IMPACT OF OIL EXPORTS FROM THE SOVIET BLOC

Supplement
To The
1962 Report

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A Report of the

NATIONAL PETROLEUM COUNCIL

1964

IMPACT

OF OIL EXPORTS FROM THE

SOVIET BLOC

SUPPLEMENT

A Revision of Volume I

Issued October 4, 1962

A Report of the

NATIONAL PETROLEUM COUNCIL'S

COMMITTEE and WORKING SUBCOMMITTEE

on the

IMPACT OF OIL EXPORTS FROM THE SOVIET BLOC

Adopted by the National Petroleum Council

March 19, 1964

NATIONAL PETROLEUM COUNCIL

1625 K Street, N.W., Washington, D. C. 20006

NATIONAL PETROLEUM COUNCIL

(Established by the Secretary of the Interior)

1625 K STREET, N. W.

WASHINGTON, D. C. 20006

March 18, 1964

Mr. J. Ed Warren, Chairman
NPC Committee on Impact of Oil
Exports from the Soviet Bloc
National Petroleum Council
Suite 601 - 1625 K Street, N. W.
Washington, D. C. 20006

Dear Mr. Warren:

Your Working Subcommittee on the Impact of Oil Exports from the Soviet Bloc, re-established in September 1963, has restudied, in the light of new data and recent developments, the entire range of subject matter contained in Volume II of the 1962 study. I am pleased to transmit herewith our final report, presented as a Supplement to the 1962 study, based on the format of the original Volume I but somewhat expanded to allow incorporation of new material.

Your Subcommittee believes that the subject of Soviet oil developments is one that will continue to deserve observation and evaluation.

Sincerely yours,

James B. Meredith

James B. Meredith, Chairman
Working Subcommittee
NPC Committee on Impact of Oil
Exports from the Soviet Bloc

F O R E W O R D

In November, 1961, the Assistant Secretary of the Interior, the Hon. John M. Kelly, requested the National Petroleum Council to make a factual study of the effects on the Free World of the exports of petroleum from the Soviet Bloc, together with such comments and conclusions as were deemed appropriate. In response to this request, the National Petroleum Council formed its Committee on the Impact of Oil Exports from the Soviet Bloc. Formed at the same time was a Working Subcommittee, which in due course completed its report and submitted it to the full Committee and to the National Petroleum Council, which adopted it on October 4, 1962.

At the time of its report, the Working Subcommittee expressed the belief that it was vital to keep informed of future developments in the oil export policies of the Soviet Bloc and of their impact upon Free World Nations. Accordingly, it recommended that the National Petroleum Council suggest to the Department of the Interior that it consider the advisability of requesting the Council to prepare periodic reports and evaluations of Soviet oil developments.

On June 28, 1963, Assistant Secretary Kelly requested the National Petroleum Council to appoint a committee to update the 1962 report because the subject is "of continued importance and concern to the Department of the Interior." In his letter, Assistant Secretary Kelly requested that certain phases of the previous report be updated, through the medium of a factual study, but indicated that such updating need not be limited to the following five subjects:

1. Energy production and consumption in the Soviet Bloc.

2. Petroleum prospecting activities, discoveries, production rates and plans in the Soviet Bloc.

3. Refining and transportation developments.

4. Oil exports to the Free World and intra-bloc movements.

5. Other aspects of East-West trade with particular reference to the export of petroleum equipment and technology to the Bloc.

In response to this request, the National Petroleum Council reactivated its 1962 Committee on the Impact of Oil Exports from the Soviet Bloc, and the Working Subcommittee thereto. This volume is the result.

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PART ONE

Supplement to the
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Report of the Working Subcommittee
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I N T R O D U C T I O N

The original 1962 report of the National Petroleum Council on the Impact of Oil Exports from the Soviet Bloc was an exhaustive study in two volumes, totalling more than 700 pages. Volume I contained two parts: the first presenting the principal conclusions of the study, the second providing a detailed summary, by subject matter, of the 600 pages of data and analysis which comprised Volume II. In preparing its current report the Committee has restudied, in the light of new data and recent developments, the entire range of subject matter contained in Volume II of the 1962 study. Some changes in historical appraisal and forecast data and in emphasis have resulted. On the whole these changes have been minor. The more substantial result has been to confirm the principal findings and conclusions of the 1962 study. This being the case the Committee has decided against publishing a revised Volume II. We have chosen instead to issue a supplement, based on the format of Volume I but somewhat expanded to allow inclusion of new material.

In several areas we believe our analysis to have been in greater depth than was possible in the 1962 study. This is particularly true of the drilling, production, refining and pipeline sections. In addition we have added new sections on Vulnerabilities of the Soviet Petroleum Industry (Section 14 of Part Two) and Soviet Bloc Assistance to Underdeveloped Areas (Section 30 of Part Two). In making the study it has, of course, been necessary for the Committee to rely heavily on USSR published statistics and comments. As in the earlier report we have tried consistently to use the word "plan" to denote an official plan of the USSR and the word "estimate" to refer to an estimate made by the Committee.

The preparation of this report has not been without problems, particularly with respect to insuring consistency of data from a wide variety of sources.

One problem has been a matter of definition. In the 1962 NPC Report, data on Cuba were included in Free World statistics for both historical and forecast periods. In the current report, wherever feasible, Free World data have been shown both excluding and including Cuba to facilitate comparison between current and earlier studies, and between future and historical periods.

A second problem has been more serious. The cut-off date for most of the data included in this revised volume was December 31, 1963. In

January 1964, however, the USSR published, with minimum elaboration, various statistics and plans which are substantially different from those available earlier. To the maximum possible extent, these new data have been incorporated into our analysis.

A major difference between the current study and the earlier 1962 report is that projections have been extended five years further into the future, reaching to 1970 instead of 1965. Conclusions reached about the remote future must generally be considered as not having the same degree of accuracy as those pertaining to the near future. This is especially the case in the present study, for the horizon has been extended at a time when the Soviet Bloc seems peculiarly beset by economic difficulties.

Serious agricultural shortfalls have forced the USSR to purchase large quantities of wheat from abroad. A program for vastly increased expenditures on chemical and fertilizer plants has been announced, and this too may require major purchases from abroad. The Russians have expressed interest in acquiring complete plants of the most technologically advanced design. Similarly they have been shopping in the West for one or more large up-to-date refineries.

This change of emphasis within the USSR poses major questions, both as to economic feasibility and as to Free World policy. Assuming Soviet import needs will be substantially expanded in the years ahead, how will the imports be paid for? Long-term credit from the West is one way, but this raises the issue of why the West should grant economic assistance to the Soviet Bloc when there remain major developmental needs in many parts of the Free World. With continuing evidence that the Soviet goal is world domination by economic, political, military and other means, it would seem dubious wisdom on the part of the West to assist in this undertaking.

In any case it is unlikely that long-term credits will be available in sufficient amounts to satisfy all Soviet needs. To a greater or lesser extent the USSR will have to pay for imports by exports of Bloc commodities. There are not many of the latter which are readily marketable in Free World countries. The Committee has only limited information on Russian gold availability, but the evidence suggests that it is far from adequate for import needs. Indeed, the costs of mining gold in the USSR appear so high as to make this a relatively inefficient way to acquire foreign exchange.

Among the goods which the USSR has for sale in quantity to other countries, oil unquestionably is that of most widespread demand. The rapid rise of oil exports in recent years supports this view. Oil sales have also afforded the Soviets an instrument for sowing distrust and confusion in

Western circles. These facts would argue that the USSR will have great incentive to push oil exports in the years ahead.

Yet, there are questions about the rapidity with which the Soviet Bloc can export ever increasing quantities of oil into Free World markets. There have been suggestions that the emerging energy shortage in the European Satellite nations will limit export capacity. The Committee recognizes the emerging deficit but estimates that the Bloc will be able to provide for its needs and still have substantial quantities of oil available for sale to the Free World. In this respect we see no substantial change from the 1962 report.

Of potentially greater significance would seem to be the recent reduction in the USSR oil production target for 1970 from 390 million metric tons (7,800,000 B/D) to "not less than 350 million tons" (7,000,000 B/D). This may be a real reduction in target, or it may be, as is suggested by the cautious language, merely the planner's desire to play it safe. The Committee's estimate is that the Soviets will have little difficulty in achieving production in the range of 350-370 million tons in 1970. In any case, a reduction in production need not imply a commensurate, or indeed any, reduction in the amount of oil which will be made available for export. In a controlled economy available resources can be forced into whatever outlet the authorities may choose. Certainly, the tanker and pipeline construction programs which the USSR has underway point to a continued emphasis on expanding exports.

The Bloc's exports to the Free World have been restudied in detail. In the 1962 report the Committee estimated the 1965 level of Bloc oil available for export at 51 million tons (1,020,000 B/D). In the current study this figure has been adjusted only slightly to 48.25 million tons (965,000 B/D). Exports of this magnitude would be more than 25% (225,000 B/D) above the 1963 levels, a volumetric growth well in excess of the 124,000 B/D attained between 1961 and 1963. As to the year 1970, the Committee has taken the view that it would be unwise to specify a single figure as being the most likely level of Bloc oil exports to the Free World. We have chosen instead a range of 70-85 million tons (1,400,000-1,700,000 B/D) as encompassing the most probable variations.

The principal conclusion of the 1962 NPC Report was that Soviet Bloc oil exports to the West would steadily grow and increasingly pose economic, political, and military problems for Free World nations. As was suggested in the prior Report, it often does not take large volumes of Soviet oil in a particular country to achieve Soviet aims. The Committee wishes to emphasize that it continues to hold these views. We feel that the threat of Bloc oil sales to Western nations is no less now than it was two years ago.

Indeed, in some respects it may be intensified, for a number of Free World countries appear to be contemplating substantial relaxations in their trading policies vis-a-vis the Soviets, in part through the extension of credits.

Our export predictions are based on the assumption that there will be a continuation of existing trade policies. Should these be relaxed, Bloc exports to the West could--and probably would--be in excess of the levels which we have forecast:

(a) More pipe sold to the Soviets would speed their pipeline construction program which so far has failed to meet established goals.

(b) Refineries made available from the West would enhance the Soviet capacity to export products and probably raise the level of total exports.

(c) Western drilling equipment would speed up production rates.

The Committee, therefore, believes that the question of Western trade policy with Communist countries is a matter of paramount importance.

C O M M E N T S A N D C O N C L U S I O N S

PRINCIPAL CONCLUSIONS

1. a. THE VOLUMES OF SOVIET BLOC OIL AVAILABLE FOR EXPORT TO THE FREE WORLD WILL STEADILY INCREASE. IN ADDITION TO FURTHERING THE POLITICAL OBJECTIVES OF THE COMMUNISTS, THERE IS A STRONG FOREIGN EXCHANGE INCENTIVE TO SEEK FURTHER PENETRATION OF WESTERN OIL MARKETS

In recent years the Soviet Bloc has increased its influence in the Free World through exporting steadily rising volumes of oil at prices substantially below existing commercial levels. The penetration has been especially marked in Western Europe where the Bloc, with 8% of sales, is now one of the largest suppliers.

The Committee estimates that the Bloc will have further major increases in the volume of oil available for export:

TABLE 1

TOTAL SOVIET BLOC CRUDE & PRODUCT EXPORTS TO THE FREE WORLD
(Including Cuba)

FROM	1963 THOUSAND METRIC TONS	1963 BARRELS PER DAY	1965 THOUSAND METRIC TONS	1965 BARRELS PER DAY	1970 THOUSAND METRIC TONS	1970 BARRELS PER DAY
USSR	31,500	630,000	42,000	840,000	69,000	1,380,000
Satellites	5,500	110,000	6,250	125,000*	8,000	160,000*
TOTAL TO FREE WORLD INCLUDING CUBA	37,000	740,000	48,250	965,000	77,000	1,540,000
TOTAL TO FREE WORLD EXCLUDING CUBA	32,250	645,000	43,350	867,000	72,000	1,440,000

* See footnote c/ in "Total Soviet Bloc Crude and Product Exports to the Free World", Table 70 in Part Two, Section 31.

The 1970 estimate for total Bloc oil exports represents about the mid-point of a range of 70 to 85 million tons (1.4 to 1.7 million B/D) exports to the Free World, including Cuba, and 65 to 80 million tons (1.3 to 1.6 million B/D) excluding Cuba. If exports should be at the high end of the range in 1970, the Free World (outside the U.S.) would be dependent on the Soviet Bloc for 9% of its oil supplies, compared with 6% in 1963. Western Europe's dependency would rise to 10%, based on the Committee's estimate of a purchase of 50 million tons (1,000,000 B/D). If Free World countries prove willing to take such a substantial percentage of their oil supplies from the Soviet Bloc, the risks of supply security will be increased.

About 90% of the Bloc's future oil exports to the Free World will emanate from the USSR. In 1962, the USSR's exports to the Free World were $2.1 billion, with oil exports accounting for 17.6% of this amount.

The magnitude of possible future increases in the Soviet's need for foreign exchange is striking. If agricultural imports continue on a large scale, these will continue to place heavy pressure on Soviet foreign exchange availability. Furthermore, plans to purchase Free World chemical and fertilizer plants alone are expected to add to foreign exchange demands as much as $2 billion for the period 1964-70. The ability of the Soviets to meet such exceptional demands on their foreign exchange by selling gold or by acquiring long-term credit is unknown but probably quite limited. Nevertheless, the need to increase exports to pay for Free World purchases seems to be one of the most pressing needs in fulfilling Soviet plans, and efforts to increase oil exports can be expected to reflect this need to a high degree.

1. b. SOVIET OIL EXPORT PRICES CONTINUE AT LOW LEVELS, CONTRARY TO REPORTS OF UPWARD MOVES

At fairly regular intervals since mid-1962 there have been reports in the Free World press that Soviet oil prices were trending upward. However, available data fail to support these reports. On the contrary, the official Soviet published prices for 1962 indicate that the average Soviet realization

per barrel in 1962 was slightly below that of 1961 on exports to the Free World.

Soviet data are not yet available for 1963 export prices, but the available information indicates there has been no material change from 1962's depressed levels. It is true that instances can be found where the USSR has sold oil at above its normal rates, such as to Brazil, and it is correct that the Soviet's sometimes seek higher prices, especially in the earlier stages of bargaining. Nevertheless, in examining Soviet prices on 1963 sales it is difficult to find any discernible change upward or downward.

The USSR continues to charge its Satellites considerably higher prices than it charges for the same oil in Free World markets.

TABLE 2

AVERAGE F.O.B. EXPORT PRICES FOR USSR CRUDE OIL
($U.S. Per Barrel*)

YEAR	TO FREE WORLD	TO SATELLITES	
1955	2.16	3.38	
1956	2.17	3.30	
1957	2.55	3.28	
1958	2.08	2.97	
1959	1.88	3.01	
1960	1.56	3.01	
		EXCLUDING CUBA	INCLUDING CUBA
1961	1.38	2.97	2.54
1962	1.36	2.98	2.52

* Converted at $1.11 per ruble

Further evidence is obtained by comparing crude prices charged specific countries. In 1962, for instance, East Germany

paid $2.66 per barrel vs. $1.30 per barrel for West Germany. Hungary paid $3.03 per barrel vs. $1.30 per barrel for Italy. Mongolia paid $3.49 per barrel vs. $1.26 per barrel for Japan. Product prices also show the same discrimination.

2. SOVIET OIL RESERVES AND SCHEDULED DRILLING WILL BE ADEQUATE TO SUPPORT PLANNED PRODUCTION

Through analysis of reports of U. S. and French exchange delegations to the USSR and of composite production and operating data published by the USSR, the Committee estimates the proven reserves to be 32 billion barrels at the end of 1963 - up from 27 billion barrels at the end of 1960. This is a 21 year reserve at the 1963 production rate. This independent analysis confirms the validity of the generalized statement of Russian technologists that reserves are not produced in excess of 5% per year and it demonstrates the vigor of the USSR exploration for oil. If the 334 barrels per foot finding rate of exploratory hole experienced in the 1946-62 period is maintained through 1970, (a reasonable assumption, in the view of the Committee) then with the estimated 7.0-7.4 million barrels per day production, reserves would be reduced to 17 years at the 1970 producing rate.

The Committee analysis indicates the USSR would have difficulty in achieving production of 7.8 million barrels per day in 1970 called for in the 20 Year plan with the amount of drilling specified. This is due to limitation of total producing capacity by wide well spacing - not a restriction of reserves to be proved. However, the Committee recognizes no difficulty for the USSR in achieving its reduced goal of not less than 7.0 million barrels per day in 1970 with the total drilling plan for oil and gas of 345 million feet recently announced for the period 1964-70.

3. PURCHASE OF WESTERN OIL INDUSTRY EQUIPMENT AND TECHNOLOGY WOULD ENHANCE THE SOVIET'S ABILITY TO PRODUCE, REFINE AND EXPORT OIL

If limitations are imposed upon Soviet oil exports to the Free World they will probably reflect:

a. Western nations unwillingness to be dependent on Soviet oil for their energy imports.

b. The effect of bottlenecks stemming from shortages of several specific items in the Soviet oil industry.

-- Refining capacity, especially in catalytic cracking and catalytic reforming.
-- Drillpipe, rigs and bits.
-- Natural gas compressors.
-- Large diameter pipe.

The USSR may be exporting almost 30% of its total oil production by 1970, with over two-thirds of these exports moving to the Free World. Clearly, the USSR does not need to buy oil industry equipment from the West simply to fulfill its own internal requirements. The effect of selling oil industry equipment to the Bloc is to enhance its ability to export oil to Western nations and correspondingly to increase the dependency of the latter on the Soviets for a growing amount of basic energy requirements.

4. TOTAL ENERGY PRODUCTION IN THE USSR IN 1965 AND 1970 WILL APPROXIMATE THE RECENTLY REDUCED SOVIET PLANS

The USSR has been successful in developing its energy production at the rapid rate of 8 - 9% per year for the last decade. The Committee's estimate of energy production in the USSR in 1965 and 1970 is shown on Table 3.

TABLE 3

TOTAL ENERGY PRODUCTION IN THE USSR

SOURCE OF ENERGY	UNIT OF NATURAL MEASURE[a]	1962 NATURAL UNITS	1962 MMTSF[b]	1962 PERCENT OF TOTAL	1965 ESTIMATE NATURAL UNITS	1965 ESTIMATE MMTSF[b]	1965 ESTIMATE PERCENT OF TOTAL	1970 ESTIMATE NATURAL UNITS	1970 ESTIMATE MMTSF[b]	1970 ESTIMATE PERCENT OF TOTAL
Coal	MMT	517	379	46.8	550	403	40.4	630	453	32.7
Crude Oil	M/B/D	3.72	266	32.8	4.90	350	35.0	7.20	515	37.2
Natural Gas Liquids	M/B/D	-	-	-	.08	6	.6	.18	13	1.0
Natural Gas	TCF	2.60	86	10.6	4.59	152	15.2	8.82	293	21.1
Hydroelectric	BKWH	71.9	32	3.9	96.5	43	4.3	157	70	5.0
SUB TOTAL		-	763	94.1	-	954	95.5	-	1,344	97.0
Peat	MMT	34.7	13	1.6	50	19	1.9	50	19	1.4
Shale	MMT	16.4	6	.7	20	7	.7	22	8	.6
Fuelwood	-	-	29	3.6	-	19	1.9	-	14	1.0
TOTAL		-	811	100.0	-	999	100.0	-	1,385	100.0

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a/ MMT = Million Metric Tons
M/B/D = Million Barrels Per Day
TCF = Trillion Cubic Feet
BKWH = Billion Kilowatt Hours

b/ MMTSF = Million Metric Tons of Standard Fuel (One metric ton of standard fuel is equivalent to 27,780,000 BTU's.)

NOTE: Detailed conversion tables are shown on Page 52.

Revised Russian production goals for coal, gas, and oil in 1965 and 1970 will result in lower total energy production in the USSR than previously predicted. The modified goals for energy production probably reflect Soviet realization that earlier goals were unnecessarily high and would have resulted in energy production much beyond local needs and outlets in export markets. In addition, a prospective slower growth rate for the Soviet economy will result in reduced energy needs. Therefore, the effect of the reduced goals on the export of energy will be negligible.

The Committee concludes that coal production will continue to fall behind the original plan as it has for several years and will reach only 550 million metric tons in 1965 (in line with the revised goal of 553 million metric tons) and 630 million metric tons in 1970, or about 10% below the original Soviet plan.

With regard to natural gas, the Committee's production estimate for 1965 is 130 billion cubic meters (4.59 trillion cubic feet) and for 1970 it is 250 billion cubic meters (8.82 trillion cubic feet). These figures are in line with the recently revised natural gas plans which reflect a 15% reduction for 1965 and a 20% reduction for 1970.

Although the Committee believes crude oil production in 1965 will exceed the USSR's new plan of 4.8 million B/D (the previous plan was 4.94 million B/D), the Committee estimate of 4.9 million B/D is lower than the one published in the previous edition of this report due to more historical data, the Russian's own downward revision of their oil plan and the reported overall slowdown in the economy's growth rate. The Committee's 1970 crude oil production estimate of 7.0-7.4 million B/D takes into account the recent Russian statement that production will reach "not less than" 7 million B/D by 1970, our estimate of Russian producing capabilities, and the fact that the USSR has historically slightly exceeded its oil production plans.

Since petroleum today supplies only 23% of the energy of the Bloc, the leverage the other forms of energy have on petroleum is great. A slight percentage shift in the production of coal would have a magnified effect on the amount of petroleum needed to satisfy internal demand and the volume available for export. Such shifts can be executed in planned economies.

The present importance of coal as a source of energy to the Bloc as a whole is shown below:

TABLE 4

ENERGY PRODUCTION IN THE SOVIET BLOC - 1962
(Million Metric Tons of Standard Fuel of 27,780,000 BTU Per Ton)

	USSR	EAST EUROPE	COMMUNIST CHINA *	TOTAL	PERCENT OF TOTAL
Coal	379	260	216	855	66
Petroleum	266	22	7	295	23
Natural Gas	86	21	1	108	8
Hydroelectric	32	4	6	42	3
TOTAL	763	307	230	1,300	100
PERCENT OF BLOC	58	24	18		100

Cuba has no significant commercial energy production.

* In this Table, China is the only Far East country included because of incomplete data on the other Far East Satellites.

THE CURRENT AND FUTURE CAPABILITIES OF THE USSR OIL INDUSTRY

PRODUCING

5. a. THE USSR IS THE DOMINANT OIL PRODUCER IN THE BLOC

It will be noted from Table 4 on the preceding page that the USSR produces 80% of the natural gas produced in the Bloc. With regard to liquid petroleum, the USSR's position is even more dominant. Table 5 summarizes the estimated petroleum supply and demand picture for the entire Bloc for 1962, 1965 and 1970.

TABLE 5

SOVIET BLOC PETROLEUM BALANCE
(Thousand Barrels Per Day)

	1962		1965 ESTIMATE		1970 ESTIMATE	
	PRODUCTION*	CONSUMPTION	PRODUCTION*	CONSUMPTION	PRODUCTION*	CONSUMPTION
USSR	3,720	2,880	4,980	3,780	7,380	5,400
East Europe	334	440	348	558	398	832
Communist China and Far East	100	174	140	165	240	246
TOTAL BLOC	4,154	3,494	5,468	4,503	8,018	6,478
Net Exports From Bloc		660[a/] [b/]		965[a/]		1,400-1,700[a/]

* Including natural gas liquids and synthetics (negligible in the USSR in 1962).

a/ Throughout this report Cuba is included in the Free World. If Cuba was included in the Soviet Bloc, these figures would be 572 for 1962, 867 for 1965 and 1,300-1,600 for 1970.

b/ Represents total exports of 670,000 B/D less Bloc imports from the Free World.

Total Bloc petroleum production has increased from 2,010,000 B/D in 1956 to 4,154,000 B/D in 1962 for an average increase of 13% per year. The Committee predicts that Bloc oil production will reach about 5.5 million B/D by 1965 and 8 million B/D by 1970 including natural gas liquids and synthetics. The great bulk of the petroleum production increase has in the past and will in the future come from the USSR. Russia provided 85% of Bloc petroleum production in 1956, 89% in 1962, and is expected to provide 92% in 1970. There will be an increasing deficiency of indigenous supplies in the Satellite countries relative to their consumption. Nevertheless, the Soviet production will be sufficient to meet this deficiency and still permit ever-increasing exports to the Free World.

5. b. PETROLEUM PRODUCTION LEVELS IN THE USSR WILL NOT BE LIMITED BY GEOLOGICAL FACTORS

The magnitude of the sedimentary area of the Soviet Union is impressive. Areas which are suitable for the occurrence of petroleum in the USSR extend from the Soviet-Iranian border in the south to the Arctic Ocean in the north and from the Western Ukraine to the Pacific.

In light of the most recent evidence from Soviet sources, the Committee now estimates the prospective sedimentary areas of the USSR at 10 million square kilometers or 3.88 million square miles.

TABLE 6

CLASSIFICATION OF SEDIMENTARY AREAS - USSR

DESCRIPTION OF AREA	MILLION SQUARE MILES
Total Favorable Area	2.56
Basin Areas of Unknown or Poor Prospect	1.32
TOTAL PROSPECTIVE AREA	3.88
Basin Areas Considered Non-Prospective	1.58
TOTAL	5.46

The areas considered favorable for the deposits of petroleum in the USSR total 2.56 million square miles. This can be compared to the estimated favorable area for the U. S. (including Alaska and the Continental Shelf up to 600 feet in depth) of 2.12 million square miles. Considering that the favorable area for the USSR is greater than that of the U. S., and recognizing the present level of U. S. producibility, the Committee concludes that the petroleum production levels in the USSR will not be limited by geological factors for many years.

5. c. THE USSR HAS A MAJOR GEOPHYSICAL AND CORE DRILLING EFFORT UNDERWAY

Geophysical techniques of prospecting have become more important as the search for oil has progressed into deeper fields and into regions where surface indications are not prominent. Table 7 indicates the number of active crews in 1961 and gives the Committee's estimate for 1965.

TABLE 7

GEOPHYSICAL CREWS - USSR

	1961	1965
Seismic	850	1,200 (Plan)
Electric	200	250*
Gravimetric	100	200*
Magnetic	6	12*
Airborne Magnetometer	12*	20*
TOTAL	1,168	1,682

* Committee estimate.

It is particularly significant that the USSR now has far more geophysical crews in operation than the 766 crews operating throughout the entire Free World.

The USSR also makes extensive use of core drilling. In 1952-58 they carried out 0.9 feet of core drilling for each foot of exploratory drilling. In 1959-65 the USSR plans to let the ratio decline to 0.68. Nevertheless, a total core drilling footage of 110 million feet has been scheduled for the years 1959-65, compared with only 53 million feet for the 1952-58 years.

5. d. THE USSR PLANS A SUBSTANTIAL STEP-UP IN ITS DRILLING RATE TO REACH 1970 PRODUCTION GOALS FOR OIL AND GAS

Total drilling in the USSR increased at the rate of 5.3% annually from 1950-57. From 1957-62 the annual increase was 7.6%. For the seven years 1964-70 the recently announced Soviet plan calls for annual increases of 10.5%, indicating ambitious drilling plans. Their plan is very similar with the Committee's estimate that an 11.3% annual increase in drilling would be required for the 1962-70 period to attain the estimated crude production level of 350-370 million tons in 1970.

The drilling plans announced by the Soviets in early 1964 have raised total drilling for oil and gas exploration and development to 345 million feet for the 1964-1970 period. This objective is in close agreement with the Committee's own estimate that 354 million feet would be required to achieve the combined goals of not less than 350 million tons (7,000,000 B/D) oil production and 250 billion cubic meters (8.8 trillion cubic feet) gas production by 1970. Thus, the Committee believes the recently announced overall drilling program is consistent with the 1970 production goals.

The Soviets' drilling plan announced in January 1964 shifts the emphasis towards exploratory drilling. Before this shift was announced the Committee had concluded that there was already excessive emphasis on exploratory drilling to the detriment of development drilling. The figures in Table 8 compare the Committee's estimates of required drilling with those of the USSR:

TABLE 8

EXPLORATORY AND DEVELOPMENT DRILLING
FOR OIL AND GAS IN THE USSR
(Million Feet)

YEAR	EXPLORATORY	DEVELOPMENT	TOTAL
1950	7.0	7.1	14.1
1955	7.4	9.1	16.5
1960	13.3	12.1	25.4
1961	14.9	12.5	27.4
1962	15.8	13.3	29.1
Revised USSR Plan for the 1964-70 Period	204.0	141.0	345.0
Committee Estimates 1964-70	153.0	201.0	354.0

The Committee believes that total drilling is the best criterion for measuring ultimate production potential and does not attach great significance to the breakdown between exploration and development announced by the USSR. They will be able to shift from exploration to development on relatively short notice to meet changing conditions.

Soviet drilling capabilities are restricted by a continued emphasis on the turbodrill which was responsible for 80% of the USSR's total drilling in 1962. Although use of the electrodrill has solved some of the difficulties encountered in deep drilling with the turbodrill, the use of Free World drilling techniques and equipment -- rotary drills, better rock bits, etc. -- might give major impetus to their oil and gas production plans. The availability of Free World drilling equipment and technology may, therefore, be of considerable importance in determining the future level of Soviet oil exports.

5. e. CRUDE OIL PRODUCTION IN THE USSR HAS INCREASED RAPIDLY AND HAS EXCEEDED OFFICIAL PLANS

Of all the major forms of primary energy in the Soviet Union, only the production of crude oil has been in excess of

the annual planned goals for each of the first five years of the Seven-Year Plan. The major portion of the growth in production of crude oil during the postwar period can be attributed to the continued development of new capacity in the Urals-Volga, which in 1962 accounted for 72% of total national output.

TABLE 9

PRODUCTION OF CRUDE OIL IN THE USSR

YEAR	MILLION BARRELS PER DAY
1950	0.76
1955	1.42
1960	2.96
1961	3.32
1962	3.72
1963	4.12
1964 Plan	4.44
1965 Revised Plan	4.80
Committee Estimate	4.90
1970 Revised Plan	At least 7.0
Committee Estimate	7.0-7.4

Growth in production has been at a rate of 14% per year for the 1950-63 period, and is estimated to be 8% per year for the 1963-70 period.

REFINING

6. a. USSR REFINING CAPACITY IN 1970 MAY PLACE A LIMIT ON PETROLEUM PRODUCT EXPORTS

USSR refining capacity in 1962 is estimated to have been 185 million tons (3.7 million B/D). The Committee believes that in order to meet product demand for internal consumption and export, the Soviet Union will need 235 million tons (4.7 million B/D) refining capacity in 1965 and 340 million tons (6.8 million B/D) in 1970. Operated according to current practice (estimated at 85% of stated capacity with a 92% yield factor), the Russians would have a refinery output of 184 million

tons (3.68 million B/D) in 1965 and 265 million tons (5.3 million B/D) in 1970.

If this schedule is met, there might be 17 million tons (340,000 B/D) of product available for export to the Free World in 1965 and 29 million tons (580,000 B/D) available in 1970. However, the Soviet Union has indicated a desire to purchase one or more large refineries (240,000 B/D each) from Free World countries. If they are unable to do so, they may have great difficulty meeting their refinery construction goals due to new competing demands for available resources, both human and material, from the fertilizer and chemical industries which have now been given top priority in the Soviet economy.

6. b. PURCHASES OF REFINERIES FROM THE WEST BY THE USSR WOULD HAVE SUBSTANTIAL MILITARY AND ECONOMIC SIGNIFICANCE

There would be substantial military and economic significance to the purchase of refineries from Western manufacturers by the USSR:

(1) Advanced technology of the Free World's refining industry would thereby be handed to the USSR. The Soviet purchasing team is understood to be interested in only the most up-to-date refinery technology.

(2) The higher octane gasolines which would be available from this type of refinery would improve the performance of military craft and ease design limitations now imposed on motor vehicle engines.

(3) The amount of oil used by military forces is large. U. S. peacetime military oil requirements constitute 8% of total U. S. oil demand. In the USSR, it is probable that military oil consumption accounts for a higher percentage of oil demand. In the event of war, the percentage of oil demand going into military activity would rise sharply.

(4) Increases in total Russian oil exports would probably result. A deficiency in refining capacity would force the Soviets to shift exports from

products to crude. It is believed that they may have more difficulty exporting crude than products due to the limited number and capacity of Free World independent and government refineries willing and able to run Soviet crude oil.

(5) Free World countries importing petroleum products from the USSR would be even more vulnerable than those importing Soviet crude because at any time it becomes politically expedient, the USSR can deny them the oil and access to the refining facilities. Should supplies from the USSR be denied, replacement from Free World sources could be accomplished with less ease for products than for crude, especially in the winter months when there is often little spare refining capacity.

(6) Further damage to oil product prices and the Free World oil industry would occur from increased Soviet product exports. Product exports can be directed into specific consuming markets with maximum disrupting effect on price levels. Also, an increase in refining capacity would enhance Soviet ability to produce gasoline for export, further aggravating European problems of product imbalance.

(7) Acquisition of refineries from the West would represent considerable savings in time and resources for the Soviet Union.

TRANSPORTATION

7. a. INTERNAL TRANSPORTATION FACILITIES WILL BE ADEQUATE TO ASSURE THE OIL EXPORT AVAILABILITY PROJECTED BY THE COMMITTEE

Railroads are the backbone of the transportation system of the USSR. They also have provided the major means of transporting petroleum as shown in Table 10.

TABLE 10

TRANSPORT OF PETROLEUM FREIGHT IN THE USSR, BY TYPE OF CARRIER

CARRIER	1962 BILLION TON-KILOMETERS	1962 PERCENT OF TOTAL	1965 PLAN (REVISED) BILLION TON-KILOMETERS	1965 PLAN (REVISED) PERCENT OF TOTAL
Rail	252	56	286	43.4
Maritime*	100	22	187	28.4
Inland Waterway	22	5	26	4.0
Pipeline	74	17	160	24.2
TOTAL	448	100	659	100.0

* Includes oil cargoes carried by Soviet flag ships, in both domestic and foreign traffic.

Although the Table above shows a growing volume of oil moving by pipeline, railroads will continue to account for the largest share -- about 43% in 1965 -- of petroleum traffic.

It is significant that, according to Soviet plans, petroleum carried by pipelines in 1965 will be equivalent to only 8% of the total rail freight in the USSR, while that transported by ship and inland waterways will be equivalent to 11% of total rail freight. Hence, any failure to achieve completely plans for modes of petroleum transportation, other than rail, would not throw a relatively large extra burden on the railroads. Western specialists have concluded that the USSR is allocating enough resources to its rail program and that fulfillment of their Seven-Year Plan goals is feasible.

Therefore, the Committee concludes that new pipeline capacity together with an expanded and possibly more efficient rail system implies that the Soviet program for future petroleum exports will probably not be limited by internal transportation difficulties. In making this appraisal, the Committee has recognized that the existing transportation system of the USSR was adequate to move more than 1,000,000 B/D in 1963 to the Soviet border for export.

7. b. THE USSR IS INCREASING ITS ABILITY TO EXPORT PETROLEUM BY BUILDING A NUMBER OF OIL EXPORT PIPELINES

At the end of 1958, the Soviet Union had in operation only 8,900 miles of crude oil and petroleum product pipelines and 8,200 miles of natural gas pipelines. The Seven-Year Plan (1959-65) originally called for the construction of 17,800 miles of oil pipelines and 16,100 miles of natural gas pipelines. Thus in seven years, the USSR planned to install about twice as much trunk line as existed at the end of 1958. It is now quite clear, however, that only the gas pipeline goal will be achieved. The Soviets recently announced that by the end of 1965, they would have 25,700 miles of natural gas pipeline available. This would indicate that they have increased their target for gas pipeline construction during the 1959-65 period from 16,100 miles to 17,500 miles. In addition, they have recently stated that they expect to construct 13,000 miles of crude oil and petroleum product pipeline between 1964 and 1970. Of this amount 3,400 miles are scheduled for 1964-65 which, together with 6,000 miles actual construction in 1958-63, would give only about one-half the total mileage originally programmed in the Seven-Year Plan for oil pipelines.

According to the Committee's estimate, the deliverability of the new pipelines definitely planned or under construction will aggregate approximately 1,100,000 B/D at terminals in the Baltic, Central Europe, and the Black Sea.

Of the major petroleum pipeline systems planned for 1959-65, most are designed to increase the export capability of the Soviet Union:

(1) The much publicized Comecon (CEMA) pipeline, or the so-called "Pipeline of Friendship", will probably be in full operation in 1965. Including all branches, this line is a 3,824 mile system, designed to transport Urals-Volga crude oil to Poland, East Germany, Czechoslovakia and Hungary, to supply refineries planned or under construction in the USSR and to carry crude to the Baltic export terminal of Ventspils. The Committee has calculated that the Comecon line will have a carrying capacity of 740,000 B/D over the 40-inch sector leading out of the Urals-Volga, based on 85-90% load factor. The sections from Mozyr (USSR) to

Bratislava (Czechoslovakia), from Sahy (Czechoslovakia) to Szazhalombatta (Hungary), and from Unecha (USSR) through Plock (Poland) to Schwedt (East Germany) are in operation and being supplied at their Russian terminals by rail.

(2) Another important system is the Al'met'yevsk (Urals-Volga) to Leningrad crude oil line. This 32/28-inch system will have a capacity of 340/320,000 B/D and is completed from Al'met'yevsk to Yaroslavl. Construction of the line between Yaroslavl and Kirishi is now underway.

(3) To facilitate petroleum exports from the Black Sea, construction is underway on a system which will link the oil fields in the Volgograd (Stalingrad) area with the Black Sea ports of Tuapse and Novorossiysk. Information indicates that the lines from Tikhoretsk to Novorossiysk and to Tuapse are now completed. Terrain conditions currently limit the capacity of these lines to 85,000 B/D to each of the two Black Sea ports.

(4) Construction is also proceeding on an extension of both crude oil and products lines running east from the Ufa region to the Far East. The 320,000 B/D crude oil line to terminate at Irkutsk is to be completed in late 1964. The products line scheduled to reach Chita by 1965 apparently has been stopped at Novosibirsk. Negotiations are now dormant between the USSR and Japan concerning the barter of Soviet crude for Japanese steel pipe for use in a 2,730 mile extension of the crude oil line from Irkutsk to the Pacific Ocean port of Nakhodka. This line is not considered part of the Seven-Year Plan.

7. c. USSR FAILURE TO ATTAIN CONSTRUCTION GOALS FOR ITS OIL PIPELINE SYSTEM HAS RESULTED FROM TRANSFER OF PRIORITY TO CONSTRUCTION OF GAS LINES AND RESTRICTION OF FREE WORLD SALES OF PIPE TO THE BLOC

Most of the lag encountered in the construction of oil pipelines, particularly after 1955, can be traced to an inadequate supply of large diameter steel pipe, and a desire to expand at a rapid rate the natural gas transmission system.

To offset the lack of pipe the Soviet Union during 1959-62 purchased at least the following amounts of 40-inch steel pipe for delivery through 1964:

SUPPLIER	METRIC TONS
West Germany	710,000
Italy	180,000
Sweden	135,000
Japan	5,000
TOTAL	1,030,000

These purchases amounted to over 40% of the 40-inch pipe required by the Seven-Year Plan. If NATO had not recommended that Free World nations refrain from selling large diameter pipe to the Soviet Bloc, purchases of pipe would undoubtedly have been even higher. The restriction on pipe sales and the Russian emphasis on natural gas pipeline have, in fact, delayed the completion of the Comecon oil pipeline substantially.

7. d. THE NEW PIPELINE SYSTEMS OF THE USSR WILL HAVE MAJOR STRATEGIC AND ECONOMIC SIGNIFICANCE

It should be noted that these new pipeline systems will supply crude oil to terminals where there are heavy concentrations of Soviet and Satellite military forces. Thus the lines make possible a more reliable, uninterrupted delivery of fuels to these forces. Moreover, pipelines to the Baltic will facilitate the fueling of naval vessels.

The economic significance of these lines arises from several factors:

First, the Communist export capabilities to the Free World will increase and enable the Soviet Bloc to exert more economic and political pressures on nations of the West that rely on Soviet oil supplies. Further, additional exports will permit the Soviet Bloc to increase purchases of critical equipment and technology from the Free World.

Second, the Comecon system will increase the dependence of the European Satellites on the USSR for crude oil.

Third, the pipeline systems will result in a substantial reduction in transportation costs. The savings can be illustrated by comparing rail transport costs from Kuybyshev to Ventspils on the Baltic Sea with estimated pipeline costs over the same route. The Committee estimates that rail costs to move crude oil from Kuybyshev to Ventspils are about $0.90 per barrel, but that pipeline costs, following completion of the line to Ventspils, will be only $0.31 per barrel.

