Western Siberia, has been completed while plants at Krasnoyarsk, Central Siberia, and the Amur Oblast, Pacific Siberia, are foreseen. Altogether, by 1960 the capacity of Siberian oil refineries is to exceed "considerably" that of the Baku enterprises (reported at 375,000 barrels daily in 1951).

Other oil plants outside of European Russia are planned in Uzbek (Fergana Valley) and Kazakhstan, both in Central Asia. In the European part of the USSR only three new oil plants are scheduled, two in Byelo Russia and one in the Ukraine.

This shift of oil processing from Western to Eastern Russia is also part of the government's overall plan to create a new industrial center in the Eastern part of the country.

This is stated clearly in the official Directives of the Sixth Five Year Plan:

"To insure in the areas of Western and Eastern Siberia and in the Kazakh republic a higher pace of capital construction than for that of the whole of the U.S.S.R. To set up in those areas a number of heavy industry enterprises, particularly those consuming electricity and fuel; to envisage a wide-scale construction of oil processing enterprises, as well as bringing into use large bases of raw material..."

"To limit the further construction of fuel-consuming and electricity-consuming industrial enterprises in the areas of the European part of U.S.S.R. ...in order to eliminate the lagging of the fuel industry of the European part of the U.S.S.R. behind the growing fuel requirements of that area...."

The directive emphasises the existing fuel shortage in European Russia which seems to be one of the main reason for establishing new industries in the East. The transfer of the Soviet Union's crude oil center from the Caucasus to the Ural-Volga region, about 1,000 miles to the North-East, has also played a significant part in this gigantic eastward shift. Even more important is the vast coal and hydro-electricity potential of the Eastern areas. The vast expanses of Siberia are also rich in many other natural resources, according to Soviet reports, which have yet to be fully exploited. In the words of the Soviet economist Prof. V. P. Vatyukhin: "It is impossible to solve successfully the fundamental economic task of the U.S.S.R. without the harnessing of the immense natural resources of the Eastern areas of the country.....Almost one half of all the capital investments in the new Five Year Plan on new construction will be directed to the Eastern areas of the country, particularly Siberia and Kazakhstan.....With the overall growth of industrial production throughout the country by 65% in the Sixth Five Year Plan, industrial production in Siberia and Kazakhstan will increase by 2.2 times".

Ofcourse, natural resources and capital equipment alone are not enough to build these new industries. Labor and agricultural production to feed the labor force are also necessary. The admitted manpower shortage in the Eastern areas has yet to be overcome. The agricultural situation at present is also very tight. Nevertheless, a totally planned authoritarian economy need not consider the individual desires of its workers too much and since it has the coercive means to enforce its plans it can count on a 'mobility' of labor, unknown in democratic countries. Thus, the industrialization of Asiatic Russia will continue and the area will consume a rapidly increasing share of Soviet oil. This, in turn, will mean more pipelines, more refineries and more tankers to carry the oil from the Black Sea to the Pacific. Since most of Siberia is a sedimentary basin, it will also mean increased efforts at finding local oil sources.

OIL CONSUMPTION IN THE SOVIET UNION

Regarding the consumption of oil in Soviet Russia, virtually nothing is known. No reliable post-war figures on the subject have appeared anywhere. In the absence of such information it may be assumed that the bulk of Soviet domestic oil consumption is very roughly equivalent to domestic production. But, again, we have no full information on the subject since the U.S.S.R. furnishes no comprehensive figures on its oil trade with other countries. However, for reason explained in our section on foreign trade, we can assume that Russia's oil imports for domestic consumption are not significant while the size of her net exports (exclusive of re-exports of Rumanian and Austrian oil) is largely determined by domestic needs as well as by governmental decisions of a non-economic nature. Thus, for all practical purposes, we may equate the country's available oil supply with its domestic production.

On a per capita basis this would mean the following annual consumption figures:

	<u>1950</u>	<u>1955</u>	<u>1960 (Plan)</u>
U.S.S.R.	0.206 tons	0.359 tons	0.630 tons
France	0.247 "	0.414 "	
Germany	0.074 "	0.215 "	
U.K.	0.320 "	0.534 "	
OEEC Area	0.208 "	0.366 "	
U.S.	2.140 "	2.650 "	

According to this computation, available oil consumption in the U.S.S.R. is about equal to that in the 16-nation OEEC area, on a per capita basis. It also appears that the rate of growth of the oil:population ratio was about the same in the two areas over the last five years. Since Europe is, next to the U.S., the most industrialized area of the world, the above figures are significant as an indication of the Soviet Union's industrial potential.

Of course, oil figures alone do not tell the whole story. We must also determine the share of oil in the country's total available energy. For in many countries a high oil consumption is merely a reflection of a low rate of consumption of other fuels. According to Soviet statistics, the various basic fuels shared as follows in the country's total minerals fuel production.

PRODUCTION OF MINERAL FUELS IN THE U.S.S.R.
(in percentages)

<u>Year</u>	<u>Coal</u>	<u>Oil</u>	<u>Nat. Gas</u>	<u>Peat</u>	<u>Shale</u>
1913	65.3	32.8	- -	1.9	--
1928	62.3	34.4	0.8	2.5	--
1932	59.7	32.2	1.3	6.7	0.1
1937	67.1	25.0	1.6	6.2	0.1
1940	70.1	21.7	1.9	6.0	0.3
1950	73.1	18.5	2.8	5.0	0.6
1955	70.0	22.1	3.0	4.3	0.6
1960(Plan)	63.4	25.3	7.1	3.8	0.4

These figures show a continuous decline of the share of oil between 1928 and 1950. After that the new oil fields of the "Second Baku" made it possible to increase oil production more rapidly than total mineral fuels production. This trend is expected to continue throughout the current Five Year Plan.