7. e. THE USSR HAS UTILIZED FREE WORLD SHIPYARDS TO BUILD A SOVIET DEEP SEA TANKER FLEET RAPIDLY

In 1950 the USSR deep sea tanker fleet totaled only 174,000 dwt with the largest vessel 10,900 dwt. Also, the Satellite fleet was extremely small. In 1958, when the USSR oil offensive was beginning to get into stride, the first Soviet supertanker, the 29,000 dwt. Pekin, was laid down. Three other ships of this size followed in 1960 and 1961, and in 1960 the USSR started acquiring tonnage in Free World yards.

As of January 1, 1964, the Soviet Bloc fleet totaled almost 2,400,000 tons as shown on Table 11.

TABLE 11

SOVIET BLOC TANKER FLEET
(As of January 1, 1964)

	T-2 EQUIVALENT	DWT
Bloc Flag Tankers in Petroleum Service	122.4	2,035,839
Bloc Flag Tankers Not Reported in Ocean Petroleum Trade	16.8	340,244
TOTAL OPERATING*	139.2	2,376,083

* Combination USSR flag ore/oil carriers have been excluded from availability since the portion of their time during which they are engaged in petroleum trade is unknown.

Of this total fleet, shown above, 58.2 T-2 equivalents, (42%) were built in Free World countries.

7. f. THE SOVIET BLOC TANKER FLEET WILL BE ALMOST INDEPENDENT OF FREE WORLD CHARTERING FOR EXPORTS IN 1965, WITH THREE-QUARTERS OF THE NEW TONNAGE SUPPLIED BY THE FREE WORLD

The Bloc tanker fleet is continuing to grow through buildings in both the Bloc and Free World yards.

As of January 1, 1964, orders for new construction in the Soviet Bloc yards totaled 10 ships, equivalent to 17.8 T-2's. But far more important than the buildings in the Bloc yards are the acquisitions in the Free World. As of January 1, 1964, orders for new construction in the Free World yards for the USSR totaled 43 ships equivalent to 67.2 T-2's, as shown on Table 12.

TABLE 12

SOVIET BLOC NEW TANKER CONSTRUCTION ON ORDER
FREE WORLD YARDS
(As of January 1, 1964)

	NUMBER OF SHIPS OF EACH DWT CLASS					TOTAL	
LOCATION	5,000	21,000	35,000	48,000	TOTAL	DWT	T-2 EQUIVALENT
Japan			10		10	350,000	24.6
Italy				5	5	240,000	16.8
Finland	13				13	64,935	3.8
Yugoslavia	—	15	—	—	15	312,000	22.0
TOTAL	13	15	10	5	43	966,935	67.2

The tonnage the Bloc is receiving from the Free World is almost four times that from its own yards. Clearly it is indebted to the Free World for the success of its program.

When the Seven-Year Plan (1959 through 1965) was announced in 1958, the stated intention was to increase the size of the tanker fleet by 80% during the Plan. Thus, the Soviet fleet would have to increase from 819,000 dwt. at the end of 1958 to 1,474,000 dwt. at the end of 1965. As contrasted to this, the Committee estimates that the USSR fleet will total approximately 3,100,000 dwt. at the end of 1965. Thus, instead of only an 80% increase as planned, the USSR fleet will almost quadruple in size with just the buildings known to date.

Balances made by the Committee on the basis of 894,000 B/D of export volume to the Free World by sea in 1965 (the remaining 71,000 B/D moving by other modes of transportation) show that the Bloc will have enough tankers of its own to move about 85% of this volume. Those customers who prefer to use their own tonnage would supply the bulk of the remaining requirements. Thus, the Soviet Bloc tanker fleet will be almost independent of Free World chartering in 1965.

7. g. DEPENDENCE ON OIL CARRIED IN BLOC TANKERS COULD CAUSE SERIOUS TRANSPORTATION DIFFICULTIES FOR THE FREE WORLD

With the Bloc self-sufficient in tankers and moving most of its exports in its own bottoms, it is in a position at any time to deny the Free World not only this export volume of oil, but also the ships being used to transport the oil. The Committee estimates that if the Bloc should export 894,000 barrels of oil per day to the Free World in 1965 by sea, and if it should interrupt this supply and deny the use of the Bloc's own tankers, then the Free World would need an additional 242.4 T-2 equivalents to replace this supply of oil from Free World alternative sources. This surge in requirements could be in excess of the then existing spare tonnage, causing severe transportation and oil problems.

OIL EXPORTS TO THE FREE WORLD

8. a. SOVIET BLOC PETROLEUM EXPORTS TO THE FREE WORLD HAVE GROWN AND WILL CONTINUE TO GROW UNLESS ACTION IS TAKEN BY THE WEST

From 1955 to 1963 Bloc oil exports to the Free World increased from 116,300 to 740,000 B/D as shown on Table 13.

TABLE 13

VOLUME OF SOVIET BLOC OIL EXPORTS
TO THE FREE WORLD - CRUDE AND PRODUCTS

YEAR	1,000 B/D
1955	116
1956	139
1957	165
1958	236
1959	352
1960	487 (444)
1961	616 (536)
1962	670 (582)
1963	740 (645)
1965 Estimate	965 (867)
1970 Estimate	1,400-1,700 (1,300-1,600)

Bracketed figures assume Cuba in the Soviet Bloc.

During the 8-year period 1955-63 these exports grew at a compound rate of 26% per annum. (24% per annum if Cuba in the Soviet Bloc). During the same period, Free Foreign oil consumption grew at a compound rate of 10% per annum.

About fifty-four percent of the total Bloc exports in 1963 was crude oil, with the remainder products. Of the 1963 total, eighty-five percent came from the USSR. In 1962, the USSR exported to the Bloc and the Free World an estimated 895,000 B/D, increasing to an estimated 1,000,000 B/D in 1963. In 1950 the USSR was a net importer of 30,000 B/D.

The Committee estimates a surplus of 965,000 B/D available for export to the Free World from the Bloc in 1965 and 1,400,000 - 1,700,000 B/D in 1970. About one-half of these volumes is expected to be products, if the Soviets have adequate refinery capacity to supply this amount. A country-by-country analysis of predicted demand patterns, types of Soviet oil purchasers, and refining and marketing facilities, indicates that there would be markets that might be induced to absorb this oil.

Planned construction of pipelines and sea going vessels for the transportation of oil, immense untapped reserves of oil within the Soviet Union and a growing need for foreign exchange, all point to increased ability and pressure by the Soviet Bloc to export more oil to the Free World. The determining factor in the actual magnitude of these exports will be willingness of Free World countries to accept the economic, political and strategic risk of Soviet Bloc oil.

8. b. THE BULK OF THE SOVIET BLOC OIL EXPORTED TO THE FREE WORLD GOES TO EUROPE

Historically, the bulk of Bloc oil exports has gone to Europe. In 1962 and 1963, Europe absorbed two-thirds of the total, as shown on Table 14.

Eighty percent of the volume of Bloc oil is absorbed by a handful of customers--Italy, West Germany, Cuba, Japan, Sweden, Finland and Egypt. NATO countries absorb 335,000 B/D or more than half the volume, excluding Cuba from the Free World. While the total amount of 1963 imports of Soviet Bloc oil was 6% of Free World demand (outside the U. S.), certain countries import much more than this percentage of their local requirements, as noted in Table 14.

8. c. GOVERNMENT-OWNED OIL COMPANIES ARE LARGE BUYERS OF SOVIET CRUDE

An analysis of the types of Free World companies which buy Communist oil shows that in 1962, 45% of the oil was purchased by government oil companies and 44% by non-integrated oil companies. Large customers such as power plants, unknown companies and others account for the remaining 11% of Soviet Bloc oil sales. It is believed that the composition of customers was about the same in 1963. The detailed distribution is shown on Table 15.

TABLE 14

TOTAL SOVIET BLOC PETROLEUM EXPORTS TO
FREE WORLD BY COUNTRY OF DESTINATION

	1962		1963 (ESTIMATED)	
WESTERN HEMISPHERE	THOUSAND BBLS. PER DAY	PERCENT OF LOCAL DEMAND	THOUSAND BBLS. PER DAY	PERCENT OF LOCAL DEMAND
Brazil	6	2	25	8
Cuba	88	100	95	100
TOTAL WESTERN HEMISPHERE	94		120	
FREE EUROPE				
Austria	22	29	26	31
Belgium	9	4	10	4
Denmark	5	4	7	4
Finland	58	87	60	80
France	25	3	27	3
West Germany	89	9	100	8
Greece	20	35	20	33
Iceland	7	88	7	82
Italy	142	20	150	19
Norway	5	6	8	9
Portugal	1	2	2	4
Spain	-	-	1	1
Sweden	55	19	60	20
Switzerland	3	3	3	2
United Kingdom	5	-	4	-
Yugoslavia	6	18	5	13
TOTAL EUROPE	452	8	490	8
OTHER EASTERN HEMISPHERE				
Ceylon	3	15	7	33
India	8	3	10	5
Japan	59	6	70	6
Egypt	32	30	25	23
Morocco	2	9	5	22
Others	20	-	13	-
TOTAL EASTERN HEMISPHERE	124	-	130	-
TOTAL FREE WORLD (EXCLUDING U.S.)	670	6	740	6

TABLE 15

1962 SOVIET BLOC SALES TO FREE WORLD
BY TYPE OF PURCHASER

	THOUSAND BARRELS PER DAY			
	GOVERNMENT OWNED COMPANIES	NON-INTE-GRATED COMPANIES	OTHERS	TOTAL
Crude				
Western Hemisphere	74	-	-	74
Europe	136	67	-	203
Other Eastern Hemisphere	23	43	-	66
Sub-Total	233	110	-	343
Percent of Total Crude	68	32	-	100
Products				
Western Hemisphere	25	-	-	25
Europe	26	167	56	249
Other Eastern Hemisphere	19	16	18	53
Sub-Total	70	183	74	327
Percent of Total Products	21	56	23	100
Percent of Total Crude & Products if Cuba in Free World	45	44	11	100
Percent of Total Crude & Products if Cuba in the Bloc	37	50	13	100

8. d. SOVIET OIL EXPORTS HAVE REDUCED THE REVENUE OF THE FREE WORLD'S OIL PRODUCING COUNTRIES AND SOVIET PRICING POLICIES HAVE A DEPRESSING EFFECT ON FREE WORLD OIL SELLING PRICES

The rapid increase in Soviet Bloc petroleum exports in recent years has been at the expense of the Free World's oil exporting countries. For the purpose of assessing the effects of Soviet oil on the revenues of producing countries, 1953 was selected as a base year. It was the year Stalin died and marked a change in emphasis in Soviet economic policy from maximum autarky to a growing reliance upon foreign trade to accelerate the economic development of the Bloc. In 1953, Soviet Bloc oil exports were confined to Western Europe, and equaled 1.9% of demand in that area. In 1963, Bloc oil supplied about 8% of Western Europe's greatly increased demand and made inroads into Free Asia, Africa and the Western Hemisphere.

In 1963, Soviet Bloc oil exports to the Free World approximated 740,000 B/D. If Soviet Bloc exports to Western Europe since 1953 had remained in line with their percentage share in that year, and there had been no penetration of other markets, the 1963 total Bloc exports would have been only 112,000 B/D, or 628,000 B/D less than the actual total. To the extent that Soviet Bloc oil exports reduced the volume of exports from Free World producing countries, Venezuela and the Middle East were the principal sufferers.

The government revenues that would have been derived from such displaced oil have been estimated on the basis of the average direct income per barrel received by Middle Eastern and Venezuelan governments. On this basis cumulative losses to these governments over the 1954-63 period, as shown in Table 16, have reached $840 million. If no action is taken by the West, the loss for 1964 is estimated at about $200 million, rising to $240 million in 1965 and to $350-450 million in 1970. These estimates do not take into consideration the fact that Soviet sales of oil at very low prices have had a depressing effect on Free World prices for petroleum.

TABLE 16

CALCULATED LOSS OF DIRECT INCOME TO THE MIDDLE EAST AND VENEZUELA DUE TO FREE WORLD IMPORTS OF SOVIET BLOC OIL 1954 - 63

YEAR	MILLIONS OF U.S. DOLLARS
1953	-
1954	15
1955	19
1956	25
1957	34
1958	52
1959	83
1960	117
1961	145
1962	167
1963	183
1954-63	840

In addition to payments of tax and royalties, and other payments stipulated in basic contracts--which form the basis of the preceding loss calculations--the production and export of oil give rise to a number of other local receipts, e.g., wages and salaries, revenues of local contractors, and payments for local purchases of goods. The level of these local receipts is linked to the level of oil production; hence, Soviet oil exports have a retarding or depressing effect on such transactions.

The size of direct payments to the governments of Free World oil exporting countries not only depends upon the volume of exports, but also is related to either posted prices or FOB selling prices. Since Soviet price cutting contributes to a reduction in these prices, the levels of direct payments per barrel, as well as total direct payments, are reduced.

SOVIET BLOC FOREIGN TRADE OBJECTIVE

9. a. BLOC FOREIGN TRADE IS AN IMPORTANT FACTOR IN REACHING SOVIET ECONOMIC AND POLITICAL GOALS

Among the first things to be nationalized when the Communists came to power in Russia was foreign trade. A government decree of April 23, 1918, prohibited all import and export transactions except through the intermediary of special state agencies. While there have been some changes in form through the years, the principle of maintaining a state monopoly over exports and imports has never been infringed.

The USSR considered it essential that foreign trade be monopolized in order to make it entirely subordinate to the aims of the country's political and economic plans. It was recognized that complete control over foreign trade had other purposes, e.g.

(1) Protection of the domestic economy against foreign competition.

(2) Isolation of the internal currency from the influence of foreign exchange markets.

(3) A strong bargaining position in trading with private enterprises in the Free World.

(4) Ability to discriminate among purchasers and suppliers and to sell in foreign markets without regard for normal commercial considerations or internal costs.

(5) Flexibility to adjust trade to serve political objectives.

Premier Khrushchev underscored the importance of the last purpose when he stated that, "We value trade least for economic reasons and most for political purposes." Clearly, Soviet Bloc trade, which is backed by the monolithic power of the State, cannot be considered on the same terms as the trade of individual private companies motivated by commercial objectives. The foreign trade of the Soviet Bloc is but one element

in the Soviet Union's plan to consolidate its power and to extend communistic influence over countries that deal with it.

Specifically, the foreign trade and aid program of the Soviet Bloc is aimed at:

(1) Obtaining vital materials and technical knowhow from the Free World to strengthen the Communist economic-military base.

(2) Spreading communism through extension of state control in countries with which the Bloc trades, thus expanding the area of ideological influence.

(3) Destroying operations of private companies. The USSR recognizes that commercial firms, operating under a system of free enterprise, are a source of strength to the Free World, and pose a threat to the ideology of state control.

(4) Creating unrest and political instability in areas of vital importance to the defenses of the Free World.

In the initial years following World War II, the trade of the Soviet Bloc followed a deliberate policy of aiming toward economic self-sufficiency. Following the death of Stalin in 1953, the commercial policy of the Bloc was reoriented toward greater trade between the East and the West. The result was a spectacular increase in trade as shown in Figure 1.

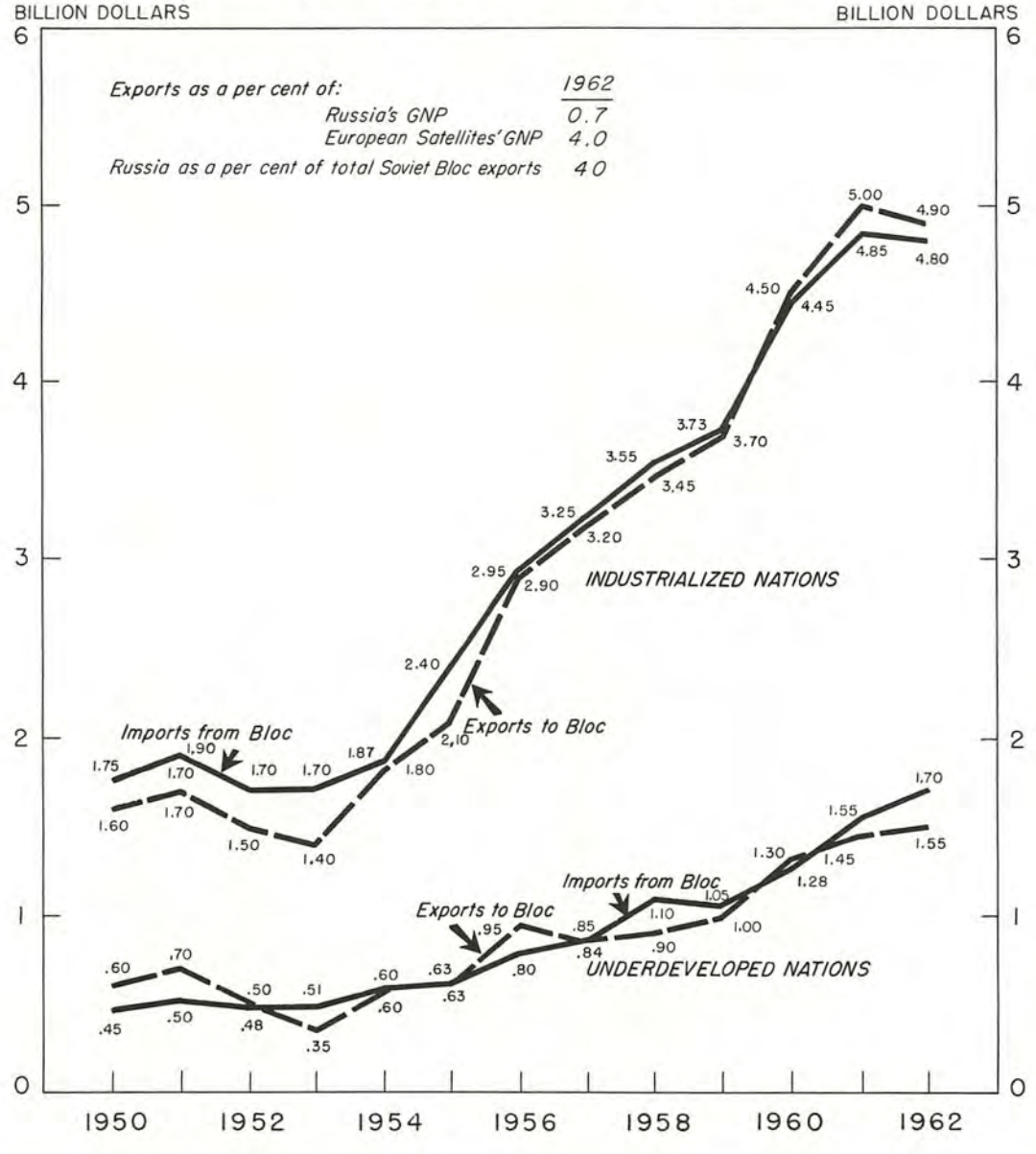
By 1962, Free World trade with the Bloc had increased to $4.9 billion in each direction, three and one-half times the 1953 level. The Bloc's share of international trade rose from about 2% to almost 4% during this period. Over half of the East-West trade in 1962 was with Western Europe.

Despite this increased trade, it would be unrealistic to expect the USSR's trade to become permanently interwoven with that of the Free World. Exports to Western nations equal only 0.7% of the USSR's Gross National Product. As the Communists readily admit, they are not interested in imports of given items over an extended period of time, but only to meet temporary shortages or to acquire technology at low cost in time and money.

FIGURE NO. I

FREE WORLD TRADE WITH THE SOVIET BLOC

(CUBA INCLUDED IN FREE WORLD)



9. b. THE ACQUISITION OF STRATEGIC GOODS AND TECHNOLOGY IS AN IMPORTANT OBJECTIVE OF THE SOVIET BLOC COUNTRIES IN THEIR TRADE WITH INDUSTRIALIZED NATIONS.

In the following table, the exports to the Bloc of metals, metal shapes, chemicals, transportation equipment, machinery, complete plants and other manufactured goods demonstrate the importance of this segment of trade to the USSR and its Satellites.

TABLE 17

VALUE OF EXPORTS TO SOVIET BLOC OF METALS, METAL SHAPES, CHEMICALS, TRANSPORT EQUIPMENT, MACHINERY, PLANTS, OTHER MANUFACTURED GOODS IN 1962

EXPORTING COUNTRY	VALUE IN MILLIONS OF U.S. DOLLARS	PERCENT OF TOTAL EXPORTS TO SOVIET BLOC
West Germany	561	75
United Kingdom	300	90
France	225	80
Italy	214	82
Japan	193	90
Austria	168	89
Sweden	120	75
Belgium-Luxembourg	73	77
United States	16	13

The items of major interest to the Soviet Bloc are the products of advanced technology. Particularly desirable from the Communist point of view are complete plants which represent an import of technology that can be duplicated directly and thus multiply many-fold the yield from a relatively small purchase. The following items are of special significance: Complete petrochemical and synthetic plants, electronic equipment for communications and control, precision and highly automatic machine tools, construction machinery, industrial handling equipment, carbon steel and alloy sheet and strip, modern cold-rolling mills for sheet and strip steel, electric power generation and transmission equipment, precision bearings, rail and ocean transport equipment, complete tire plants, and large diameter pipe and other equipment needed for the production and

transportation of oil. As previously mentioned, in the period 1959-64. the USSR purchased at least 1,030,000 tons of 40-inch diameter pipe from West Germany, Italy and Sweden. Also, during the last two years, the USSR purchased a number of tankers. Many of these items have obvious military as well as economic significance.

In return, the industrialized nations buy from the Bloc large amounts of food, crude materials and fuels. Of the ten countries listed in Table 17 above, six -- West Germany, France, Austria, Italy, Sweden and Japan -- are among the ten largest offtakers of Soviet Bloc oil.

Though the Bloc is now buying huge amounts of industrial equipment and products of high technology, it has no wish to remain dependent on foreign suppliers for such items. The Soviets have not abandoned their goal of self-sufficiency. A current example is the case of tankers. At this time, the Bloc is dependent on tonnage chartered in the Free World, but by 1965 it will be practically self-sufficient.

In short, the bulk of East-West trade is characterized by the Bloc importing what it desperately needs but is unable to produce at home, while the West receives in exchange items already in abundant supply in the Free World.

9. c. ANOTHER IMPORTANT AIM OF THE SOVIET BLOC'S ECONOMIC OFFENSIVE IS TO EXERT POLITICAL PRESSURE AND EXTEND COMMUNIST INFLUENCE

In the developing countries of the world, the USSR combines the extending of economic assistance with an aggressive expansion of trade often under conditions which are ostensibly favorable to the less developed participants. Many of these nations have political and economic structures that make them prime targets for Communist subversion.

From the less developed countries, the Soviet Bloc generally receives agricultural commodities and raw materials. In turn, the Bloc sells them machinery, petroleum, food and ferrous metals. The benefit to the less developed countries lies largely in their ability to dispose of commodities in

chronic surplus. In some cases, however, the Bloc has moved in with much fanfare to buy up a whole crop or substantial quantities of surplus products, only later to resell them on Free World markets in competition with countries from which they were originally purchased.

Nevertheless, barter deals involving surplus products are effective vehicles of Soviet influence since they make commodity producing countries highly dependent on the Soviet Bloc for markets. In countries where currencies are soft or inconvertible, the exchange of commodities through barter agreements gives Soviet oil a big advantage over Free World oil. As well, the principles of free trade are violated and free enterprise is weakened whenever state trading is promoted.

However, the specter of Soviet pressure and interference in the domestic affairs of the Free World also hangs over the industrialized countries. Development of industries that depend on the Soviet markets can be undermined by abrupt and arbitrary political decisions of the Bloc. If these markets are closed, it is natural that the enterprises involved should seek a reopening of trade outlets. Since the markets may well have been closed for political reasons, regaining access to them might well involve concessions that would be advantageous to the Soviets.

The significance to the exporting nations of outlets in the Soviet Bloc, acquired or increased as a result of the acceptance of Soviet Bloc oil or other products, varies widely from country to country. Any substantial reliance by a Free World country on trade with the Soviet Bloc, the governments of which exercise complete control over foreign trade, creates a threat to the security, political independence and economic health of that country.

Soviet Bloc markets can be -- and have been -- closed and Soviet Bloc supplies can be -- and have been -- interrupted more for political reasons than for commercial considerations. This happened to Israel in 1956 when its supply of Soviet oil was cut off in the Suez crisis. Israel's claims for damages were rejected by the Soviet Foreign Trade Arbitration Commission. Also in 1958, the USSR cancelled orders in Finland, delayed trade negotiations, and cut off crude oil supplies until certain Conservative members of the Cabinet resigned. In 1963, Polish

exports of coal to France were halted during a French coal miners' strike in a move to support the miners and to force the French government to accede to their demands.

9. d. PETROLEUM EXPORTS ARE MOST ESSENTIAL TO THE SOVIET UNION IN REACHING ITS TRADE OBJECTIVES

The Soviet Bloc has seized on petroleum as a highly merchantable commodity that can be used both to gain much needed Western equipment and technology and to increase political influence. In 1961 the value of Free World petroleum imports from the Soviet Bloc amounted to $506 million as shown in the following Table:

TABLE 18

PETROLEUM COMPONENT OF FREE WORLD (INCLUDING CUBA) IMPORTS FROM THE BLOC*
($U.S. Millions and Percent)

	FROM TOTAL BLOC			FROM USSR		
YEAR	TOTAL TRADE	PETROLEUM	PERCENT OF TOTAL	TOTAL TRADE	PETROLEUM	PERCENT OF TOTAL
1952	1,634	26	1.6	468	10	2.1
1955	2,435	143	5.9	654	71	10.8
1960	4,443	443	10.0	1,507	326	21.6
1961	4,908	506	10.3	1,870	384	20.2
1961**	(4,678)	(436)	(9.8)	(1,594)	(336)	(21.0)

* Derived from Battle Act Report published December, 1963.
** Cuba included in Bloc.

The growth of oil has been spectacular. It now accounts for over 9% of the Free World imports from the Bloc and for about 20% of those from the USSR.

9. e. THE FREE WORLD OIL INDUSTRY IS A MAJOR TARGET OF THE SOVIET ECONOMIC OFFENSIVE

The growth in Bloc oil trade has a significance more widespread than the volume indicates.

From Lenin down to the present day, the Communists have looked upon the private oil industry as a major symbol of the free enterprise system and of the economic strength of the Free World. As such, the continuing existence and prosperity of the private oil industry poses an obstacle to the spread of their own ideology and influence.

An article in an authoritative Soviet publication clearly expressed the aims of the Communists toward the Free World oil industry.* It stated:

> It should be borne in mind that oil concessions represent, as it were, the foundation of the entire edifice of Western political influence in the (less developed) world, of all military bases and aggressive Blocs. If this foundation cracks, the entire edifice may begin to totter and then come tumbling down.*

Thus, the Soviet Union is not out simply to sell oil, but to disrupt, undermine and, if possible, destroy the position of the private oil industry.

The USSR is using every means to encourage state control over oil in Free World countries, and to incite the leaders of developing nations against the private oil industry. Facilities have already been expropriated in Ceylon and Cuba, and the industry is under heavy pressure in many other countries

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* From an article in the Soviet publication International Affairs.

as a result of Soviet offers of oil aid. The Soviet Bloc is sending out petroleum technicians and making loans to any country willing to promote state development and distribution of oil. Countries which have accepted such aid range from Afghanistan in the Far East to Brazil in the Western Hemisphere. As previously shown, government oil companies, in turn, become large customers of Soviet oil.

The trading methods of the Communists--state trading on the basis of government-to-government barter agreements--weaken seriously the basis for continued private trading in oil. State trading is by its nature discriminatory and destructive of free enterprise, and when conducted on a massive scale and by countries opposed to private ownership, it becomes an even more powerful means of weakening private operations.

9. f. PRESENT FREE WORLD TRADE CONTROLS ARE LARGELY INEFFECTIVE IN RETARDING THE EXPORTS OF BLOC OIL, AND, WITH THE EXCEPTION OF U.S. CONTROLS, IN PREVENTING SALES OF CRITICAL EQUIPMENT THAT THE BLOC PROCURES WITH OIL

Although the Committee may not be aware of all the efforts to restrict Bloc oil, it believes that relatively little has been done to date. However, it is known that restrictive measures have been discussed in NATO and consideration is now being given this problem by the European Common Market.

Equally serious is the lack of an effective program for controlling the critical equipment the Bloc is purchasing in the West--purchases toward which Soviet oil is making a large contribution. The present COCOM agreements are limited to a narrow list of arms, atomic energy material and strategic materials. The agreement is not aimed at the export of goods and technology which contribute to the industrial potential of the Bloc. To illustrate, the Committee believes the USSR is seeking one or more complete refineries and other petroleum equipment in the West to insure meeting its petroleum goals. None of these items is embargoed by COCOM. The only restrictions in effect are those adopted by the NATO countries on the shipment of large diameter pipe to the Soviet Bloc.

The U. S. maintains a much tighter control than the COCOM agreement prescribes, but even in the U. S. general licenses exist for the export of drill pipe, drill collars and

tool joints to Poland. The U. S. does require validated export licenses for other drilling equipment destined to Poland, and, in general, all drilling equipment to the other Bloc nations.

As is indicated elsewhere in this report, the Committee's estimates of Soviet Bloc oil exports to the West assume a continuation of present Western trade policies vis-a-vis the Soviets. Should these policies be relaxed, exports would reach higher levels.

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PART TWO

APPRAISAL OF THE SOVIET BLOC:

DETAILED BACKGROUND

1964 Supplement to Report

Issued—October 4, 1962

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for

PART TWO *

* As is explained in the Introduction, this part of the 1964 Supplement presents in Summary form the results of the Committee's detailed reappraisal of the material covered at length in Volume II of the 1962 report.

V. THE SINO-SOVIET BLOC: EXTERNAL

General Trade with Free World

Petroleum Trade and Aid

Free World Export Trade Controls Applying to the Bloc

STATISTICAL APPENDIX

Separate Table of Contents Listing Appendices Appears on Page A-1.

TABLE OF CONVERSION

	MULTIPLED BY	EQUALS
Meters	3.281	Feet
Kilometers	0.621	Miles
Cubic Meters	35.314	Cubic Feet
Metric Ton	1.102	Short Tons
Metric Ton	7.3	Barrels
Million Metric Tons Per Year	20.0	Thousand Barrels Per Day
Barrels Per Day	50	Metric Tons Per Year
Hectare	2.471	Acres
Square Kilometer	0.386	Square Miles
Square Meter	10.764	Square Feet

ENERGY CONVERSION FACTORS FOR THE U. S. S. R.

YEAR	HARD COAL [a]	CRUDE OIL [a]	NATURAL GAS [b]	HYDRO-ELECTRIC POWER [c]
1961	0.73	1.43	1.20	0.45
1962	0.73	1.43	1.17	0.44
1965	0.733	1.43	1.17	N.A.
1970	0.72	1.43	1.17	N.A.

ENERGY CONVERSION FACTORS FOR THE SATELLITES

COUNTRY	HARD COAL [a]	BROWN COAL & LIGNITE [a]	CRUDE OIL [a]	NATURAL GAS [b]	HYDRO-ELECTRIC POWER [c]
Albania	-	0.5000	1.40	1.30	0.5
Bulgaria	0.75	0.4966	1.40	1.30	0.5
Czechoslovakia	0.7271	0.4989	1.50	1.30	0.5
East Germany	0.8571	0.3143	1.50	1.30	0.5
Hungary	0.6714	0.4643	1.40	1.30	0.5
Poland	0.8571	0.2857	1.50	1.30	0.5
Rumania	0.5714	0.2771	1.50	1.35	0.5
China	0.48	-	1.43	0.13	0.48

(a) The given factor times production expressed in millions of tons yields millions of tons of standard fuel.

(b) The given factor times production expressed in millions of cubic meters yields thousands of tons of standard fuel.

(c) The given factor times production expressed in billions of kilowatt-hours yields millions of tons of standard fuel.

All of the ruble quotations in this Report are in new rubles; i.e.: 1 ruble = $U.S. 1.11

All ton figures in this Supplement are given in metric tons.

I N T R O D U C T I O N

For the performance of its assigned task of revising the National Petroleum Council's 1962 report on the "Impact of Oil Exports from the Soviet Bloc", the Committee considered it particularly desirable to advance the forward horizon for projections and forecasts from 1965 to 1970. At the same time, the Committee felt that the quality and quantity of new material did not justify the great amount of work which would be required to revise and re-issue the 607 pages of Volume II of the original report. Considering the virtues of brevity, the Committee decided to present to you significant changes and additions in an updated version of Volume I. A new section, consisting of a number of statistical tables, has been added as an Appendix.

One word of caution: Some of the statistics shown in these pages (particularly cost data) may appear questionable in the light of difficulties in arriving at comparable data for the U.S. However, it must be recognized that in some cases certain data may be more readily fixed in a planned and authoritarian economy. Obviously the Committee had no way of checking some Soviet statistics other than by appraising their internal consistency and assessing their reasonableness in the light of Western experience.

The Committee wishes to emphasize that while there may be inaccuracies in some of the data reported by the USSR, these data nevertheless appear to be used by Soviet planners and operators in decision making. In many ways it is the data which they use, rather than what is actually true, which is more significant. Furthermore, it should be noted that the actual cost of production, or the Soviet estimate thereof, is not the only factor in setting the selling price of petroleum to the Free World. The Soviet economic system permits the establishment of selling prices at any level believed desirable to meet economic and political objectives.

I. THE SOVIET UNION

ENERGY IN THE SOVIET UNION

SECTION 1. PRODUCTION OF ENERGY

The production of energy in the Soviet Union is moving steadily toward a greater share for crude oil and natural gas at the expense of coal. This shift to the more economical liquid and gaseous fuels, which was programmed in the Seven Year Plan (1958-1965), is bringing a substantial lessening of costs and giving the USSR a more diversified energy base.

During the first five years of the Seven Year Plan, the production of both coal and natural gas lagged behind goals, while that of crude oil was consistently above target. Reflecting these developments, the Soviets in 1963 began changing production goals. First they lowered coal and natural gas targets for 1965 while raising that for oil. Subsequently they had second thoughts about oil and restored the original target. The new, lower total energy production estimates reflect two factors. First, the original goals were unrealistically high even in terms of historical growth rates. Second, the Soviet economic growth rate has apparently slowed down since the Committee's 1962 study.

The USSR has also revised downward the 1970 targets which were given in the Twenty Year Plan (1961-80). The goal for oil production has been reduced by about 10% and that for gas by 20%.

The Committee believes that the reduced amounts of energy thus programmed for both 1965 and 1970 represent attainable targets. Indeed in the case of oil the targets may well be conservative. Production of these volumes should provide adequately for domestic needs while allowing high levels of exports to the outside world.

Table 19 compares reported energy production for 1961 and 1962 with the Committee's estimates for 1965 and 1970.

TABLE 19

TOTAL ENERGY PRODUCTION IN THE USSR

SOURCE OF ENERGY	UNIT OF NATURAL MEASURE[a]	1961 NATURAL UNITS	1961 MMTSF[b]	1961 PERCENT OF TOTAL	1962 NATURAL UNITS	1962 MMTSF[b]	1962 PERCENT OF TOTAL	1965 COMMITTEE ESTIMATE NATURAL UNITS	1965 COMMITTEE ESTIMATE MMTSF[b]	1965 COMMITTEE ESTIMATE PERCENT OF TOTAL	1970 COMMITTEE ESTIMATE NATURAL UNITS	1970 COMMITTEE ESTIMATE MMTSF[b]	1970 COMMITTEE ESTIMATE PERCENT OF TOTAL
Coal	MMT	510.5	370.1	49.0	517.4	379.3	46.8	550	403	40.4	630	453	32.7
Crude Oil	Million B/D	3.32	237.5	31.4	3.72	266.1	32.8	4.90	350	35.0	7.20	515	37.2
Natural Gas Liquids	Million B/D	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	0.08	6	0.6	0.18	13	0.9
Natural Gas	Trillion CF	2.08	70.8	9.4	2.60	85.9	10.6	4.59	152	15.2	8.82	293	21.2
Hydroelectric	BKWH	59.1	26.7	3.5	71.9	31.5	3.9	NA	43	4.3	NA	70	5.0
Nuclear	BKWH	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	NA	NA	NA
Sub-Total		-	705.1	93.3	-	762.8	94.1	-	954	95.5	-	1,344	97.0
Peat	MMT	51.6	19.6	2.6	34.7	13.3	1.6	50	19	1.9	50	19	1.4
Shale	MMT	15.2	5.2	0.7	16.4	5.8	0.7	20	7	0.7	22	8	0.6
Fuelwood		NA	26.0	3.4	NA	29.4	3.6	NA	19	1.9	NA	14	1.0
GRAND TOTAL		-	755.9	100.0	-	811.3	100.0	-	999	100.0	-	1,385	100.0

a/ MMT = Million Metric Tons.
B/D = Barrels Per Day. Converted from original figures in metric tons. 1 million metric tons per year = 20,000 B/D.
CF = Cubic Feet.
BKWH = Billion Kilowatt-Hours.

b/ MMTSF = Million Metric Tons of Standard Fuel. One metric ton of standard fuel has a calorific value of 7,000,000 kilocalories or 27,780,000 BTU.

Neg. = Negligible
NA = Not available.

SECTION 2. CONSUMPTION OF ENERGY AND NET TRADE

Little information is available in current Soviet literature with respect to the consumption of primary energy. Published data consistently exclude gasoline, kerosine, and diesel fuel, and, therefore, overemphasize the importance of coal and understate the role of petroleum.

The Committee has, however, calculated the apparent energy consumption for a number of recent years, by deducting net trade in fuels from energy production. Table 20 summarizes the estimates for 1961 and 1962 and the predictions for 1965 and 1970.

The Committee estimates that during the current Seven Year Plan period the apparent consumption of primary energy will increase from 612 million metric tons of standard fuel in 1958 to about 886 million tons in 1965. Of this growth, over three-fourths is to be provided by oil and natural gas, despite net exports of these fuels equivalent to about 85 million tons of standard fuel in 1965.

The Committee further estimates that during the current decade the apparent consumption of primary energy will increase from 668 million metric tons of standard fuel in 1960 to about 1,200 million tons in 1970. Again oil and gas will supply the major portion, about 70%, of the growth.

Annual per capita energy consumption in the U. S. in 1961 was 3 times that in the USSR (250 vs. 87 million BTUs/capita). Over the forecast period the absolute gap in per capita consumption between the U. S. and the USSR probably will remain about constant.

In 1958 the USSR showed a net export of energy equivalent to 4% of production, but by 1961 net exports reached almost 9% of production. The Committee believes that exports are to increase further to 113 million tons of standard fuel in 1965, or 11% of estimated energy output in that year. By 1970, the USSR may be exporting over 13% of its total energy production. Clearly energy is and will continue to be a prime export commodity, primarily in the form of petroleum. (See Table 21.)

TABLE 20

COMMITTEE ESTIMATES OF APPARENT
TOTAL ENERGY CONSUMPTION IN USSR

	1961		1962		1965		1970	
	MILLION METRIC TONS OF STANDARD FUEL	PERCENT OF TOTAL	MILLION METRIC TONS OF STANDARD FUEL	PERCENT OF TOTAL	MILLION METRIC TONS OF STANDARD FUEL	PERCENT OF TOTAL	MILLION METRIC TONS OF STANDARD FUEL	PERCENT OF TOTAL
Coal	358.2	52.0	364.0	49.7	378	42.6	416	34.7
Crude Oil	181.9	26.4	203.0	27.7	264	29.9	373	31.1
Natural Gas Liquids	Neg.	Neg.	Neg.	Neg.	6	0.7	13	1.1
Natural Gas	70.4	10.2	85.5	11.7	151	17.0	292	24.3
Peat	19.6	2.9	13.3	1.8	19	2.1	19	1.6
Shale	5.2	0.8	5.8	0.8	7	0.8	8	0.7
Fuelwood	26.0	3.8	29.4	4.0	19	2.1	14	1.1
Hydroelectric	26.7	3.9	31.5	4.3	42	4.8	65	5.4
Nuclear	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	NA	NA
TOTAL	688.0	100.0	732.5	100.0	886	100.0	1,200	100.0

TABLE 21

COMMITTEE ESTIMATES OF
APPARENT NET TRADE OF ENERGY IN USSR [a]

	1961		1962		COMMITTEE ESTIMATE 1965		COMMITTEE ESTIMATE 1970	
	MILLION METRIC TONS OF STANDARD FUEL [b]	PERCENT OF TOTAL	MILLION METRIC TONS OF STANDARD FUEL	PERCENT OF TOTAL	MILLION METRIC TONS OF STANDARD FUEL	PERCENT OF TOTAL	MILLION METRIC TONS OF STANDARD FUEL	PERCENT OF TOTAL
Coal	-11.9	17.5	-15.3	19.4	- 20.0	22.1	- 37.0	20.0
Liquid Petroleum	-55.6	81.9	-63.1	80.1	- 86.0	76.1	-142.0	76.8
Natural Gas	- 0.4	0.6	- 0.4	0.5	- 1.0	0.9	- 1.0	0.5
Hydroelectric	-	-	-	-	- 1.0	0.9	- 5.0	2.7
TOTAL	-67.9	100.0	-78.8	100.0	-113.0	100.0	-185.0	100.0

a/ Minus sign indicates net exports.
b/ See statistical appendix for conversion factors.

USSR NON-PETROLEUM ENERGY

SECTION 3. COAL IN THE SOVIET UNION

Increases in coal production have, so far, fared poorly in the Seven Year Plan, largely because of the slow development of new mines in the Donets Basin, a continued shortage of mining equipment, failure to achieve the desired results in the hydraulic mining of coal, and a shift in emphasis to the production of high-grade coal. As the production program unfolded, it became necessary to revise downward the annual output goals. Production of coal during the first years of the Seven Year Plan is compared with goals in Figure 2. Additional information is shown in Table 22.

Because of the foregoing, the Committee believes that actual production of coal in 1965 will be about 550 million tons, considerably less than the 612 million tons which originally had been planned for that year*, but quite close to the revised output goal announced in late 1963. For 1970, the Committee estimates that production will be about 630 tons against a programmed target of 686-700 tons.

TABLE 22

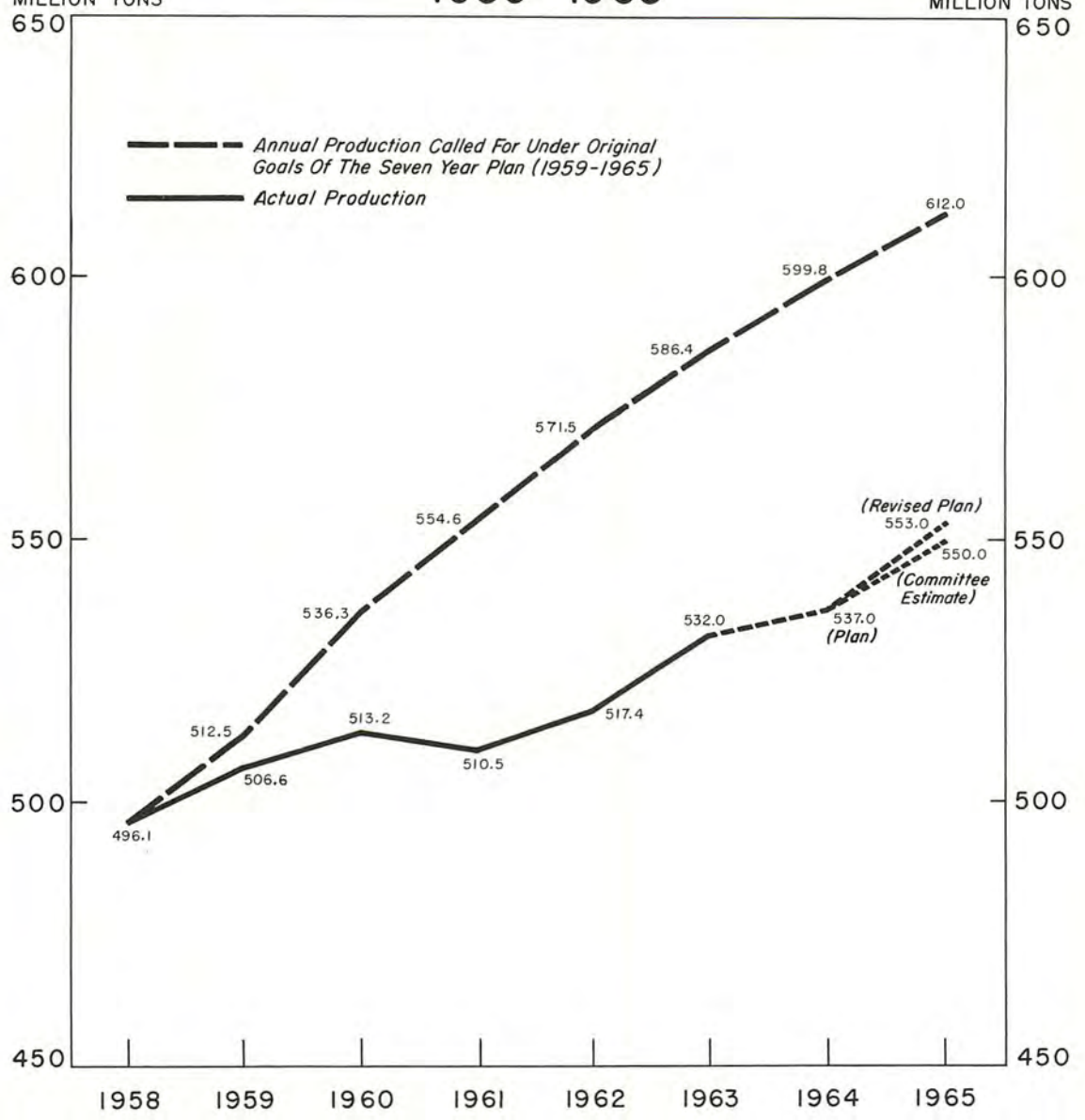
PRODUCTION OF COAL IN USSR

YEAR	MILLION METRIC TONS
1950	261
1955	391
1960	513
1961	511
1962	517
1963	532
1964 Plan	537
1965 Plan (Revised)	553
Committee Estimate	550
1970 (20-Year Plan)	686-700
Committee Estimate	630
1975 (20-Year Plan)	900
1980 Plan	1,180-1,200

* Also 15 million tons less than the Committee's estimate in the original (1962) version of this report.

FIGURE. NO. 2

PRODUCTION OF COAL IN THE U.S.S.R. IN THE FIRST FIVE YEARS OF THE SEVEN YEAR PLAN 1959–1963



The USSR has laid out a twenty year program for the development of the coal industry. As shown in Table 22, this program calls for production of coal to reach between 1,180-1,200 million tons by 1980. On the basis of current problems plaguing the industry and the likelihood that these programs will not be easily solved, the Committee believes that it is unlikely that these long-range production goals will be attained. The program as announced emphasizes coal production in the eastern regions, to the point that in 1980, 66% of total national coal output is to be provided by this area, compared to 36% in 1960. Production from strip mines is scheduled to provide the major portion of the output - 51.5% in 1980, compared to 21% in 1961, again through development of strip mines in the eastern regions. It seems that the production goals, in particular, and probably the general long-range plans for development of the coal industry, will ultimately be revised downward to levels more in keeping with Soviet capability.

Cost of production of coal was greatly affected by the introduction of the reduced work week in 1958. As a result of this change, the cost was raised back to the 1949-1950 level, and according to Soviet reports averaged 7.92 rubles ($8.79) per ton in 1962, compared with 6.58 rubles ($7.31) per ton in 1955. A major effort is aimed at bringing costs back in line with those which prevailed before the reduced work week.

The single largest use for coal is as a fuel by thermal power stations. In 1960 this use accounted for 36% of total coal consumption, and by 1965 is to account for 44%* of the total, according to plan.

The Soviet Union has been a net exporter of coal and coke since 1956. In 1962, of the total exports of coal and coke**, 44%, or 7.7 million tons, was exported to the West.

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* In the original (1962) version of this report, the Committee estimated 41.1%. The present figure of 44% is based on more accurate information which has recently become available.

** After deduction of Polish coal and coke exports to East Germany. These exports are shown in official USSR statistics first as imports from Poland and then as exports to East Germany.

Japan is the major Western importer, having accounted for 14.9% of Soviet sales of coal and coke to the West in 1962.

The European Satellites pay the highest prices of anyone for Soviet coal and coke as shown by the following sampling of FOB Soviet border prices paid in 1962:

HARD COAL	RUBLES/METRIC TON
East Germany	13.88
West Germany	6.07
Czechoslovakia	13.02
Italy	6.37
Poland	14.92
Yugoslavia	8.06
Japan	10.46
COKE	
Hungary	24.67
Finland	14.04
East Germany	23.69
Denmark	13.44

SECTION 4. HYDROELECTRIC AND ELECTRIC POWER

In terms of hydroelectric potential, the USSR ranks second in the world, after Communist China. For the past several years the generation of electricity by hydroelectric plants has represented about 18% of the total electric power generated in the USSR. Information available on the planned development of the hydroelectric power industry through 1980 indicates that there is to be no revision of significance in the ratio of hydropower to total electric power output.

TABLE 23

GENERATION OF ELECTRIC POWER AND OF HYDROELECTRIC POWER IN THE USSR

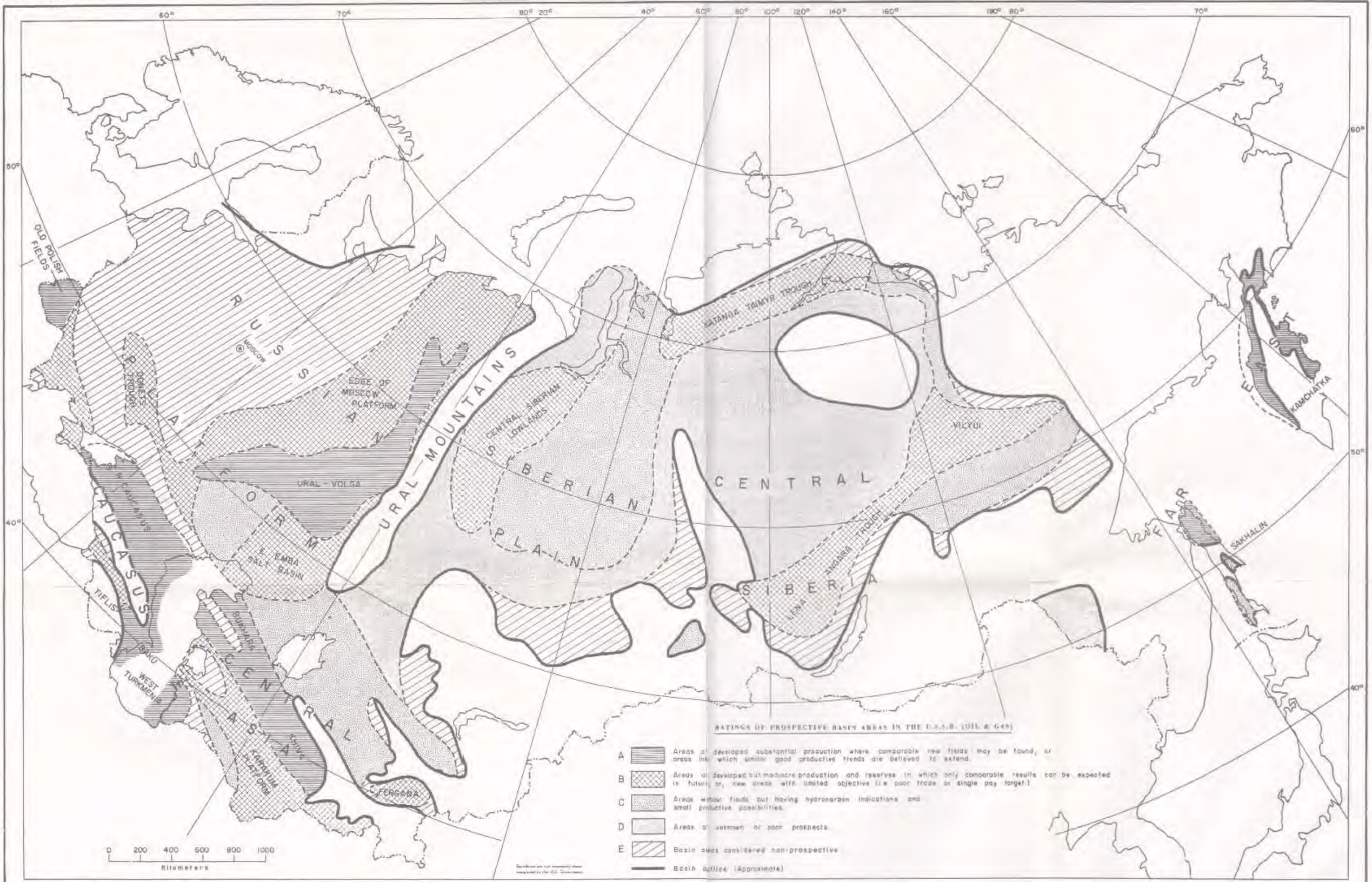
YEAR	TOTAL (BILLION KILOWATT-HOURS)	OF WHICH, FROM HYDROPOWER STATIONS: AMOUNT (BILLION KILOWATT-HOURS)	OF WHICH, FROM HYDROPOWER STATIONS: PERCENT OF TOTAL
1950	91.2	12.7	13.9
1955	170.2	23.2	13.6
1960	292.3	50.9	17.4
1961	327.0	59.1	18.0
1962	369.3	71.9	19.5
1965 Plan	508.0	100.0	19.7
1970 Plan	900-1,000	190.0	19-21
1980 Plan	2,700-3,000	570.0	19-21

In 1958 only 38% of total electric output and 24.4% of hydroelectric output was provided by the eastern regions of the country. Implementation of the Seven Year Plan directives has brought about a modest change in the distribution, the share of the eastern regions in total output rising to 41.2% in 1962. According to plan, in 1965 the eastern regions are to account for 46% of total electric power output and 40.5% of hydroelectric output. It does not appear likely, however, that this goal for regional apportionment of output will be met.

Industry currently consumes about two-thirds of total electric power, while approximately 12% is used for the everyday needs of the population. More electric power - 22% of total output in 1980 - is to be made available to the population of the country for use in illumination, cooking and heating. However, per capita consumption planned for that year will only slightly exceed U.S. per capita consumption in 1960.

It is interesting to note that exports of electric power appeared for the first time in 1962 in the insignificant amount of 0.2 billion kilowatt-hours. The Committee estimates that in 1965 the USSR will show a net export of electric power of about 2 billion kilowatt-hours or 1 million metric tons of standard fuel.

MAP NO. 1



RATINGS OF PROSPECTIVE BASIN AREAS IN THE U.S.S.R. (OIL & GAS)

A — Areas of developed substantial production where comparable new fields may be found, or areas in which similar good productive trends are believed to extend.

B — Areas of developed but mediocre production and reserves (in which only comparable results can be expected in future) or, new areas with limited objective (i.e. poor traps or single pay target.)

C — Areas without fields but having hydrocarbon indications and small productive possibilities.

D — Areas of unknown or poor prospects.

E — Basin areas considered non-prospective.

Basin outline (Approximate)

AS OF JANUARY 1, 1954

SECTION 5. PROSPECTIVE SEDIMENTARY AREAS

In the light of the most recent evidence the Committee now estimates the prospective sedimentary areas of the USSR at 10.04 million square kilometers or 3.88 million square miles. The Committee has classified the prospective area of the USSR into four categories, as shown on Map No. 1.

Of the total prospective area, it is estimated that 2.56 million square miles can be classed as favorable for the occurrence of oil and gas, which roughly compares with 2.12 million square miles of favorable area for the U. S. (including Alaska and the Continental Shelf to a depth of 600 feet).

The Committee concludes that the Soviet petroleum production levels will not be limited by geological factors for many years to come.

SECTION 6. GEOPHYSICAL AND CORE DRILLING ACTIVITIES

The USSR makes extensive use of core drilling and geophysical techniques of prospecting in its search for oil. According to Soviet press reports, during 1952-58 the USSR carried out 0.9 meters of core drilling for each meter of exploratory drilling. For the period 1959-65 this ratio will decline to 0.68 if plans are realized, even though the 1965 plan for core drilling has been set at 6 million meters (19.7 million feet), almost double that accomplished in 1958. During this same seven-year period, (1959-65), the average depth of core wells drilled is planned to increase from 502 to 935 meters.

Because of the nature of the Soviet terrain, with geological surface indications not prominent, use of the geophysical techniques of prospecting has become particularly important. In 1961, 850 seismic parties, 200 electric parties and 100 gravity parties were reported in operation. The Committee estimates that by 1965 almost 1,700 geophysical parties employing various methods of search will be employed.

SECTION 7. DRILLING

The vagaries of economic planning are nowhere better illustrated than in the constantly shifting statements of the USSR on the needs for oil and gas drilling. Within the last five years three sets of plans have been enunciated, which have not only varied total requirements but substantially altered the shares of the total going for exploration and development. These several plans, together with independent Committee estimates of the amount of drilling which would be required to meet the production goals which have accompanied the shifting drilling targets, are shown in Table 24*.

In its original (1962) report, the Committee pointed out that the Seven Year Plan (1959-1965) called for about 1.5 meters of exploratory drilling for each meter of development drilling. Only two years after the Seven Year Plan had been initiated, a new Twenty-Year Plan (1961-80) for drilling was announced. The goals set in the latter indicated drastic changes in the thinking of the USSR oil industry management. Perhaps reflecting the high degree of success in oil and gas exploration during 1959-60, the new plan severely curtailed the previously planned exploration effort and retained, in substance, much of the previous development plans. Thus, the total drilling effort called for by the Seven Year Plan (1959-65) was apparently recognized by the USSR as unrealistic or unnecessarily high.

Because the Twenty Year Plan for drilling was published only in global outline, the Committee had to do its own interpreting of the Plan in order to determine the targets for individual years. The Committee assumes that the Russians intended to achieve their goals by continuous upward progress from year to year at as steady a pace as possible, and it is on this basis that we interpolated a Plan figure for 1970. This interpolation indicated that the USSR apparently was planning to drill a total of more than 62 million feet in 1970, of which 61% was to be devoted to development drilling. The Committee then independently estimated the amount of drilling required to achieve the crude oil production goal for 1970, or called for by the Twenty Year Plan (390 million tons). These calculations showed that

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* For a statement of production targets see footnote to Table 24.

TABLE 24

EXPLORATION AND DEVELOPMENT DRILLING FOR OIL AND GAS IN THE USSR

YEAR		MILLION FEET EXPLORATORY	DEVELOPMENT	TOTAL	DRILLING RATE INCREASE PERCENT PER YEAR
1950		7.0	7.1	14.1	
1955		7.4	9.1	16.5	
1960		13.3	12.1	25.4	6.2 *
1961		14.9	12.5	27.4	
1962		15.8	13.3	29.1	
1965	Seven Year Plan (Discarded)	33.2	19.5	52.7	
-	Twenty Year Plan (As Interpreted by Committee)	18.4	20.4	38.8	
-	Committee Est. to Meet Revised Production Plan	18.8	20.6	39.4	
1970	Twenty Year Plan (As Interpreted by Committee)	24.1	38.2	62.3	10 **
-	Committee Est. to Meet Production Goal Implicit in Twenty Year Plan a/	26.8	50.7	77.5	13 **
-	Plan announced in 1964 (As Interpreted by Committee)	38.4	26.7	65.1	
-	Committee Est. to Meet Revised Production Goal as Stated in 1964 a/	23.8	44.7	68.5	
1964-1970	Drilling Plan Announced in 1964 (Total for Period)	204	141	345	10.5
	Committee Est. to Meet New Production Target (Total for Period)	153	201	354	11.3

* 1950 to 1962

** 1962 to 1970

a/ The 1970 crude production target as given in the Twenty Year Plan was 390 million tons (7,800,000 B/D). The new target for that year is stated as not less than 350 million tons (7,000,000 B/D). We have assumed 360 million tons (7,200,000 B/D) for our calculations. The 1970 target for natural gas in the Twenty Year Plan was 310-325 billion cubic meters (10.9-11.5 trillion cubic feet). However, the Committee has assumed that only 250 billion cubic meters could have been produced in 1970, and it is this figure which entered into our calculations of total drilling requirements to meet 1970 production goals, as per Twenty Year Plan. The recently announced 20% reduction in the 1970 gas production goal to 250 billion cubic meters confirmed our earlier analysis.

to achieve the required production levels, a substantial increase in drilling, on the order of 22%, would have to be made.

The most recently announced drilling targets, those which appeared in early 1964, once again reverse direction. Total requirements have been raised and the emphasis has been shifted back to exploratory drilling. As will be noted below, the Committee's view is that the major limitation on achieving the planned production target for 1970 is likely to be development drilling....even if the USSR were to devote 60% of total drilling to development, compared with only slightly more than 40% indicated by the 1964-70 Plan. At the same time the Committee has concluded that adequate reserves would be proved by an exploration effort using only 40% of total planned drilling. However, the Committee believes that total drilling is perhaps the most useful criterion for measuring ultimate production potential and does not attach particular significance to the breakdown between exploration and development announced by the Russians. On a total drilling basis the Soviet target for 1970 is now remarkably close to the Committee estimate of drilling required to meet the newly announced 1970 production target (an implied 10.5% annual growth rate, 1964-70, versus 11.3%).

Adequacy of the Drilling Program

The Committee calculates that the USSR exploration effort has proven oil reserves at the rate of 150 metric tons per meter (334 bbls./ft.) drilled in the post-World War II (1946-1960) era.* The Committee estimates proven crude oil reserves were 3.7 billion tons (27 billion bbls.) at the end of 1960, equivalent to 25 years reserves at the 1960 producing rate.** By the end of 1963 estimated proven reserves had increased to 4.4 billion tons (32 billion bbls.), equivalent to 21 years reserves at the 1963 producing rate. This does not

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* This is an upward revision from the 121 metric tons per meter (269 bbls./ft.) estimated by the Committee in its original (1962) report, Volume II, Page 108.

** This is a considerable upward revision from the 2.96 billion tons (21.6 billion bbls.) at year-end 1960 estimated by the Committee in its original (1962) report, Volume II, Page 106.

include secondary recovery reserves in the older, substantially depleted fields which may be more difficult to exploit at this time than new development.

The Committee considers it not unreasonable to assume that the above mentioned finding rate of 150 metric tons per meter of exploratory hole (334 bbls./ft.) might be maintained through 1970. Consequently the Committee concludes that the USSR's Twenty Year Plan for exploration drilling could perhaps outline adequate reserves to sustain the level of production originally planned through 1970 (390 billion tons or 7.8 million B/D in 1970); however, in so doing the USSR would deplete its total reserves to the extent that it would have only 15 years reserves at the 1970 producing rate. The USSR leaders have indicated 20 years reserves as desirable. Subsequent to reaching this conclusion, the Committee learned of the new Soviet targets which lower 1970 oil production to not less than 350 million tons per year (7,000,000 B/D) while increasing drilling rates. If production were to be, say 360 million tons (7.2 million B/D) in 1970, this would increase the Committee's estimate of reserves to 17 or more years at the 1970 producing rate, based on the recently expanded drilling target. In short, the Committee believes that likely drilling under either Plan probably would be sufficient to sustain planned oil production with adequate reserves.

On the basis of a detailed analysis of oil production procedures and performance in the USSR (with particular attention to the wide use of pressure maintenance by water injection), the Committee believes that plans for <u>development drilling for oil</u> would have to be significantly accelerated to meet the original 1970 oil production plans. Planned oil development drilling from 1964 to 1970, inclusive, was calculated as 55 million meters (180 million feet). The Committee believes 68 million meters (223 million feet) would be needed for the original production target of 390 million tons in 1970. If, in line with the recent Soviet announcement, production were to be 360 million tons (7.2 million B/D) in 1970, then 58 million meters (190 million feet) would probably be sufficient.

Taking oil exploration and oil development together, the Committee estimates that 83 to 93 million meters (272 to 305 million feet) will probably have to be drilled from 1964 through 1970 in order to sustain planned oil production through 1970. The lower figure relates to the recently announced production targets, the higher to the 1970 target implicit in the

Twenty Year Plan. While the Committee's interpretation of the Twenty Year Plan indicates a planned drilling for oil during this period of only 80 million meters (262 million feet), the more recently announced drilling program suggests no difficulty in meeting the revised 1970 production goal.

Exploration drilling for natural gas has risen steadily from 15% of total exploratory drilling in 1955 to 34% in 1962. An analysis of published statistics shows that for each meter of exploratory drilling for natural gas during the 1950-57 period, 300,000 cubic meters of gas were discovered (3.2 million cubic feet per foot). For the 1958-62 period a discovery record of 246,000 cubic meters per meter drilled (2.65 million cubic feet per foot) is indicated.

In the Twenty-Year Plan the 1970 target for natural gas production was 310-325 billion cubic meters (10.9 - 11.5 trillion cubic feet). The Committee's view has been that this was an unrealistic target, an analysis borne out by the recent Soviet decision to reduce the target by 20%. To achieve the new goal of 250 billion cubic meters, the Committee estimates that between 1964 and 1970 approximately 21.5 million meters of exploratory drilling (70.5 million feet) and 3.6 million meters of development drilling (11.5 million feet) will be necessary. This total effort of 25.1 million meters (82 million cubic feet) can be expected to leave the USSR with a twenty year reserve/production ratio by 1970 -- assuming an exploration effectiveness during the period of approximately 250,000 cubic meters of discovered gas per meter drilled. The Committee believes that the revised natural gas production target is attainable by the Soviets.

Thus, the Committee believes that total drilling for oil and gas during the period 1964-1970 would have to be about 118 million meters (387 million feet) in order to meet 1970 targets of 390 million tons of oil (Twenty-Year Plan) and 250 billion cubic meters of gas. Keeping the same gas target but lowering the crude production goal to 360 million tons would reduce total drilling requirements to 108 million meters (354 million feet). The Twenty-Year Plan, as interpreted by the Committee, called for only about 101 million meters (331 million feet). However, the recent Soviet announcement programs 105 million meters (345 million feet) total drilling during the period 1964-1970.

Drilling Techniques

The USSR during the four-year period from 1958-61 inclusive, drilled slightly less than 50% of the footage per rig-month that was attained by all types of drilling in the US during the same period.

In 1962 the turbodrill was responsible for 80% of all drilling in the USSR. It is recognized in Russian technical literature that this system is not easily adapted to deeper drilling. (At 8,000 feet and deeper the turbodrill is wholly unsatisfactory). Research in the USSR is now striving to find a way around this difficulty. The electrodrill, which is the announced hope for deeper drilling, will overcome many difficulties related to controlling power at the bit, but other limitations are introduced and this system is not likely to improve drilling rates. Better diamond bits will offer some improvement, but not for all formations being drilled.

There is no question but that the increased use of conventional rotary drilling (as employed in the US) would improve drilling rates. But there are several impediments to a rapid move in this direction.

> The USSR has proclaimed to the world that conventional rotary drilling is a relatively inefficient drilling system. A quick reversal of Soviet thinking is not to be expected. Even if the USSR were willing, psychologically, to depart from established techniques, the complexities of Soviet industrial organization are probably such that any significant move toward rotary drilling would be difficult.
>
> Drilling crews trained to operate the turbodrill would have to learn a completely new technology to make conventional rotary drilling effective.
>
> The need for high-grade drill pipe and better rock bits, would perhaps be the most critical impediment.

The Committee has concluded that little recourse will be had to rotary drilling during the 1964-70 period. On this assumption we have estimated the number of fully active drilling rigs needed to achieve total drilling requirements for three cases: (1) that believed necessary to achieve the recently announced drilling plan for 1964-70, inclusive, (2) that believed by the Committee to be necessary to meet the recently announced USSR 1970 production goals, and (3) that which would have been necessary to meet a combined goal of 390 million tons of oil (Twenty Year Plan) and 250 million cubic meters of gas by 1970.

TABLE 25

ESTIMATED NUMBER OF RIGS NEEDED IN ACTIVE USE

	CASE I USSR RECENTLY ANNOUNCED DRILLING PLANS (1964-70, INCL.)	CASE II COMMITTEE ESTIMATE OF DRILLING REQUIRED FOR RECENTLY ANNOUNCED 1970 PRODUCTION PLANS [a]	CASE III COMMITTEE ESTIMATE OF DRILLING REQUIRED FOR 1970 PRODUCTION ANNOUNCED IN TWENTY-YEAR PLAN [b]
AMOUNT OF DRILLING			
Million Meters	105	108	118
Million Feet	345	354	387
NO. of Rigs			
1960-61 (History)	1,213	1,213	1,213
1965	1,557	1,560	1,620
1970	2,204 (2,600)[c]	2,270 (2,700)[c]	2,460

ESTIMATED NEW RIGS OR MAJOR RIG COMPONENTS REQUIRED PER YEAR

	CASE I	CASE II	CASE III
For Expansion			
1960-65	80	85	100
1970	185 (235)[c]	195 (245)[c]	220
For Replacement			
1960-65	275	275	275
1970	325 (400)[c]	330 (410)[c]	350
Total			
1960-65	355	360	375
1970	510 (635)[c]	525 (655)[c]	570

a/ Assumed to be 360 million tons (7,200,000 B/D) of crude and 250 billion cubic meters of gas.
b/ With gas target revised downward to 250 billion cubic meters.
c/ If USSR actually drills 60% of footage as exploratory hole rather than 40% as per earlier plans, bracketed figures indicate number of required rigs.

The estimated number of rigs in active use and those new rigs that must be introduced annually into the system for expansion and replacement through 1970 are shown for the three cases considered. It should be recalled that a 10.5% increase in drilling rate per year is required for Case I, and 11.3% for Case II, and 13% for Case III. The Committee has no basis for concluding that the USSR will not devote the basic industry required to provide for necessary expansion of its total drilling effort. It should be pointed out, however, that demands in this respect could increase the need for assistance from the West for critical lines of drilling and production equipment, particularly if it should be found necessary to move toward rotary drilling.

If, for whatever reason, the drilling achievement of the USSR should fall short of that required to reach 1970 production targets, it need not follow that oil exports will be reduced. At least two broad options would be available to the Russians. One would be a cutback in domestic consumption. The other would be to allow the reserve/production ratio to fall still further. The above calculations assume a decline from a current ratio of about 21 years to something in the neighborhood of 17 years by 1970. This would still be substantially above the level of about 12 years to which we are accustomed in the United States.

SECTION 8. PRODUCTION OF PETROLEUM

A. Crude Oil

Of all of the major forms of primary energy in the Soviet Union, crude oil alone has exceeded production goals in each of the first five years of the Seven Year Plan. The major portion of the growth in crude oil production during the post-war period came from continued development of new capacity in the Urals-Volga, which in 1962 accounted for 71.7% of total national output, just a little short of the proportion - 74% - planned for 1965. In the next most important area - Azerbaydzhan - absolute production has increased modestly but the relative proportion has declined steadily, from 39.1% of total USSR production in 1950 to about 10% in 1963. There have been no changes of significance in other areas of the country.

The reported actual and planned production of crude oil is as follows:

TABLE 26

PRODUCTION OF CRUDE OIL IN THE USSR

YEAR	MILLION METRIC TONS	MILLION BARRELS PER DAY
1950	37.9	0.7
1955	70.8	1.4
1956	83.8	1.7
1957	98.3	2.0
1958	113.2	2.3
1959	129.6	2.6
1960	147.9	2.9
1961	166.0	3.3
1962	186.0	3.7
1963	206.0	4.1
1964 Seven Year Plan	222.0	4.4
1965 Seven Year Plan	230-240	4.6-4.8
1965 Plan (Revised early 1963)	247.0	4.9
1965 Plan (Revised late 1963)	240.0	4.8
1965 Committee Estimate	245.0	4.9
1970 (20-Year Plan)	390.0	7.8
1970 Plan (Revised early 1964) Min.	350.0	Min. 7.0
1970 Committee Estimate	350-370	7.0-7.4
1975 (20-Year Plan)	545.0	10.9
1980 (20-Year Plan)	690.0-710.0	13.8-14.2

The continued success of the USSR in exceeding goals for production in the first four years (1959-1962) of the Seven Year Plan caused the Soviets early last year to increase the production plan for 1965 from 240 million tons to 247 million tons (4.9 million B/D). But in late 1963 the Plan for 1965 was changed back to 240 million tons (4.8 million B/D). In early 1964 the Plan for 1970 was reduced to "not less than 350 million tons" (7.0 million B/D). The Committee believes that production in 1965 will at least equal and may exceed slightly the planned 240 million ton target for 1965. The goal for 1970 also seems within reach.

The reduction in the Plan for output of crude oil in 1970 probably reflects the following factors.

(1) Difficulty in maintaining and increasing production at older fields.

(2) Lack of investment resources. As noted in the section on investment, only modest investment growth in the oil and gas industry is scheduled through 1970.

(3) Reduced total energy needs as a result of the apparent slowdown in the economic growth rate.

The 1970 Plan indicates that as much as one-third of the output in that year is to be provided by new fields. If so, a large part of available resources will have to be directed to new areas, whose geographical location and climatic conditions make for high investment ratios.

Although the USSR has not published actual estimates of proved reserves of crude oil since the 1930's, partial information on three large Urals-Volga fields, contributing about 30% of the nation's production in 1960; and production and operating data for the entire USSR permit an order of magnitude estimate of proved reserves. Through 1963 these three fields have produced about 0.4 billion tons (3 billion barrels) and have remaining proved reserves of the order of 2.3 billion tons (17 billion barrels). The huge Romashkino Field, 8 times larger in area and 2.5 to 4 times greater in ultimate recovery of oil than East Texas, is not yet fully developed although

exploratory stepout wells have approximately defined productive limits. Some 230 other pools and fields subjected to pressure maintenance by water injection have also produced about 0.4 billion tons (3 billion barrels) through 1963 without evidence of major water breakthrough. The ratio of water injected to oil produced (in fields subjected to water injection) has declined from 1.7/1 in 1958-60 to 1.6/1 in 1961-62, and oil produced from flowing wells has remained in the range of 73-74% of total production in the USSR from 1959 through 1962. Based on this apparent lack of major water breakthrough into producing wells and on geometry of well spacing for injection of water around the periphery of all fields, except the large Romashkino Field, the Committee believes oil produced so far is not more than about 20% of ultimate recovery from these fields. Annual production is 3 to 4% of recoverable oil reserve in place initially.

Although the proportion of oil produced from fields not subjected to water injection declined from 38% of all USSR production in 1958 to 35% in 1962, actual volume of such production increased about 11% per year in that period. Thus new fields or extensions are being developed, many of which will require water injection in the future. Developed primary reserves of fields not yet subjected to water injection are considered to be 7 to 10 times current annual production. By 1965 the Plan provides for 82% of all oil produced to come from fields with water injection compared with 65% actual in 1962.

In the previous Section the Committee estimated the developed and proved undeveloped crude oil reserves as of January 1, 1964 to be 4.4 billion tons (32 billion barrels). This agrees substantially with generalized Russian statements that the oil reserve/production ratio is about 20/1. To this must be added a potential secondary recovery of 1.4 to 2.1 billion tons (10 to 15 billion barrels) from fields not now being subjected to water injection. Secondary water flooding of older fields substantially depleted by natural methods has not yet been started on a major scale in the USSR.

In October, 1961, the Soviet Union announced plans for the development of production of crude oil for the twenty year period 1961-80. According to this plan, in 1980 crude oil output was to reach 690-710 million tons (13.8-14.2 million B/D), with output in the intervening years to reach 390 million tons (7.8 million B/D) in 1970 (since changed to "not less than" 350 million tons), and 545 million tons (10.9 million B/D) in 1975.

If these goals are to be reached, it is apparent that a very substantial volume of crude oil must be found. In-ground reserves at the end of 1980 might be estimated at about 77 billion barrels for a reserves/production ratio of 15 to 1. New finds during 1964-80 thus must amount to 90 billion barrels, including oil produced. For comparison the total recoverable oil found through 1963, including potential secondary recovery of oil in fields not now under water flood, is estimated to be about 60 billion barrels. About 75% of this was found during the period 1946-1963.

If the Soviet plans are realized, the Urals-Volga will continue to be the major source of crude oil production, although the share anticipated for 1980 -- slightly more than 50% -- will represent a decline from the current position. The North Caucasus is to emerge as a major producer of crude oil, although this area has not been given the publicity comparable to the new discoveries on the Mangyshlak Peninsula in Western Kazakhstan and the first discoveries of commercial crude oil in Siberia.

While it is difficult to forecast whether the USSR will succeed or fail in achieving these long-range pro-production goals, such goals are not inconsistent with the announced plans for prospecting and drilling and are not unreasonable in view of the probable oil reserves of the USSR. Achievement of long range production goals will also be dependent upon the value which the Soviet authorities place on petroleum exports as a political and economic weapon. Probably the greatest problem will be overcoming the deficiencies in present Soviet drilling and producing equipment and technology and the shortage of oil field tubular goods and other related materials. The Committee believes that in an attempt to

solve these problems, the Soviet Union will look increasingly to the Free World for the supply of equipment and technology. Meanwhile, the recent Soviet forecast that 1970 crude oil production will be "not less than 350 million tons" (7.0 million B/D) rather than 390 million tons (7.8 million B/D) casts considerable doubt on the feasibility of the 1961-80 plans.

Average cost of production of crude oil (and associated natural gas) as reported by the USSR, has declined from 5.9 rubles per ton ($0.90/bbl.) in 1950 to 2.9 rubles per ton ($0.44/bbl.) in 1962. During the most recent years it has decreased about 5% per year, and a further decline to 2.7 rubles per ton ($0.41/bbl.) is forecast for 1965 by Soviet planners. The widespread program of water injection to maintain production capacity of individual wells has been a major factor in cost reduction. However, the Committee believes that water breakthrough into producing wells in the water flood fields will become an increasing problem within the next few years. In this event more artificial lifting will be required, and production rates per well will fall. The USSR may achieve its production cost target for 1965, but thereafter costs can be expected to rise moderately. It should be noted that in the Soviet accounting system, expenditures for geological prospecting and exploratory drilling are not included in reported production costs. When these expenditures are added, average costs are raised by 30 to 40%.

Costs of production vary widely within the USSR. Soviet figures indicate that by far the cheapest oil obtainable is found in the Urals-Volga, where crude costs from the Tatar ASSR in 1958 were only 40% of the national average. At the other extreme, crude production in Sakhalin cost 3.3 times the national average.

B. Natural Gas

The performance of the natural gas industry during the Seven Year Plan has been a source of disappointment to Soviet planners. Largely because of continued lags in the installation of compressors on existing gas pipelines, the failure to prepare potential consumers for the use of natural gas, and the lack of storage facilities to meet peak load demands, the natural gas industry was unable consistently to meet annual production goals over the period 1956-61. In 1962 and 1963, goals were more realistically determined and production exceeded plans by 4.3% and 6.8% respectively.

The Seven Year Plan, introduced in 1959, established 148.3 billion cubic meters (5.24 trillion cubic feet) as the goal for production of natural gas in 1965. Because of the difficulty in achieving the desired increments to production during 1959-63, in early 1964 the USSR announced a significant reduction in the target for 1965, to 126.0 billion cubic meters (4.45 trillion cubic feet). The Committee's estimate of 1965 production is 130 billion cubic meters, slightly in excess of the reduced goal. A new goal for 1970 has also been set, at 250 billion cubic meters, and appears realistic.

TABLE 27

PRODUCTION OF TOTAL NATURAL GAS IN THE USSR
(Including Associated Gas)

	PLAN	ACTUAL PRODUCTION	
YEAR	BILLION CUBIC METERS	BILLION CUBIC METERS	TRILLION CUBIC FEET
1950		5.8	0.2
1955		9.0	0.3
1959	39.2	35.4	1.3
1960	51.4	45.3	1.6
1961	61.3	59.0	2.1
1962	70.5	73.5	2.6
1963	85.8	90.0	3.2
		COMMITTEE ESTIMATE	
		BILLION CUBIC METERS	TRILLION CUBIC FEET
1965	148.3 (Seven-Year Plan)		
1965	126.0 (Revised late 1963 Plan)	130.0	4.6
1970	310-325 (Twenty-Year Plan)		
1970	250 (Revised early 1964 Plan)	250.0	8.8
1980	680-720 (Twenty-Year Plan)	-	-

As of January 1, 1964, proved non-associated gas reserves were about 2.13 trillion cubic meters (75.2 trillion cubic feet) equal to a 28 year supply at the 1963 rate of production. Between 1959 and 1962 the annual gross addition to proved reserves decreased each year, and in 1962 it was much less than production. However, 1963 reversed the declining trend, with gross additions of over 8 trillion cubic feet. The 1959-1963 record has occurred even though exploratory drilling for gas increased about 16% per year during the period 1958-1962. From 1950 through 1956 development drilling for gas averaged only 15% of exploratory drilling for gas and only 1.2% of total development drilling. However, gas production in 1963 was 7.5 times greater than gas production in 1956. Possibly a greater proportion of total development drilling was directed toward gas in these later years to provide this rapidly increasing production (data on development drilling are no longer segregated between oil and gas).

TABLE 28

NON-ASSOCIATED NATURAL GAS RESERVES OF USSR

	PROVED RESERVES BEGINNING OF YEAR		NET ADDITIONS TO RESERVES	PRODUCTION DURING YEAR	GROSS ADDITIONS TO RESERVES
YEAR	BILLION CUBIC METERS	TRILLION CUBIC FEET	TRILLION CUBIC FEET	TRILLION CUBIC FEET	TRILLION CUBIC FEET
1955	388.8	13.73	3.63	0.21	3.84
1956	491.6	17.36	3.40	0.29	3.69
1957	588.0	20.76	3.92	0.50	4.42
1958	699.0	24.68	8.37	0.79	9.16
1959	936.0	33.05	24.12	0.81	24.93
1960	1619.0	57.17	8.34	1.31	9.65
1961	1855.0	65.51	5.64	1.78	7.42
1962	2014.9	71.15	(-) 1.73	2.24	0.51
1963	1965.9	69.42	5.80	2.68	8.48
1964	2130	75.22			
1965 Plan	4185*	147.79*			
1970 Plan	7187*	253.80*			

* End of year.