In order to compare the overall pattern of energy production with that of Western countries, we must add water power to the mineral fuels listed above. This gives us the following picture:

TOTAL ENERGY PRODUCTION IN THE U.S.S.R.
(in million tons of hard-coal equivalent)

	<u>1950</u>	<u>%</u>	<u>1955</u>	<u>%</u>	<u>1960(Plan)</u>	<u>%</u>
Hard Coal	185.2	63.3	276.1	60.2	415.1	53.8
Lignite	25.1	8.6	37.9	8.3	58.7	7.6
Peat	14.4	4.9	20.4	4.5	28.6	3.7
Oil	53.1	18.2	99.1	21.6	188.6	24.5
Nat.Gas	8.2	2.8	13.8	3.0	53.2	6.9
Shale	1.5	0.5	2.0	0.4	3.3	0.4
Water Power	<u>5.1</u>	<u>1.7</u>	<u>9.2</u>	<u>2.0</u>	<u>23.6</u>	<u>3.1</u>
Total	292.6	100.0	458.5	100.0	771.3	100.0

This Table shows the same trend of a rising share in oil and gas output and a declining share in the output of all solid fuels. This reversal of the contribution of oil from a declining to a rising share in the total fuel supply is considered very important by Soviet economic planners: N.A. Baibakov, formerly Soviet Oil Minister and now Chairman of the State Planning Commission, emphasized last year in a speech the need to improve the "balance" of the Soviet Union's energy supply "through numerous change-overs from solid to liquid fuels". At the 20th Party Congress last February the subject was broached by Premier Bulganin who criticized the low share of oil and gas in the Soviet Union's fuel balance pointing out that "gas and oil are the cheapest and most efficient of all fuels. The costs of extraction of natural gas, for instance, are 1/8th that of the extraction of coal". According to all indications, the reason why solid fuels production is growing at a slower rate is not due to any actual or potential shortage of this resource but rather to the greater emphasis put on gas and oil because of its greater efficiency, and also to the fact that the transportation of these two fuels will not put additional burdens on the railroads. Nevertheless, solid fuels production is not really being de-emphasized since it is scheduled to reach a record total of 503 million tons of bituminous coal-equivalent by 1960. This is still slightly less than the 535 million tons that will be produced by the OEEC countries in that year but the increase over 1955 will be 50% for the USSR against only 5% for the Western European bloc.

In the field of atomic energy, Russia, like all nations, is still in the experimental field. Between 1955 and 1960 she will build a total of 10 atomic power reactors with a total capacity of 2 - 2.5 million kilowatts. This is slightly more than Europe will have by then. However, the main purpose of these first reactors -- each of which is of a different type -- is not to create power but to serve as pilot models. After 1960 the Soviet Union plans to begin a program of producing atomic energy on a large scale, as an additional fuel supply source.

Since we are assuming that the USSR's fuel production is approximately equivalent to domestic consumption, a comparison with the fuel consumption of other countries is permissible:

INDICATED ENERGY CONSUMPTION - 1955
(in million tons of hard-coal equivalent)

	U.S.S.R.		O.E.E.C.		United States	
	Million Tons	%	Million Tons	%	Million Tons	%
Coal	276.1	60.2	511.0	69.5	369.7	28.0
Lignite, Peat	58.3	12.7	31.0	4.2	20.2	1.5
Oil	99.1	21.6	130.0	17.7	583.5	44.1
Nat. Gas	13.8	3.0	6.5	0.9	299.0	22.6
Shale	2.0	0.4	--	--	--	--
Water Power	9.2	2.0	57.0	7.7	49.8	3.8
Total	458.5	100.0	735.5	100.0	1,322.2	100.0

The Soviet Union's production of solid fuels, petroliferous fuels and water power is in each case still lower than the respective output in Western Europe or in the U.S. However, on a per capita basis, the difference, particularly between the USSR and the OEEC area, is much less pronounced:

USSR	2.30 tons hard-coal equivalent
OEEC	2.58 " " " "
Latin America	0.75 " " " "
United States	8.00 " " " "
World	1.28 " " " "

Thus, on a per capita basis, the Soviet Union's available fuel supply is nearly equal to that of non-Communist Europe. This makes it quite clear that the Soviet Union does not have an energy shortage. The standard of living of its population is considerably lower than that of Western Europeans which suggests a lower consumption of fuel in the household and transportation sectors. It can therefore be assumed that the USSR has an ample energy supply to carry out its development plans in industry and agriculture. In the course of the Sixth Five Year Plan this energy supply is scheduled to grow even more. Between 1955 and 1960, it will increase by 68%, to a total of 773 million tons of hard-coal equivalent. This will give the USSR a per capita consumption of about 3.6 tons in 1960. Since energy consumption in the OEEC area is expected to grow by no more than 18% during the same period (to a total of 860 million tons), the Soviet Union's per capita fuel supply will probably surpass the aggregate figure for non-Communist Europe within the next 2-4 years.

Of course, this projection is entirely dependent upon fulfillment of the official production targets set for the various fuel sources over the next 5 years. At present, there is a slight possibility that in the coal sector this may not be the case. On the other hand, the natural gas sector has made such progress since its target was fixed that Oil Minister Yevseyenko has now announced a 15% upward revision. It can therefore be assumed that, on the whole, the Soviet energy sector will meet its set targets for 1960.