To achieve production increasing to the Twenty Year Plan target of 310 billion cubic meters (10.9 trillion cubic feet) by 1970, with reserves in that year reaching the planned level shown in Table 28 above, would require the discovery of 6.7 trillion cubic meters (237 trillion

cubic feet) over the period. This is about 3 times as much as all gas discovered in the USSR prior to 1963. In the opinion of the Committee it is unlikely that this much new gas will be found by 1970.

Production and reserves, planned for 1970 under the Twenty Year Plan, would yield a reserve ratio in 1970 of about 23 years production. The recently reduced production target of 250 billion cubic meters for 1970 seems much more attainable, especially in view of the associated reduction in crude oil production goals. Although new reserve targets for natural gas have not been announced it seems likely that these, too, must have been lowered.

The North Caucasus and the Ukraine together accounted for almost 73% of total gas production in 1962, and the growth rate in these two producing areas has been rapid. The most dramatic shift in the regional production of natural gas which is planned to take place during 1961-80 is the growth in the share of the Central Asian Republics, from 1.6% of the national output in 1960 to 24.3% by 1980. Both in terms of percentage and absolute growth, that planned for Central Asia far exceeds that for any other area of the Soviet Union. The second leading regional producer of natural gas in 1980 is to be the Urals-Volga (21.5%), followed by the Ukraine (15.4%).

The cost of production of non-associated natural gas has been steadily declining since 1955 and according to the plan will continue to decline through 1965. Soviet publications state that in 1962, the cost of producing 1,000 cubic meters of non-associated natural gas was 0.49 rubles ($0.016 per thousand cubic feet). It should be noted that reported costs do not include expenditures for geological-exploratory work and, therefore, probably represent a substantial under-statement of the real costs. The continuing decline in cost of production has been possible through the increased exploitation of the very rich gas deposits in Gazli in the Uzbek Republic and the multiple fields in Krasnodar Kray.

C. Natural Gas Liquids

Development of the production and consumption of LPG and of natural gas liquids in general in the USSR has lagged considerably behind the potential available. Major problems have been the lack of consuming equipment, a lack of transport and storage facilities and a failure to meet natural gasoline plant construction schedules.

The consumption of LPG in the USSR (excluding output from refineries) has increased from 73,000 tons in 1957 (about 1.5 thousand B/D) to 1.8 million tons in 1963 (about 36 thousand B/D).

No data are available on the output of natural gasoline, but it is probable that production is quite limited.

Although current Soviet plans call for the output of 6.5 million tons of natural gas liquids in 1965 (130 thousand B/D), the Committee views this level of production as unrealistically high and estimates that output probably will be 4 million tons (80 thousand B/D).

SECTION 9. REFINING OF CRUDE OIL

Analysis of recent Soviet published data leads the Committee to estimate that during the current Seven Year Plan (1959-1965) the USSR needs to increase its capacity for crude distillation by about 100%, raising it from 121 million tons per year (2.42 million B/D) in 1958 to an estimated 235 million tons per year (4.70 million B/D) in 1965. If operated according to current Soviet practice (estimated at about 85% of stated capacity, with a 92% yield factor), 235 million tons design capacity will be sufficient to process 200 million tons per year (4.00 million B/D) of crude oil charge (including a small quantity of natural gas liquids) with non-gas product yield of about 184 million tons (3.68 million B/D). This - together with an estimated 2 million tons of products imported from the Satellites (see Section 15, below) and also including the equivalency of 2 million tons of synthetics and additional non-refined natural gas liquids - would meet estimated domestic demand of 168 million tons per year of non-gaseous products and allow exports of an estimated 20 million tons of products per year (400,000 B/D).

The 2.3 million B/D addition in capacity apparently will require the expenditure of 3.3 billion rubles ($3.6 billion) during the seven year period, including about 18% for the expansion and modernization of facilities operating in 1958. About eighty-three million tons capacity (1.65 million B/D) will be provided by 15 major new refineries with the remainder in the expansion of existing refineries. There will then be a total of 61 refineries in the USSR. The location of existing refineries is shown on Map No. 2.

Official figures are not available beyond the present Seven Year Plan period; but based upon recent performance, the Committee estimates that 1970 capacity requirements will be 340 million tons per year (6.8 million B/D). If operated according to current Soviet practice, 340 million tons design capacity will process 288 million tons per year (5.8 million B/D) of crude oil charge (including a relatively small quantity of natural gas liquids) with non-gas product yield of about 265 million tons (5.3 million B/D). This yield, together with an estimated 1 million tons of products imported from the Satellites and 4 million tons of NGL added as product, (see Section 15, below) provides a product supply of 270 million tons,

compared to domestic consumption estimated at 240 million tons in 1970. Thus, the Committee estimates that total products available for export from the USSR to both Free World and Bloc countries in 1970, including the equivalency of synthetics and additional natural gas liquids, may be 30 million tons (roughly 600,000 B/D).

A comparison of the Committee's estimated 1965 and 1970 crude charge and yields with 1960 is given in Table 29.

Should the estimated capacity of 235 million tons per year (4.7 million B/D) not be reached by 1965, domestic requirements will probably not be in jeopardy, inasmuch as a charge of 183 million tons per year would satisfy internal demand. Export of products would be less, however, and substitution of exports of crude would probably be attempted. However, should refining be short, it seems likely that the USSR would attempt to operate above the historical 85% of capacity rate in an attempt to handle additional crude in existing capacity.

Although the Committee believes that total crude distillation capacity will be adequate in 1965, it is unlikely that there will be adequate secondary refining capacity to insure desired qualities and proportions in the product mix. The Soviet industry has a perennial problem of surplus gasoline and shortage of diesel fuel. Diesel fuel yields have been limited by pour point and sulfur content, especially as the average sulfur content of crude oil has increased. An urgent need therefore exists for hydrogen treatment for sulfur removal and wax removal for pour point depression. Demand for diesel fuel has been satisfied recently only because of a very low rate of growth in illuminating kerosine consumption and a decline in demand for tractor kerosine. Excess low-quality straight run gasoline is being used in light diesel fuel blends to the extent possible, limited by specifications; but additional secondary processing facilities are urgently needed to maximize diesel fuel production.

The percentage of gasoline yield apparently decreased in 1960 and further decreases are projected through 1970. After 1970 gasoline requirement is expected to increase at least as rapidly as diesel fuel due to a projected increase in production of carburetor-type engines. If gasoline yield

MAP NO. 2

REFINERIES AND REFINING CAPACITY IN THE USSR

REFINING CAPACITY (1 January 1964)

- More than 12 million tons per year
- 4 million to 12 million tons per year
- 1 million to 4 million tons per year
- 100,000 to 1 million tons per year
- Less than 100,000 tons per year

REGIONAL DISTRIBUTION OF REFINING CAPACITY
1958 and 1965 (million metric tons)

KAZAKHSTAN AND CENTRAL ASIA: 12.3 (1958), 24.3 (1965)

1 metric ton equals 7.3 barrels

Economic region boundary

TABLE 29

ESTIMATED REFINERY YIELDS
IN THE USSR

REFINERY YIELD	1960 MILLION METRIC TONS	1960 THOUSAND BARRELS PER DAY	1960 YIELD WEIGHT PERCENT	COMMITTEE ESTIMATE 1965 MILLION METRIC TONS	COMMITTEE ESTIMATE 1965 THOUSAND BARRELS PER DAY	COMMITTEE ESTIMATE 1965 YIELD WEIGHT PERCENT	COMMITTEE ESTIMATE 1970 MILLION METRIC TONS	COMMITTEE ESTIMATE 1970 THOUSAND BARRELS PER DAY	COMMITTEE ESTIMATE 1970 YIELD WEIGHT PERCENT
Gasoline	24.5	577	19.0	38	895	19.0	52	1,225	18.0
Kerosine	17.4	374	13.5	28	602	14.0	37	795	13.0
Light Diesel	27.7	561	21.5	44	891	22.0	66	1,337	23.0
Heavy Diesel	5.8	113	4.5	10	194	5.0	14	272	5.0
Lube Base Oils	4.5	86	3.5	6	115	3.0	9	173	3.0
Residual and Others	38.6	666	30.0	58	1,001	29.0	87	1,502	30.0
TOTAL NON-GAS PRODUCTS	118.5	2,377	92.0	184	3,698	92.0	265	5,304	92.0
Refinery Gas Plus Losses	10.3	199	8.0	16	302	8.0	23	456	8.0
TOTAL REFINERY CHARGE .	128.8	2,576	100.0	200	4,000	100.0	288	5,760	100.0

reduction is accomplished through use of catalytic reforming as planned, there would be an accompanying improvement in gasoline quality. Catalytic reforming would also yield by-product hydrogen for desulfurization of diesel fuel and base stocks for petrochemical uses.

Officials of the Soviet oil industry mention quite frequently the problem of naphtha surplus, so it would not be at all unlikely for the USSR to offer virgin naphtha as petrochemical feed stock to Free World markets, thus intensifying an already existing worldwide naphtha surplus. It is unlikely that the USSR will attempt to penetrate the high quality motor gasoline market because of its general lack of octane improving secondary refining facilities.

The yield problems of the Soviets exist despite indications in Soviet literature that notable gains have been achieved in the development of secondary refining technology, especially in thermal conversion, catalytic cracking and catalytic hydrotreating processes. If these gains have in fact been realized, it is clear that the ability to convert them into operating facilities has lagged. This would seem to be the explanation for the Soviets having recently approached United States and British contractors with proposals for construction of a 12 million ton capacity complete refinery. This refinery would include the latest catalytic cracking, reforming, hydrocracking and lubricating oil processes and catalyst manufacturing plant. Successful negotiation of such a contract would not only supply additional crude oil charge capacity, but would also furnish prototype process units of types believed to be new to the Soviet industry. As far as is known, their purchase efforts have not yet been successful.

SECTION 10. TRANSPORTATION OF PETROLEUM

Petroleum freight has been growing about twice as fast as the total of all freight moved in the USSR -- 14% per year versus 7% per year, based on ton kilometers of freight carried by all forms of transportation. Thus, petroleum freight in 1962 represented about 21% of the total of all freight moved in the USSR, as compared to 15% in 1958. Continued growth in the share of petroleum freight can be expected.

A. Railroads

Railroads not only have been the backbone of the transportation system of the USSR (having accounted for about 78% of the total freight in 1962) but also have provided the major means of transportation of petroleum, as is shown below.

TABLE 30

TRANSPORT OF PETROLEUM FREIGHT IN USSR-OWNED CARRIERS

CARRIER	1962 TON-KILOMETERS (BILLION)	1962 TON-KILOMETERS (PERCENT OF TOTAL)	1965 ORIGINAL PLAN TON-KILOMETERS (BILLION)	1965 ORIGINAL PLAN TON-KILOMETERS (PERCENT OF TOTAL)	1965 REVISED PLAN [a] TON-KILOMETERS (BILLION)	1965 REVISED PLAN [a] TON-KILOMETERS (PERCENT OF TOTAL)
Rail	252.0	56.2	210	41.7	286.0	43.4
Inland Waterways	22.0	4.9	24	4.8	26.5	4.0
Maritime[b]	100.0[b]	22.3	85[b]	16.9	187.1[b]	28.4
Pipeline	74.4	16.6	185	36.7	160.0	24.2
TOTAL	448.4	100.0	504	100.0	659.6	100.0

a/ Source: Sheyman, K. L. Perspektivy ratsionalizatsily perevozok gruzov (Prospects for the Rationalization of Freight Transport), Moscow, 1962, Page 52-53.

b/ Maritime includes transoceanic export movements in USSR bottoms.

The railroads accounted for 62.7% of the total petroleum movement in 1958. It will be noted from Table 30 that by 1962, this percentage had dropped to 56.2%. In recent years, Soviet plans for a spectacular increase in the petroleum pipeline system have been given wide publicity. However, because of shortfalls in pipeline construction, as discussed elsewhere in this report, oil movements by pipeline have failed to meet levels established by annual goals. Continuing growth in the pipeline share

is anticipated, but for the coming years railroads will continue to account for the largest share -- more than 43% in 1965 -- of petroleum traffic.

At the present time tank car inventory is the principal limitation in railroad transportation of petroleum, but the USSR has announced plans to bring the 1965 inventory to 87% above 1958. Further toward easing the task of Soviet oil transportation by rail, the European-bound railroad transport is to be simplified by outfitting tank cars with axles that adjust the wheels from wide gauge to normal gauge.

B. Inland Waterways

Inland waterways play only a minor and decreasing role in the movement of petroleum freight within the USSR. Largely as a result of the increasing importance of pipelines, the share of inland waterways in the total movement of petroleum freight is planned to decline from 6.4% in 1958 to 4.0% in 1965, as the volume increases by more than 50% over these seven years. All water transport (including both maritime and inland waterway) accounted for 23.5% of petroleum traffic in 1958, and will increase to 32.4% by 1965, reflecting increased usage of Bloc tankers in the movement of exported oil. River transport traditionally had been the cheapest means of petroleum transport in the USSR, but the introduction of large-diameter pipelines reportedly has now lowered pipeline transport cost to a level below that of inland waters.

C. Pipeline Transportation (Petroleum and Natural Gas)

The Seven Year Plan (1959-65) of the Soviet Union originally called for construction of 17,800 miles of oil pipeline and 16,100 miles of gas pipeline, or nearly twice the amount of pipeline mileage in use in the USSR at the end of 1958.

It is now clear that only the gas pipeline goal will be achieved. Indeed, the Committee estimates that about 17,500 miles of gas pipeline will be built during 1959-65. That priority has been given to gas pipeline construction has meant less resources available for the construction of oil pipeline. The Committee estimates that only 9,400 miles of oil pipeline will be added during the Seven Year Plan, or less than 54% of the original goal. The estimated availability of oil and gas pipelines through 1970 is given below.

END OF YEAR	MILES IN PLACE		
	OIL	GAS	TOTAL
1950	3,375	1,776	5,151
1955	6,504	3,651	10,155
1958	8,966	8,208	17,174
1959	10,354	10,597	20,951
1960	10,726	13,354	24,080
1961	12,710	15,703	28,413
1962	13,454	17,645	31,099
1963 (Est.)	15,004	20,460	35,464
1964 (Est.)	16,430	22,754	39,184
1965 (Est.)	18,414	25,730	44,144
1970 (Est.)	28,024	NA	NA

Of the major oil pipeline systems planned for 1959-65 most were designed to increase the export capability of the Soviet Union. Most notable among these is the much-publicized Comecon pipeline, shown on Map No. 3. The Comecon line is a 3,824 mile system (including all branches) which is designed to transport crude oil from the Urals-Volga fields to Poland, East Germany, Czechoslovakia and Hungary as well as providing export lines to Baltic ports and to the Black Sea port of Odessa. Recent information is contradictory with regard to construction of pipelines to the Baltic ports of Ventspils and Klaipeda. Problems in keeping the Klaipeda harbor channel open make the line to Ventspils appear more attractive and available information indicates that construction of a crude oil pipeline between Polotsk and Ventspils is to be undertaken during 1964-65. Kaliningrad also has been mentioned as a possible oil export base.

The Committee has calculated that the Comecon line will have a carrying capacity of 740,000 B/D over the entire 40-inch sector between Kuybyshev and Mozyr, based on a 85-90 percent load factor. The entire system is not expected to be completed for use until 1965 although all of the sections from Mozyr (USSR) to the East European countries of Poland, East Germany, Czechoslovakia, and Hungary essentially were in operation by the beginning of 1964.*

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* The Committee notes that in 1970 the USSR may deliver as much as 30 million tons (600,000 B/D) of crude oil to East Europe. About 15% of this quantity may be moved to Bulgaria via the Black Sea, leaving some 25 million tons (500,000 B/D) to be handled via other means. If all of this quantity were to be moved by pipeline, parallel sectors of the Comecon line within East Europe would have to be built since the portions of the line running west from Mozyr have far less capacity than the Kuybyshev-Mozyr branch.

The status of other important oil pipelines, currently under construction, is shown in the following tabulation:

ORIGIN	TERMINUS	LENGTH MILES	SERVICE	CARRYING CAP.B/D [a]	COMMITTEE EST. OF COMPL. DATE
Urals-Volga	Leningrad	935	Crude	320,000	Completed to Yaroslavl by end of 1963. Construction on remainder of line now underway but completion before 1965 unlikely.
Volgograd	Tuapse	520	Crude	85,000 [b]	Tikhoretsk-Tuapse and Novorossiysk sectors completed by end of 1963. Long range plans to build link between Volgograd and Kuybyshev.
	Novorossiysk	520	Crude	85,000 [b]	
Tuymazy	Irkutsk	2,300	Crude	320,000	Fall of 1964

a/ Committee estimate, assuming 85-90% load factor.
b/ Sharply reduced carrying capacities because of terrain.

A crude oil pipeline from Irkutsk to Nakhodka on the Soviet Pacific Coast is periodically mentioned, usually in connection with the barter of Soviet oil for Japanese 28-inch pipe. This 2,740 mile line is not considered part of the Seven Year Plan.


MAP NO. 3
COMECON AND NEW MAJOR CRUDE OIL EXPORT LINES
EUROPEAN AREA
AS OF JANUARY 1, 1964
FINLAND
SWEDEN
STOCKHOLM
DENMARK
BALTIC SEA
LENINGRAD
KIRISHI
TAROSLAVL
GORKIY
AL MET' YEVSK
VENTSPILS
KLAIPEDA
CONSTRUCTION QUESTIONABLE
POLOTSK
KALININGRAD
MOSCOW
WEST GERMANY
EAST GERMANY
BERLIN
SCHWEDT
PLOCK
WARSAW
FRANKFURT
MOST
POLAND
SOVIET UNION
PENZA
SYZRAN
KUYBYSHEV
PRAGUE
CZECHOSLOVAKIA
MOZYR
UNECHA
MICHURINSK
SARATOV
OVRUCH
LISKI
BRODY
VIENNA
BRATISLAVA
AUSTRIA
SANY
UZHGOROD
KREMENCHUG
VOLGOGRAD
BUDAPEST
SZAZHALOMBATTA
HUNGARY
RUMANIA
ODESSA
TIKHORETSK
NOVOROSSIYSK
TUAPSE
BUCHAREST
BLACK SEA
CASPIAN SEA
BASIS FOR CAPACITY CALCULATIONS
CRUDE OIL CHARACTERISTICS
34° API (.855 SP. GR.)
80 SSU (16 CENTISTOKES)
PIPE WORKING PRESSURE, (GRADE X-52)
12" DIA. — (3/64" WALL — 1192 PSI)
20" DIA. — 5/16" WALL — 1168 PSI
21" DIA. — 5/16" WALL — 1113 PSI
24" DIA. — 5/16" WALL — 973 PSI
28" DIA. — 15/32" WALL — 1252 PSI
32" DIA. — 15/32" WALL — 1100 PSI
40" DIA. — 7/16" WALL — 820 PSI
AVERAGE STATION SPACING
100MI. TO 120MI. (ASSUMED)
CARRYING CAPACITY BASED ON 85% TO
90% LOAD FACTOR.
PIPE LINE STATUS
COMPLETED
UNDER CONSTRUCTION
PLANNED
LEGEND
REFINERY, TANKAGE & PUMP STA.
MARINE TERMINAL
TANKAGE & PUMP STATION
BOOSTER STATION
50,000 B/D — CARRYING CAPACITY BARRELS PER DAY
0 50 100 200 300
MILES

Two additional pipelines under construction or planned may have an ultimate effect on the petroleum export capability of the USSR. These are the Okha (Sakhalin) - Komsomol'sk crude pipeline and a Baku-Batumi product pipeline.

The two Maps show major crude oil and petroleum product pipelines in the USSR.*

The savings to the Soviet economy which will result from the increased use of petroleum pipelines can be illustrated by comparing rail transport costs from Kuybyshev to Ventspils on the Baltic Sea with estimated pipeline costs over the same route. The committee estimates the cost of such movement averages about $0.90 per barrel by rail compared with $0.31 per barrel by pipeline.

Such savings will be of considerable benefit to the Soviet Union, particularly in competing for world oil markets. For example, the costs of transporting Soviet oil from the Urals-Volga fields to Stockholm via Ventspils versus Free World oil from the Persian Gulf to Stockholm are shown below:

	CENTS PER BARREL	
	URALS-VOLGA	PERSIAN GULF
Pipeline to Ventspils	31	-
Tanker to Stockholm	17 a/	64 b/
	48	64

a/ Intascale flat 25,000 (or less) DWT tanker.
b/ Intascale - 50% 63,000 DWT tanker.

* These maps and the gas pipeline maps were completed prior to preparation of the text. Consequently the data on these maps and the text will not always be comparable. In the event of non-comparability, the text always takes precedence.

MAP NO. 4-A

Western U.S.S.R. - Trunk Oil Pipelines

MAP NO. 4-B

Eastern U.S.S.R. - Trunk Oil Pipelines

WESTERN U.S.S.R.
TRUNK OIL PIPELINES

1 January 1963

Crude Oil		Petroleum Product
———	Commissioned before 1959	———
———	Constructed during 1959 to 1961	———
– – –	Under construction in 1962 for completion before the end of 1963	– – –
– – –	Planned for completion before the end of 1965, but not under construction before 1963	– – –
———	Planned for completion after 1965, but not under construction before 1963	———
▼	Locality on existing or future pipeline route	

NORWAY

FINLAND

POLAND

RUMANIA

BULGARIA

GREECE

TURKEY

IRAN

BARENTS SEA

WHITE SEA

BLACK SEA

CASPIAN SEA

The Soviet capability to export increasing quantities of oil depends to a considerable degree on the completion of its pipeline construction goals. Lack of progress up to 1959 cast some doubt on their ability to complete the plan on schedule. This lack of progress was attributed generally to their inability to make sufficient quantities of steel pipe, particularly large diameter pipe. Even though plans were modest for the years 1959 through 1962, the USSR very nearly equalled construction goals in the period only by resorting to purchases of pipe and other equipment from Western sources. From 1959 through 1963, the USSR purchased at least the following amounts of 40-inch diameter pipe:

	METRIC TONS
West Germany	710,000
Italy	180,000
Sweden	135,000
Japan	5,000
	1,030,000

These purchases amount to over 40% of the 40-inch pipe required in the Seven Year Plan.

In November 1962 NATO recommended that the countries of the Free World not sell large diameter pipe to the Soviet Bloc. To offset this move, the USSR announced plans to construct two large diameter pipe mills and expand several existing facilities. It is not known how soon or to what extent domestic production will be able to fill the gap caused by the embargo.

Reports now indicate that most of the available 40-inch pipe is being directed to the construction of gas pipelines. It is largely because of this diversion that the main section of the Comecon oil pipeline probably will not be completed for operation until late 1964 or early 1965. Rapid increases are forecast in the use of natural gas in the USSR, particularly for industrial purposes, which has placed a heavy burden on the Soviets to accelerate the expansion of their natural gas pipeline system.

The following two maps show the major natural gas pipelines in the USSR.

The most important gas pipeline planned for construction during 1959-65 is the dual 40-inch system designed to transport gas from the Central Asian Republic of Uzbekistan to industrial consumers in the Urals. The first of these 2 lines was completed to Chelyabinsk by year-end 1963 and work is now underway on the second line.

Other significant gas pipeline systems planned or under construction include:

1. A 40-inch line between Ostrogozhsk and Serpukhov which will parallel the Krasnodar-Kray-Serpukhov system.

2. A pipeline between Moscow and Leningrad.

3. A third pipeline from Krasnodar-Kray deposits to Rostov.

4. A pipeline from the Berezovo-Igrim area to Sverdlovsk in the Urals.

Poor performance in the utilization of gas transmission pipelines in the USSR has been one of the major factors in the failure to meet the annual goals for gas production. This poor performance can be attributed, at least in part, to the inability of the USSR to develop compressors adequate for use on large diameter pipelines. Another problem of the pipeline system is the apparent shortage of oil pumping equipment for large diameter systems. It appears that this is one of the reasons for petroleum pipelines operating at only about 50% of ultimate capacity.

Originally the Soviet Union had very extensive pipeline plans for the future. Whereas at the end of 1962 gas and oil pipelines in use totaled about 31,000 miles, tentative plans had called for the installation of more than 155,000 miles of pipeline in the 1961-80 period. Of this total, 93,000 to 106,000 miles were to have been for gas and 50,000 to 62,000 miles for oil. Recently published data, however, imply more modest goals have been formulated. Plans for oil pipeline construction during 1964-70 now indicate a

MAP NO. 5-A

Western U.S.S.R. - Transmission Pipelines

for Natural Gas

MAP NO. 5-B

Central Asiatic U.S.S.R. -

Transmission Pipelines for Natural Gas


NORWAY
SWEDEN
FINLAND
POLAND
EAST GERMANY
CZECH.
HUNG.
RUMANIA
TURKEY
IRAN
AFGHANISTAN
MONGOLIA
CHINA
CHINA
JAPAN
KOREA
EASTERN U.S.S.R.
TRUNK OIL PIPELINES
1 January 1963

total of 13,020 miles are to be built. Allowing for the 3,410 miles scheduled for 1964-65, 9,610 miles remain for installation during 1966-70. These plans represent little significant deviation from current rates of construction. Except for plans to build 5,270 miles of gas pipeline during 1964-65, little is known of gas pipeline construction in the coming years. Nevertheless, the growth in production of gas from an estimated 130 billion cubic meters in 1965 to 250 billion cubic meters in 1970 implies that priority in pipeline construction will continue to be given to gas pipelines.

In summation, the oil and gas pipeline systems of the USSR are designed to accomplish four primary objectives:

1. To supply industry with reliable, cheap and convenient fuels.

2. To supply a much needed form of energy to the European satellites, thus making these countries dependent upon the USSR and preventing an alignment with Western sources.

3. To provide facilities for the export of oil to the Free World in the drive to acquire foreign exchange and equipment and to disrupt the established Free World oil industry.

4. To reduce the present cost of delivering oil and gas to internal consumers and to export bases.

D. Ability to Transport Exportable Petroleum Surpluses

The Committee concludes that internal transportation in the past has not limited the Bloc's ability to deliver petroleum to points of export. However, the NATO recommendation to limit shipments of large diameter pipeline to the Soviet Bloc has substantially delayed the completion of the Comecon pipeline and forced continued reliance on rail transportation. Neither petroleum port facilities nor the availability of tankers appear to be factors limiting the export of petroleum surpluses. In making this appraisal, the Committee has recognized that the existing Soviet transportation system has been adequate to move more than 1,000,000 barrels of petroleum per day in 1963 to the Soviet border for export to the Satellites and the Free World.

As to the future, internal transportation facilities are expected to be adequate to assure the oil export availability projected by the Committee. If the Comecon and other major oil export pipelines are completed, they could provide 1,100,000 B/D of pipeline export capacity by 1965.* However, it now appears that the Soviets may be unable to complete the 320,000 B/D pipeline from Yaroslavl to Leningrad and the 125,000 B/D pipeline from Kremenchug to Odessa by 1965. Therefore, their total oil pipeline export capability may be only about 700,000 B/D in 1965. The Soviet plan for 1964 to 1970 calls for the construction of about 13,000 miles of crude and product pipeline. This rate of construction implies little growth from the present rate of pipeline construction. However, it must be kept in mind that as pipelines are constructed

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* In the 1962 report this figure was given as 1,500,000 B/D. Since that time it appears that the 220,000 B/D Polotsk to Klaipeda pipeline may not be built, that the Polotsk to Ventspils pipeline capacity may be 145,000 B/D rather than 180,000 B/D, and that the Tikhoretsk to Tuapse and Novorossiysk pipeline may operate at only 40% of design capacity due to terrain. On the other hand, recent plans call for a 125,000 B/D pipeline from Kremenchug to Odessa.

many thousands of additional tank cars will be made available for movement of oil to export bases. The portions of the Comecon line completed during 1963 have released 150,000 tank cars, according to Soviet statements, and when the line is completed, several times this many will be released.

The Soviet Bloc's tanker fleet is the most rapidly growing fleet in the world, with known construction showing that the USSR fleet will almost quadruple between 1958 and 1965. As a result, the Soviet Bloc will have minimum need to charter Free World vessels after 1965 even though it may then be exporting close to a million B/D to the Free World, including about 100,000 B/D to Cuba. The Committee estimates that Soviet flag tankers will carry some 85% of USSR oil exports in 1965 with most of the balance moving in the tankers of customers.

WESTERN U. S. S. R.
TRANSMISSION PIPELINES FOR NATURAL GAS

1 JANUARY 1963

IN OPERATION

——— In operation before 1961

——— Put into operation during 1961-62

UNDER CONSTRUCTION OR PLANNED

——— Under construction in 1963, planned for initial operation during 1963-65

——— Construction and operation planned during 1964-65

• Facility on existing or future pipeline route

NORWAY

BARENTS SEA

WHITE SEA

FINLAND

POLAND

RUMANIA

BULGARIA

GREECE

BLACK SEA

TURKEY

IRAN

CASPIAN SEA

SECTION 11. ESTIMATED INVESTMENT IN THE PETROLEUM INDUSTRY

The Seven Year Plan provided for a total investment in the oil and gas industries of 17.0-17.3 billion rubles (excluding tanker construction). Of this amount almost three-quarters was planned for the oil industry and the remainder for the gas industry.

Of the total investment of 17.15 billion rubles (mid-point of the range given by the Plan), the larger share -- almost 54% -- was set aside for drilling and production expenses. An estimated 3.8 billion rubles or about 23% was to be allocated to the construction of refineries (including petro-chemical installations at refineries) and storage facilities. A similar amount was to be invested in the construction of oil and gas pipelines.

Since 1955, gross investment in the oil and gas industries of the USSR has continued to show sustained growth and investment planned for 1963 was 2.4 times the amount invested in 1955. Investment during the years 1955, 1958-63 and that planned for 1965 and 1970 is shown in the table on the following page.

Nevertheless, as indicated by the data presented in Table 31, investment during the first five years of the Seven Year Plan in general has been short of the established goals. In only one year -- 1962 -- was reported investment in excess of plan and only because of the very modest growth which had been scheduled for that year. In fact, the sum planned for investment in 1962 represented a reduction from the 1961 plan. It is of interest that, despite these shortfalls, oil production during these five years has consistently exceeded goals.

Failures to meet the plans for exploratory and development drilling and continued difficulty in the pipeline and refinery construction program have been the major contributors to the apparent shortcomings in the investment program.

Announcement of the plan for the development of the Soviet economy during 1964-65 indicates that the original goal for investment in the oil and gas industry has been set aside. The new plan states that investment in oil and gas in 1965 will

TABLE 31

PLANNED, ESTIMATED AND REPORTED GROSS INVESTMENT IN THE OIL AND GAS INDUSTRIES OF THE USSR 1955, 1959-65 AND 1970

YEAR	PLANNED (MILLION RUBLES)	REPORTED (MILLION RUBLES)	$US MILLION[a]	PERCENT INCREASE PLANNED	PERCENT INCREASE REPORTED
1955	-	957	1,062	-	-
1959	1,670	1,550	1,720	23.1	14.2
1960	1,880	1,730	1,920	21.3	11.6
1961	2,000	1,900	2,109	15.6	9.8
1962	1,980	1,990	2,209	4.5	4.7
1963	2,300	2,190	2,431	15.6	10.0
1964 Committee Estimate	2,600	-	2,886	18.7	-
1965 Plan	3,000	-	3,330	15.4	-
1959-65 Committee Estimate	15,000	-	16,650	-	-
Original Plan	17,150 [b]	-	19,036 [c]	-	-
1970 Plan	4,400	-	4,884	-	-

a/ Rubles converted to $U.S. at the official exchange rate of 1 ruble equivalent to $U.S. 1.11.

b/ Mid-point of the range of 17,000 to 17,300 million rubles stated in the original Seven Year Plan.

c/ Not sum of figures for individual years owing to annual revisions of plans.


MONGOLIA
CHINA
CHINA
IRAN
AFGHANISTAN
PAKISTAN
JAMMU AND KASHMIR
(Status in Dispute)
CENTRAL ASIATIC U. S. S. R.
TRANSMISSION PIPELINES FOR NATURAL GAS
1 JANUARY 1963
IN OPERATION
In operation before 1961
Put into operation during 1961-62
UNDER CONSTRUCTION OR PLANNED
Under construction in 1963, planned for initial operation during 1963-65
Construction and operation planned during 1964-65
Locality on existing or future pipeline route

be 38% above investment in 1963. Allowing for a reasonable investment in 1964, it appears that total investment in the oil and gas industry for the 1959-65 period may approximate 15 billion rubles ($U.S. 16.6 billion) or about 10% less than the original schedule.

A modest growth in investment apparently has been planned for 1966-70. Investment in 1970 is to reach about 4.4 billion rubles, which would indicate an average annual growth in investment during 1966-70 of less than 300 million rubles as compared to an average 370 million rubles growth during each of the preceding five years. The reduction in investment growth reflects modest oil pipeline construction plans for 1964-70 and reduced construction of ancillary production facilities.

SECTION 12. CONSUMPTION

A. Petroleum Products

The Soviet Union has published no figures on petroleum consumption since before World War II. However, since 1955, when the USSR began publishing foreign trade figures, we have been able to estimate domestic consumption. Table 32 shows estimated Soviet domestic oil product consumption for the years 1955 to 1963 and a forecast of consumption for 1965 and 1970. Between 1955 and 1962 domestic consumption increased at an average rate of 11.6% per year. In the period 1962-65, an average 9% increase is expected, and in the period 1965-70 7% per year.

TABLE 32

OIL PRODUCT CONSUMPTION IN USSR

YEAR	THOUSAND BARRELS PER DAY	MILLION METRIC TONS
1955	1,216	60.8
1956	1,432	71.6
1957	1,608	80.4
1958	1,794	89.7
1959	1,940	97.0
1960	2,156	107.8
1961	2,340	117.0
1962	2,622	131.1
1963	2,914	145.7
1965 Forecast	3,360	168.0
1970 Forecast	4,800	240.0

In 1955 the apparent demand for liquid petroleum products was 86% of production. In 1962 it had declined to 70% and the Committee forecasts that it will decline to 67% of production in 1970.

The Committee's estimates of the USSR's domestic oil consumption are based on published Soviet production figures. By adding crude imports to production and deducting exports and losses, an estimate of refinery crude charge may be obtained. To refinery crude charge is added unrefined NGL production and product imports. Product exports

and estimated refinery fuel and losses are deducted. The resultant figure is the apparent domestic oil consumption. Because so many estimates are involved in this procedure, our estimates and forecasts of Soviet oil consumption are subject to considerable variation.

The rapid increase in Soviet crude production has been reflected chiefly in a fast growth of exports, sometimes at the expense of domestic consumption. This is supported by the fact that diesel fuel, which in 1962 accounted for more than one-third of total Soviet exports of petroleum products, admittedly has been in short supply internally, at least since 1958. It is clear that by substituting other energy forms in domestic consumption the Soviets can, within limits, restrict oil consumption, thereby making oil available to trade for badly needed imports. The Committee has considered the probability of their doing this in arriving at estimates of future domestic oil consumption.

The recent failures in Soviet agriculture may mean that greater efforts will be put into mechanization of farms and the use of chemical fertilizers. This may necessitate revision in energy consumption plans. The Soviets may need to export more oil to pay for needed agricultural and industrial imports. In such case, they probably will substitute gas for oil in industrial installations as much as possible.

The major portion of the domestic availability of petroleum products is allocated to the industrial sector, and the smallest portion -- only 2.6% in 1959 (the latest figures available) -- goes for heating, cooking, illumination and the like. The smallness of the household use of oil products is accounted for by the considerable use of natural gas for household fuel in Soviet cities and of wood in the country, together with the exceedingly small use that is made of private automobiles throughout the Communist Bloc. Further, there is no apparent plan for this situation to change in the foreseeable future.

USSR OIL CONSUMPTION

CONSUMER	1959 PERCENT OF TOTAL
Industry	45.0
Agriculture	20.0
Transport	16.0
Communal-Everyday	2.6
Military and Other	16.4
TOTAL	100.0

B. Natural Gas

In 1963 only 8.5% of the total consumption of natural gas in the USSR was utilized in so-called communal household enterprises. The remainder, except for a very small portion which was exported, was used in domestic industry, by far the largest portion, about 20%, having been used for the generation of electric power. Total consumption for the year 1963 was 3.17 trillion cubic feet (89.7 billion cubic meters). According to plan, the consumption of natural gas in the USSR is to increase very rapidly between now and 1980. Because of poor performance in the utilization of gas pipelines, the laying of city gas mains, the manufacture of compressors, and the manufacture and distribution of industrial and household equipment designed to use gas, it is thought that production and therefore domestic consumption may develop somewhat more slowly than planned. Total consumption in the Soviet Union is forecast to rise to 4.55 trillion cubic feet (130 billion cubic meters) in 1965 and 8.79 trillion cubic feet (250 billion cubic meters) in 1970. Exports of natural gas are now small. Exports to Poland and other European Satellites may double in the next seven years, but will probably remain below 40 billion cubic feet (1 billion cubic meters) until 1970 and will be offset to some degree by imports from Afghanistan.

We have no plan figure for 1970 distribution of natural gas consumption, but in 1980, communal-household consumption is expected to be about 10% of the total, whereas use by thermal electric power stations is expected to rise to more than 40%.

In 1958, almost one-third of the available natural gas was consumed in the South Economic Region, being fed from the North Caucasus fields and those around Volgograd and Saratov. The discovery of very large deposits of natural gas in Central Asia and Western Siberia, together with construction of gas pipelines in the Seven Year Plan will particularly benefit the Ural industrial area, Western Siberia, and Central Asia, where the consumption of gas is planned to increase from 6.7% of the national total in 1958 to 26.5% in 1965, and probably an even larger amount by 1970. At the same time, there is to be a sharp relative decline in gas consumption in the South, to about 18.7% of the total in 1965, and less in 1970. The rapid development of domestic natural gas consumption is probably a large factor in the growing availability of petroleum for export.

SECTION 13. EXPORTS OF PETROLEUM

A. Historical Volumes

In recent years the USSR has changed from a negligible trader in petroleum to an exporter of worldwide significance. In 1950, the Soviet Union exported 1.1 million tons (22,000 B/D) of petroleum, but imported 2.6 million tons (52,000 B/D) from the Satellites and hence was a net importer. By 1955 the USSR exports had increased to more than 8 million tons (160,000 B/D), and by 1962 had reached 45 million tons (895,000 B/D). In 1963, the Soviet Union exported 50 million tons (1,000,000 B/D), according to the Committee's estimate. The growth rate in exports was thus 26% per year from 1955 to 1963.

TABLE 33

TOTAL USSR CRUDE AND PRODUCT EXPORTS

DESTINATION	1955 THOUSAND METRIC TONS	1955 BARRELS PER DAY	1962 THOUSAND METRIC TONS	1962 BARRELS PER DAY	COMMITTEE ESTIMATE 1963 THOUSAND METRIC TONS	COMMITTEE ESTIMATE 1963 BARRELS PER DAY
Western Hemisphere	637	12,700	4,600	92,000[a]	6,000	120,000[a]
Free Europe	2,535	50,700	18,300	366,000	19,500	390,000
Other Free Eastern Hemisphere	387	7,700	5,850	117,000	6,000	120,000
TOTAL TO FREE WORLD	4,049[b]	80,800[b]	28,750	575,000[a]	31,500	630,000[a]
Sino-Soviet Bloc	3,967	79,300	16,000	320,000	18,500	370,000
TOTAL TO WORLD	8,006[b]	160,100[b]	44,750	895,000	50,000	1,000,000

a/ Includes USSR exports to Cuba of 88,000 B/D in 1962 and estimated exports to Cuba of 95,000 B/D in 1963.

b/ Totals include volumes of petroleum not accounted for in export figures to individual countries.

While exports were divided evenly between the Free World and the Bloc destinations in 1955, 63% of total exports, or 31.5 million tons (630,000 B/D), went to the Free World (including Cuba) by 1963.* Crude oil accounted for one-third of oil exports from the USSR in 1955, but in 1963 was about 60% of the total.

Petroleum exports have become increasingly important relative to total exports in recent years. In 1955 petroleum represented 6.7% of total Russian exports to the other Bloc countries and the Free World. By 1962 petroleum had risen to 11.5% of Russia's total exports and generated $807 million of foreign exchange credits at the official exchange rate. The importance of Russian oil exports in trade with the Free World is even more pronounced. In 1962 oil represented 17.6% of Russian exports to the Free World. Oil is the largest single item in Soviet export trade to the Free World.

The list of major Free World importers reflects two facets of the Soviet trade program. First, oil represents an important medium of exchange in countries where the Soviets obtain, primarily through bilateral trade agreements, large volumes of goods important to her economy (e.g. Italy, Japan, West Germany, and Sweden). Second, exports of petroleum are substantial to those countries where important political relationships are being fostered (e.g. Cuba, Ceylon and Finland).