However, despite this achievement, the Soviet Union's avowed major economic task for the Sixth Five Year Plan "to overtake and surpass the most developed

capitalist countries as regards per capita production" will not have been accomplished by 1960, at least as far as the energy sector is concerned. Not only the U.S., but also Britain, Germany, Norway, Sweden and Belgium had already in 1955 a higher per capita output than Russia will have in 1960. But most of the other European countries have already fallen, or will soon fall, behind the Soviet Union in per capita energy production.

This does not mean that temporary regional fuel shortages can no longer occur in the USSR. On the contrary, the forced speed of economic development is most likely to cause occasional bottlenecks of this sort. The European part of Russia is particularly subject to this since it is a heavily industrialized and populated area whose rapidly growing fuel requirements are falling more and more behind its own oil, coal and gas resources. It must therefore depend increasingly on outside fuel shipments. As has been mentioned before, the long-range solution to this recognized problem is "to limit the further construction of fuel-consuming and electricity-consuming industrial enterprises in the European part of the USSR". Meanwhile, however, this important area will continue to experience occasional fuel shortages. In fact, such a shortage existed earlier this year. Its immediate cause could be traced largely to the unusually long and cold winter of 1955/56 which caused the area's fuel needs to soar up and oil and coal stocks to diminish. At the same time the regionally very important Donbas coal mines failed to fulfill their production target for the first half of 1956. The combination of these factors resulted in a serious fuel bottleneck which by last July was still causing "many industrial establishments and the railwaysin the European part of the USSR.....to operate below capacity.....owing to a shortage of coal", according to an official announcement. A Pravda editorial subsequently urged the oil industry to over-fulfill its target in 1956 in order to compensate for the coal shortages and to permit the creation of adequate stocks before next winter. (Pravda claims crude oil production could have been over-fulfilled by 170,000 tons and refinery output by 400,000 tons in the first half of 1956 if all enterprises had worked at capacity).

Eventually, European Russia's precarious fuel balance will improve since the region's fuel demand will increase from now on at a lower rate than the rest of the country, and since an extensive oil and gas pipeline network from the "Second Baku" is now being built into the area. In the short-run future however, it will probably continue to plague Soviet officials. But this would not be evidence of a nationwide fuel shortage.

OIL CONSUMPTION BY SECTORS

As we stated previously, no reliable Soviet oil consumption figures exist at present. However, on the assumption that the bulk of Soviet oil is now consumed domestically, we can look at the planned increases in some oil-using sectors of the economy under the new Five Year Plan (1955-1960) for an approximate idea of whether the scheduled 91% increase in oil output will suffice to meet them.

The overall growth in industrial production is scheduled to rise by only 65%, a good deal less than the envisaged oil increase. Production of oil-consuming equipment is slated for the following rise:

	1955 (Units)	1960 (Units)	Increase over 1955 (in percentages)
Automobiles	445,200	650,000	46
Tractors	163,450	322,000	97
Diesel Locomotives	136	1,630	1100
Motorcycles	244,000	395,000	62

Most of the automotive units listed above are not slated for as large an increase as oil production. Furthermore, their output will not be significant even when the above targets have been met. The U.S. whose total oil consumption last year was not quite six times that of the USSR, produced 18 times as many cars and the OEEC countries, whose collective oil consumption was only 25% higher than that of the USSR, exceeded the latter's car production by over 600%. This means that the car:oil ratio in the Soviet Union will still be extremely low, by Western standards, by 1960 and gasoline consumption by motor vehicles will still account for a very much smaller percentage of total oil consumption than it does in the Western world. The situation is somewhat similar regarding tractor production. Soviet output last year was only about 1/3 of the tractor output in the OEEC countries and even by 1960 it will still not have reached last year's OEEC output. Since tractors are the major source of oil consumption in agriculture, the USSR's agricultural sector must account for a considerably smaller share of oil consumption than Western Europe's agricultural sector which uses about 4% of total consumption. On the basis of official figures it seems very unlikely that the total increase in tractor delivery to agriculture over the next 5 years will be more than the 91% increase scheduled for crude oil output.

Nevertheless, the agricultural sector's share of oil consumption is certain to rise over the next five years by more than that percentage because of the planned higher per unit utilization of tractors and other oil-using farm machinery. According to the Five Year Plan directive, the daily output per tractor and per grain combine in agricultural is to rise by 25 to 30% which would also mean a correspondingly higher diesel or kerosene consumption per unit. Superimposed on the higher number of tractors in use, this would give the agricultural sector in 1960 an increase in oil consumption of 100 to 150% over 1955.

If the agricultural sector increases its share of total Soviet oil consumption, some other sectors must drop theirs by a corresponding amount. In the industrial sector this is most unlikely to happen. Though overall industrial output goes up by only 65%, the sub-sector of heavy industry, traditionally a much bigger fuel consumer than light industry, is to rise by 70%. This is still less than the scheduled oil output increase but a shift from solid to liquid fuels is indicated (1) by the fact that output of the former will increase by only 50% and (2) by the above mentioned official announcements regarding greater emphasis on hydrocarbons.

The transportation sector is also more likely to increase its share of total oil consumption. This is due both to the scheduled productivity increases and to the shifting from steam to diesel locomotives. The following directives apply to productivity (utilization) increases under the Five Year Plan in the field of transportation:

Railroads - 25% increase in average gross weight, to 2,200 tons per freight train

River transport - 30-36% increase in tugboat and cargo boat productivity.

Ocean shipping - 25% productivity increases for tankers; 34% for dry cargo ships.

Automobile transports - increase in road haulage freight by 430%; increase in transport of passengers by car by almost 3 times and by bus by 3.5 times; increase in productivity of trucks by about 36%.

At least in the case of automobile transport, the above productivity rises seem questionable. How can road freight haulage rise by 430% if total truck manufacture is to rise by only 32% and productivity per truck by 36%? For the same reason, a 300% increase in automobile passenger traffic seems also rather unlikely. Still, the Soviet Union will not only have more vehicles by 1960 than it has now but each vehicle will also be more utilized and therefore consume more fuel.

As far as the railroad sub-sector is concerned, the production of steam engines has been stopped and the large-scale dieselization of the railroad system has begun. In the next 5 years, 2,250 main line diesel engines plus a number of diesel shunting locomotives are to be delivered to the railroads. On the basis of available locomotive production figures, this must be at least 4 times the number delivered during the past five years. In addition to this significant switch from steam to diesel, railroad oil consumption will also be affected by the building of 6,500 kilometers of new railway track, which is twice as much as was built in the 1950-55 period. There is little doubt therefore that in the Soviet transportation sector, oil consumption will grow by a larger percentage than the scheduled growth in oil production.

In the personal consumption sector, on the other hand, it is more likely to grow at a lesser rate. Real wages are to rise by 30%, collective farmers' income by 40%, state social security payments by 40% and retail turnover by 50%. All of these are only about half the increase slated for oil output. Residential housing is the only item in this category scheduled to increase by about 90%. But increased residential building in the Soviet Union does not mean a correspondingly higher oil consumption. On the contrary, the bulk of older rural housing units is still lit and heated by kerosene. New dwellings, however, are being furnished with natural gas and/or electric power in line with the progress in rural electrification and natural gas utilization (the latter is slated to supply 2.5 times as many flats by 1960 as in 1955).

Finally, we must look at the military sector. For in a country such as the Soviet Union whose mechanization of transport and agriculture is still far behind that of non-Communist Europe, the maintenance of a modern, well-equipped armed force, larger than all European defense forces together, is bound to absorb a very large share of the available oil supply. We have, of course, no official way of knowing how big this share is, nor whether it is growing or declining. But, we do know that the Soviet Union has recently announced several large cut-backs in military manpower. There is no confirmation that these cut-backs actually took place but well informed observers seem to agree that they appear entirely logical in view of (1) Soviet disbelief in a major war in the foreseeable future; (2) a partial switch from the concept of "man"-power to atomic power in strategic planning and (3) a growing labor shortage in industry and agriculture which could well endanger the Five Year Plan target both in civilian and military production unless additional manpower becomes available.

It is therefore quite possible that some part of the large military oil consumption is now being shifted to other sectors of the economy, always bearing in mind that these

other sectors -- particularly, capital goods production and transportation -- are also contributing to the military strength of the country.

Summarizing, we may say that in relation to the 91% scheduled increase in Soviet oil supply, oil consumption will grow as follows over the next 5 years:

In the industrial sector (a heavy oil consumer) by a higher percentage.

In the transportation sector (a heavy oil consumer from now on) by a considerably higher percentage.

In the agricultural sector (a relatively small oil consumer) by a slightly higher percentage.

In the military sector (a very heavy oil consumer) by a somewhat lesser percentage of undeterminable proportions.

In the household sector (a small oil consumer) by a somewhat lesser percentage.

The net effect of all these factors on Soviet oil supply can of course not be established in the absence of any figures. However, we can approximately determine the effect of the new Five Year Plan on the total fuel balance by taking the recognized close correlation between changes in industrial output and changes in fuel consumption in most national economies as a basis. In the period 1950-55, Soviet industrial production rose by 85% while available primary energy supplies increased by only 57%. Thus, for each percent of increase in industrial output a corresponding 0.65% increase in fuel supplies was needed. It is interesting to note that this ratio is very close to that for Western Europe for the 1948-1955 period. Under the new Five Year Plan, industrial production is scheduled to rise by 65% (with the emphasis again on heavy industry) and primary fuel supplies will rise by 68%. Assuming a slightly higher degree of switching from non-commercial (vegetal, animate) fuel sources, which are not statistically recorded, to commercial fuel sources, as a result of the latter's spreading to lesser developed regions, a 0.7 to 0.8 ratio of industrial expansion to energy expansion would appear reasonable over the next 5 years. This would also be approximately in line with the current world-wide ratio. On this basis, the 65% planned increase in industrial production could be fueled by a 46% rise in available energy. The planned 68% energy increase -- if achieved -- should therefore either lead to an exportable or storable energy surplus or to an overfullfillment of the production targets. However, this prognosis is valid only as far as the total energy supply is concerned. Oil alone may well experience a different trend because of the previously discussed switch from coal to oil in several sectors of the economy. A similar kind of switch is also currently on the way in Western Europe and the U.S. But, whereas in Europe it is based mainly on the lower domestic availability of coal, in the Soviet Union, the major motivation is the higher fuel efficiency of oil, its much lower labor input per unit of calorie and the possibility of transporting oil without further burdening the existing traffic system. Oil consumption is therefore bound to increase by a significantly higher percentage than the total fuel consumption over the next 5 years.