B. Prediction of Future Export Volumes

The Committee estimates that the USSR may have available 62 million tons (1,240,000 B/D) of petroleum for export by 1965. Of this exportable supply, the Satellites may require 20 million tons (400,000 B/D), leaving 42 million tons (840,000 B/D) available for the Free World including exports of 98,000 B/D to Cuba. (In addition, the Satellites will have about 125,000 B/D to export outside the Bloc, as discussed later.**)

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* If Cuba is included among the Satellite nations in 1962-1963, the shift toward Free World destinations is less pronounced, but still present.

** See footnote C in "Total Soviet Bloc Crude and Product Exports To The Free World", Table 70 on Page 164.

Estimated energy availability in the USSR for 1970 and energy consumption based on past experience indicate that about 100 million tons of oil (2,000,000 B/D) will be available for export in that year. Of this it is estimated that 69 million tons (1,380,000 B/D) may be available for export to the Free World including 100,000 B/D to Cuba and 31 million tons (620,000 B/D) will meet the requirements of the Satellites. In addition, the Satellites may have available for export about 8 million tons (160,000 B/D*) of products to the Free World. From this it would appear that total Bloc exports to the Free World, including Cuba, by 1970 might be 77 million tons (1,540,000 B/D) or 72 million tons (1,440,000 B/D) excluding Cuba. However, the Committee is cognizant of the uncertainties which attach to these figures. They are the net result of estimates of many other variables. Small errors in any of these variables could have a substantial impact on exports. Moreover, we are aware of the policy uncertainties which must confront the Soviet Bloc. Internal economic difficulties suggest problems in attaining petroleum production goals earlier announced. (As has been noted elsewhere in this study, these difficulties have forced recent downward revisions in targets.) On the other hand, the import requirements of the USSR for a variety of goods appear to have intensified, these too arising from emerging economic problems at home. In the absence of long-term credits, imports will have to be purchased through the export of goods, and among the commodities which the USSR has for sale, petroleum is at the top of the list.

For these several reasons the Committee does not regard Bloc exports of 77 million tons to the Free World in 1970 as a precise estimate. We feel that it is more reasonable to state a probable range and have chosen limits of 70-85 million tons (1,400,000 - 1,700,000 B/D) as bracketing the most likely variations. If Cuba is excluded from the Free World, the range for Soviet Bloc exports would become 65-80 million tons (1,300,000 - 1,600,000 B/D). Where within this range exports emerge will depend to a large extent on the market outlets available to the Soviets in 1970. In addition, should Free World restrictions on trade with the

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* See footnote C in "Total Soviet Bloc Crude and Product Exports To The Free World", Table 70 on page 164.

Soviet Bloc be relaxed, it is conceivable that the Bloc may be able to make available for export even more than 1,700,000 B/D in 1970. The limits of 1,400,000 - 1,700,000 B/D represent 7-9% of expected total Free World (ex. U. S.) demand in 1970 compared to 6% in 1963. Of the 70-85 million tons (1,400,000 - 1,700,000 B/D) it is likely that the Soviets will try to market in the neighborhood of 50 million tons (1,000,000 B/D) in Europe. This volume would represent about 10% of Free Europe's 1970 oil demand as compared with Soviet Bloc oil supplying 8% of Free Europe's demand in 1963.

Whether these volumes will actually be absorbed in the Free World depends on what action is taken by importing countries, but without doubt severe pressures will exist to move Soviet oil into Free World channels. The absorption of Soviet Bloc oil will of course be at the expense of production from developing nations of the Free World.

C. Pricing

Published Soviet trade statistics for the years 1955 through 1962 show (Figure No. 3) that prices to the Free World have been gradually decreasing as greater supplies of Soviet oil became available, though prices have now been practically stable for two years. By 1962, crude was sold to the Free World at an average price of $1.36 per barrel* (f.o.b. Soviet Border) compared with a Persian Gulf posted price of $1.80 per barrel for Arabian crude of approximately equivalent value. Arabian 34° API crude appears to equate in refinery value with the average exported Soviet crude, considering gravities and sulfur contents. A price differential of this magnitude suggests one reason for the pressures for discounts off postings which have characterized some sales of Free World oil in recent years.

The Soviets reported an average sale price in 1962 to Italy of $1.30 per barrel f.o.b. Black Sea. This would correspond to a c.i.f. price of $1.53 per barrel in Italy. Using a charter freight rate from the Persian Gulf to Italy of $0.47 per barrel (Intascale - 45%), this nets back to the Persian Gulf at $1.06 per barrel. Hence, it represents a discount of about $0.75 per barrel below the posted price for a comparable Middle East crude oil.

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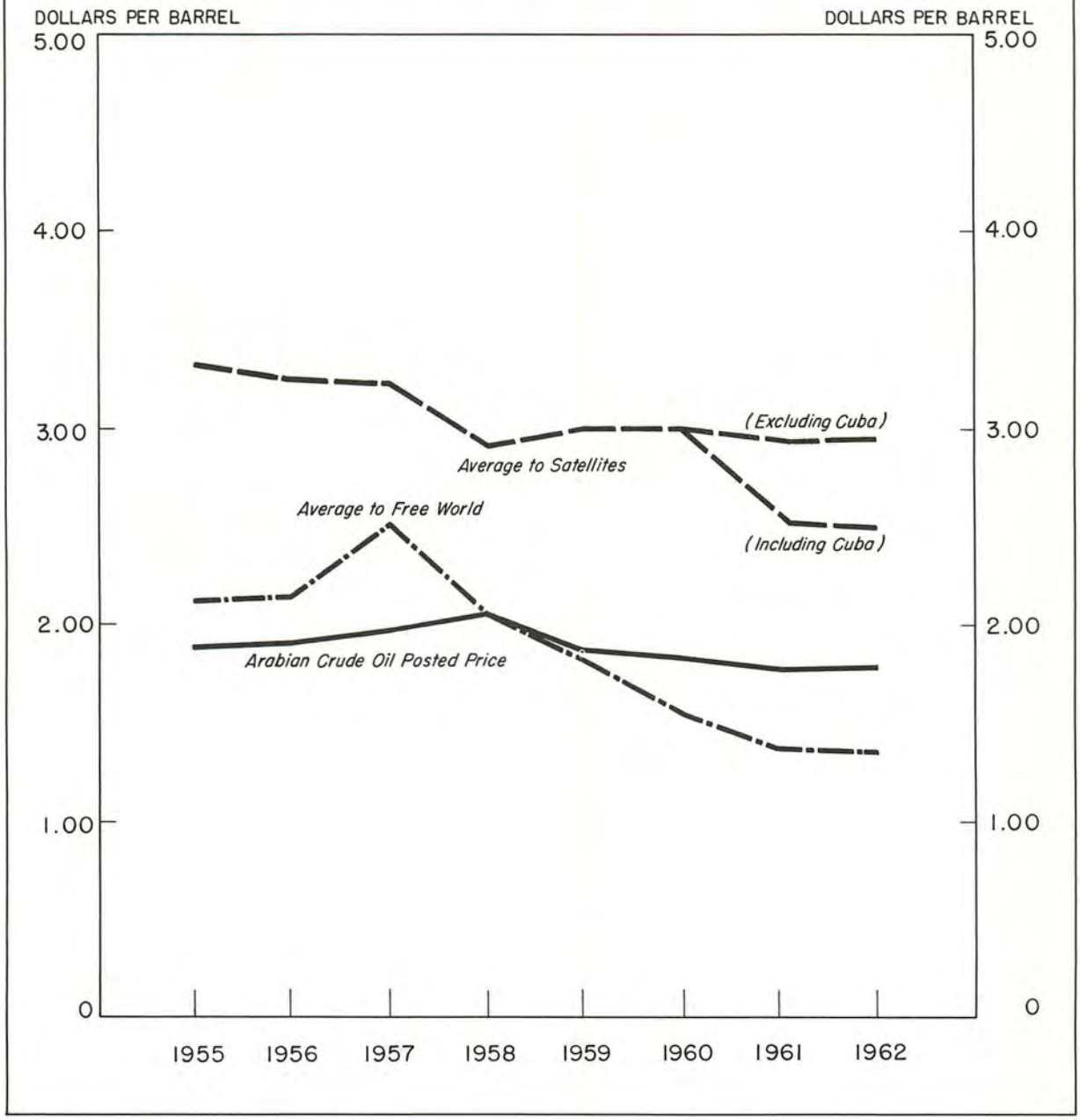
* Soviet statistics

FIGURE NO. 3

U.S.S.R. CRUDE EXPORT PRICES



This is the discount on the average sale price of Soviet oil. To some large purchasers, effective discounts of more than $0.90 from Middle East posted prices have been granted. Based on the Middle East posted price, discounts of nearly 50% were in effect granted to Italy, West Germany, and Japan, all of whom are important to Russia, both as large purchasers and as suppliers of industrial goods and equipment. It is interesting to note that a price equivalence of $0.90 to $1.00 per barrel f.o.b. Persian Gulf leaves very little margin, above the average $0.75 per barrel revenue received by Middle East governments, to cover costs and return on investment.

While the USSR has been making crude available at very attractive prices to the Free World customers, apparently it has been taking advantage of captive markets in the Satellite countries. If Cuba is excluded from the Soviet Bloc, prices to the Satellites have been very stable at a level of about $3.00 per barrel since 1958. Cuba, which received very favorable oil prices in its trade agreement with Russia, paid $1.49 per barrel in 1962 and $1.49 per barrel in 1961. Therefore, if Cuba is included in the Soviet Bloc, the average cost to the Satellites for Soviet crude oil declined to $2.54 per barrel in 1961 and $2.52 per barrel in 1962.

TABLE 34

AVERAGE F.O.B. EXPORT PRICES FOR SOVIET CRUDE OIL - 1955 - 1962

	FREE WORLD COUNTRIES		SATELLITES*	
YEAR	RUBLES PER METRIC TON	U.S. $ PER BARREL	RUBLES PER METRIC TON	U.S. $ PER BARREL
1955	14.2	2.16	22.2	3.38
1956	14.3	2.17	21.7	3.30
1957	16.8	2.55	21.6	3.28
1958	13.7	2.08	19.5	2.97
1959	12.4	1.88	19.8	3.01
1960	10.3	1.56	19.8	3.01
1961	9.1	1.38	19.5	2.97
1962	8.9	1.36	19.5	2.98

* Excluding Cuba

On the average Satellite nations have apparently been paying premiums, when compared to Free World countries, which have ranged from a minimum of 29% in 1957 to 119% in 1962. The variations in crude oil and refined product prices charged in 1962 are shown by several specific examples:

TABLE 35

AVERAGE SOVIET PETROLEUM EXPORT PRICES TO SELECTED COUNTRIES - 1962

(F.O.B. Price - U.S. $ Per Barrel)

EXPORTED TO:	CRUDE OIL	GASOLINE	KEROSENE	DISTILLATES	RESIDUAL FUEL OIL
The Baltic					
Poland	3.10	4.31	4.40	4.52	2.74
East Germany	2.66	4.39	-	3.95	-
Finland	1.52	4.11	3.98	3.38	1.74
West Germany	1.30	2.03	-	2.55	1.35
Sweden	-	2.94	2.88	2.71	1.33
Southern Europe					
Hungary	3.03	4.70	-	4.20	2.71
Yugoslavia	1.81	5.52	-	3.06	2.17
Italy	1.30	-	-	2.76	1.32
Far East					
China	-	4.67	4.30	4.73	-
Mongolia	3.49	4.94	-	5.56	-
Japan	1.26	-	-	2.32	1.55

In practically all cases the Satellite countries paid substantially higher prices for both crude oil and oil products than the Free World countries in the same geographical areas. The non-Bloc nations which have very strong economic ties with the USSR, e.g. Finland and Yugoslavia, paid intermediate prices.

If Satellite nations receive prices substantially above world market prices for the items they sell to Russia, then the price discrimination on Russian petroleum is not as great as it appears. Unfortunately, factors such as quality differentials make an accurate analysis with definite conclusions impossible. From data examined, it does appear possible that part of the high oil prices charged Satellite nations by the Soviets may be recouped in higher prices for goods sold to Russia by the Satellite nations.

By far, the overriding factor in determining whether the oil trade is profitable to the Soviet Union, however, lies in the type of goods which she is receiving in trade in return and the political influence she is gaining through trade.

There is speculation in the West on the possibility of a more intensive Russian drive to sell oil in the markets of the Free World in order to pay for increased imports of food and industrial equipment. This suggests the possibility of greater downward pressure on prices. On the other hand there have been reports during the last year that Russia has attempted to negotiate higher prices for oil sold Japan, Sweden and West Germany, but these price increases have thus far been successfully resisted. Conflicting price pressure on both sides of the Iron Curtain make price forecasts for Communist Bloc oil very hazardous.

SECTION 14. VULNERABILITIES OF THE SOVIET PETROLEUM INDUSTRY

The Committee has concluded that the USSR possesses the geologic potential for continued increases in the production of crude oil and natural gas. Whether this potential can be realized depends to a large extent on whether the industry will have at its disposal equipment adequate in quality and quantity to handle the growing problems of expanding production, refining, and transportation.

As the oil industry of the USSR matures, the need for equipment to search for, to find, produce, refine, and transport oil under increasingly complex conditions assumes greater significance. The USSR so far has not demonstrated the capability to manufacture the equipment required if these complex conditions are to be successfully overcome. Moreover, there is little evidence to indicate that this capability can be readily achieved.

The major vulnerability of the Soviet petroleum industry, as defined by the Committee, is the inability to design, test, manufacture, and place into general use within a reasonable period of time the wide range of equipment considered essential to the orderly development of the industry. The Committee has found that deficiences are most significant with respect to:

(a) Deep drilling rigs

(b) Bits of all purposes

(c) Pipe of all diameters

(d) Compressors for transmission gas pipelines

(e) Pumps for trunk oil pipelines

(f) Drill pipe, particularly high-yield

(g) Secondary refining facilities

These deficiences in drilling equipment may serve to postpone the development of new crude oil production in West Siberia and on the Mangyshlak Peninsula. Both of these areas

are counted on heavily as providing a major portion of the increment in production to be obtained in the coming years. Yet this new oil is found at great depths and the present equipment is not fully suitable to the task at hand. Lack of pumping and compressor facilities on the oil and gas pipelines has prevented full capacity utilization of these systems in the past -- in fact, oil pipelines currently operate at about 50% of planned capacity primarily because of inadequate pumping facilities.

The lack of adequate secondary processing capacity, if permitted to continue, may result in high quality fuels and lubricants being in short supply. While the absence of high quality fuels and lubricants does not pose any particular problem at the present time, to secure planned advances in other sectors of the economy, will require greater sophistication in refining.

That the oil and gas industry will now have to compete with the chemical and petrochemical industries and the agricultural program for labor and material only magnifies the equipment vulnerability. A considerable portion of the chemical facilities to be installed in the USSR in the coming years is to be purchased abroad. To pay for this equipment, the USSR will be forced to step up its foreign exchange earnings. To do so, the policy makers may decide to force the export of crude oil and petroleum products. Recently some published estimates of gold production and gold reserves in the USSR, imply little opportunity for increased foreign exchange earnings above current levels from the sale of gold. Thus, only oil remains as the most likely earner.

To maximize the position of oil as an earner of foreign exchange, the USSR must find ways in which to meet the growing requirements for equipment.

The Committee has good reason to believe that at least a portion of the requirements for oil industry equipment -- pipe, bits, pumps, drill rigs -- and refining equipment is scheduled to be met by imports. The equipment manufacturing industry of the USSR generally has been inadequate in recent years for the tasks laid before it. Output has lagged both in quality and in quantity. Inasmuch as the planned rapid development of the chemical and petrochemical industries will

draw heavily on equipment manufacturing -- in fact, it is logical to assume the transfer of a considerable portion of the equipment manufacturing capacity to the production of items for the chemical industry -- it is difficult to forecast any significant growth in oil equipment from domestic sources. On balance, the immediate solution as seen by Soviet planners would be found in stepped-up purchases from non-Bloc countries.

It is likely that contracts offered by the USSR to Western equipment suppliers would be accompanied by a demand for long term credits.

To the extent that the nations of the Free World decline to grant such credits or to sell to the Soviet Bloc equipment and material deemed critical to the development of the oil industry, then the demand for this equipment and material will have to be met domestically. To do so would require a reallocation of investment resources. Recognizing that such resources are limited, a redistribution could only mean the withdrawal of investment funds from one sector and transferral to another, in this case, the equipment manufacturing sector.

II. THE EUROPEAN SATELLITES

SECTION 15. SUMMARY OF ENERGY DEVELOPMENTS

Energy consumption of the European Satellite nations has been expanding more rapidly than production. With only limited possibilities for the expansion of the production of primary energy, the region is now an energy deficient area. For this reason the Satellites will be forced to rely to a much greater extent in future years upon energy imported from the Soviet Union, particularly upon imports of Russian crude oil moving via the Comecon pipeline.

Due to rather extensive coal reserves and limited crude oil and natural gas reserves, the East European Satellites have been and will continue to be dependent upon coal for their own primary energy production. As shown in Table 36, there has been very little change in the make-up of Satellite primary energy production in recent years.

TABLE 36

PRODUCTION OF PRIMARY ENERGY IN THE EUROPEAN SATELLITES [a]

	MILLION METRIC TONS OF STANDARD FUEL			PERCENT OF TOTAL		
	1956	1961	1962	1956	1961	1962
Coal	205.8	249.9	260.1	86.6	85.5	84.7
Crude Oil	19.3	21.4	22.3	8.1	7.3	7.3
Natural Gas	10.6	17.9	20.9	4.5	6.1	6.8
Hydroelectric Power	2.0	3.2	3.6	0.8	1.1	1.2
TOTAL	237.7	292.4	306.9	100.0	100.0	100.0

a/ Excluding peat, shale and fuelwood.

Poland is the largest producer of primary energy in the European Satellites, followed by East Germany and Czechoslovakia. All three of these countries maintain their position as energy producers by virtue of large coal production. Rumania, by far the largest oil producer in the Satellite countries, nevertheless ranks a poor fourth as a source of total energy.

TABLE 37

DISTRIBUTION OF PRODUCTION OF PRIMARY ENERGY IN THE EUROPEAN SATELLITES, BY COUNTRY

	MILLION METRIC TONS OF STANDARD FUEL			PERCENT OF TOTAL		
	1956	1961	1962	1956	1961	1962
Albania	0.5	1.3	1.3	0.2	0.4	0.5
Bulgaria	6.2	10.6	11.2	2.6	3.6	3.6
Czechoslovakia	38.3	55.2	58.3	16.1	18.9	19.0
East Germany	67.4	77.2	80.6	28.4	26.4	26.3
Hungary	12.4	16.3	16.8	5.2	5.6	5.5
Poland	84.5	95.9	99.2	35.6	32.8	32.3
Rumania	28.4	35.9	39.4	11.9	12.3	12.8
TOTAL[a/]	237.7	292.4	306.9	100.0	100.0	100.0

a/ Rounded Figures

Crude Oil

The current production of crude oil in East Europe is about 8% of the output of the USSR. This ratio will continue to decline, averaging less than 7% in 1965 and about 5% in 1970.

TABLE 38

PRODUCTION OF CRUDE OIL
IN THE EUROPEAN SATELLITES

	THOUSAND METRIC TONS				THOUS. BARRELS PER DAY			
			COMMITTEE ESTIMATES				COMMITTEE ESTIMATES	
	1961	1962	1965	1970	1961	1962	1965	1970
Albania	770	785	1,000	1,500	15.4	15.7	20.0	30.0
Bulgaria	207	199	400	1,000	4.1	4.0	8.0	20.0
Czechoslovakia	154	175	a/ 200	400	3.1	3.5	4.0	8.0
East Germany	2	30	200	300	0.0	b/ 0.6	4.0	6.0
Hungary	1,457	1,641	2,200	3,500	29.1	32.8	44.0	70.0
Poland	203	203	200	300	4.1	4.1	5.0	6.0
Rumania	11,582	11,864	12,200	12,500	231.6	237.3	244.0	250.0
TOTAL c/	14,375	14,897	16,400	19,500	287.5	297.9	329.0	390.0

a/ Committee estimate.
b/ Less than 50 barrels per day.
c/ Detail may not add to total due to rounding.

Crude production of the East European Satellites increased at an annual rate of 2 percent over the 1956-1962 period. The estimates in the preceding table indicate a steady growth of about 3.5 percent annually between 1962 and 1970.

Taken as a group, the East European Satellites shifted from a net exporter of petroleum to a net importer in 1959 and by 1962 had become a substantial importer. The following petroleum balance projects this growing dependence upon imports to be supplied from the Soviet Union.

TABLE 39

PETROLEUM SUPPLY AND DEMAND BALANCE
IN EAST EUROPEAN SATELLITES

	MILLION METRIC TONS				THOUS. BARRELS PER DAY			
			COMMITTEE ESTIMATES				COMMITTEE ESTIMATES	
	1956	1962	1965	1970	1956	1962	1965	1970
SUPPLY								
Production								
Crude Oil	12.9	14.9	16.5	19.5	258	298	330	390
Natural Gas Liquids & Synthetics	2.4	1.8	0.9	0.4	48	36	18	8
Imports of Crude Oil & Prods. from USSR	2.9	13.3	19.5	31.8	58	266	390	636
TOTAL SUPPLY	18.2	30.0	36.9	51.7	364	600	738	1,034
DEMAND								
Exports of Crude Oil & Petroleum Products								
to USSR	3.9	2.3	2.3	1.3	78	46	46	26
to Free World	1.8	5.7	6.7	8.8	36	114[a]/	134[a]/	176[a]/
TOTAL EXPORTS	5.7	8.0	9.0	10.1	114	160	180	202
Apparent Domestic Demand	12.5	22.0	27.9	41.6	250	440	558	832
TOTAL DEMAND	18.2	30.0	36.9	51.7	364	600	738	1,034

a/ See footnote c/ in "Total Soviet Bloc Crude and Product Exports to the Free World", Table 70 on page 164.

Liquid fuel internal demand of the East European Satellites, which grew at nearly 10% per year from 1956 to 1962, is expected to reflect a steady growth of nearly 8.5% annually for the periods 1962-1965 and 1965-1970. Despite the relatively stable rate of growth forecast for the region as a whole, the Table 40 indicates widely varying rates of expansion projected for individual countries.

TABLE 40

APPARENT INTERNAL DEMAND OF INDIVIDUAL EAST EUROPEAN SATELLITE COUNTRIES

	THOUSAND METRIC TONS			THOUSAND BARRELS PER DAY			ANNUAL PERCENTAGE RATE OF INCREASE		
	1962	1965	1970	1962	1965	1970	1962/ 1956	1965/ 1962	1970/ 1965
Albania	350	580	810	7.0	11.6	16.2	28.0	18.3	6.9
Bulgaria	1,811	2,300	3,020	36.2	46.0	60.4	23.0	8.3	5.6
Czechoslovakia	4,356	5,100	9,570	87.1	102.0	191.4	18.2	5.4	13.4
East Germany	3,545	4,150	5,630	70.9	83.0	112.6	7.8	5.4	6.3
Hungary	2,697	4,200	6,800	53.9	84.0	136.0	9.5	15.9	10.1
Poland	3,334	5,400	8,720	66.7	109.0	174.4	14.4	17.4	10.1
Rumania	5,864	6,200	7,000	117.3	124.0	140.0	2.5	1.9	2.5
TOTAL	21,957	27,930	41,550	439.1	558.6	831.0	9.8	8.4	8.3

The Satellites are undertaking a substantial program of refinery expansion to meet this demand and by 1965 will be approaching self-sufficiency in refinery capacity. Thus, while total imports from the USSR are estimated by the Committee at 19.5 million tons (390,000 B/D) by 1965, more than 85% of this amount will be in crude. The map of the Soviet European Satellites gives available information on the location of current and planned refineries and other petroleum facilities in East Europe.

Natural Gas

The production of natural gas in the East European Satellites, of which about 80% originates in Rumania, is equal to about 21% of the USSR production. This ratio will be drastically reduced by 1965 if the USSR continues the rapid expansion of its own production.

MAP NO. 6

The Soviet European Satellites -

Petroleum Resources and Facilities

THE SOVIET EUROPEAN SATELLITES
PETROLEUM RESOURCES AND FACILITIES

- Producing oilfield
- Producing gasfield
- Oil refinery

- Oil product pipeline
- Crude oil pipeline
- Natural gas pipeline
- Manufactured gas pipeline

- CEMA Intra-Bloc pipeline, completed
- CEMA Intra-Bloc pipeline, under construction

Scale 1:4,000,000

EAST GERMANY
SOVIET ZONE
POLAND
U S S R
FEDERAL REPUBLIC OF GERMANY
CZECHOSLOVAKIA
AUSTRIA
HUNGARY
ROMANIA
YUGOSLAVIA
ITALY
SAN MARINO
ALBANIA
GREECE
BULGARIA
TURKEY

Hydroelectric Power

The generation of hydroelectric power in East Europe in 1962 reached an estimated 7.0 billion kilowatt hours, equivalent to about 10% of the Soviet output.

TABLE 43

PRODUCTION OF HYDROELECTRIC POWER
IN THE EUROPEAN SATELLITES
(Million Kilowatt Hours)

	1956	1961	1962
Albania	60	108	125 a/
Bulgaria	754	1,796	1,695
Czechoslovakia	1,899	2,524	3,007
East Germany	522	676	611
Hungary	35	82	86
Poland	637	619	774
Rumania	287	466	652
TOTAL	4,194	6,271	6,950

a/ Committee estimates.

Of particular importance is the problem of intra-bloc exchange of electric power. Plans are being made for uniting electric power grids of several regional systems: East Germany, Poland, Czechoslovakia and Hungary; Rumania and Czechoslovakia; and Hungary, Poland and the USSR.

SECTION 16. ENERGY IN ALBANIA

The major sources of energy in Albania are crude oil, representing about 84% of 1962 primary energy production, and brown coal and lignite representing some 11% of the total.

TABLE 44

PRODUCTION OF PRIMARY ENERGY IN ALBANIA
1956 AND 1959-1962
(Thousand Metric Tons of Standard Fuel)

	1956		1959		1960		1961		1962	
	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL
Coal (Brown/Lignite)	98	19.6%	144	16.4%	146	11.9%	145	11.4%	150	11.5%
Crude Oil	372	74.4	671	76.8	1,019	83.1	1,078	84.4	1,099	84.3
Hydro Power	30	6.0	59	6.8	61	5.0	54	4.2	54	4.2
TOTAL	500	100.0	874	100.0	1,226	100.0	1,277	100.0	1,303	100.0

Historically, production of crude oil has met the internal needs of the economy and permitted significant export to other countries. The petroleum supply and demand tabulation shown in Table 45 indicates this situation will continue.

Local production is expected to grow from 785,000 metric tons (15,700 B/D) in 1962 to nearly 1.5 million metric tons (30,000 B/D) in 1970 -- an increase of 705,000 metric tons (14,100 B/D).

While local requirements are expected to more than double over this period, reaching 810,000 metric tons (16,200 B/D) in 1970, exports will continue to expand.

TABLE 45

PETROLEUM SUPPLY AND DEMAND IN ALBANIA
1956-1962 ACTUAL: 1965 AND 1970 ESTIMATED
(Thousand Metric Tons)

	1956	1957	1958	1959	1960	1961	1962	COMMITTEE ESTIMATE 1965	COMMITTEE ESTIMATE 1970
SUPPLY									
Production of Crude Oil	266	490	400	479	728	770	785	1,010	1,490
Imports of Crude & Products	10	5	5	9	20	15	15[a]	0	10
TOTAL SUPPLY	276	495	405	488	748	785	800	1,010	1,500
DEMAND									
Exports to USSR	198	319	171	198	311	235	0	0	0
To Other Bloc Countries, Incl. China	0	0	40[a]	80[a]	254	256	335	200	300
To Free World	0	10	5	0	0	1	115	230	390
TOTAL EXPORTS	198	329	216	278	565	492	450[a]	430	690
Apparent Domestic Demand	78	166	189	210	183	293	350	580	810
TOTAL DEMAND	276	495	405	488	748	785	800	1,010	1,500

a/ Committee Estimate

SECTION 17. ENERGY IN BULGARIA

Coal accounted for about 89% of primary energy production in Bulgaria in 1962, with hydroelectric power and crude oil representing 8% and 3% respectively.

TABLE 46

PRODUCTION OF PRIMARY ENERGY IN BULGARIA
1956 AND 1959-1962
(Million Metric Tons of Standard Fuel)

SOURCE OF ENERGY	1956		1959		1960		1961		1962	
	AMOUNT	PERCENT OF TOTAL	AMOUNT	PERCENT OF TOTAL	AMOUNT	PERCENT OF TOTAL	AMOUNT	PERCENT OF TOTAL	AMOUNT	PERCENT OF TOTAL
Coal	5.5	88.7%	7.8	89.7%	8.6	87.7%	9.4	88.7%	10.0	89.3%
Crude Oil	0.3	4.8	0.3	3.4	0.3	3.1	0.3	2.8	0.3	2.7
Natural Gas	0	0	0	0	0	0	0	0	0	0
Hydroelectric Power	0.4	6.5	0.6	6.9	0.9	9.2	0.9	8.5	0.9 a/	8.0
TOTAL	6.2	100.0	8.7	100.0	9.8	100.0	10.6	100.0	11.2	100.0

a/ Committee Estimates

Important new discoveries in 1962 increased petroleum reserves significantly. Consequently, as shown in the petroleum supply and demand tabulation on Table 47, local production is expected to average about 400,000 metric tons (8,000 B/D) by 1965 and 1 million metric tons (20,000 B/D) by 1970, as compared to 200,000 metric tons (4,000 B/D) in 1962.

Total oil imports from the USSR and other Bloc countries will not grow as rapidly over the period from 1962 to 1965 as during the preceding three years and after reaching 2 million metric tons (40,000 B/D) by 1965, should stabilize near that level through 1970. Bulgaria achieved a substantial degree of self-sufficiency in refinery capacity when the Burgas refinery went on stream in late 1963.

TABLE 47

PETROLEUM SUPPLY AND DEMAND IN BULGARIA
1956-1962 ACTUAL: 1965 AND 1970 ESTIMATED
(Thousand Metric Tons)

	1956	1957	1958	1959	1960	1961	1962	Committee Estimate 1965	Committee Estimate 1970
SUPPLY									
Production of Crude Oil	247	285	222	192	200	207	199	400	1,000
Imports									
From USSR	165	381	423	559	804	1,104	1,564	1,950	2,200
From Other Bloc Countries	286	203	228	250	180	150	165	50	20
TOTAL IMPORTS	451	584	651	809	984	1,254	1,729	2,000	2,220
TOTAL SUPPLY	698	869	873	1,001	1,184	1,461	1,928	2,400	3,220
DEMAND									
Exports	189	202	153	81	80	126	117	100	200
Apparent Domestic Demand	509	667	720	920	1,104	1,335	1,811	2,300	3,020
TOTAL DEMAND	698	869	873	1,001	1,184	1,461	1,928	2,400	3,220

SECTION 18. ENERGY IN CZECHOSLOVAKIA

Coal represented about 93% of total primary energy production in Czechoslovakia in 1962. With natural gas providing 3.6% and hydroelectric power 2.6% the oil contribution is still only about one-half of one percent.

TABLE 48

PRODUCTION OF PRIMARY ENERGY IN CZECHOSLOVAKIA
1956 AND 1959-1962
(Million Metric Tons of Standard Fuel)

	1956		1959		1960		1961		1962	
	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL
Coal	36.9	96.1%	45.1	93.6%	48.2	93.6%	51.7	93.7%	54.4	93.3%
Crude Oil	0.2	0.5	0.2	0.4	0.2	0.4	0.2	0.4	0.3	0.5
Natural Gas	0.3	1.0	1.9	3.9	1.9	3.7	2.0	3.6	2.1a/	3.6
Hydro Power	0.9	2.4	1.0	2.1	1.2	2.3	1.3	2.3	1.5	2.6
TOTAL	38.3	100.0	48.2	100.0	51.5	100.0	55.2	100.0	58.3	100.0

a/ Committee Estimate

Local crude production is small - 175,000 metric tons (3,500 B/D) in 1962 -- and is not expected to increase significantly through 1970. The petroleum supply and demand shown in Table 49 demonstrates the complete dependency of the Czechoslovak economy for oil upon shipments of Soviet crude.

The Committee estimates the petroleum imports were 4.1 million metric tons (82,000 B/D) in 1962 and will increase to 5.1 million metric tons (102,000 B/D) by 1965 and about 9.6 million metric tons (192,000 B/D) by 1970. It is anticipated that total Czechoslovak requirements of petroleum products will be fully covered by domestic refining facilities by 1965.

TABLE 49

PETROLEUM SUPPLY AND DEMAND IN CZECHOSLOVAKIA
1956-1962 ACTUAL: 1965 AND 1970 ESTIMATED
(Thousand Metric Tons)

	1956	1957	1958	1959	1960	1961	1962	Committee Estimate 1965	Committee Estimate 1970
SUPPLY									
Production									
Crude Oil	108	108	106	123	137	154	175[a]	200	400
Natural Gas Liquids Plus Synthetics[a]	350	350	350	350	350	350	350	350	350
Imports									
Crude from USSR	677	1,235	1,392	1,819	2,355	2,845	3,673	4,930	9,500
Products from USSR	130	103	110	103	293	308	344	100	0
Imports from Other Bloc	369	271	143	154	81	73	83	70	70
TOTAL IMPORTS	1,176	1,609	1,645	2,076	2,729	3,226	4,100	5,100	9,570
TOTAL SUPPLY	1,634	2,067	2,101	2,549	3,216	3,730	4,625	5,650	10,320
DEMAND									
Total Exports	43	122	75	91	150	212	269	550	750
Apparent Domestic Demand	1,591	1,945	2,026	2,458	3,066	3,518	4,356	5,100	9,570
TOTAL DEMAND	1,634	2,067	2,101	2,549	3,216	3,730	4,625	5,650	10,320

a/ Committee Estimate

SECTION 19. ENERGY IN EAST GERMANY

In East Germany, about 99% of the primary energy produced during 1962 came from coal, of which only 1% was from hard coal. Consequently, brown coal and lignite constitute the basis of the country's energy supply. While there has been some additional utilization of hydroelectric power, its contribution to East Germany total energy production is still small.

TABLE 50

PRODUCTION OF PRIMARY ENERGY IN EAST GERMANY
1956 AND 1959-1962
(Million Metric Tons of Standard Fuel)

	1956		1959		1960		1961		1962	
	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL
Coal	67.1	99.6%	69.9	99.6%	73.2	99.5%	76.8	99.5%	79.9	99.1%
Crude Oil	-	-	-	-	-	-	-	-	0.2	0.2
Natural Gas	-	-	-	-	0.1	0.1	0.1	0.1	0.1	0.1
Hydro Power	0.3	0.4	0.3	0.4	0.3	0.4	0.3	0.4	0.4 a/	0.5
TOTAL	67.4	100.0	70.2	100.0	73.6	100.0	77.2	100.0	80.6	100.0

a/ Committee Estimate

In the past, petroleum requirements of East Germany were met by imports and domestically produced synthetic oils. Crude oil and natural gas production are negligible. As shown in the tabulation in Table 51, the output of synthetic oil has declined steadily since 1960 and is expected to be eliminated by 1970.

Imports of crude and products in 1962 were 3.1 million metric tons (62,300 B/D) and may rise to about 5.4 million metric tons (107,000 B/D) by 1965 and 7.8 million metric tons (156,000 B/D) by 1970. At these levels, East Germany will be able to meet growing local requirements and expand substantially its exports -- primarily to the Free World. The refinery construction program of East Germany provides for self-sufficiency by 1965.

TABLE 51

PETROLEUM SUPPLY AND DEMAND IN EAST GERMANY
1956-1962 ACTUAL: 1965 AND 1970 ESTIMATED
(Thousand Metric Tons)

	1956	1957	1958	1959	1960	1961	1962	Committee Estimate 1965	Committee Estimate 1970
SUPPLY									
Production:									
Crude Oil	0	0	0	2	2	2	30 a/	200	300
Synthetics a/	2,000	2,000	2,000	2,000	2,000	1,500	1,400	500	0
Imports:									
From USSR									
Crude	746	1,045	1,107	1,582	1,780	2,077	2,437	4,550	7,100
Products	4	116	17	220	406	515	500	400	0
TOTAL	750	1,161	1,124	1,802	2,186	2,592	2,937	4,950	7,100
From Other Countries	235	100	100	100	114	178	178	400	680
TOTAL IMPORTS	985	1,261	1,224	1,902	2,300	2,770	3,115	5,350	7,780
TOTAL SUPPLY	2,985	3,261	3,224	3,904	4,302	4,272	4,545	6,050	8,080
DEMAND									
Exports:									
To the USSR	228	211	225	218	231	192	233	250	300
To Other Bloc Countries a/	155	100	124	191	213	100	82	150	150
To Free World	343	500	454	659	637	643	685	1,500	2,000
TOTAL EXPORTS	726	811	803	1,068	1,081	935	1,000	1,900	2,450
Apparent Domestic Demand	2,259	2,450	2,421	2,836	3,221	3,337	3,545	4,150	5,630
TOTAL DEMAND	2,985	3,261	3,224	3,904	4,302	4,272	4,545	6,050	8,080

a/ Committee Estimates

SECTION 20. ENERGY IN HUNGARY

Coal provided about 83% of total primary energy production in Hungary in 1962, with crude oil accounting for some 14%. Prospects for natural gas to increase its share from 2.4% in 1962 have improved substantially as a result of recent gas discoveries.

TABLE 52

PRODUCTION OF PRIMARY ENERGY IN HUNGARY
1956 AND 1959-1962
(Million Metric Tons of Standard Fuel)

	1956		1959		1960		1961		1962	
	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL
Coal	10.1	81.5%	12.3	87.3%	12.9	86.0%	13.8	84.6%	14.0	83.3%
Crude Oil	1.7	13.7	1.4	9.9	1.7	11.3	2.0	12.3	2.3	13.7
Natural Gas	0.6	4.8	0.4	2.8	0.4	2.7	0.4	2.4	0.4	2.4
Hydro Power	-	-	-	-	-	-	0.1	0.7	0.1 a/	0.6
TOTAL	12.4	100.0	14.1	100.0	15.0	100.0	16.3	100.0	16.8	100.0

a/ Committee Estimates

In 1962 total petroleum liquids supply of about 3.5 million metric tons (70,000 B/D) was met about equally by local crude and natural gas liquid production (33,800 B/D) and by crude and product imports (35,400 B/D). As shown in Table 53, the Committee estimates the relative importance of these two sources will be maintained through 1970.

The impact of the Comecon crude pipeline and growth of local refining capacity is evidenced by the disappearance of product imports in the forecast period. At present Hungary has one major crude refinery at Szony and by 1965 will have its second, at Szazhalombatta, in partial operation.

TABLE 53

PETROLEUM SUPPLY AND DEMAND IN HUNGARY
1956-1962 ACTUAL: 1965 AND 1970 ESTIMATED
(Thousand Metric Tons)

	1956	1957	1958	1959	1960	1961	1962	Committee Estimate 1965	Committee Estimate 1970
SUPPLY									
Production									
Production of Crude Oil	1,202	700	800	1,036	1,217	1,457	1,641	2,200	3,500
NGL	50	50	50	50	50	50	50	50	50
Imports									
Crude from USSR	305	919	1,086	1,204	1,393	1,397	1,522	2,550	4,000
Products from USSR	40	61	56	58	86	168	209	0	0
Imports from Other Bloc	155	270	70	62	74	78	39	0	0
TOTAL IMPORTS	500	1,250	1,212	1,324	1,553	1,643	1,770	2,550	4,050
TOTAL SUPPLY	1,752	2,000	2,062	2,410	2,820	3,150	3,461	4,800	7,600
DEMAND									
Crude & Product Exports									
To USSR	44	26	65	29	30	31	29	0	0
To Other Countries	149	215	307	450	594	618	735	600	800
TOTAL EXPORTS	193	241	372	479	624	649	764	600	800
Apparent Domestic Demand	1,559	1,759	1,690	1,931	2,196	2,501	2,697	4,200	6,800
TOTAL DEMAND	1,752	2,000	2,062	2,410	2,820	3,150	3,461	4,800	7,600

SECTION 21. ENERGY IN POLAND

Coal provides over 98% of total primary energy production in Poland and coal - particularly hard coal - is a chief article of export. Recently announced plans for increased output indicate that the dominant role of coal in the economy will continue. Natural gas production, while small, has been rising rapidly, following the development of the 1961 discoveries near Przeworsk.

TABLE 54

PRODUCTION OF PRIMARY ENERGY IN POLAND
1956 AND 1959-1962
(Million Metric Tons of Standard Fuel)

	1956		1959		1960		1961		1962	
	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL
Coal	83.3	98.5%	87.6	98.7%	92.2	98.6%	94.3	98.4%	97.5	98.3%
Crude Oil	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Natural Gas	0.6	0.7	0.6	0.7	0.7	0.8	1.0	1.0	1.1	1.1
Hydro Power	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3[a/]	0.3
TOTAL	84.5	100.0	88.8	100.0	93.5	100.0	95.9	100.0	99.2	100.0

a/ Committee Estimate

Crude production in 1962 totaled 203,000 metric tons (4,060 B/D) compared with internal apparent demand for petroleum liquids of some 3.3 million tons (66,000 B/D). As local production is not expected to increase significantly through 1970, Poland's complete dependence on imports, primarily from the USSR, will continue (See Table 55).