SOVIET OIL IMPORTS

The fact that a large part of this increase in Soviet oil consumption will be due to shifts from other fuel sources is important in evaluating the country's potential foreign trade in oil. On the import side it means that a shortage requiring substantial

amounts of crude oil imports is extremely unlikely to occur in the foreseeable future, since any temporary gap between domestic oil demand and supply would only affect the speed of substitution but not the overall energy supply. This means the Soviet Union is under no economic pressure to look for additional crude oil sources beyond its borders. Its intentions in the Middle East, however, inimical to the West, are therefore not dictated by any peace-time need or desire for Middle East oil. (However, the Soviet Union is trying for political reasons to cut the West off from this oil supply source by fomenting anti-Western feeling throughout the area). The lack of tankers to transport more than a small percentage of Middle East oil and the total absence of excess refinery capacity make it even clearer that the Soviet Union is not in a position to become an important consumer of Middle East oil.

Oil from other non-Communist sources is also of only limited importance to the Soviet Union. It is true, she is receiving 1.2 million tons annually from Austria for the next 6 years (and 1 million tons for the following 4 years) under the State Treaty of 1955 which ended that country's military occupation. However the great bulk of this oil never really enters the Soviet Union but is sold by her to her East European satellites. This was also true for the period 1947-1955 when the East Austrian oil fields were under exclusive Soviet administration. According to recent Austrian computations, the Soviet Union took a total of over 7 million tons of crude oil and products out of Austria during this period. This was equivalent to about half of Austria's total crude oil output. Most of the oil was sold to East Germany, Poland, Hungary and Czechoslovakia. In 1954, the Soviet Union charged these countries the equivalent of \$21.- per ton for this oil. According to Austrian statistics this represented a net profit of \$8.40 per ton to the Soviet Union. Austria received no compensation for these oil exports. The signing of the Austrian State Treaty did not bring this type of transaction to an end since Russia is now re-selling -- again at a profit -- most of the oil it received under the Treaty to the satellite countries.

The only oil imports of any consequence actually going into Russia do not come from the West but from Rumania. The present quantity of these imports is not known. For the period 1948-1952, they were estimated as follows by a former Rumanian oil executive now in the U.S.:

1948 -----	2,080 million tons
1949 -----	2,503 " "
1950 -----	2,209 " "
1951 -----	3,029 " "
1952 -----	4,188 " "

In 1952 these shipments represented nearly 90% of Rumania's total exports and about 2/3 of her total production of 6.4 million tons of oil. For the Soviet Union they were equivalent to nearly 9% of domestic production and thus represented a sizable addition to available supplies. All of the imports consisted of refined products. Since 1952, the Soviet Union has relinquished her holdings in Sovrompetrol, the Rumanian State Oil Agency, in return for unstated quantities of oil shipments, in lieu of other payment. A products pipeline between the Rumanian oil fields at Ploesti and the Soviet Black Sea port of Odessa has been completed some time ago. This line serves not only Odessa itself and its large bunkering trade but also supplies a substantial part of Russia's oil exports to the West, much of which originates from Odessa. Other Rumanian oil exports, again all products, are going by tanker to the Far Eastern Provinces of the USSR

The quantity of these shipments is known since they must all go through the Suez Canal which up to its recent nationalization issued periodic statistics on oil transit. Over the past 2 years, Rumanian oil shipments to Siberia have increased at an extremely rapid rate while tanker deliveries of Soviet domestic oil to the Far East have slightly declined:

TANKER SHIPMENTS FROM THE BLACK SEA TO RUSSIA'S PACIFIC COAST
(in tons)

<u>Period</u>	<u>From Rumania</u>	<u>From USSR</u>	<u>Total</u>
July-Dec. 1954	17,125	60,046	77,170
Jan.-June 1955	28,372	148,644	177,016
July-Dec. 1955	60,996	133,176	194,172
Jan.-June 1956	247,543	125,934	373,486

These figures show clearly that the oil demand in that part of the Soviet Union is being met to an increasing degree by Rumanian imports. We do not know whether this trend will continue but it is interesting to point out in this connection that the Far East is the only area in the Soviet Union which would gain from a switch to a non-Communist oil supply source. The present tanker route from the Black Sea is over 7,500 miles long and therefore far more expensive than shipments from the much closer Persian Gulf or, even better, Indonesia would be. In general, the Soviet Union's disinclination to rely for any substantial share of its needs on non-Communist sources would outweigh such economic advantages. But in this case, the necessity to use the Suez Canal puts the oil supply of this area under foreign control and/or scrutiny anyway so that switching to supply sources East of Suez would not change this picture. It would, however, avoid reliance on the Canal which might be preferable to the Soviet Union in view of present circumstances. To be sure, there is no present indication that the USSR intends to switch to a foreign source for the supply of its Far Eastern territories but such a step would seem entirely logical and quite feasible. Quantity-wise, it would amount to a mere fraction of the Middle East's total oil output but for Indonesia it would represent 8-10% of total oil production.

SOVIET OIL EXPORTS

In the Soviet Union's oil exports we must differentiate between shipments to the Communist countries and to the non-Communist countries. Regarding the former we have only general information while on the latter we frequently have also actual figures. Quantitatively, Soviet oil shipments to other Communist countries are probably not significant. In the first place, the bulk of them are transfer shipments of Austrian oil. As we pointed out before, Austrian oil consignments for the USSR, under the State Treaty of 1955, are mostly sold to Austria's Communist neighbors. Thus, they are Soviet oil exports in name but do not involve the physical transfer of Russian oil. In the second place, under the East European Regional Economic Cooperation Plan (Molotov Plan), Rumania has been assigned the main task of supplying oil to European Communist countries. Communist China also seems to draw whatever small quantities of oil supplies it imports, from Rumania rather than Russia. In the period June 1955-1956, not a single Russian tanker went to China while Rumania sent nearly 100,000 tons of oil there. Of course, China may get some oil supplies from Russia by Trans-Siberian railroad but they are unlikely to be of quantitative significance.