In 1962 Polish refineries supplied over one-third of that country's petroleum product requirements. By 1965, because of the substantial expansion program under way, local refineries are expected to supply more than 70% of total consumption.

TABLE 55

PETROLEUM SUPPLY AND DEMAND IN POLAND
1956-1962 ACTUAL: 1965 AND 1970 ESTIMATED
(Thousand Metric Tons)

	1956	1957	1958	1959	1960	1961	1962	Committee Estimate 1965	Committee Estimate 1970
SUPPLY									
Production									
Crude Oil	184	181	175	175	194	203	203	250	300
Imports									
Crude from USSR	489	633	554	683	714	720	1,094	3,500	8,000
Products from USSR	374	695	964	1,098	1,339	1,592	1,931	1,450	1,000
Imports from Other Bloc	550	461	337	400	466	718	678	700	120
TOTAL IMPORTS	1,413	1,789	1,855	2,181	2,519	3,030	3,703	5,650	9,120
TOTAL SUPPLY	1,597	1,970	2,030	2,356	2,713	3,233	3,906	5,900	9,420
DEMAND									
Exports to Bloc Countries	16	24	18	16	13	-	18	-	-
Exports to Other Countries	97	34	123	187	198	265	554	500	700
Apparent Domestic Demand	1,484	1,912	1,889	2,153	2,502	2,968	3,334	5,400	8,720
TOTAL DEMAND	1,597	1,970	2,030	2,356	2,713	3,233	3,906	5,900	9,420

SECTION 22. ENERGY IN RUMANIA*

The Rumanian economy is in a period of vigorous expansion and present plans call for a raising of industrial output by at least 12% annually until 1970. Rumania's economic and political planning is increasingly independent of the rest of the East European Satellites and at the present time trade with the West accounts for about 40% of total foreign trade.

TABLE 56

PRODUCTION OF PRIMARY ENERGY IN RUMANIA
1956 AND 1959-1962
(Million Metric Tons of Standard Fuel)

	1956		1959		1960		1961		1962	
	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL	VOLUME	PERCENT OF TOTAL
Coal	2.8	9.9%	3.4	10.2%	3.6	10.4%	3.8	10.6%	4.1	10.4%
Crude Oil	16.4	57.7	17.2	51.7	17.2	49.5	17.5	48.7	17.8	45.2
Natural Gas	9.1	32.0	12.6	37.8	13.7	39.5	14.4	40.1	17.2	43.6
Hydro Power	0.1	0.4	0.1	0.3	0.2	0.6	0.2	0.6	0.3	0.8
TOTAL	28.4	100.0	33.3	100.0	34.7	100.0	35.9	100.0	39.4	100.0

Total energy consumption increased by about one-half, from 19.6 to 30.1 million tons of standard fuel, between 1956 and 1962, and published plans indicate at least a further doubling by 1970. Crude oil and natural gas currently account for almost 90% of Rumania's energy consumption. Within Rumania, the energy value of natural gas consumption is now about double that of crude oil consumption, and the prospects are for even greater dependence on natural gas in future years, partly because of the relatively easier availability of additional natural gas supplies and partly in order to continue the country's vitally important petroleum exports.

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* A delegation of U.S. oil men visited Rumania from Sept. 14 - Oct. 5, 1963 and an American Petroleum Institute report on the visit will be forthcoming.

TABLE 42

PRODUCTION OF COAL IN THE EUROPEAN SATELLITES

	MILLION METRIC TONS								
	1956			1961			1962		
	HARD COAL	BROWN COAL	TOTAL	HARD COAL	BROWN COAL	TOTAL	HARD COAL	BROWN COAL	TOTAL
Albania	0	0.2	0.2	0	0.3	0.3	0	0.3	0.3
Bulgaria	0.4	10.4	10.8	0.7	18.4	19.1	0.4	20.2	20.6
Czechoslovakia	21.8	42.3	64.1	26.2	65.3	91.5	27.1	69.5	96.6
East Germany	2.7	205.9	208.6	2.7	237.0	239.7	2.6	247.0	249.6
Hungary	2.4	18.2	20.6	3.1	25.1	28.2	3.3	25.3	28.6
Poland	95.1	6.2	101.3	106.6	10.3	116.9	110.0	11.1	121.1
Rumania	3.5	3.0	6.5	4.7	4.0	8.7	5.3	4.3	9.6
TOTAL	125.9	286.2	412.1	144.0	360.4	504.4	148.7	377.7	526.4

East Germany is the outstanding producer of brown coal and lignite and Poland the leading producer of hard coal. Total coal production of the area has grown at the average rate of 4% per year from 1956 to 1962. Data on consumption are not as complete as for production. However, based on United Nations data on solid fuels, it is estimated that in 1961 the European Satellites were net exporters of about three percent of the solid fuel energy produced.

TABLE 41

PRODUCTION OF NATURAL GAS IN THE EUROPEAN SATELLITES

	MILLION CUBIC METERS			BILLION CUBIC FEET		
	1956	1961	1962	1956	1961	1962
Albania	0	0	0	0	0	0
Bulgaria	0	0	0	0	0	0
Czechoslovakia	274	1,500	1,700 a/	9.7	52.8	60.0 a/
East Germany	20	40	80 a/	0.7	1.4	2.8 a/
Hungary	452	320	340	16.0	11.3	12.0
Poland	435	700	821	15.4	24.7	29.0
Rumania	6,756	10,700	12,725	238.6	377.9	450.0
TOTAL	7,937	13,260	15,666	280.4	468.1	553.8

a/ Committee estimates.

Coal

Eighty-five percent of the production of primary energy in the East European Satellites is in the form of coal. Poland's reserves of hard coal, estimated at 135 billion tons, represent over 95% of the area's hard coal reserves. She also has the largest reserves of brown coal and lignite, followed closely by East Germany. Together these two countries have over 80% of the 79 billion tons of brown coal and lignite reserves occurring in the area as a whole.

Production of coal in East Europe for 1956, 1961 and 1962 is shown in Table 42.

TABLE 57

ENERGY BALANCE FOR RUMANIA - 1962

	PRODUCTION		NET TRADE		CONSUMPTION	
	NATURAL UNITS [a]	MMTSF	NATURAL UNITS	MMTSF	NATURAL UNITS	MMTSF
Coal	-	4.1	-	-	-	4.1
Crude Oil	11.86 MMT	17.8	- 5.9	9.0	5.9	8.8
Natural Gas	12.725 BM^3	17.2	- .204	0.3	12.521	16.9
Hydro	-	0.3	-	-	-	0.3
TOTAL		39.4				30.1

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a/ MMT = Million Metric Tons
BM^3 = Billion Cubic Meters

Crude oil reserves are estimated at about 150 million tons (one billion barrels), equivalent to about 12 years' supply at current producing rates. Between 1956 and 1962, despite extensive efforts, the Rumanian industry has increased crude oil producing rates by only 9% (See Table 58). The record of this effort, combined with the fact that any major discoveries will probably be made at 10,000 feet or deeper and at proportionately greater costs of finding and producing, suggest that the Rumanian crude oil industry has passed its peak and will henceforth play a decreasingly important role in Eastern Europe as well as within the international oil industry.

Rumania's 10 refineries (only six of which are important) with an annual crude charge capacity of 12.5 million tons (250,000 B/D), a thermal cracking capacity of 3.8 million tons (76,000 B/D), and a catalytic cracking capacity of 0.5 million tons (10,000 B/D) are sufficient to refine all Rumanian produced crude oil. A current refinery modernization program will reduce the major refineries from the current six to three or four by 1970 and is aimed at upgrading the quality of products rather than increasing total capacity.

Of the 11.5 million tons (230,000 B/D) of refined products manufactured in 1962, Rumania exported slightly more than one-half, that is 5.9 million tons (118,000 B/D). Of these exports, 3 million tons (60,000 B/D) went to the Free World, 2 million tons (40,000 B/D) went to the USSR, and the remaining 1 million tons (20,000 B/D) were exported to the other Soviet Bloc countries.

Rumania's net gas production in 1962 was 9,091 million cubic meters (321 billion cubic feet) of dry methane gas plus 3,634 million cubic meters (128 billion cubic feet) of associated oil field gas for a total of 12,725 million cubic meters (499 billion cubic feet). This was equivalent to 43.6% of total Rumanian energy production in 1962. Projected increases in gas production for 1963 promise that henceforth more than one-half of Rumania's energy production will be in the form of gas. Dry methane gas reserves are estimated to be in the neighborhood of 180 billion cubic meters (twenty times current production) and associated gas reserves at about 50 billion cubic meters (twelve times current production).

TABLE 58

PETROLEUM SUPPLY AND DEMAND IN RUMANIA
1956-1962 ACTUAL: 1965 AND 1970 ESTIMATED
(Thousand Metric Tons)

SUPPLY	1956	1957	1958	1959	1960	1961	1962	COMMITTEE ESTIMATE 1965	COMMITTEE ESTIMATE 1970
Production of Crude Oil	10,920	11,180	11,336	11,437	11,500	11,582	11,864	12,200	12,500
Imports	0	0	0	0	0	0	0	0	0
TOTAL SUPPLY	10,920	11,180	11,336	11,437	11,500	11,582	11,864	12,200	12,500
DEMAND									
Product Exports									
To USSR	3,437	2,582	2,824	2,956	2,823	2,325	2,000	2,000	1,000
To Other Bloc Countries	1,041	756	544	476	508	930	1,000	1,000	500
To Free World	1,376	1,403	1,696	2,442	2,632	2,900	3,000	3,000	4,000
TOTAL	5,854	4,741	5,064	5,874	5,963	6,155	6,000	6,000	5,500
Apparent Domestic Demand	5,066	6,439	6,272	5,563	5,537	5,427	5,864	6,200	7,000
TOTAL DEMAND	10,920	11,180	11,336	11,437	11,500	11,582	11,864	12,200	12,500

The only export of natural gas is to Hungary through a 225 mile pipeline which in its first year, 1959, delivered 147.3 million cubic meters (5.2 billion cubic feet) and, in 1962, 204.5 million cubic meters (7.2 billion cubic feet). These exports represent little more than 2% of Rumania's natural gas production.

In 1962 pipelines accounted for about 54% of Rumania's internal crude and products transportation with the remainder being transported by railroad tank cars. In 1958, the last year for which complete data are available, the length of the entire pipeline system was 1,963 miles of which 1,488 miles was used to transport crude oil from the fields to the refineries. Eighty percent of Rumania's petroleum exports pass through the marine terminal at Constanta with the remainder being shipped by pipeline to the USSR or moving by other means such as the Danube River barges. The Rumanian ocean-going tanker fleet consists of two vessels, the Friendship and the Peace, each of 17,500 tons built in Denmark in 1954.

The Committee estimates that Rumanian oil production will increase only moderately in future years reaching 12.2 million tons (224,000 B/D) by 1965, and 12.5 million tons (250,000 B/D) by 1970. All Rumanian oil exports are expected to continue to be in the form of products and are expected to remain at or slightly below the 1962 export level of 6 million tons (120,000 B/D). It is forecast, however, that there will be a shift toward Free World exports (4 million tons in 1970 versus 3 million tons in 1962) and away from exports to the Soviet Bloc (1.5 million tons in 1970 versus 3 million tons in 1962).

III. COMMUNIST CHINA AND MONGOLIA

SECTION 23. ENERGY IN COMMUNIST CHINA

In 1962 total primary energy production in Communist China was equivalent to about 230 million tons of standard fuel. Until 1960 primary energy production in China was growing rapidly, having apparently doubled during the first Five Year Plan (1952-1957) and redoubled during the next three years (1957-1960). However, the "great leap forward" program collapsed during 1960 and in 1962 the total energy production remained at about the same level as 1960.

Coal is the dominant source of primary commercial energy production in China, accounting for 94.0% of total production in 1962. In that year petroleum supplied 3.1%, natural gas 0.4%, and hydroelectric power 2.5% of total energy production (See Table 59). In spite of the speculative nature of reserves data, there is little doubt that, as a whole, energy resources in Communist China are adequate to support a highly industrialized economy. China has claimed total reserves, including inferred, of 9.6 trillion metric tons of coal and 5.9 billion metric tons of petroleum, including both natural and shale oil. The latest claims of measured reserves, however, are only 100 billion tons of coal and 200 million tons of oil.

Although Communist China has a large sedimentary basin area, it has not been able to develop an oil producing industry of any significance. At the end of the first Five Year Plan (1957) crude oil production amounted to only 1.5 million metric tons (30,000 B/D). Of this total two-fifths was oil from shale and coal. By 1960, when the "great leap forward" program collapsed, production had reached 5 million tons (100,000 B/D). This had been the 1962 objective of the second Five Year Plan and in fact, 1962 production was the same as in 1960. Early in 1964, the Chinese announced the development of a new oilfield near Chinhsien which will reportedly meet internal needs and also permit the export of several million tons of oil by 1965. The announcement has been received skeptically by many Free World analysts.

TABLE 59

PRODUCTION OF PRIMARY ENERGY
IN COMMUNIST CHINA

	1952			1957			1960			1962		
	NATURAL UNITS [a]	MMTSF [b]	PERCENT OF TOTAL	NATURAL UNITS [a]	MMTSF [b]	PERCENT OF TOTAL	NATURAL UNITS [a]	MMTSF [b]	PERCENT OF TOTAL	NATURAL UNITS [a]	MMTSF [b]	PERCENT OF TOTAL
Coal	66.5	47.5	96.9	130.7	93.4	94.4	425.0	204.5	93.7	450.0	216.3	94.0
Oil	436	0.6	1.2	1,458	1.9	1.9	5,000	7.1	3.3	5,000	7.1	3.1
Natural Gas	-	-	-	600	0.8	0.8	700	0.9	0.4	700	0.9	0.4
Hydro-electricity	1,260	0.9	1.9	4,712	2.8	2.9	11,864	5.8	2.6	12,000	5.8	2.5
TOTAL		49.0	100.0		98.9	100.0		218.3	100.0		230.1	100.0

a/ Natural Units are million tons of coal, thousand tons of oil, million cubic meters of gas, and million kilowatt-hours of hydroelectricity.
b/ MMTSF = Million Metric Tons of Standard Fuel.

Primary production of the energy resources other than oil can be taken as representative of energy consumption in China. In the case of oil, however, production has been significantly augmented by oil imports, primarily from the USSR. In 1952 only 40% of oil consumption was met from Chinese production. Although this ratio had improved by 1957, China still produced less than half of its oil needs. Between 1957 and 1960 this pattern was reversed. Increased production supplied 77% or 3.6 million tons (72,000 B/D) of the 4.7 million tons (94,000 B/D) increase in oil consumption. By 1962, China's oil self-sufficiency had reached 70%.

TABLE 60

OIL PRODUCTION, IMPORTS, AND DEMAND IN COMMUNIST CHINA, 1952 - 1970

	PRODUCTION		IMPORTS		APPARENT DEMAND	
	THOUSAND TONS	THOUSAND BARRELS PER DAY	THOUSAND TONS	THOUSAND BARRELS PER DAY	THOUSAND TONS	THOUSAND BARRELS PER DAY
1952	436	8.7	608	12.2	1,044	20.9
1957	1,458	29.2	1,803	36.1	3,261	65.2
1960[a]	5,000	100.0	2,963	59.3	7,963	159.3
1961[a]	5,000	100.0	2,928	58.6	7,928	158.6
1962[a]	5,000	100.0	2,000	40.0	7,000	140.0
1963[a]	6,000	120.0	1,000	20.0	7,000	140.0
1965[a]	7,000	140.0	1,000	20.0	8,000	160.0
1967[b]					15-20,000	3-400.0
1970[a]	12,000	240.0	300	6.0	12,300	246.0

a/ Committee Estimate.
b/ Chinese Plan.

Refining capacity in Communist China was estimated at 5.5 million metric tons (110,000 B/D) in 1961. Of this total 15% was accounted for by synthetic plants and 85% by natural crude oil plants. Refining capacity was scheduled to approximate 13 million tons (260,000 B/D) by the end of the second Five Year Plan in 1962. However, the Committee feels it is unlikely that refining capacity is presently much more than 8.0 million metric tons (160,000 B/D). The Chinese Government is reported to be negotiating for the purchase of a complete refinery from one Western country.

Information about developments in China's energy industries since 1960 is sparse. Two events have dominated this period. One is the 1960 collapse of the "great leap". The other is the changed political relationship with the USSR.

The Chinese economy is estimated to have declined by one-third in 1961 from the historical peak of 1960. The decline is thought to have been contained in 1962. However, the disruption is considered to have had such an effect that the 1960 level of general activity may not be reached again sooner than 1966. Total energy needs have undoubtedly been reduced by these developments.

The political rift with the USSR has manifested itself principally in the withdrawal by the Soviet of economic assistance and technicians and in a curtailment of trade including a reduction in Soviet oil exports to China.

The direct effect of these events on the Chinese oil industry since 1960 can be gauged from estimates of production, imports, and demand tabulated previously. Estimated 1962 oil consumption of 7 million metric tons (140,000 B/D) was lower than the indicated level for 1960. The decline in Soviet oil exports to China was only partially offset by higher Chinese crude oil production. A further increase of about 1 million tons in production is considered plausible in 1963. Assuming a further decline in exports from the USSR with no offsetting increases from other Bloc sources, oil consumption in China may have been 7 million metric tons (140,000 B/D) in 1963. This can be compared with the 1967 target of 15-20 million tons' oil consumption. In the opinion of the Committee -- considering the state of the Chinese economy, the likelihood of a further reduction in oil imports from Bloc countries, and the difficulty of doubling crude oil production in this brief period -- the 1967 target is not likely to be achieved.

SECTION 24. ENERGY IN MONGOLIA

Mongolia produced about 665,000 tons of coal in 1961 and 771,000 tons in 1962. The 1965 planned coal production is 1,300,000 tons, a goal which seems overly optimistic in light of its past performance.

Crude oil production in 1961 was 53,000 tons (1,060 B/D) from the one oil field currently in production. No oil production plans for 1965 are available.

Mongolia is dependent on Russia for over 70% of her petroleum supplies. In 1961 Mongolia imported 24,300 tons

(486 B/D) of crude oil and 118,500 tons (2,370 B/D) of petroleum products from Russia. In 1962 these imports rose to 30,900 tons (618 B/D) of crude and 134,000 tons (2,680 B/D) of products. All crude supplies were run in two Mongolian refineries.

SECTION 25. ENERGY AND PETROLEUM SUPPLY-DEMAND BALANCE FOR THE BLOC

The energy balance for the entire Sino-Soviet Bloc for 1962 may be summarized as follows:

TABLE 61

ENERGY BALANCE FOR THE SINO-SOVIET BLOC 1962

	PRODUCTION		APPARENT CONSUMPTION	NET EXPORT
	MMTSF [a]	PERCENT OF TOTAL	MMTSF [a]	MMTSF [a]
Coal	855	66	839	16
Liquid Petroleum [b]	295	23	248	47
Natural Gas	108	8	108	-
Hydroelectric	42	3	42	-
TOTAL FOR BLOC	1,300		1,237	63

a/ MMTSF = Million Metric Tons of Standard Fuel.
b/ Includes natural gas liquids and synthetics.

Table 61 highlights the great importance of coal as a source of energy to the Bloc as a whole. In spite of the large increases expected in the production of crude oil and natural gas in the USSR, coal is destined to be the major Bloc energy source for many years to come.

The role of the Soviet Union as a producer of total energy in the Bloc is not as significant as its role as a petroleum producer. Of the total Bloc primary commercial energy produced in 1962, 58% was supplied by the USSR, with the remainder produced in roughly equal amounts by China and the

TABLE 62

PRODUCTION AND CONSUMPTION OF PETROLEUM
IN THE SINO - SOVIET BLOC [a]

	1962			1965 ESTIMATE			1970 ESTIMATE		
	PRODUCTION		CONSUMPTION	PRODUCTION		CONSUMPTION	PRODUCTION		CONSUMPTION
	MILLION METRIC TONS	THOUSAND BARRELS PER DAY	THOUSAND BARRELS PER DAY	MILLION METRIC TONS	THOUSAND BARRELS PER DAY	THOUSAND BARRELS PER DAY	MILLION METRIC TONS	THOUSAND BARRELS PER DAY	THOUSAND BARRELS PER DAY
USSR	186.0	3,720	2,880	249.0	4,980	3,780	369.0	7,380	5,400
EAST EUROPE									
Albania	.8	16	8	1.0	20	12	1.5	30	16
Bulgaria	.2	4	36	.4	8	46	1.0	20	60
Czechoslovakia	.5	10	88	.6	12	102	.8	16	192
East Germany	1.4	28	70	.7	14	82	.3	6	114
Hungary	1.7	34	54	2.3	46	84	3.5	70	136
Poland	.2	4	66	.2	4	108	.3	6	174
Rumania	11.9	238	118	12.2	244	124	12.5	250	140
TOTAL EAST EUROPE	16.7	334	440	17.4	348	558	19.9	398	832
CHINA AND FAR EAST	5.0	100	174	7.0	140	165	12.0	240	246
GRAND TOTAL FOR BLOC	207.7	4,154	3,494[b]	273.4	5,468	4,503[b]	400.9	8,018	6,478[b]
NET EXPORTS FROM BLOC			660[c]			965[b]			1,540[d]

[a] Including natural gas liquids and synthetics, except for the USSR in 1962.
[b] If Cuba is included in the Bloc, total consumption would rise 88,000 B/D in 1962, 98,000 B/D in 1965, and 100,000 B/D in 1970. Bloc exports would shrink accordingly.
[c] Represents total exports of 670,000 B/D less Bloc imports from the Free World.
[d] About the center of a 1,400,000 - 1,700,000 B/D range.

European Satellites. Thus, the USSR has an obvious interest in the continued exploitation of the vast coal and hydroelectric resources of the Satellite nations.

In petroleum production, however, the Soviet Union is clearly the force to be reckoned with, as shown in Table 62. The Committee estimates that total Bloc petroleum production was 208.6 million tons (4.2 million B/D) in 1962, and predicts that this total will reach almost 275 million tons (5.5 million B/D) by 1965 and 400 million tons (8 million B/D) by 1970, including natural gas liquids and synthetics. The great bulk of the petroleum production increase has in the past and will in the future come from the USSR. The USSR provided 83% of the Bloc petroleum production in 1956, 89% in 1962, and is expected to provide over 92% by 1970. Despite an increasing deficiency of supplies with respect to consumption in the Satellite countries, the Soviet production of crude oil will be adequate not only to meet this deficiency, but to permit increasing exports to the Free World. The Committee predicts a Bloc exportable surplus of 48.25 million tons (965,000 B/D) by 1965 and believes that as much as 70 to 85 million tons (1,400,000 - 1,700,000 B/D) may be available for export in 1970.* Should Free World restrictions on trade with the Soviet Bloc be relaxed, it is conceivable that the Bloc may be able to make available for export, even more than 1,700,000 B/D in 1970.

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* Export availability to the Free World will be less by 98,000 B/D in 1965 and 100,000 B/D in 1970 if Cuba is included in the Bloc.

SECTION 26. TRADE AMONG COUNTRIES OF THE SINO-SOVIET BLOC [a]

In 1962 commodities valued at over $11.7 (12.6)[b] billion were traded between countries of the Sino-Soviet Bloc; of this total, slightly under 10%, or $1.1 (1.15)[b] billion, constituted energy fuels, petroleum, and coal. Coal trade, which historically has had the major share of the intra-bloc energy market, now accounts for about half, and petroleum, the remaining half of the total movements of fuels. In the next decade, petroleum trade should increase substantially and take the lead as the prime energy fuel in intra-bloc trade.

Only within the past several years have sufficient trade statistics become available to evaluate, with any degree of confidence, the trends of intra-bloc trade. Even now, certain information is still unobtainable. Therefore, analysis of trade trends has been limited to statistical data since 1958. Also, in this section, analysis of trade patterns only considers the total of exchanges between the Satellite countries themselves and exports and imports from the USSR to the Satellites excluding Cuba. No attempt is made here to discuss individual country trade other than that of the Soviet Union.

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a/ The text in this section is descriptive of intra-bloc trade, excluding Cuba. The inclusion of Cuba in the Bloc would not materially change the flavor of the comments. However, at a number of places in the text bracketed figures are given, showing the effect of including Cuba in the Soviet Bloc.

b/ Bracketed figures include Cuba in the Bloc.

A. Intra-Bloc Trade of All Commodities

From 1958 to 1962, trade of all commodities within the Sino-Soviet Bloc increased from $8.5 billion to $11.7 (12.6)[b] billion, for an annual gain of 8.3 (13.0)[b] percent. Apparently one-fourth of this trade was conducted by the Satellites with each other, as is shown in Table 63. Exports from the USSR to the Satellites grew at a higher rate than Soviet imports from the Satellites during the four-year period.

TABLE 63

INTRA-BLOC TRADE OF ALL COMMODITIES [a]
(Millions of Dollars)

	1958	1959	1960	1961	1962
Intra-Satellite Trade (Including Cuba)	2,313	2,647	2,884 (2,949)	2,832 (3,115)	2,958 (3,172)
Satellite Exports to USSR (Including Cuba)	3,197	3,764	3,833 (3,937)	3,823 (4,132)	4,304 (4,538)
USSR Exports to Satellites (Including Cuba)	3,011	4,003	4,022 (4,093)	3,911 (4,186)	4,480 (4,852)
TOTAL INTRA-BLOC TRADE (INCLUDING CUBA)	8,521	10,414	10,739 (10,979)	10,566 (11,434)	11,742 (12,562)

a/ Data do not include trade between the following countries which are unavailable -- Mainland China, North Korea, North Vietnam, and Outer Mongolia.

B. Energy Trade in Relation to Total Trade

Energy trade within the Bloc, that is, movements of petroleum and coal, averaged slightly under 10% of total trade from 1958-1962 and increased at about the same rate as total trade, or 7.5 (8.6)[b] percent. As shown in

b/ Bracketed figures include Cuba in the Bloc.

Table 64, in 1962 intra-bloc energy trade amounted to over a billion dollars in value.

TABLE 64

INTRA-BLOC TRADE IN ENERGY
(Millions of Dollars)

	1958	1959	1960	1961	1962
Intra-Satellite Trade	262	319	308	327	313
Satellite Exports to USSR	162	173	180	163	152
USSR Exports to Satellites (Including Cuba)	404	478	508 (533)	578 (620)	641 (687)
Total Intra-Bloc Trade (Including Cuba)	828	970	996 (1,021)	1,068 (1,110)	1,106 (1,152)

Trade data over the four-year period reveal, however, an increasing dependence by the Satellites on the Soviet Union for their energy supplies. Exports from the USSR to these countries grew by 12% per year, while Soviet imports of energy actually declined. Intra-Satellite energy trade essentially remained constant. As pipeline systems from the USSR are completed in the future, this energy dependence will become even greater.

Limited quantities of other energy sources, such as natural gas and electricity, are also exchanged between several of the bloc countries. However, at the present time their contribution to total energy trade is insignificant.

C. Petroleum Trade

Petroleum trade within the Bloc, as shown in Table 65, amounted to 19 million tons (380,000 B/D) in 1962. The predominant share, of course, was exports from the USSR to the Satellites, which doubled during the five-year period. It is forecast that Soviet exports to the Satellites will be about 15 million tons (300,000 B/D) greater in 1970 than in 1962.

TABLE 65

INTRA-BLOC PETROLEUM TRADE
(Million Metric Tons)

	1958	1959	1960	1961	1962
Intra-Satellite Trade	1	1	1	1	1
Satellite Exports to USSR	3	3	3	3	3
USSR Exports to Satellites	8	11	13	14	16
(Including Cuba)	—	—	(15)	(18)	(20)
Total Intra-Bloc Trade	12	15	17	18	19
(Including Cuba)			(19)	(22)	(23)

While the volume of petroleum trade within the Bloc has increased by an average annual rate of 12 percent since 1958, the value of this trade, as shown in Table 66, has advanced at a much lesser rate, only 6.5 percent. This is due, for the most part, to a greater proportion of lower-priced crude oil in Russian exports, as against relatively more higher-valued product exports in the earlier years.

TABLE 66

INTRA-BLOC PETROLEUM TRADE
(Millions of Dollars)

	1958	1959	1960	1961	1962
Intra-Satellite Trade	24	23	23	27	25
Satellite Exports to USSR	83	87	86	69	55
USSR Exports to Satellites	253	318	337	374	384
(Including Cuba)	—	—	(361)	(414)	(429)
Total Intra-Bloc Trade	360	428	446	470	464
(Including Cuba)			(470)	(510)	(509)

D. Coal Trade

While petroleum trade within the Sino-Soviet Bloc has held the spotlight in recent years, expanding volumes of coal have also been exchanged between these countries. As shown in Table 67, the volume of this trade amounted to over 36 million tons in 1962, an increase of 10 million tons since 1958.

TABLE 67

INTRA-BLOC COAL TRADE
(Million Metric Tons)

	1958	1959	1960	1961	1962
Intra-Satellite Trade	13.2	16.3	15.5	16.4	15.7
Satellite Exports to USSR	4.5	5.0	5.5	5.3	5.5
USSR Exports to Satellites	8.4	8.8	9.3	11.8	14.9
Total Intra-Bloc Trade	26.1	30.1	30.3	33.5	36.1

Coal trade data within the Bloc are distorted by the large volume exported from Poland to the USSR which is actually shipped directly from Poland to East Germany for Russian account. This volume amounted to 4.3 million tons in 1958 and rose to 5.3 million tons by 1962. Nevertheless, actual shipments of Russian-produced coal to the Satellites are increasing significantly, while intra-Satellite trade has shown little change since 1959.

The value of coal trade within the Bloc, see Table 68, has risen slightly less than the volume of trade, indicating lower overall prices or a greater share of less valuable coals. Over the four-year period, the value of trade grew by 8.2% per year, while volume was increasing annually by 8.5%.

TABLE 68

INTRA-BLOC COAL TRADE
(Millions of Dollars)

	1958	1959	1960	1961	1962
Intra-Satellite Trade	238	295	285	300	288
Satellite Exports to USSR	79	86	93	94	97
USSR Exports to Satellites	151	160	172	206	257
Total Intra-Bloc Trade	468	541	550	600	642

V. THE SINO-SOVIET BLOC: EXTERNAL

GENERAL TRADE WITH FREE WORLD

SECTION 27. HISTORICAL

In 1918 the USSR established a state monopoly over foreign trade. While the original purpose of this move was to subordinate such trade to the aims of national economic planning, it is now serving the purpose of maximizing Soviet advantage in trade with the Free World.

Soviet Bloc trade is being used to extend Communist influence, destroy operations of private companies that pose a threat to the spread of the ideology of state control, create unrest in key foreign areas, obtain vital strategic materials and technical know-how from the Free World, and make up for certain short-term domestic shortages.

In the initial years following World War II, the trade of the Sino-Soviet Bloc was heavily oriented toward an exchange of materials between the Bloc countries. This resulted from a deliberate policy of promoting economic self-sufficiency as well as from a failure of the Communist countries to develop sizeable surpluses for export to the Free World. After the death of Stalin in 1953, the commercial policy of the Bloc was immediately reversed with the aim of expanding economic relations with the Free World. The result was a spectacular increase in the trade of Free World countries with the Soviet Bloc.

By 1961 Free World (including Cuba) trade with the Bloc had increased threefold over 1953 levels, to $4.9 (4.7)[a/] billion in each direction. The Communists' share of total international trade rose from about 2% to 4% over this period. Sixty percent of Soviet Bloc trade in 1961 was with Western Europe.

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a/ Bracketed figure includes Cuba in Soviet Bloc.

The bulk of Free World exports to the Bloc in 1961 consisted of food, crude materials, metals, chemicals, machinery and plants. Food exports to the Bloc in 1961 were almost 60% higher than those in 1960. Much of this increase may be attributed to Canadian and Australian wheat shipments to Communist China. Total crude materials exports were valued at $1.2 billion. Textile fibers, including synthetics, comprised half of the crude materials exports; rubber, one-fourth; while the remaining quarter included such items as ores, minerals, hides, pulp and wood. Food, crude materials, manufactured goods and fuels represented the major Free World imports from the Bloc in 1961. Petroleum (including products) was the largest single item and represented between 9 and 10% by value of all imports from the USSR and her Satellites.

TABLE 69

FREE WORLD TRADE WITH SINO-SOVIET BLOC
($ U. S. Million)

Free World Imports From:

YEAR	USSR	EUROPEAN SATELLITES	CHINA & FAR EAST	CUBA	TOTAL	BLOC AS PERCENT OF FREE WORLD
1947	273.9	732.9	417.9	-	1,424.7	2.7
1953	381.8	807.9	441.4	-	1,631.1	2.1
1956	832.6	1,473.0	657.5	-	2,963.1	3.0
1960	1,506.3	2,146.1	790.3	-	4,442.7	3.7
1960[a/]	(1,435.5)	(2,127.3)	(790.3)	(512.8)	(4,865.9)	(4.1)
1961	1,869.5	2,373.3	665.6	-	4,908.4	3.9
1961[a/]	(1,593.6)	(2,259.7)	(665.6)	(159.1)	(4,678.0)	(3.8)

Free World Exports To:

1947	477.0	856.5	672.2	-	2,005.7	4.1
1953	423.5	677.9	287.4	-	1,388.8	1.9
1956	799.2	1,327.3	434.2	-	2,560.7	2.7
1960	1,561.4	2,174.2	685.8	-	4,421.4	3.9
1960[a/]	(1,457.9)	(2,162.0)	(652.0)	(391.6)	(4,663.5)	(4.1)
1961	1,833.8	2,383.5	772.9	-	4,990.2	4.2
1961[a/]	(1,524.8)	(2,313.0)	(673.5)	(175.5)	(4,686.8)	(4.0)

a/ Bracketed figures include Cuba in the Soviet Bloc.

SECTION 28. LESS DEVELOPED NATIONS

In less developed areas, a major objective of Soviet trade policy is to exert political pressure and extend Communist influence. The USSR combines the extending of economic assistance with an aggressive expansion of trade under conditions ostensibly quite favorable to the less developed countries. The latter, however, cannot export products that are as important to the Communists as those of highly industrialized countries. Thus, exports to the Bloc (including Cuba) from the less developed areas have grown more slowly (81% from 1955 to 1961) than exports from the industrialized nations (148% in the same period). On the other hand, imports by less developed countries from the Bloc in 1955-1961 have grown much faster (121% in the same period) than imports by the industrialized countries (80%). In 1961, 28% of total Bloc trade with the Free World was with less developed areas. From these areas the USSR receives agricultural commodities and raw materials. In turn, she sells them machinery, petroleum, food and ferrous metals.

Experience suggests that the USSR occasionally abrogates contracts or interrupts supplies unilaterally and arbitrarily. This enables the Communists, when it suits their purposes, to exert strong influence on customers who are dependent on Soviet Bloc trade. Yugoslavia and Israel are major examples of the application of political pressure through the sudden withholding of trade. The political flavor of trade with the underdeveloped nations is underlined by the fact that Soviet exhibitions and participation in trade fairs held in the countries of Asia, Africa and Latin America, follow closely on the development of trade relations. These exhibitions are designed not only to advertise merchandise but also to give glowing pictures of the Soviet political system and social, scientific, industrial and cultural achievements. The Bloc gains additional political influence in the less developed countries by grants of credits, technical assistance and outright gifts.

Some of the less developed countries have a very high percentage of their trade with the Communists. Among the developing nations, Afghanistan and Guinea are highly dependent, each receiving more than 40% of its import trade from

the members of the Communist group. In total volume, Egypt and Yugoslavia are the largest traders with the Soviet Bloc among developing countries. In 1961, 24% of Egypt's total imports trade and 44%, or $211 million, of her exports trade were with the Bloc. India, an ideological leader in Asia, also has a large volume of trade with the Bloc. In addition, Malaysia's export trade with the Sino-Soviet Bloc and Hong Kong imports from the Bloc are of considerable magnitude. From the point of view of Western military strategy, the economic ties of Iceland and Greece with the Communist countries are also important.

SECTION 29. INDUSTRIALIZED COUNTRIES

The Sino-Soviet Bloc obtains important strategic materials from industrialized countries in the Free World. About 60 to 90% of the exports of Western Europe and Japan to the Bloc consist of metals, metal shapes, transportation equipment, machinery, complete plants and other manufactured goods. The items of major interest to the Bloc are products of advanced technology. Particularly desirable, from the Communist point of view, are complete plants which represent an import of technology that can be duplicated directly, and thus multiply many fold the yield from a relatively small purchase. Many of the items - for example, equipment used for an expanding oil transportation network - have obvious potential military value. Recently, due to consumer shortages the Bloc has shown an interest in food imports. The industrialized nations, in return, buy large amounts of food, crude materials and fuels from the Bloc. It is evident that many Western nations are making significant contributions to the economic and military strength of the Sino-Soviet Bloc.

West Germany, Japan, France, Austria and Italy have expanded their trade with the Soviet Union more rapidly than other major industrial countries. Exports to the USSR and her Satellites in 1961 from these five countries were four to ten times their exports in 1948-1952. West Germany is by far the largest exporter to the Bloc, with $742 million exported in 1961. The United Kingdom, France and Italy are also important exporters.

The threat of Soviet political leverage in the internal affairs of Free World countries hangs over the industrialized nations as well as over the less developed ones. Many of the

industrialized nations have interests which are concerned with maintaining export outlets to the Soviet Bloc. If the USSR closed its markets to such nations, the enterprises affected would undoubtedly pressure their governments to try to reopen these trade outlets. Since the markets would have been closed for political purposes, regaining access to them might well involve concessions that would be advantageous to the Soviet Union. Finland affords a good example of how the Soviet Union may exert political pressure by withholding trade.

In many cases, the role of Communist oil, specifically, can be seen to be significant in maintaining such export outlets

SECTION 30. SOVIET BLOC ASSISTANCE TO UNDERDEVELOPED AREAS

Soviet Bloc aid to petroleum activities in underdeveloped countries is used to augment petroleum trade as a Soviet offensive weapon.* Such aid is instrumental in fostering the development of state-owned oil companies which operate in direct competition with local and international private companies. Soviet aid in the form of long-term loans for the purchase of Soviet Bloc equipment has been extended to at least 15 less developed countries for petroleum related purposes.

In measuring the extent of the Soviet Aid Program, it should be noted the credits granted are usually not expended immediately. Often several years lapse between the announcement of the agreement and the receipt of equipment. Facts on Soviet exports under the terms of aid agreements are limited. Cancellations and postponed deliveries are rarely publicized. Therefore, it is difficult to determine the exact amounts extended by the Bloc governments but impossible to know the amounts actually spent at a given time. Nevertheless, the extent of the Soviet Bloc Aid Program is portrayed by the following:

EXAMPLES OF USSR FINANCIAL AID TO DEVELOPING COUNTRIES

YEAR	COUNTRY	AMOUNT IN EQUIVALENT U.S. DOLLARS
1954	Afghanistan	$ 3,500,000
1958	Afghanistan	10,000,000
1958	Egypt	175,000,000
1959	Iraq	140,000,000
1959	Ethiopia	44,000,000
1960	Ghana	40,000,000
1961	India	66,000,000
1961	Pakistan	30,000,000
1961	Mali	44,000,000
1962	Indonesia	35,000,000

* See "History of Soviet Bloc Aid to Underdeveloped Areas - Detail by Country", which is Appendix No. 1 in the Statistical Appendix to this Part Two.

The financial assistance includes credits for the export of 55 complete drilling rigs from 1959 through 1961, and present orders for crude capacity refining equipment total 180,000 B/D. Refinery construction through the aid program includes completion of the 15,000 B/D Gauhati unit in India; the 20,000 B/D addition to the Egyptian refinery at Alexandria, and a 20,000 B/D refinery in Syria at Homs. In addition, under-construction or planned refineries include:

India (Barauni)	40,000 B/D*
India (Koyali)	40,000 B/D*
Egypt (Suez)	20,000 B/D
Ethiopia (Assab)	10,000 B/D
Indonesia (Java)	30,000 B/D

* To be increased to 60,000 B/D each.

Technical assistance has been carried on by at least 7,200 Soviet technicians, including more than 700 geologists, in various less developed countries. In addition, over 200 geologists have been active in Cuba.

Soviet Bloc aid to less developed countries is usually in the form of a long-term trade credit (12 years or more) with terms including:

(1) Repayment of equal installments upon project completion.

(2) Low interest rates. (2½% vs. 5-6% for conventional Western or World Bank loans.)

(3) Repayment is accepted in the form of traditional and/or surplus products at world market prices, or even accepted in local currency.