Soviet oil exports to the non-Communist world (see Table, page 29) are fairly well known, although neither the Soviet Union's oil export trust NEFTEXPORT nor the respective organizations in the other Communist countries have ever issued comprehensive quantity figures. In examining USSR export figures it must be borne in mind that the Soviet Union collaborates very closely with Rumania in the matter of oil exports and that often a drop in imports from the USSR means merely a shift to purchases from Rumania. Of course, this does not mean that the two countries compete against each other in the world oil market. On the contrary, the noticeable switch from Russian to Rumanian oil exports which has taken place in the last year (see Table, page 29) was probably made at the Soviet Union's request, simply to avoid trans-shipment of Rumanian oil to Russia since a good part of Russia's oil exports -- as we have seen -- consist only of re-exports of Rumanian oil piped to Odessa. Oil exports to the West from the other Communist countries are all very small. Hungary is the only one actually exporting natural oil products but the recent appearance of salt water in the wells of one of her major oil fields (Nagylengyl) has now caused her to undertake a sharp downward revision of her oil export program. The other countries in Eastern Europe export only synthetic oil products, made mainly from brown coal.

Historically, post-war Soviet oil exports to the Free World are only of very recent origin, as the figures below show:

1952	850,000 tons
1953	1,800,000 "
1954	3,450,000 "
1955	5,250,000 "

The quantities, even in 1955 are quite small in comparison with the total oil needs of the Free World -- about 1-3/4% of the oil consumption of the Free World, outside the United States. Therefore, they play no significant role in the oil supply of the West, in general. For all of non-Communist Europe (incl. Yugoslavia) which absorbs the bulk of the Communist bloc's oil shipments, they amounted in 1955 to only 3.5% of total oil imports from outside areas, compared to 3.1% in 1954.

However, while the total impact of these shipments on the West is very slight, they are extremely important to some countries (for full details see Table, page 29). Usually, the reasons why such countries have switched their oil imports to the East are both economic and political. For Finland, which gets virtually all of its oil from the Soviet bloc, the main reason is that Eastern Europe has become her main customer; Finland must therefore purchase as much as possible from that area to avoid accumulating useless trade surpluses with Communist countries. Iceland has also switched completely to the Soviet bloc for its oil needs. Here the reason is not only economic but also in retaliation against British restrictions on Icelandic fish imports. Yugoslavia purchased Western oil mainly because the Soviet bloc refused to deal with her after Marshal Tito broke with Stalin. This situation has now changed and Yugoslavia is again turning to the East for many of her import needs. Sweden, which now imports almost 15% of her large oil needs from the Soviet bloc, does so strictly for commercial and foreign exchange reasons.

Outside Europe, Soviet bloc oil imports are important in two Middle East countries: Egypt and Israel. In Egypt, Soviet oil imports are part of the general trend of the economy to reduce its ties with the West and expand its barter trade with the Soviet bloc. Most of the Soviet oil going to Egypt is not paid for in foreign currency but

is bartered against cotton. Israel has been forced to turn to the Soviet bloc because of the oil boycott by its Arab neighbors and the denial of access to the Suez Canal. Oil is being shipped into Israel from Venezuela and from Iran, around the Cape of Good Hope, but the transport costs make these imports far more expensive than those from nearby Soviet Black Sea ports. Finally, in Afghanistan, oil is being piped across from the Soviet wells in Central Asia, just opposite the Afghan border. Here too, politics play a part since the Russian pipeline frees Afghanistan from dependence on Pakistan which has been known to cut off the supply route through the Kyber Pass whenever the existing territorial dispute between the two countries flared up.

Price-wise, Soviet bloc oil is reported to be generally slightly cheaper than Western oil in those countries where it must compete against the West. Russian crude oil varies between \$17.20 and \$20.80 per ton but these figures have only limited meaning since no information is available on qualitative differences. Fuel oil is the most prevalent type of product exported by the Soviet bloc though some lighter fractions are also included. All of the crude oil exports are of USSR origin, accounting for about 1/3 of Russia's total oil exports to the non-Communist world. This bears out further our assumption that the USSR has at present a domestic crude oil surplus, due to the inability of refinery capacity to keep step with the expanding crude oil production. In Rumania, on the other hand, all crude oil is domestically refined, regardless of its final destination.

As to the future trend of Soviet bloc oil exports, it may be expected to continue its upward climb although at a less sharp rate than up to now. Here are some indications of increased Soviet oil exports in 1956 and 1957:

1. Germany, which last year contracted for about \$1.5 million of Rumanian oil has allocated this year \$9 million for this purpose, with the bulk consisting of fuel oil (however, not all of it may be shipped in 1956).
2. Italy has recently signed a new trade agreement with the USSR, calling for a 25% increase in oil deliveries over 1955. Italy is also negotiating with the USSR for a barter agreement of 5 tankers of 18,000 dead-weight tons and 5 tankers of 5,000 dead-weight tons against 1.5 million tons of crude oil and 500,000 tons of fuel oil.
3. Yugoslavia is scheduled to get 300,000 to 400,000 tons of oil this year which would be a spectacular increase over 1955 and reduce Western shipments to 35%, or less, of total oil imports, compared to 60% last year.
4. In Egypt the switch to the Soviet bloc is gathering momentum each month. In the first half of 1956, 362,000 tons of oil were received from Russia and Rumania, or nearly twice as much as during all of last year. The blocking of Egypt's sterling and dollar balance abroad, as a consequence of the Suez Canal seizure, will undoubtedly cause her to rely to an even larger extent on Eastern imports from now on.
5. Denmark which received last year only an insignificant amount of Soviet bloc oil has recently concluded a trade agreement for the period March 1956-March 1958 under which it will receive 150,000 tons of oil in the first year and 250,000 tons in the second, or between 5 and 8% of her total oil imports.
6. Sweden which imported about 900,000 tons of oil from the Soviet bloc last year will purchase at least 1 million tons this year.