The trade credit is usually extended for the purchase of Soviet Bloc hardware and equipment not available from indigenous sources, for technical assistance and training of local personnel, and for geological surveys by Soviet teams. Projects selected for Soviet assistance are usually "impact projects" designed to represent and manifest in a spectacular manner the rapid industrial progress of the underdeveloped

country through Soviet aid. Further such Soviet aid is aimed at fostering the development of State-owned industry which will directly compete with Western or local free enterprise organizations. This practice encourages socialist patterns of development while blunting the influences of Western industry.

Free World petroleum companies operate extensively throughout the less developed world and represent examples of Western skill and resourcefulness. If the Soviet Union is to depict the Western world as a decaying system, she must first destroy the image of the local Western representatives. A strong State-owned oil company of the local government will reduce the economic importance of foreign private companies. This fact, coupled with that prestige and power that a government company will bring to local officials, has caused the Soviets to be extremely active in the petroleum field.

Mineral exploration contracts are usually written on a fee basis in which the Soviet Bloc does not take a financial position. Instead, the local country promises to pay for the exploration by the Soviet technicians, irrespective of the outcome. The less developed country, however, retains the right to all minerals discovered. Upon completion of permanent projects, such as refineries and chemical plants, their operation is turned over to local, but Soviet-trained, personnel.

SECTION 31. CONSUMING COUNTRIES

Oil is the major weapon of the Soviet trade offensive in the Free World. The Communists fully recognize the potential they have for attacking the operations of private oil companies, whose oil concessions the USSR considers to be highly important to the Free World's economic and military strength.

From 1955 to 1963 Bloc oil exports to the Free World including Cuba increased from 5.8 million tons (116,300 B/D) to 37.0 million tons (740,000 B/D) for an average growth rate of 26% per year. About eighty-five percent of the total in 1963 came from the USSR. Fifty-four percent of the total exports in 1963 were crude oil, with the remainder in various products.

TABLE 70

TOTAL SOVIET BLOC CRUDE AND PRODUCT EXPORTS TO THE FREE WORLD (INCLUDING CUBA) [a]

DESTINATION	1955 THOUSAND METRIC TONS	1955 BARRELS PER DAY	1962 THOUSAND METRIC TONS	1962 BARRELS PER DAY
Western Hemisphere [a]	641.9	12,800	4,950	94,000
Free Europe	4,064.5	81,300	22,600	452,000
Other Eastern Hemisphere	632.0	12,600	5,950	124,000
TOTAL TO FREE WORLD	5,818.2 [b]	116,300 [b]	33,500	670,000 [c]

COMMITTEE ESTIMATES

DESTINATION	1963 THOUSAND METRIC TONS	1963 BARRELS PER DAY	1965 THOUSAND METRIC TONS	1965 BARRELS PER DAY	1970 THOUSAND METRIC TONS	1970 BARRELS PER DAY
Western Hemisphere [a]	6,000	120,000	9,000	180,000	11,500	230,000
Free Europe	24,500	490,000	29,750	595,000	47,500	950,000
Other Eastern Hemisphere	6,500	130,000	9,500	190,000	18,000	360,000
TOTAL TO FREE WORLD	37,000	740,000	48,250	965,000 [c]	77,000 [d]	1,540,000 [c]

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a/ Includes USSR exports to Cuba of 88,000 B/D in 1962 and estimated exports of 95,000 B/D in 1963, 98,000 B/D in 1965, and 100,000 B/D in 1970.

b/ Totals include volumes not accounted for in geographic areas.

c/ These include 95,000 B/D in 1962, 125,000 B/D in 1965, and 160,000 B/D in 1970 of product exports from the European Satellities to the Free World. The Summary Petroleum Supply - Demand Balance for the European Satellites in Section 15 shows exports of 114,000 B/D in 1962, 134,000 B/D in 1965, and 176,000 B/D in 1970. The difference arises from the methodology used to calculate the two figures. For example, the 114,000 B/D exports in 1962 represent the difference between production and imports on the one hand, and consumption within the Satellites on the other hand. Thus, it is the difference of two estimates. The 95,000 B/D figure is a summation of verified receipts of Satellite oil in Free World nations and therefore, provides a known minimum level of Satellite exports. Similarly, lower figures have been projected for future Satellite product exports to the Free World to give the lower export estimates.

d/ About center of 70-85 MMT export range.

In 1962 the value of Free World petroleum imports from the Bloc (including Cuba) was $476 million and represented 9.2% of all imports from the Bloc -- by far the largest item purchased from the Bloc by the West.

Almost eighty percent of the volume of Bloc oil is absorbed by a handful of customers -- Italy, West Germany, Cuba, Japan, Sweden, Egypt and Finland. While the total amount of 1962 and 1963 imports of Soviet Bloc oil was 6% of the Free World demand (outside the U.S.), certain countries import much more than this percentage in relation to their local requirements.

TABLE 71

ESTIMATED SOVIET BLOC PETROLEUM IMPORTS OF SELECTED CONSUMERS

	1962			1963		
IMPORTERS	THOUSAND METRIC TONS	BARRELS PER DAY	PERCENT OF LOCAL DEMAND	THOUSAND METRIC TONS	BARRELS PER DAY	PERCENT OF LOCAL DEMAND
Austria	1,100	22,000	29	1,300	26,000	31
Cuba	4,400	88,000	100	4,750	95,000	100
Egypt	1,600	32,000	30	1,250	25,000	23
Finland	2,900	58,000	87	3,000	60,000	80
West Germany	4,450	89,000	9	5,000	100,000	8
Greece	1,000	20,000	35	1,000	20,000	33
Iceland	350	7,000	88	350	7,000	82
Italy	7,100	142,000	20	7,500	150,000	19
Sweden	2,750	55,000	19	3,000	60,000	20

An analysis of the types of companies which buy Bloc oil shows that in 1962, 45 (37)[a/] percent of the known Free World purchasers of Soviet oil were government companies and 44 (50)[a/] percent were non-integrated oil companies. Eleven

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a/ Bracketed figures exclude Cuba from the Free World.

percent was bought by large consumers, mainly power plants, other and unknown companies. It is estimated that the composition of the customers was about the same in 1963.

Supply and demand projections for the countries of the Sino-Soviet Bloc lead to Committee predictions that in 1965 the Bloc may have 48.25 million tons (965,000 B/D) and by 1970, 70-85 million tons (1,400,000-1,700,000 B/D) of crude and products available for export to the Free World.b/ Where, within this range, or conceivably beyond it, exports end up depends upon political and economic climates at the time. There is no doubt, however, that pressures to move it into the Free World will be intense.

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b/ Reduced by 98,000 B/D in 1965 and 100,000 B/D in 1970 if Cuba is excluded from the Free World.

SECTION 32. EFFECT ON PETROLEUM EXPORTING COUNTRIES

Since the 1950's the principal suppliers of petroleum in world trade have been Venezuela and the Middle East. The United States, though still the world's biggest oil producer, has become a net importer, and its exports have dwindled to nominal volumes. Indonesia and North Africa in recent years have also begun to make significant exports to Free World markets.

During the period under discussion, it is safe to regard Venezuela and the Middle East as the major sources of marginal supplies of oil for Free World markets, the allocation between those two areas being determined mainly by geographical factors. To the extent that Soviet Bloc oil exports have reduced the volume of exports from Free World producing countries, Venezuela and the Middle East have been the principal sufferers.

Oil income to the producing countries is received from the producing companies through direct payments consisting mainly of royalties and income tax payments and through expenditures for items such as wages and salaries paid to employees of local nationality, personal income taxes paid by expatriate employees, payments to local contractors, and payments for local purchases of goods. Oil income's contribution to the national economies is felt principally in two ways: by providing revenues to the national governments for budgetary use, and by adding to the foreign exchange resources. In nearly all the producing countries, the proportion of total government revenues provided by direct income from oil has been in excess of 50%, and it has often been substantially in excess. Though neither Kuwait nor Qatar has published budget information in the past, there is reason to suppose that direct oil revenues probably account for upwards of 90% of Kuwait's budget, and the percentage in Qatar is certainly of the same order of magnitude.

It would, of course, be possible to estimate the income loss to Free World producer governments as a result of <u>total</u> Soviet Bloc exports to the Free World. (From 1953 to 1963, the cumulative figure is probably about $960 million.) However, since the Soviet Bloc has always been an oil-exporting area, and could rely on special circumstances, such as geographical proximity, to preserve some position in the Free World oil trade, it has been thought to be more realistic to

select a base year. In 1953, the base year selected, Soviet Bloc oil exports were confined to Western Europe, and equalled 1.9% of oil demand in that area. The year of the death of Stalin also saw a change in emphasis in Soviet economic policy, from maximum autarky to a growing reliance upon foreign trade to accelerate the development of the Bloc's resources.

In 1963, Soviet Bloc oil exports to the Free World, including Cuba, approximated 37 million tons (740,000 B/D). If Soviet Bloc exports to Western Europe since 1953 had remained in line with their percentage share in that year, and there had been no penetration of other markets, the 1963 total Bloc exports would have been only 112,000 B/D, or 628,000 B/D (31.4 million tons) less than the actual total. The value of such displaced oil has been estimated on the basis of the average direct income per barrel received by the Middle East and Venezuela. In 1963 alone, the losses amounted to $183 million. From 1953 up to and including 1963, the Committee estimates that the producing countries of the Middle East and Venezuela have lost nearly $850 million in direct royalties and taxes due to the expansion of Soviet Bloc oil sales into traditional Free World markets over the Soviet's 1953 position.

In the long run, a continued high level of Soviet Bloc oil exports to the Free World may also be expected to have an effect upon the incomes of producer states arising from oil companies' "other expenditures". The impact of the increased Soviet Bloc oil exports on these "other expenditures" is not direct or immediate. The level of such expenditures is, however, linked to the level of production, and to the general prosperity of the oil producing companies. Loss of markets, therefore, is likely to have an effect on "other expenditures".

The loss of income resulting from a reduction in volume of sales is the only kind of loss caused to oil exporting countries by increased Soviet oil exports which can be reasonably estimated. However, the size of direct payments to the governments of the Free World oil exporting countries not only depends upon the volume of exports, but also is related to posted prices. If Soviet price-cutting contributes to reducing those prices, the level of direct payments per barrel is affected.

Evidence is shown in an earlier section on Soviet pricing that, in many markets, the USSR has used substantial reductions in prices, below those determined by competition

among Free World suppliers, as its main means of obtaining or increasing its oil export business. This practice has inevitably increased existing pressure upon the f.o.b. selling prices. For example, though the degree of responsibility is not demonstrable, it would seem that cut-price Soviet Bloc exports contributed to the reductions in Middle East posted prices which took place in February, 1959 and August, 1960. Soviet Bloc oil now constitutes more than one-third of the non-integrated company oil entering Europe and is sold primarily to independent and government companies. This enables these companies to be large price-cutters.

Since few Free World markets are insulated from the effects of spreading price weakness, the impact of Soviet pricing policies is felt not merely by the Middle East and Venezuela, whose sales have been displaced, but by all oil exporting countries whose incomes depend upon the levels of selling prices. The threat of Soviet exports to the prices of oil exported by Free World producing countries is thus of wider concern, and may be even more serious than the threat to the actual volumes of Free World exports.

SECTION 33. SOVIET BLOC MARINE ACTIVITIES

The Soviet Bloc tanker fleet currently (January 1, 1964) consists of:

(a) 130 vessels in reported ocean petroleum service aggregating 2,035,839 DWT (equivalent to 122.4 T-2's).

(b) 45 vessels unreported in ocean petroleum service aggregating 340,244 DWT (equivalent to 16.8 T-2's).

Thus, the total tonnage amounts to 2,400,000 DWT or 139.2 T-2's, of which 82% flies the USSR flag. This excludes 9 USSR flag vessels which are designed as combination oil/ore carriers.

The fleet is comparatively young as shown by the fact that in 1950 there were only 28 USSR tankers totaling less than 175,000 DWT.

The Soviet Seven Year Plan (1959 through 1965) called for increasing the tanker fleet by 80%. However, this is to be far exceeded. Currently, known new buildings show that the USSR fleet will almost quadruple in size between 1959 and 1965. Undoubtedly, new orders will be placed for delivery before the end of 1965 so the fleet will probably grow even more. This emphasizes the importance the Bloc has placed on controlling the tonnage required to move their petroleum and is one of the firmest indications we have of the Soviets' thinking as to their future oil exports.

Since almost four times as much of this new tonnage is being acquired in Free World yards as is being constructed in Bloc yards, a large foreign exchange cost on the part of the Soviets is involved. This would seem to indicate their strong desire to increase oil exports. The breakdown in known new buildings is as follows:

YARD	NUMBER OF SHIPS	T-2 EQUIVALENT
USSR	5	15.7
Poland	1	1.2
Bulgaria	4	0.9
Sub Total Bloc	10	17.8
Japan	10	24.6
Italy	5	16.8
Finland	13	3.8
Yugoslavia	15	22.0
Sub Total Free World	43	67.2
GRAND TOTAL	53	85.0

Elsewhere in this report it has been pointed out that in the absence of corrective action, Bloc exports by sea to the Free World including Cuba might reach 44.7 million tons (894 thousand B/D) by 1965. At this level, the Bloc requirements for tankers, for Free World trades, have been estimated by the Committee at 237 T-2 equivalents. The Committee finds that the Soviet Bloc will have sufficient owned tonnage to meet this requirement except for a small amount of transportation that their customers will provide. This is shown below.

	T-2 EQUIVALENTS
Average Requirements	237
Availability Mid-Year 1965:	
Existing Block Fleet*	122
Known New Construction	66
Assumed New Orders	13
Customer Arranged Transportation	33
	234
Apparent Deficit	3

* Less Scrappage

Apparently the Bloc is placing great importance in owning the bulk of the ships needed to transport their export oil.

Assuming that operating costs will be comparable to a typical Western European fleet, average costs for Soviet-owned tankers are forecast to decrease from $1.13 per thousand loaded ton miles (excluding port and canal taxes) to $0.90 in 1965, because of the increasing average size of the tankers.

In 1959, 69% of the Soviet Black Sea chartering was of the single voyage type fixture. In the first half of 1960, Russia began to make contracts of affreightment and also considerably more time charters. By 1961, the USSR had made enough long-term contracts for transportation so that their chartering fell to a very low level -- less than one million tons total. This compares with over 13 million tons of fixtures made in 1960.

In July 1960, a major oil company initiated its "Black Sea" policy which denied shipping contracts to any tanker owner moving Soviet oil. This policy apparently caused an increase in the cost of Soviet charters, but it did not reduce the volume of oil shipments. The results of the "Black Sea" policy indicates that individual action by one company has little effect on the oil movements by the Soviet Bloc.

The Committee believes that tankers will be available to the Soviet Bloc in sufficient quantity to move nearly all the oil that the Bloc has available for export in 1965. However, if the Free World were suddenly to be cut off from Soviet Bloc oil in 1965, a considerable strain would be put on the tanker fleet, for some 242 T-2's would be required to move the supplies needed to replace Russian oil from the Caribbean and the Persian Gulf to consuming countries.

Existing port facilities in the Communist Bloc, plus planned new construction, appear to be adequate to handle Soviet Bloc oil tanker freight traffic. Port costs seem to be about the same as those prevailing in the West.

In conclusion, the planned growth in the Soviet merchant fleet seems to indicate that the Bloc does anticipate large future increases in their Free World trade and that oil trade continues to play an important role in the plans of the Soviet Bloc. This is emphasized by the Bloc's willingness to spend their limited foreign exchange credits to purchase new vessels from Free World yards.

FREE WORLD EXPORT TRADE CONTROLS APPLYING TO THE BLOC

Summary

With the exception of the United States export control program, there are no embargoes on equipment such as large diameter pipe, drilling bits, drill pipe, drill collars, rotary rigs, or gas compressors which the Soviet Bloc has sought or might seek in the future to accelerate their petroleum production program. However, the NATO countries agreed to limit shipment of large diameter pipe to the Bloc countries in 1962 and as a result the completion date of the Comecon pipeline has been substantially delayed.

The U. S. embargoes commodities and technology that the other industrial nations do not. U. S. security export controls include a complete embargo on trade with Communist China, North Korea and North Vietnam, a partial embargo on trade with Cuba (food and drugs excepted), and broad controls on trade with the USSR and Soviet Bloc countries to control direct or indirect shipments of U. S. products to these destinations. Controls on U. S. exports to Free World countries are mainly concerned with a highly selective list of goods - known as the Positive List - the control of which is necessary to prevent the unauthorized diversion of Free World security goods to the Soviet Bloc, and to prevent the frustration of U. S. controls over shipments to Soviet Bloc destinations.

Industrialized nations, excepting the U. S., are conducting a growing trade with the Communists in industrial equipment, including equipment used in petroleum operations. Soviet realization of their petroleum goals is materially assisted by the importation from the Free World of pipe, pumps, compressors, etc., in exchange for oil or other commodities.

SECTION 34. UNITED STATES

The basic controls over exports of commodities from the United States are provided by three acts of Congress:

(a) The Export Control Act of 1949.

(b) The Mutual Defense Assistance Control Act of 1951 ("Battle Act").

(c) Trading With The Enemy Act of October 6, 1917 as amended.

All commercial exports from the United States and from its territories and possessions, except to Canada, are prohibited unless the Department of Commerce has either issued a "validated license" or established a "general license" permitting such shipments. The export of technical data is considered a commercial export for purposes of these regulations. Exports to the USSR and other Bloc countries, as well as to the Free World, are governed by these regulations.

The fact that a commodity is included on the U. S. Positive List does not necessarily mean that it cannot be exported to the USSR or the Bloc. In practice, each application for an export license for items on the Positive List is considered by an inter-agency government committee which recommends to the Secretary of Commerce that the application be denied or approved. The Secretary of Commerce has the power to overrule the inter-agency committee.

The Department of Commerce initiates changes in the Positive List. Such recommendations for additions to, or deletions from, the Positive List are reviewed by the inter-agency committee.

Since mid-1954 the U. S. policy with respect to exports on non-strategic goods to Soviet Bloc nations in Eastern Europe has been liberalized to some extent. In particular, a less restrictive policy with respect to Poland has been pursued since August 1957.

The controls require validated licenses to ship certain petroleum producing and transportation equipment to all the nations of the Soviet Bloc, except Poland. General licenses are established that permit shipments of drill pipe, drill collars and tool joints to Poland.

Technical Data

The Department of Commerce has reported that the interest of the Soviet Bloc in acquiring U. S. technical data

increased significantly during the latter part of 1963. Emphasis, as in the past, was on industrial equipment, process and plant technology in the fields of petroleum refining, petrochemicals, steel plant equipment, and textiles. U. S. firms have continued to seek the view of the government on the desirability of their licensees, affiliates, or subsidiaries abroad furnishing technical data and/or equipment and material to the Soviet Bloc for construction of facilities of possible strategic importance.

The general license which authorizes the exportation of unpublished technical data, requires an exporter of certain types of data, including data relating to petroleum or petrochemical processes, oil field equipment and large diameter pipeline materials and equipment, to obtain from the foreign importer a written assurance that neither the technical data nor the direct product thereof is intended to be shipped either directly or indirectly to a Soviet Bloc nation (including Poland) or Cuba.

SECTION 35. OTHER INDUSTRIALIZED NATIONS

In 1950 a Consultative/Coordination Committee (COCOM) was established to form a coordinated trade control program between certain Free World countries relative to the Sino-Soviet Bloc. The membership consists of 15 nations -- all the NATO countries except Iceland, plus Japan. Its agreements represent moral obligations only.

The COCOM group maintains a list of arms, atomic energy materials and other strategic materials that are to be embargoed or kept under surveillance. The list revision, which took effect February 1, 1960, made some embargoed items subject to so-called "administrative exceptions", a procedure which permits governments to issue licenses for the export to the Communist Bloc by unilateral decision when they are satisfied that no security interest is being endangered or when prescribed conditions are met.

Until May 1957 the internationally agreed minimum level of control on trade with Communist China was substantially more severe than that applied to the European Soviet Bloc. The China control list included about 200 items in addition to those under various levels of control to the other Communist Bloc countries.

During 1956 and the first 6 months of 1957, the pressure by some of the participating countries for easing this differential and expanding trade with Communist China mounted steadily. The advocates of relaxation urged a realignment of China controls with those imposed on commerce with the Soviet Union and its European Satellites. When multilateral negotiations in Paris in May 1957 failed to reconcile divergent proposals for modifying the China embargo, a number of countries unilaterally eliminated the China differential. The United States did not join in this action, however, and continues to maintain an embargo on exports to Communist China.

The scope of the COCOM list is much narrower than those items under U. S. control, and has been reduced considerably since 1950. It is not aimed at curbing the industrial potential of the Bloc, but rather concentrates more directly on key materials whose denials would have an impact on military preparation. There are no embargoes on equipment that the Bloc has sought or might seek in the future to accelerate their petroleum development.

STATISTICAL

APPENDIX

TO

PART TWO

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STATISTICAL APPENDIX

APPENDIX 1

HISTORY OF SOVIET BLOC AID TO UNDERDEVELOPED AREAS - DETAIL BY COUNTRY

The history of the petroleum-related aid granted by the Soviet Bloc has been organized on the basis of chronological events within each country.

MIDDLE EAST

Iran

In 1956, Russia made a "gift" of the Soviet portion of the Soviet Iranian Joint Stock Company as consideration for a promise that Iran would not permit the former Soviet concession to be granted to any other country or foreign organization. By late 1959, Russia offered to prospect for oil in Northern Iran and to give Iran 15% of any petroleum found for a promise by the Teheran government not to permit military bases of foreign powers on her territory.

Iraq

The USSR, in March 1959, extended a $140 million credit to Iraq for the construction of various projects including a chemical fertilizer plant with a 60,000-ton ammonia annual capacity and a geological survey of the entire country including seismic and magnetometer work in promising areas. It further included the construction of a geological equipment repair shop and laboratory. In April 1960, a contract was signed for Soviet seismic search over a 400 square mile area in the region of Dzarabik and Naft Khaneh-Khanaquin, which is an area not within the concessions granted to Western oil companies. In late 1960, Czechoslovakia granted Iraq an eight year credit for approximately $34 million for technical assistance including the construction of a 40,000 B/D refinery near Basra. However, in August of 1963, the Basra refinery was shelved as being uneconomic until 1970. Finally, in 1961, Iraq cancelled the unused concessions of the Western companies and ordered a complete drilling rig (valued at $1.68 million) from the Soviet Union. This step was apparently an indication that the Iraqi government company intended to prospect in areas formerly within Western concessions.

Syria

In 1957, Syria received a 10-year credit for $11.3 million from Czechoslovakia for the construction of a 20,000 B/D refinery at Homs, which went on stream in June 1959. In addition, the Soviet Union, in 1957, agreed to prospect for oil in a 19,300 square mile area in the Northern part of the country and to make 18 borings ranging from 4,500 to 18,000 feet. In 1959, apparently as a result of Soviet Bloc exploration, an oil deposit estimated at 150 to 160 million tons was discovered in Qarah Chok. Commercial production will not commence until a 500-mile pipeline to Tartus on the Mediterranean is completed. In mid-1961, three Soviet deep drilling rigs were sent to the Qarah Chok area. The Russian radio at Baku reported in March of 1963, that Soviet oil experts had discovered oil deposits in the El Ejesire province.

Yemen

Soviet Bloc relations with Yemen started with negotiations as early as 1955. The Chinese, East Germans and Czechs as well as the Russians had made overtures to Yemen. Loans from Bloc countries totaled $57 million for various projects including a $25 million loan from the Soviet Union specifying among other projects, a complete geological survey of the country.

AFRICA

Egypt

Egypt received $175 million trade credit from the USSR in January 1958, which included 65 "development projects". Included in the project list were many non-petroleum items but the petroleum industry received the majority of the loan. In addition to geological surveys, the loan was intended to cover technical assistance and equipment for the construction of a 1,200 B/D lubricating oil plant at Suez, a 20,000 B/D refinery at Suez and at Alexandria (which went into operation in 1963), a 20,000 B/D desalting unit, a 4,800 B/D desulfurization plant, a 6,000 B/D gasoline plant and a plant for production and repair of oil prospecting and drilling equipment (all numbers converted from tons per year to barrels per day). In addition, the 544 ton seismic ship BAKIR was used for prospecting in the Red Sea, along the Mediterranean Coast and in the Gulf of Suez

with Russian-trained Egyptians at the ship's instruments. Soviet geologists continue to survey the Red Sea area in 1963.

Ethiopia

In July 1959, the Soviet Union extended trade credit to Ethiopia amounting to $100 million. The loan was to finance the industrial and agricultural development projects including $44 million devoted to the Ethiopian petroleum industry. Specific projects included geological surveys of the country and the equipment, materials and technical assistance for the construction of a 10,000 B/D refinery at Assab on the Red Sea. In March of 1960, a team of Russians commenced extensive geological surveys throughout the country. In July 1961, it was reported in the Petroleum Press Service that Ethiopia had changed her mind in regard to the Assab refinery construction. However, in November 1961, Emperor Haile Selassie visited Moscow and announced that construction on the Assab project (cost $12.7 million) would start in 1963. In March 1963, Soviet engineers announced the completion of the engineering work for the Assab refinery and reaffirmed that construction would commence later in the year.

Ghana

In August 1960, it was announced that Ghana and the USSR had signed an agreement calling for $40 million in long-term credit for the purchase of various projects including oil exploration and petroleum products supply in exchange for traditional Ghana exports. Twenty-five Russian geologists arrived in Accra for the geological survey commencing in March 1962.

Mali

In March 1961, Mali signed an agreement with the Soviet Union calling for technical assistance in the search for oil, gold and diamonds in addition to other projects. Also, the agreement included provisions for importing Russian petroleum products in the long-term agreement. The amount of the loan for the entire package totalled $44 million to be repaid over a 12-year period.

ASIA AND THE FAR EAST

Afghanistan

Afghanistan was the first country to receive Soviet Bloc economic aid in the postwar era. In 1954, the USSR agreed to loan Afghanistan $1.2 million for the construction of three oil storage tanks. In February 1955, the Soviet government granted the Afghans a $2 million credit for the purchase of two asphalt works which were used to surface the streets of Kabul. In January 1958, another agreement was signed which included $15 million to be spent on Soviet oil surveys. Russian drilling crews expended $10 million in the Sar-i-Pul region. A 1929 treaty between the Soviet Union and Afghanistan provides that no foreign interest may work near the Northern border. This treaty closed the area to Western company exploration. Soviet geological and photographic surveys in the Sar-i-Pul area were conducted between 1958 and 1960, as well as the construction of nine storage tanks. Natural gas was discovered by Soviet crews in 1961, at Haja Gugerdagh. Fourteen horizons have been discovered since and deposits at Khwaja-Gugerdagh were estimated to equal 1,059 billion cubic feet. In January 1962, a new agreement was signed calling for Soviet economic and technical assistance in geological prospecting, and in design and construction of installations for the oil and chemical industries. Finally, in October 1963, an agreement was signed with Russia calling for Soviet aid in the construction of a gas pipeline to the Soviet border which will supply Russia with 1,500 million cubic feet of gas per year by 1966.

Ceylon

Ceylon has been seeking a company or country to finance the construction of a 34,000 B/D refinery near Colombo. In June of 1963, Czechoslovakia offered to set up this refinery and in August 1963, it was reported that Rumania, as well as several others, had made offers. No decision has been made to date.

India

In 1955, a team of Soviet oil exports was sent to India to make a survey to determine if conditions were favorable for the assistance of the government in petroleum activities. In 1956, an agreement was signed for the purchase of deep drilling rigs valued at $1.3 million. Forty-four technicians arrived that year from

the Soviet Union to supervise the assembly of the rigs and to train Indian personnel. In November 1956, India and Russia agreed upon the terms of a $63 million Soviet exploration program. One-hundred-seventy Soviet oil experts were sent to India. Indian personnel were sent to Baku for a six-month production course. Exploration by the Indian Government using Soviet Bloc crews and equipment began in 1957 (three Russian turbodrills and a single Rumanian rotary rig). Ninety-eight Bloc technicians serving with 350 Indians discovered only traces of oil but in September 1958, a significant deposit was discovered near Cambay at the 6,572 foot level. By mid-year of 1959, the oil and natural gas commission of India was operating five Russian and three Rumanian rigs. Planned construction of a Soviet-financed $25 million refinery at Barauni (40,000 B/D) and a Rumanian-financed $11.1 million refinery at Assam (15,000 B/D) were announced. A new deposit was discovered in May 1960 at Ankleswar. A Soviet credit was announced furnishing $66 million to be spent over a five-year period commencing in April 1961. In February 1961, an agreement was signed for the Soviet assistance and the construction of a 40,000 B/D refinery and 480,000 kw. power station at Koyali (Gujarat) to use Ankleswar crude. The Soviet Bloc was to contribute $20 million of the $60 million project. In July 1963, an agreement was signed to expand the Koyali refinery to 60,000 B/D including Russian equipment valued at $13,860.00. The contract called for the first stage to be completed by 1964, and the second stage by 1966. The Barauni refinery was also scheduled to be expanded to 60,000 B/D. Rumanians offered to expand the Gauhati refinery by 20,000 to 40,000 B/D and a decision has not been announced. However, the Indians had complained that the Rumanian-built refinery could only operate at 60% of capacity due to defective engineering and workmanship. Finally, in October 1963, Russia signed a contract with India for a credit to be used for $19 million in oil exploration and production equipment.

Indonesia

In October 1962, Rumania agreed to provide technical assistance and equipment valued at $35 million for the construction of a 30,000 B/D refinery in Java. The assistance also includes the rehabilitation and exploration of oil fields in Java.

Pakistan

In January 1962, Pakistan concluded arrangements with the Soviet Union for a $35 million credit to pay for Soviet exploration in that country. Under the provisions, the Pakistani government would retain rights to all minerals discovered. Also, the loan would be repaid over a 17-year period at a low interest rate. In January 1963, 79 Russian technicians were in Pakistan in connection with this agreement.

LATIN AMERICA

Argentina

In 1958, the USSR extended a $100 million credit to Argentina. A portion of this credit was to be used by the State-owned oil company for the purchase of drilling equipment. A subsequent agreement was signed providing for Russian crude to be shipped to Argentina in the amounts of 400,000 tons in 1958 and 600,000 tons in 1959 at a price of $15.86 per ton.

Brazil

In April 1963, Soviet technicians were contracted to assist Petrobras, the Brazilian State-owned company, in the exploration of the Amazon Region. Included in the agreement was a provision for the import of 6.1 million tons of Russian crude and products over a three-year period.

British Guiana

A U.N. sponsored team of Soviet geologists were sent to British Guiana to explore that country's oil potentialities. In 1962, Radio Moscow claimed that extensive oil fields covering an area of 15,000 square miles had been discovered. Four wells were reported to yield oil and gas. Two Soviet experts had been assigned as petroleum advisors to the government in Georgetown in June of 1962. In early 1963, Premier Jagan requested $672,000 in financial assistance from the U.N. for an offshore survey costing $1 million. It has not been learned whether this survey, if funds are granted, will be conducted by Soviet personnel.

APPENDIX 2

ENERGY PRODUCTION IN THE SOVIET BLOC IN 1960 AND 1962 *

(Million Metric Tons of Standard Fuel)

	1960	PERCENT OF TOTAL	1962	PERCENT OF TOTAL
USSR				
Coal	373	56	379	50
Petroleum	212	32	266	35
Natural Gas	54	8	86	11
Hydroelectric	24	4	32	4
TOTAL	663	100	763	100
EAST EUROPE				
Coal	238	85	260	85
Petroleum	21	8	22	7
Natural Gas	17	6	21	7
Hydroelectric	3	1	4	1
TOTAL	279	100	307	100
CHINA				
Coal	204	94	216	94
Petroleum	7	3	7	3
Natural Gas	1	-	1	-
Hydroelectric	6	3	6	3
TOTAL	218	100	230	100
TOTAL BLOC				
Coal	815	70	855	66
Petroleum	240	21	295	23
Natural Gas	72	6	108	8
Hydroelectric	33	3	42	3
TOTAL	1,160	100	1,300	100

* See Appendix 16 for Cuba.

APPENDIX 3

U. S. S. R.

ESTIMATED PETROLEUM SUPPLY AND DEMAND BALANCE
FOR 1965 AND 1970

	1965		1970	
	MM TONS	M B/D	MM TONS	M B/D
Crude Production	245	4,900	360	7,200
Natural Gas Liquids[a]	2	40	5	100
TOTAL SUPPLY	247	4,940	365	7,300
Crude Exports to Free World	25(21)*	500(430)	40(36)	800(730)
Crude Exports to Satellites	17(21)	340(410)	30(34)	600(670)
TOTAL CRUDE EXPORTS	42	840	70	1,400
Crude Loss	5	100	7	140
Refinery Charge	200	4,000	288	5,760
Refinery Fuel and Loss (8%)	16	320	23	460
Refinery Output	184	3,680	265	5,300
Product Imports (from Rumania)	2	40	1	20
Natural Gas Liquids[a]	2	40	4	80
TOTAL PRODUCT SUPPLY	188	3,760	270	5,400
Product Exports to Free World	17(16)	340(312)	29(28)	580(550)
Product Exports to Satellites	3(4)	60(88)	1(2)	20(50)
TOTAL PRODUCT EXPORTS	20	400	30	600
Apparent Product Demand	168	3,360	240	4,800
Apparent Crude + Product Demand	189	3,780	270	5,400
Total Crude + Product Exports	62	1,240	100	2,000
USSR to Free World	42(37)	840(742)	69(64)	1,380(1,280)
USSR to Other Bloc	20(25)	400(498)	31(36)	620(720)
TOTAL SOVIET BLOC EXPORTS TO FREE WORLD				
Crude from USSR	25(21)	500(430)	40(36)	800(730)
Product from USSR	17(16)	340(312)	29(28)	580(550)
Product from Satellites	6(6)	125(125)	8(8)	160(160)
TOTAL	48(43)	965(867)	77(72)[b]	1,540(1,440)

()* Figures show effect of including Cuba among Satellites.

a/ Half of the Natural Gas Liquids are assumed to require refinery processing.

b/ 77 is about the center of a range of 70-85 million tons with Cuba in the Free World. 72 is about the center of a range of 65-80 million tons if Cuba is included in the Bloc.

APPENDIX 4

USSR NET TRADE IN COAL AND COKE
1959-62
(THOUSAND METRIC TONS)

	EXPORTS			IMPORTS			NET*		
YEAR	COAL	COKE**	TOTAL	COAL	COKE**	TOTAL	COAL	COKE**	TOTAL
1959	11,069	3,452	14,521	4,384	882	5,266	- 6,658	-2,570	- 9,228
1960	12,315	3,704	16,019	4,800	921	5,721	- 7,515	-2,783	-10,298
1961	15,117	4,222	19,339	4,700	907	5,607	-10,417	-3,315	-13,732
1962	19,350	4,651	24,001	4,900	850	5,750	-14,450	-3,801	-18,251

*Net exports designated by minus (-) sign.
**Coke has been converted to coal equivalents at the rate of 1.4 tons of coal for each ton of coke.

APPENDIX 5

FREE WORLD IMPORTS OF SOVIET BLOC OIL
(Thousand B/D)

IMPORTING COUNTRY	1962 FROM USSR	1962 FROM SATELLITES	1962 FROM TOTAL SOVIET BLOC	1963 FROM USSR	1963 FROM SATELLITES	1963 FROM TOTAL SOVIET BLOC
Brazil	4	2	6	20	5	25
Cuba	88	-	88	95	-	95
Total Western Hemisphere	92	2	94	115	5	120
Austria	9	13	22	9	17	26
Belgium	6	3	9	7	3	10
Denmark	4	1	5	6	1	7
Finland	56	2	58	59	1	60
France	15	10	25	11	16	27
West Germany [a]	55	34	89	62	38	100
Greece	16	4	20	14	6	20
Iceland	7	-	7	7	-	7
Italy [a]	135	7	142	143	7	150
Norway	3	2	5	5	3	8
Portugal	-	1	1	-	2	2
Spain	-	-	-	1	-	1
Sweden	49	6	55	56	4	60
Switzerland	-	3	3	-	3	3
United Kingdom	5	-	5	4	-	4
Yugoslavia	6	-	6	3	2	5
Total Europe	366	86	452	387	103	490
Egypt	27	5	32	24	1	25
Morocco	2	-	2	5	-	5
Ceylon	3	-	3	7	-	7
India	8	-	5	10	-	10
Japan	59	-	59	70	-	70
Other	18	2	23	12	1	13
Total Eastern Hemisphere Ex Europe	117	7	124	128	2	130
TOTAL	575 [b]	95	670	630	110	740
	(487)*		(582)*	(535)*		(645)*

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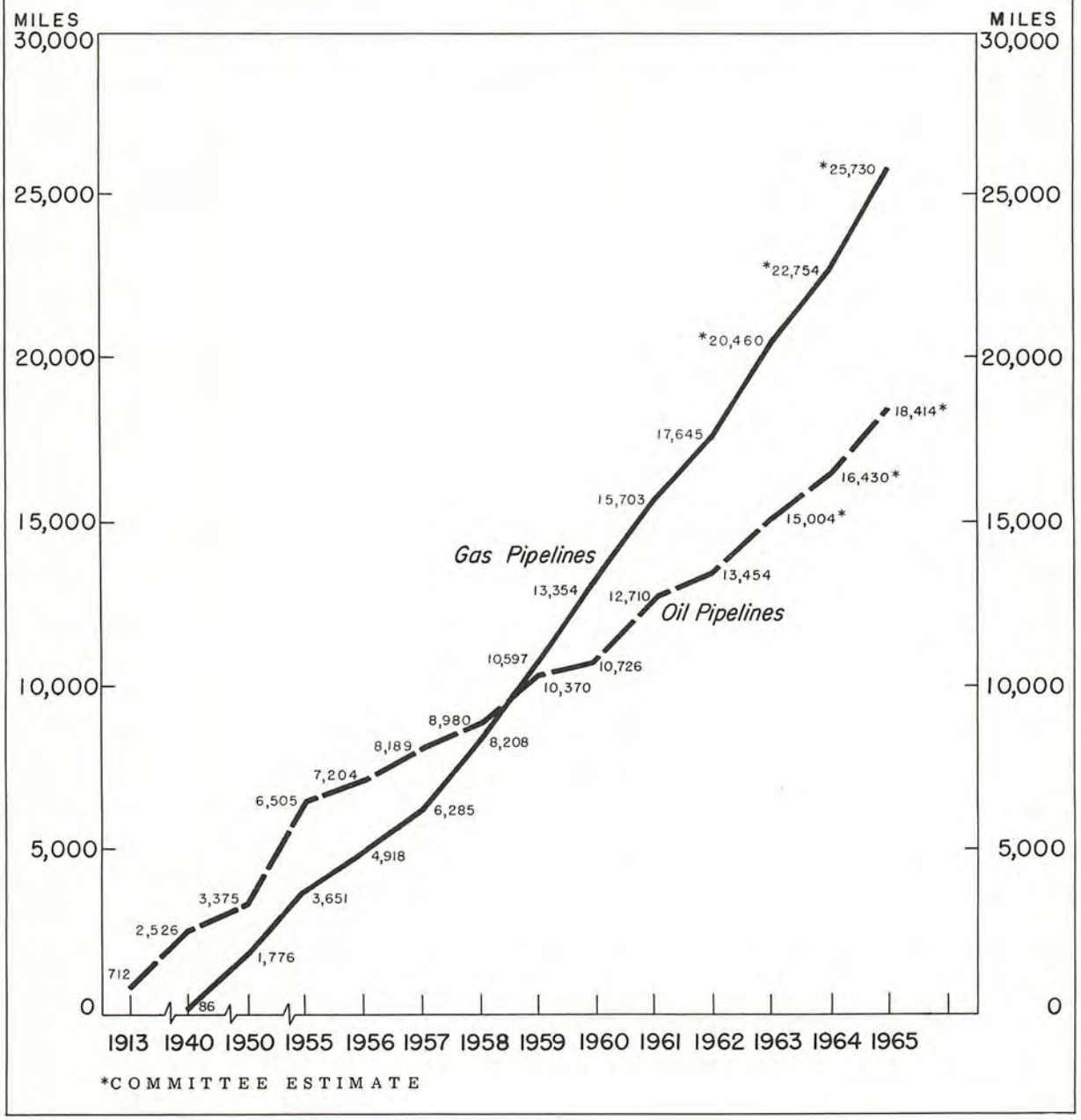
a/ Includes some crude processed for export.

b/ Data represents actual imports by Free World countries. They are about 1% below the 582 thousand B/D implied by official Soviet statistics, with the minor difference attributable to:
(1) Soviet statistics being on an export basis, and,
(2) Conversion factors.

* Excluding Cuba from the Free World.

FIGURE NO. 4

OIL AND GAS PIPELINES IN THE U.S.S.R.



APPENDIX 7

APPARENT ANNUAL AVERAGE PRICE PER BARREL RECEIVED BY RUSSIA FOR EXPORTS OF CRUDE OIL (U.S. DOLLARS PER BARREL) F.O.B.