7. Norway has concluded a new trade agreement with Rumania for the period May 1956-June 1957 under which it will receive nearly \$2 million worth of oil products, about three times as much as it got last year from both Russia and Rumania.
8. Turkey which imported no Soviet bloc oil last year, has reportedly just signed an agreement with Rumania for unspecified quantities of oil imports to fill the gap created by the refusal of Western oil companies to extend Turkey new credits until a settlement on overdue payments for past shipments is reached.
9. Pakistan has concluded in June 1956 a 1-year trade agreement with the Soviet Union under which it will receive, among other things, Soviet gasoline and other oil products. In the past, Pakistan's oil imports came entirely from Western sources.
10. Israel has recently signed a new 2-year agreement with the Soviet Union under which it will receive \$20 million worth of oil, equivalent to about 25% of her total oil needs.
11. Lebanon and Syria both signed trade agreements with Rumania in January 1956 under which they will (both for the first time) receive Soviet bloc oil products.
12. Yemen is to receive oil from the USSR under an agreement signed in March 1956.
13. The Soviet government has offered to sell substantial quantities of Baku oil to Japan. Japan rejected the offer because the long haul would have made it too expensive but has expressed interest in purchasing Soviet oil from the Sakhalin Island fields.

It is difficult to estimate by how much these various new arrangements will raise Soviet oil exports to the non-Communist world but a total of 6.5-7 million tons for 1956 would seem a fairly conservative estimate. This figure would still not make Soviet bloc oil an important factor in the oil supply of the Free World. Whether it ever will become one, depends both on the willingness of the West to re-direct part of its oil purchases to the East and on the willingness of the Communist bloc to increase its exports. As to the first, the current Suez Canal crisis with its attendant danger of a major oil shortage in Western Europe, could well make some European nations more inclined than before to develop Russia and/or Rumania as a secondary oil supply source. This would also reduce the freight cost since the Soviet bloc's Black Sea ports are considerably closer to Western and Northwestern Europe than the Persian Gulf.

Regarding Soviet intentions in respect to oil exports to the West, we have several significant statements. One was made in September 1955 by Maxim Z. Saburov, chief of the State Committee for Current Planning and member of the Presidium of the Communist Party (the Soviet Union's highest decision-making body), who specifically mentioned oil among the commodities the Soviet Union was willing and able to sell to the West. Premier Bulganin also specifically mentioned Soviet oil exports in an appeal to Latin America for more East-West trade, earlier this year. An even more direct appeal was made by the USSR Minister of Foreign Trade Ivan G. Kabanov at a conference of the UN Commission for Europe last April. Mr. Kabanov, in a major speech, invited Western European countries to look to Moscow for their needs when dollar aid ran out. In this connection, he called special attention to the growth in Soviet production of crude oil and coal which, according to him, would make it

possible for the USSR to supply an important share of Western Europe's fuel needs. As an example of what he had in mind, he cited the high level of Soviet oil exports to Finland, Iceland and Sweden. Mr. Kabanov seemed more interested in the long-term outlook (and probably also in the propaganda value of his offer) than in immediate trade deals. This may have been due, at least partly, to the fact that when he spoke, the aforementioned temporary coal shortage existed in the USSR, requiring large-scale substitution by fuel oil, an item of which Western Europe is also very much in need but of which no additional quantities could have been exported just then.

However, the real decision of whether oil exports to the West are to be increased rests not so much on economic realities as on political expectations. The Soviet bloc certainly has more than the required minimum quantity of oil needed for its own chartered growth. Whether it wants to use whatever "excess" oil it produces, for speeding up its growth process still more or for increasing allocations to private consumers or for more exports is, in a totally centralized economy such as the Soviet bloc, largely an administrative policy decision in which the economic interplay of supply and demand, as we know it in the Free World, is only one factor to be considered.

S O V I E T B L O C O I L E X P O R T S , 1 9 5 4 - 5 5
(in thousands of tons and millions of dollars)

TO:	FROM: U.S.S.R.				RUMANIA				POLAND				CZECHOSLOVAKIA				EAST GERMANY				HUNGARY				TOTAL VOLUME	
	1955		1954		1955		1954		1955		1954		1955		1954		1955		1954		1955		1954			
	Vol.	Val.	Vol.	Val.	Vol.	Val.	Vol.	Val.	Vol.	Val.	Vol.	Val.	Vol.	Val.	Vol.	Val.	Vol.	Val.	Vol.	Val.	Vol.	Val.	1955	1954		
Austria					50.4	0.9	9.8	0.2			0.7	*			1.3	0.2	1.1	0.2	100.3	1.7	5.6	0.1	152.7	16.5		
Belgium	53.8	1.5	36.6	1.0	58.4	0.9	147.1	1.7	1.3	*	1.0	*	1.4	*	8.9	0.2							115.0	193.6		
Denmark	0.1	*	0.2	*											0.1	*	0.2	*			0.1	*	0.3	0.5		
Finland	193.0	7.7	914.0	32.0	802.7	25.8	4.2	0.1	6.2	0.1	0.2	*	1.9	0.1	3.0	0.3	0.4	0.1	0.8	0.1	0.5	0.1	0.9	0.1		
France	362.7	10.3	245.8	7.3	161.6	4.8	160.1	4.2					11.5	0.5	10.1	0.3							542.0	416.0		
Germany	26.5	0.8	64.7	2.1	53.4	1.5	45.0	1.1					22.7	0.6	13.8	0.3	136.6	9.9	122.9	7.7	20.0	0.4	2.7	*		
Greece	22.0	0.8	24.9	0.3	136.3	2.9	55.9	1.2															259.2	249.1		
Iceland	231.3	6.4	218.4	6.1					2.3	0.1	3.5	0.2											158.2	80.8		
Italy	144.3	2.5	143.6	2.8	68.3	1.0	114.0	1.5					3.3	0.2	2.9	0.2	1.1	0.1					231.3	218.4		
Netherlands	4.6	0.2	6.2	0.2			0.8	*															219.3	264.1		
Norway	13.0	0.2	0.4	0.1																			4.6	7.0		
Sweden	650.0	16.3	580.5	14.2	21.5	0.3	150.3	2.1															34.4	150.7		
Switzerland	5.6	0.1	5.6	0.1	242.0	4.3	125.0	1.6	41.0	1.5	7.2	0.3		0.6	*	1.0	0.1	1.5	0.2		0.1	*	934.0	714.9		
Turkey			11.5	0.4			2.0	0.1															5.6	7.6		
U.K.	49.8	1.3	35.6	0.8					0.5	*			0.6	*	0.3	*					0.1	*	1.0	0.1		
Yugoslavia	178.0	4.1	47.7	1.1													1.3	0.2			0.1	*		0.1		
					3.9	0.3									0.2	*			0.3	0.1			182.5	47.7		
Total Europe	1,935.0	52.2	2,335.7	68.5	1,598.5	42.7	814.2	13.8	51.3	1.7	11.9	0.5	42.1	1.4	39.6	1.3	140.7	10.4	127.8	8.4	121.2	2.3	10.4	0.3		
																							3,888.6	3,339.6		
																							16.4%	**		
Egypt	185.5		84.5		149.6		59.9																335.1	144.4		
Argentina	769.1		12.0																				769.1	12.0		
Israel	350.0																						350.0			
Afghanistan	50.0		25.0																				50.0	25.0		
Total Free World	3,289.2		2,457.2		1,748.1		874.1		51.3		11.9		42.1		39.6		140.7		127.8		121.2		10.4			
																							5,392.7	3,521.0		

53.2% **

* Under \$50,000

** % increase 1955 over 1954

RUSSIAN OIL PRODUCTION by UNION REPUBLICS
(in thousands of tons)

	<u>1913*</u>	<u>1940</u>	<u>1950</u>	<u>1954</u>	<u>1955</u>	<u>1960 (Plan)</u>
<u>Russian Republic</u> ("Second Baku"; North- east Russia; Caucasus, Sakhalin Island)	1,295	7,039	18,231	38,208	49,262	108,926
<u>Ukraine Republic</u> (Galicia; Central Ukraine)	1,047	353	293	415	531	1,487
<u>Uzbek Republic</u> (Fergana Valley)	13	119	1,342	994	996	1,494
<u>Kazakh Republic</u> (Emba River Valley; North-Northeast Coast of Caspian Sea)	118	697	1,059	1,384	1,397	1,966
<u>Georgian Republic</u> (Central Georgia)	--	41	43	51	43	43
<u>Azerbaijan Republic</u> (Baku Region)	7,669	22,231	14,822	15,241	15,305	15,780
<u>Kirgiz Republic</u> (Frunze - north of Chinese Border)	--	24	47	110	116	905
<u>Tadzhik Republic</u> (Oxus River Valley- Afghan Border)	10	30	20	16	17	29
<u>Turkmenian Republic</u> (Southeast shore of Caspian Sea)	129	587	2,021	2,862	3,126	4,084
<u>Estonian Republic **</u>	--	180	450	700	900	1,530
<u>Total, USSR</u>	<u>10,281</u>	<u>31,301</u>	<u>38,328</u>	<u>59,981</u>	<u>71,693</u>	<u>136,244</u>

Location of oil fields in parenthesis.

* within present boundaries.

** Shale oil production (unofficial estimate)

SOVIET BLOC
CRUDE OIL PRODUCTION
(in thousands of tons)

	<u>1950</u>	<u>1955</u>	<u>1960(Plan)</u>
Rumania	5,047	10,600	13,500
Hungary	600	1,600	1,900 *
Albania	132	263	408
Czechoslovakia	63	200	?
Poland	177	180	?
Bulgaria	--	150	?
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Total European Communist Satellites	6,019	12,993	--
China **	200	667	1,520(1957)
USSR **	<u>59,281</u>	<u>70,793</u>	<u>134,714</u>
Total Communist Bloc	65,500	84,453	--

* The 1960 target will probably have to be revised downward because of the recent saltwater encroachment on Hungary's largest oil field. According to Hungary's Prime Minister, the flooding will cause a 320,000 ton production decline in 1956.

** Excluding shale oil production which presently amounts to about 900,000 tons in the Soviet Union and 700,000 tons in China.