Country	1955	1956	1957	1958	1959	1960	1961	1962
Latin America								
Argentina	2.12	-	-	1.61	1.52	-	-	-
Brazil	-	-	-	-	2.14	1.73	1.65	1.61
Uruguay	-	-	-	2.35	2.16	2.12	1.78	-
Free Europe								
Austria	-	-	-	-	2.57	2.57	2.15	1.67
Belgium	-	-	-	-	-	-	1.32	-
Finland	-	-	-	-	1.75	1.72	1.50	1.52
France	2.00	2.08	2.48	2.24	1.76	1.61	1.52	1.51
Germany, West	-	-	-	-	1.69	1.39	1.27	1.30
Greece	-	-	-	-	2.05	1.94	1.85	1.85
Italy	1.95	2.18	2.68	2.00	1.75	1.42	1.31	1.30
Portugal	-	-	-	2.33	-	-	-	-
Yugoslavia	2.38	2.38	2.75	2.55	2.36	2.27	1.92	1.81
Other Eastern Hemisphere								
Egypt	1.95	1.93	2.41	2.23	1.80	1.63	1.43	1.45
Israel	-	2.44	-	-	-	-	-	-
Japan	-	-	-	1.78	1.68	1.34	1.26	1.26
Morocco	-	-	-	2.06	1.94	1.83	1.65	1.61
Communist Bloc								
China	5.12	5.12	5.12	3.05	2.96	2.92	-	-
Cuba	-	-	-	-	-	1.53	1.49	1.49
Czechoslovakia	3.58	3.04	3.08	3.11	3.18	3.14	3.17	3.10
Germany, East	2.99	3.13	3.15	2.72	2.70	2.69	2.61	2.66
Hungary	2.39	2.77	2.97	3.02	3.08	3.06	3.04	3.03
Mongolia	-	-	-	-	3.48	3.50	3.68	3.49
Poland	2.70	2.82	3.26	2.94	3.26	3.28	3.17	3.10

Sources: Mineral Trade Notes - U.S. Bureau of Mines and U.S.S.R. Trade Statistics.

Conversion Factors: 1 Metric Ton = 7.3 U.S. Barrels;
1955-59 - 1 ruble = $0.25; 1960-62 - 1 ruble = $1.11.

APPENDIX 8

APPARENT ANNUAL AVERAGE PRICE PER BARREL RECEIVED BY RUSSIA FOR EXPORTS OF GASOLINE (U.S. DOLLARS PER BARREL)

F.O.B.

Country	1955	1956	1957	1958	1959	1960	1961	1962
Latin America								
Uruguay	-	-	-	3.34	3.36	-	-	-
Free Europe								
Austria	-	-	-	-	-	-	2.64	2.55
Finland	4.22	4.30	4.55	4.15	4.47	3.71	4.22	4.11
France	3.68	3.35	3.73	3.66	3.66	3.23	2.84	2.81
Germany, West	-	-	-	-	-	2.18	2.23	2.03
Greece	-	-	-	-	3.10	3.27	-	-
Iceland	4.31	4.30	4.53	4.20	4.32	3.80	3.23	3.14
Sweden	-	-	-	-	-	-	1.95	2.94
Switzerland	-	-	-	-	3.21	-	-	-
Yugoslavia	7.79	7.65	7.60	7.08	6.61	6.07	5.64	5.52
Other Eastern Hemisphere								
Afghanistan	7.48	7.62	7.64	7.47	6.92	6.43	6.51	6.59
Burma	-	-	-	-	-	-	2.35	2.56
Ceylon	-	-	-	-	-	-	-	2.83
Egypt	-	3.89	3.88	6.75	5.13	6.40	-	3.33
Guinea	-	-	-	-	-	3.30	2.98	3.14
Mali	-	-	-	-	-	-	8.16	-
Morocco	-	-	-	-	-	-	3.16	2.94
Syria	-	-	-	3.95	-	7.14	-	-
Turkey	-	-	-	-	-	-	2.93	-
Yemen	-	-	-	-	-	-	4.18	4.14
Communist Bloc								
Bulgaria	3.95	3.96	4.24	3.89	4.58	4.43	4.52	4.42
China	6.35	-	6.45	4.78	4.85	4.77	4.70	4.67
Cuba	-	-	-	-	-	4.24	3.82	3.53
Czechoslovakia	4.47	5.00	4.51	4.31	4.31	4.31	4.30	4.30
Germany, East	-	-	-	-	3.86	4.77	4.42	4.39
Hungary	-	-	-	-	-	-	4.87	4.70
Korea, North	6.21	-	6.14	4.10	4.07	4.06	4.04	4.12
Mongolia	6.89	6.96	6.66	4.96	4.93	4.87	4.90	4.94
Poland	4.47	4.54	4.72	4.35	4.28	4.31	4.46	4.31
Viet Nam, North	-	3.79	3.89	3.91	4.45	4.77	4.83	4.78

Sources: Mineral Trade Notes - U.S. Bureau of Mines and U.S.S.R. Trade Statistics.

Conversion Factors: 1 Metric Ton = 8.5 U.S. Barrels; 1955-59 - 1 ruble = $0.25; 1960-62 - 1 ruble = $1.11.

APPENDIX 9

APPARENT ANNUAL AVERAGE PRICE PER BARREL RECEIVED BY RUSSIA FOR EXPORTS OF KEROSINE (U.S. DOLLARS PER BARREL) F.O.B.

Country	1955	1956	1957	1958	1959	1960	1961	1962
Latin America								
Argentina	-	-	-	3.04	3.28	-	-	-
Uruguay	-	-	-	-	2.94	-	-	-
Free Europe								
Finland	3.81	4.07	4.11	3.79	3.75	3.44	3.83	3.98
Greece	3.70	3.92	4.12	3.43	3.88	3.59	-	-
Netherlands	-	-	-	2.91	-	-	-	-
Sweden	3.45	3.56	3.75	3.20	3.19	2.78	2.96	2.88
Other Eastern Hemisphere								
Afghanistan	9.45	9.71	10.74	9.74	9.82	7.25	9.83	10.03
Burma	-	-	-	-	-	-	3.10	2.95
Ceylon	-	-	-	-	-	-	-	3.06
Egypt	3.81	3.86	4.51	3.77	3.50	3.37	3.38	3.80
Ethiopia	-	-	-	-	-	7.50	-	-
Guinea	-	-	-	-	-	3.38	-	-
India	-	-	-	-	-	-	3.20	3.19
Japan	-	-	-	-	2.82	-	-	-
Syria	-	4.19	-	-	3.83	-	-	-
Yemen	-	-	-	-	-	-	-	5.42
Communist Bloc								
Albania	-	3.19	-	-	-	-	-	-
Bulgaria	3.30	3.34	3.52	3.19	4.37	4.42	4.38	4.40
China	5.72	5.80	5.77	4.61	4.47	4.48	4.48	4.30
Cuba	-	-	-	-	-	3.88	-	-
Czechoslovakia	-	-	-	-	-	4.63	4.57	4.48
Germany, East	-	-	-	-	-	3.78	3.77	-
Korea, North	5.82	5.86	5.79	4.60	4.58	4.65	4.58	4.55
Mongolia	6.53	4.82	9.81	5.16	8.39	5.73	-	-
Poland	3.30	3.37	3.61	4.22	4.26	4.46	4.47	4.40
Viet Nam, North	-	-	3.19	3.17	4.31	4.23	4.18	4.30

Sources: Mineral Trade Notes - U.S. Bureau of Mines and U.S.S.R. Trade Statistics.

Conversion Factors: 1 Metric Ton = 7.75 U.S. Barrels
1955-59 - 1 ruble = $0.25; 1960-62 - 1 ruble = $1.11.

APPENDIX 10

APPARENT ANNUAL AVERAGE PRICE PER BARREL
RECEIVED BY RUSSIA FOR EXPORTS OF DISTILLATES
(U.S. DOLLARS PER BARREL)

F.O.B.

Country	1955	1956	1957	1958	1959	1960	1961	1962
Latin America								
Argentina	3.25	-	-	3.45	3.48	-	-	-
Brazil	-	-	-	-	-	3.25	-	-
Uruguay	-	-	-	2.32	3.45	3.53	-	-
Free Europe								
Belgium	3.61	3.67	-	-	3.22	2.84	2.68	2.51
Denmark	3.72	4.09	6.43	4.29	3.65	4.15	3.83	3.94
Finland	3.74	3.90	4.16	3.70	3.75	3.33	3.37	3.38
France	3.94	3.59	3.92	3.47	3.49	3.15	3.02	2.80
Germany, West	4.08	3.50	4.09	3.19	3.20	2.67	2.57	2.55
Greece	3.53	3.95	4.36	3.52	3.37	3.17	3.43	3.33
Iceland	3.62	3.73	4.07	3.63	3.80	3.26	3.29	3.20
Italy	3.74	4.24	5.68	4.00	3.66	3.56	3.73	2.76
Netherlands	3.53	3.70	-	3.04	3.13	2.91	3.22	2.62
Norway	4.01	4.39	4.44	3.80	3.79	3.12	2.89	2.82
Portugal	-	-	-	-	-	3.17	-	-
Spain	-	-	-	-	-	-	2.58	2.59
Sweden	3.44	3.63	3.91	3.30	3.22	2.91	2.91	2.71
Switzerland	-	-	4.41	-	2.92	-	-	2.81
United Kingdom	3.94	3.90	4.42	4.04	4.07	3.13	3.55	3.73
Yugoslavia	-	3.90	5.43	3.86	3.99	3.12	3.10	3.06
Other Eastern Hemisphere								
Afghanistan	7.04	7.16	6.89	6.87	6.47	6.50	6.46	6.35
Algeria	3.46	-	3.85	3.47	3.32	3.05	2.98	3.25
Burma	-	-	-	-	-	-	2.87	2.96
Ceylon	-	-	-	-	-	-	-	2.89
Egypt	-	3.85	4.57	3.51	3.72	3.16	3.38	3.11
Ethiopia	-	-	-	-	-	7.27	-	-
Guinea	-	-	-	-	-	3.19	3.16	3.08
India	-	-	-	-	-	-	2.97	3.11
Japan	-	-	-	-	2.89	2.84	2.57	2.32
Lebanon	-	-	3.96	-	4.14	-	3.98	3.52
Mali	-	-	-	-	-	-	9.44	-
Morocco	-	-	3.78	-	-	-	3.14	3.30
Syria	-	3.79	4.38	3.51	3.56	3.21	3.17	-
Tunisia	-	-	-	-	2.87	3.33	3.09	2.76
Turkey	-	-	5.49	-	-	-	2.93	3.15
Yemen	-	-	-	-	-	-	3.31	2.51

(Continued on next page)

APPENDIX 10 - Continued

APPARENT ANNUAL AVERAGE PRICE PER BARREL
RECEIVED BY RUSSIA FOR EXPORTS OF DISTILLATES
(U.S. DOLLARS PER BARREL)
F.O.B.

Country	1955	1956	1957	1958	1959	1960	1961	1962
Communist Bloc								
Albania	3.18	3.15	3.85	3.68	3.37	-	-	-
Bulgaria	3.22	3.16	3.24	4.10	4.15	3.86	3.69	3.61
Cuba	-	-	-	-	-	2.41	2.96	2.94
China	5.81	5.89	5.88	4.66	4.64	4.66	4.61	4.73
Czechoslovakia	3.76	3.16	4.81	4.22	-	-	-	-
Germany, East	-	-	-	-	3.97	3.91	3.95	3.95
Hungary	-	3.14	-	-	-	-	4.23	4.20
Korea, North	5.85	5.76	5.61	4.65	4.68	4.85	4.58	4.65
Mongolia	9.27	6.60	5.95	5.76	5.78	5.69	5.49	5.56
Poland	3.25	3.17	5.02	4.50	4.55	4.66	4.56	4.52
Viet Nam, North	-	-	3.17	3.15	4.23	4.26	4.15	4.44

Sources: Mineral Trade Notes - U.S. Bureau of Mines and U.S.S.R. Trade Statistics.

Conversion Factors: 1 Metric Ton = 7.25 U.S. Barrels
1955-59 - 1 ruble = $0.25; 1960-62 - 1 ruble = $1.11.

APPENDIX 11

APPARENT ANNUAL AVERAGE PRICE PER BARREL
RECEIVED BY RUSSIA FOR EXPORTS OF RESIDUAL FUEL OIL
(U.S. DOLLARS PER BARREL)
F.O.B.

Country	1955	1956	1957	1958	1959	1960	1961	1962
Latin America								
Argentina	1.44	-	-	-	1.69	-	-	-
Brazil	-	-	-	-	-	-	-	2.17
Uruguay	-	-	-	1.86	1.64	1.45	-	-
Free Europe								
Austria	-	-	-	-	-	-	1.62	.81
Belgium	2.21	-	4.26	1.70	1.57	1.46	1.44	1.35
Denmark	2.50	3.00	2.49	1.56	1.60	1.68	1.54	1.45
Finland	2.16	2.17	2.58	2.13	1.98	1.87	1.77	1.74
France	2.62	2.41	2.71	2.16	2.13	1.99	1.65	1.69
Germany, West	2.62	-	2.86	1.86	1.88	1.55	1.54	1.35
Greece	1.86	2.14	2.80	2.13	1.80	1.50	1.41	1.51
Iceland	1.91	2.29	2.80	2.35	2.23	2.24	1.98	1.99
Italy	1.87	2.56	2.77	1.96	1.59	1.54	1.47	1.32
Netherlands	3.33	-	-	1.52	2.03	2.33	2.17	1.75
Norway	2.01	2.54	2.86	1.94	1.69	1.62	1.66	1.48
Sweden	1.92	2.16	2.67	1.72	1.50	1.48	1.34	1.33
Switzerland	-	3.25	3.09	-	1.66	1.21	1.17	-
United Kingdom	1.61	3.04	4.38	2.30	1.86	1.59	1.46	1.71
Yugoslavia	-	-	-	-	2.56	2.34	2.20	2.17
Other Eastern Hemisphere								
Afghanistan	4.17	10.21	8.87	5.00	-	12.00	12.08	5.02
Algeria	-	-	2.65	-	-	1.58	1.58	-
Burma	-	-	-	-	-	-	-	1.49
Egypt	-	2.08	2.75	2.20	1.63	1.54	1.47	2.00
Ethiopia	-	-	-	-	-	3.16	-	-
Guinea	-	-	-	-	-	-	1.50	1.54
India	-	-	-	-	-	-	-	1.52
Israel	-	2.08	-	-	-	-	-	-
Japan	-	-	-	-	1.50	1.35	1.68	1.55
Lebanon	-	-	-	-	1.56	-	2.52	2.06
Morocco	-	-	2.82	-	-	-	-	1.53
Syria	-	-	-	2.07	1.66	-	-	-
Tunisia	-	-	-	-	1.84	-	1.41	1.39
Turkey	2.50	3.39	4.32	1.54	2.77	2.27	2.17	2.13
Communist Bloc								
Bulgaria	2.81	2.43	3.32	2.52	1.68	1.75	1.64	1.63
Cuba	-	-	-	-	-	1.46	1.41	1.38
Hungary	-	1.92	2.26	2.91	2.91	2.91	2.69	2.71
Korea, North	5.16	5.21	5.02	4.11	4.18	2.74	3.85	2.96
Poland	1.67	3.02	2.50	2.75	2.57	2.73	2.64	2.74

Sources: Mineral Trade Notes - U.S. Bureau of Mines and U.S.S.R. Trade Statistics.

Conversion Factors: 1 Metric Ton = 6.66 U.S. Barrels
1955-59 - 1 ruble = $0.25; 1960-62 - 1 ruble = $1.11.

APPENDIX 12

TOTAL TRADE WITHIN THE SINO-SOVIET BLOC AND CUBA
(Thousand Dollars)

Importer	Exporter	Albania	Bulgaria	Mainland China	Cuba*	Czecho-slovakia	East Germany	Hungary	North Korea	North Vietnam	Outer Mongolia	Poland	Rumania	U.S.S.R.	Total Imports Excluding U.S.S.R.	TOTAL IMPORTS
	1958		2,499	N.A.	N.A.	9,537	5,928	3,354	N.A.	N.A.	N.A.	4,394	2,784	44,333	28,496	72,829
	1959		3,591	N.A.	N.A.	10,459	6,940	3,341	N.A.	N.A.	N.A.	4,199	1,200	48,888	29,730	78,618
Albania	1960		2,651	6,980	N.A.	7,881	5,010	2,363	N.A.	N.A.	N.A.	3,292	1,950	43,444	30,127	73,571
	1961		1,796	19,480	N.A.	10,945	3,891	3,590	N.A.	N.A.	N.A.	3,718	1,300	20,333	44,720	65,053
	1962		1,650	24,000	N.A.	9,044	3,200	3,700	N.A.	N.A.	N.A.	3,704	1,200	16,900	46,498	63,398
	1958	1,176		7,056	N.A.	36,229	38,113	9,961	588	N.A.	N.A.	17,085	4,629	196,783	114,837	311,620
	1959	598		10,600	N.A.	53,181	51,012	15,478	1,112	N.A.	N.A.	19,655	6,593	288,241	158,229	446,470
Bulgaria	1960	1,283		9,576	N.A.	61,691	69,655	11,714	1,710	N.A.	N.A.	24,584	9.125	330,711	189,338	520,049
	1961	2,052		4,532	8,208	56,231	84,012	13,562	428	N.A.	N.A.	22,085	8,253	355,950	199,363	555,313
	1962	2,400		3,900	9,100	61,924	86,200	14,500	450	N.A.	N.A.	24,266	8,400	447,773	211,140	658,913
	1958	N.A.	11,025		N.A.	109,175	133,238	57,568	N.A.	N.A.	N.A.	72,148	25,855	633,994	409,009	1,043,003
Mainland	1959	N.A.	6,327		N.A.	99,591	106,497	39,606	N.A.	N.A.	N.A.	42,885	29,456	954,546	324,362	1,278,908
China	1960	2,080	7,524		N.A.	109,314	97,133	40,202	N.A.	N.A.	N.A.	49,954	N.A.	817,103	306,207	1,123,310
	1961	2,780	7,524		N.A.	34,031	55,079	28,792	N.A.	N.A.	N.A.	26,692	9,285	367,330	164,183	531,513
	1962	4,100	7,600		N.A.	11,945	38,200	24,200	N.A.	N.A.	N.A.	15,054	8,700	233,442	109,799	343,241
	1958	N.A.	N.A.	N.A.		1,822	131	6	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1,959	1,959
	1959	N.A.	N.A.	N.A.		2,362	140	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	2,502	2,502
Cuba*	1960	N.A.	513	N.A.		10,402	2,696	1,134	N.A.	N.A.	N.A.	4,081	33,340	70,777	52,166	122,943
	1961	N.A.	11,799	N.A.		29,433	27,564	10,856	N.A.	N.A.	N.A.	22,560	11,419	275,886	113,631	389,517
	1962	N.A.	14,400	N.A.		36,728	29,100	11,600	N.A.	N.A.	N.A.	20,293	12,100	370,774	124,221	494,995
	1958	4,218	41,154	90,980	79		159,779	91,424	1,528	3,056	2,917	72,008	22,511	449,326	489,654	938,980
Czecho-	1959	6,531	43,391	95,563	87		174,683	87,023	6,251	2,639	4,167	81,303	38,792	600,461	540,430	1,140,891
slovakia	1960	7,013	55,907	93,341	1,284		195,159	93,888	3,611	4,167	5,556	111,807	63,487	630,552	635,220	1,265,772
	1961	10,632	65,794	41,948	29,044		229,431	136,803	5,000	3,195	5,973	143,932	55,431	654,376	727,183	1,381,559
	1962	9,920	65,008	25,558	37,358		228,418	139,393	5,300	3,300	6,200	145,411	60,085	776,065	725,951	1,502,016
	1958	2,635	30,104	107,416	472	151,349		73,938	2,848	4,376	1,722	95,552	30,141	749,988	500,553	1,250,541
East	1959	4,536	46,200	114,987	346	168,340		86,305	5,522	5,538	3,319	120,790	34,148	977,277	590,031	1,567,308
Germany	1960	4,331	55,424	100,173	4,383	191,279		97,081	4,590	6,844	2,027	116,723	52,930	1,004,858	635,785	1,640,643
	1961	6,285	70,750	40,081	11,671	218,855		107,012	3,259	4,477	3,549	105,950	51,629	1,139,482	623,518	1,763,000
	1962	6,700	82,300	29,300	14,100	229,810		114,400	2,900	4,200	3,900	117,592	53,400	1,372,764	658,602	2,031,366
	1958	2,002	8,607	33,531	N.A.	76,859	68,413		248	982	761	30,335	13,885	197,414	235,623	433,037
	1959	2,559	10,495	44,282	N.A.	87,117	89,022		616	707	1,055	38,519	22,789	257,735	297,161	554,896
Hungary	1960	3,817	12,375	36,283	N.A.	111,721	97,564		3,300	2,163	1,583	48,023	41,771	307,176	358,600	665,776
	1961	2,856	13,862	17,245	8,111	103,778	102,095		842	1,993	1,741	56,548	24,708	356,971	333,779	690,750
	1962	2,500	16,200	12,700	9,700	125,042	105,200		900	1,800	1,900	63,635	25,300	411,107	364,877	775,984

* Cuban exports and imports in 1960, 1961 and 1962 subject to revision.

(Continued on next page)

APPENDIX 12 - Continued

TOTAL TRADE WITHIN THE SINO-SOVIET BLOC AND CUBA
(Thousand Dollars)

Importer	Exporter	Albania	Bulgaria	Mainland China	Cuba*	Czecho-slavakia	East Germany	Hungary	North Korea	North Vietnam	Outer Mongolia	Poland	Rumania	U.S.S.R.	Total Imports Excluding U.S.S.R.	TOTAL IMPORTS
North Korea	1958	N.A.	735	N.A.	N.A.	11,807	5,516	4,256		N.A.	N.A.	1,779	3,184	57,999	27,277	85,276
	1959	N.A.	1,454	N.A.	N.A.	23,752	8,363	4,499		N.A.	N.A.	6,491	5,401	74,110	49,960	124,070
	1960	N.A.	N.A.	N.A.	N.A.	11,668	4,733	4,579		N.A.	N.A.	1,354	5,318	39,444	27,652	67,096
	1961	N.A.	684	N.A.	N.A.	6,389	4,047	4,270		N.A.	N.A.	1,431	867	76,999	17,688	94,687
	1962	N.A.	700	N.A.	N.A.	5,900	3,750	4,100		N.A.	N.A.	3,282	1,000	80,666	18,732	99,398
North Vietnam	1958	N.A.	N.A.	N.A.	N.A.	4,445	4,909	1,837	N.A.		N.A.	3,457	600	8,222	15,248	23,470
	1959	N.A.	N.A.	N.A.	N.A.	6,112	9,993	2,183	N.A.		N.A.	4,431	1,584	19,889	24,303	44,192
	1960	N.A.	N.A.	N.A.	N.A.	5,556	11,210	2,920	N.A.		N.A.	6,473	4,468	24,444	30,627	55,071
	1961	N.A.	N.A.	N.A.	N.A.	4,028	7,528	3,114	N.A.		N.A.	4,335	4,301	41,333	23,306	64,639
	1962	N.A.	N.A.	N.A.	N.A.	3,700	6,100	3,300	N.A.		N.A.	1,881	4,400	54,666	19,381	74,047
Outer Mongolia	1958	N.A.	N.A.	N.A.	N.A.	4,167	2,838	973	N.A.	N.A.		1,019	83	64,777	9,080	73,857
	1959	N.A.	N.A.	N.A.	N.A.	5,834	2,680	990	N.A.	N.A.		1,093	117	78,666	10,714	89,380
	1960	N.A.	N.A.	N.A.	N.A.	6,528	4,738	1,588	N.A.	N.A.		3,088	217	82,888	16,159	99,047
	1961	N.A.	N.A.	N.A.	N.A.	4,445	3,058	2,028	N.A.	N.A.		3,067	450	92,444	13,048	105,492
	1962	N.A.	N.A.	N.A.	N.A.	4,100	2,600	2,200	N.A.	N.A.		2,550	520	126,221	11,970	138,191
Poland	1958	1,892	19,142	36,247	N.A.	94,671	153,986	33,711	821	3,517	770		12,413	355,370	357,170	712,540
	1959	2,307	22,221	56,052	N.A.	113,857	186,965	37,795	2,454	3,700	1,241		21,521	469,366	448,113	917,479
	1960	3,057	20,257	46,378	9,757	127,763	185,175	45,797	1,885	5,608	1,942		20,698	478,023	468,317	946,340
	1961	3,965	21,478	20,670	24,385	163,465	205,437	59,301	2,848	1,613	2,229		24,330	510,200	529,721	1,039,921
	1962	5,122	31,189	22,741	19,094	199,832	234,899	68,169	3,974	2,906	2,104		40,200	585,980	630,230	1,216,210
Rumania	1958	517	6,535	16,603	N.A.	38,390	35,381	15,032	367	750	67	13,189		252,591	126,831	379,422
	1959	383	4,929	29,939	N.A.	54,913	46,330	18,253	1,084	850	117	17,731		233,586	174,529	408,115
	1960	733	8,499	23,605	N.A.	63,760	50,083	25,830	2,951	2,150	233	23,148		263,326	200,992	464,318
	1961	400	13,969	19,737	517	76,624	58,700	28,992	2,834	2,567	450	32,247		295,173	237,037	532,210
	1962	450	16,700	18,000	720	81,200	61,600	31,000	2,800	2,700	500	35,108		374,774	250,778	625,552
U.S.S.R.	1958	14,000	202,323	881,213	15,555	504,616	830,914	160,327	47,111	9,889	47,222	265,148	234,467			3,212,785
	1959	14,777	260,134	1,100,322	7,444	584,660	915,445	207,574	51,555	15,555	49,555	314,762	249,780			3,771,563
	1960	24,222	302,963	848,103	103,777	655,537	926,994	252,363	74,666	23,110	56,332	388,442	280,744			3,937,253
	1961	21,778	331,532	551,439	311,886	705,497	893,585	329,314	79,110	25,666	58,222	480,946	346,022			4,134,997
	1962	17,600	388,774	516,328	233,998	826,577	1,072,656	388,774	88,221	30,222	60,333	566,431	348,330			4,538,244
Total Exports Excluding U.S.S.R.	1958	12,440	119,801	291,833	551	538,451	608,232	292,060	6,400	12,681	6,237	310,966	116,085		2,315,737	
	1959	16,914	138,608	351,423	433	625,518	682,625	295,473	17,039	13,434	9,899	337,097	161,601		2,650,064	
	1960	22,314	163,150	316,336	15,424	707,563	723,156	327,096	18,047	20,932	11,341	392,527	233,304		2,951,190	
	1961	28,971	207,656	163,693	81,936	708,224	780,842	398,320	15,211	13,845	13,942	422,565	191,973		3,027,177	
	1962	31,192	235,747	136,199	90,072	769,225	799,267	416,562	16,324	14,906	14,604	432,776	215,305		3,172,179	
TOTAL EXPORTS	1958	26,440	322,124	1,173,046	16,106	1,043,067	1,439,146	452,387	53,511	22,570	53,459	576,114	350,552	3,010,797		8,539,319
	1959	31,691	398,742	1,451,745	7,877	1,210,178	1,598,070	503,047	68,594	28,989	59,454	651,859	411,381	4,002,765		10,424,392
	1960	46,536	466,113	1,164,439	119,201	1,363,100	1,650,150	579,459	92,713	44,042	67,673	780,969	514,048	4,092,746		10,981,189
	1961	50,748	539,188	715,132	393,822	1,413,721	1,674,427	727,634	94,321	39,511	72,164	903,511	537,995	4,186,477		11,348,651
	1962	48,792	624,521	652,527	324,070	1,595,802	1,871,923	805,336	104,545	45,128	74,937	999,207	563,635	4,851,132		12,561,555

Source: 1958-1961, Department of Commerce
1962, Committee Estimate

* Cuban exports and imports in 1960, 1961 and 1962 subject to revision.

APPENDIX 13

ENERGY TRADE WITHIN THE SINO-SOVIET BLOC AND CUBA
(Thousands of Dollars)

Exporter	Importer	Albania	Bulgaria	Mainland China	Cuba*	Czecho-slavakia	East Germany	Hungary	North Korea	North Vietnam	Outer Mongolia	Poland	Rumania	U.S.S.R.	Bloc ex. U.S.S.R. Exports	Grand Total Exports
	1958		1,192	--	--	228	990	1,113	--	--	--	554	--	4,737	4,077	8,814
	1959		1,204	--	--	348	1,970	1,350	--	--	--	554	--	5,485	5,426	10,911
Albania	1960		1,204	462	--	266	2,215	1,072	--	198	--	499	--	8,365	5,916	14,281
	1961		1,126	1,232	--	440	2,432	67	132	132	--	575	--	5,075	6,136	11,211
	1962		1,100	2,002	--	427	2,212	--	132	132	--	944	--	--	6,949	6,949
	1958	--		--	--	--	--	2,682	--	--	--	942	--	--	3,624	3,624
	1959	--		--	--	--	--	2,250	--	--	--	166	--	--	2,416	2,416
Bulgaria	1960	--		--	--	17	--	1,818	--	--	--	--	--	--	1,835	1,835
	1961	--		--	--	--	190	1,683	--	--	--	500	--	--	2,373	2,373
	1962	--		--	--	--	194	1,748	--	--	--	189	--	--	2,131	2,131
	1958	--	--		--	--	--	--	--	--	--	--	--	2,600	--	2,600
	1959	--	--		--	--	--	--	--	--	--	--	--	2,600	--	2,600
Mainland	1960	--	--		--	--	--	--	--	--	--	--	--	2,590	--	2,590
China	1961	--	--		--	--	--	--	--	--	--	--	--	2,450	--	2,450
	1962	--	--		--	--	--	--	--	--	--	--	--	2,653	--	2,653
	1958	--	--	--	--		12,390	11,925	--	--	--	554	2,260	--	27,129	27,129
	1959	--	2,200	--	--		24,780	13,950	--	--	--	1,108	9,040	--	51,078	51,078
Czecho-slavakia	1960	--	4,400	--	--		23,010	18,000	--	--	--	1,524	11,300	--	58,234	58,234
	1961	--	4,400	--	--		23,010	18,225	--	--	--	3,945	13,560	--	63,140	63,140
	1962	--	4,400	--	--		26,550	18,000	--	--	--	3,870	11,300	--	64,120	64,120
	1958	--	--	--	--	3,160		1,350	--	--	--	20,032	--	--	24,542	24,542
	1959	--	--	--	--	4,740		4,950	--	--	--	31,722	--	--	41,412	41,412
East	1960	--	--	--	--	12,640		9,000	--	--	--	13,352	--	--	34,992	34,992
Germany	1961	--	--	--	--	11,060		13,500	--	--	--	17,930	--	--	42,490	42,490
	1962	--	--	--	--	13,035		9,000	--	--	--	13,295	--	--	35,330	35,330
	1958	--	--	--	--	1,140	--		--	--	--	2,770	--	610	3,910	4,520
	1959	--	--	--	--	1,160	--		--	--	--	3,047	--	610	4,207	4,817
Hungary	1960	--	--	--	--	863	--		--	--	--	3,213	--	722	4,076	4,798
	1961	--	--	--	--	1,020	--		--	--	--	3,225	--	583	4,245	4,828
	1962	--	--	--	--	989	--		--	--	--	2,738	--	583	3,727	4,310
	1958	220	880	--	--	25,280	138,060	20,250	--	--	--		2,260	76,110	186,950	263,060
	1959	220	880	--	--	20,540	157,530	22,500	--	--	--		2,260	83,190	203,930	287,120
Poland	1960	220	880	332	278	22,153	146,930	20,250	--	--	--		2,260	90,239	193,303	283,542
	1961	220	660	--	620	25,280	146,910	22,500	--	--	--		2,260	90,579	198,450	289,029
	1962	405	770	406	348	17,438	145,198	24,750	--	--	--		2,260	93,838	191,575	285,413
	1958	--	3,278	--	--	--	--	--	--	--	--	8,310		78,225	11,588	89,813
	1959	--	3,311	--	--	--	--	--	--	--	--	6,925		81,881	10,236	92,117
Rumania	1960	1,904	2,324	--	--	--	--	--	--	--	--	5,263		78,197	9,491	87,688
	1961	1,496	1,474	--	--	--	--	--	--	--	--	7,425		64,403	10,395	74,798
	1962	705	1,441	--	--	--	--	--	--	--	--	7,387		55,178	9,533	64,711
	1958	680	14,805	104,542	--	50,046	123,145	41,080	7,458	990	3,120	48,729	9,040		--	403,635
	1959	1,224	19,026	128,626	--	60,390	141,699	44,145	8,052	2,409	4,446	58,661	9,040		--	477,718
U.S.S.R.	1960	816	24,712	122,965	24,351	60,721	149,794	52,588	7,194	2,046	4,929	70,078	12,521		--	532,715
	1961	564	37,406	120,048	42,154	92,494	173,062	54,740	11,352	2,376	5,132	72,293	8,598		--	620,219
	1962	--	53,777	75,354	45,489	123,460	202,938	54,735	14,454	3,201	7,420	87,990	17,703		--	686,521
Bloc	1958	220	5,350	--	--	29,808	151,440	37,320	--	--	--	33,162	4,520		261,820	
Excluding	1959	220	7,595	--	--	26,788	184,280	45,000	--	--	--	43,522	11,300		318,705	
U.S.S.R.	1960	2,124	8,808	794	278	35,939	172,155	50,140	--	198	--	23,851	13,560		307,847	
Imports	1961	1,716	7,660	1,232	620	37,800	172,542	55,975	132	132	--	33,600	15,820		327,229	
	1962	1,110	7,711	2,408	348	31,889	174,154	53,498	132	132	--	28,423	13,560		313,365	
Grand	1958	900	20,155	104,542	--	79,854	274,585	78,400	7,458	990	3,120	81,891	13,560	162,282		827,737
Total	1959	1,444	26,621	128,626	--	87,178	325,979	89,145	8,052	2,409	4,446	102,183	20,340	173,766		970,189
Imports	1960	2,940	33,520	123,759	24,629	96,660	321,949	102,728	7,194	2,244	4,929	93,929	26,081	180,113		1,020,675
	1961	2,280	45,066	121,280	42,774	130,294	345,604	110,715	11,484	2,508	5,132	105,893	24,418	163,090		1,110,538
	1962	1,110	61,488	77,762	45,837	155,349	377,092	108,233	14,586	3,333	7,420	116,413	31,263	152,252		1,152,138

Source: Appendices 14-A and 15-A

* Cuban exports and imports in 1960, 1961 and 1962 subject to revision.

APPENDIX 14

PETROLEUM TRADE WITHIN THE SINO-SOVIET BLOC AND CUBA
(Thousand Metric Tons)

Exporter \ Importer		Albania	Bulgaria	Mainland China	Cuba*	Czecho-slavakia	East Germany	Hungary	North Korea	North Vietnam	Outer Mongolia	Poland	Rumania	U.S.S.R.	Bloc ex. U.S.S.R. Exports	Grand Total Exports
Albania	1958		40	--	--	10	50	40	--	--	--	20	--	171	160	331
	1959		40	--	--	15	100	40	--	--	--	20	--	198	215	413
	1960		43	21	--	16	113	38	--	6	--	18	--	302	255	557
	1961		42	56	--	22	128	3	4	4	--	23	--	203	282	485
	1962		42	91	--	22	114	--	4	4	--	40	--	--	317	317
Bulgaria	1958	--		--	--	--	--	60	--	--	--	34	--	--	94	94
	1959	--		--	--	--	--	40	--	--	--	6	--	--	46	46
	1960	--		--	--	1	--	21	--	--	--	--	--	--	22	22
	1961	--		--	--	--	10	15	--	--	--	20	--	--	45	45
	1962	--		--	--	--	10	18	--	--	--	8	--	--	36	36
Czechoslavakia	1958	--	--	--	--		--	--	--	--	--	20	--	--	20	20
	1959	--	--	--	--		--	--	--	--	--	40	--	--	40	40
	1960	--	--	--	--		--	--	--	--	--	55	--	--	55	55
	1961	--	--	--	--		--	--	--	--	--	91	--	--	91	91
	1962	--	--	--	--		--	--	--	--	--	72	--	--	72	72
East Germany	1958	--	--	--	--	--		--	--	--	--	60	--	--	60	60
	1959	--	--	--	--	--		--	--	--	--	60	--	--	60	60
	1960	--	--	--	--	--		--	--	--	--	60	--	--	60	60
	1961	--	--	--	--	--		--	--	--	--	116	--	--	116	116
	1962	--	--	--	--	--		--	--	--	--	68	--	--	68	68
Hungary	1958	--	--	--	--	50	--		--	--	--	100	--	--	150	150
	1959	--	--	--	--	50	--		--	--	--	110	--	--	160	160
	1960	--	--	--	--	52	--		--	--	--	116	--	--	168	168
	1961	--	--	--	--	51	--		--	--	--	129	--	--	180	180
	1962	--	--	--	--	51	--		--	--	--	116	--	--	167	167
Poland	1958	--	--	--	--	--	--	--	--	--	--		--	--	--	--
	1959	--	--	--	--	--	--	--	--	--	--		--	--	--	--
	1960	--	--	8	--	2	1	--	--	--	--		--	2	11	13
	1961	--	--	--	--	--	--	--	--	--	--		--	--	--	--
	1962	1	--	10	--	3	3	--	--	--	--		--	1	17	18
Rumania	1958	--	110	--	--	--	--	--	--	--	--	300		2,824	410	3,234
	1959	--	110	--	--	--	--	--	--	--	--	250		2,956	360	3,316
	1960	14	83	--	--	--	--	--	--	--	--	190		2,823	287	3,110
	1961	11	55	--	--	--	--	--	--	--	--	297		2,325	363	2,688
	1962	5	55	--	--	--	--	--	--	--	--	313		1,992	373	2,365
U.S.S.R.	1958	5	423	2,507	--	1,502	1,124	1,141	226	30	80	1,518	--		--	8,556
	1959	9	559	3,048	--	1,922	1,802	1,262	244	73	119	1,756	--		--	10,794
	1960	6	804	2,963	2,164	2,648	2,186	1,486	218	62	129	2,053	1		--	14,720
	1961	4	1,109	2,928	4,029	3,153	2,592	1,564	344	72	142	2,312	1		--	18,250
	1962	--	1,564	1,856	4,384	4,017	2,937	1,731	438	97	165	3,025	1		--	20,215
Bloc Excluding U.S.S.R. Imports	1958	--	150	--	--	60	50	100	--	--	--	534	--	--	894	
	1959	--	150	--	--	65	100	80	--	--	--	486	--	--	881	
	1960	14	126	29	--	71	114	59	--	6	--	439	--	--	858	
	1961	11	97	56	--	73	138	18	4	4	--	676	--	--	1,077	
	1962	6	97	101	--	76	127	18	4	4	--	617	--	--	1,050	
Grand Total Imports	1958	5	573	2,507	--	1,562	1,174	1,241	226	30	80	2,052	--	2,995		12,445
	1959	9	709	3,048	--	1,987	1,902	1,342	244	73	119	2,242	--	3,154		14,829
	1960	20	930	2,992	2,164	2,719	2,300	1,545	218	68	129	2,492	1	3,127		18,705
	1961	15	1,206	2,984	4,029	3,226	2,730	1,582	348	76	142	2,988	1	2,528		21,855
	1962	6	1,661	1,957	4,384	4,093	3,064	1,749	442	101	165	3,642	1	1,993		23,258

Source: Various statistical handbooks, partially estimated.

* Cuban exports and imports in 1960, 1961 and 1962 subject to revision.

APPENDIX 14-A

PETROLEUM TRADE WITHIN THE SINO-SOVIET BLOC AND CUBA

(Thousands of Dollars)

Exporter	Importer	Albania	Bulgaria	Mainland China	Cuba *	Czecho-slovakia	East Germany	Hungary	North Korea	North Vietnam	Outer Mongolia	Poland	Rumania	U.S.S.R.	Bloc ex. U.S.S.R. Exports	Grand Total Exports
	1958		1,192	--	--	228	990	888	--	--	--	554	--	4,737	3,852	8,589
	1959		1,204	--	--	348	1,970	900	--	--	--	554	--	5,485	4,976	10,461
Albania	1960		1,204	462	--	266	2,215	847	--	198	--	499	--	8,365	5,691	14,056
	1961		1,126	1,232	--	440	2,432	67	132	132	--	575	--	5,075	6,136	11,211
	1962		1,100	2,002	--	427	2,212	--	132	132	--	944	--	--	6,949	6,949
	1958	--		--	--	--	--	1,332	--	--	--	942	--	--	2,274	2,274
	1959	--		--	--	--	--	900	--	--	--	166	--	--	1,066	1,066
Bulgaria	1960	--		--	--	17	--	468	--	--	--	--	--	--	485	485
	1961	--		--	--	--	190	333	--	--	--	500	--	--	1,023	1,023
	1962	--		--	--	--	194	398	--	--	--	189	--	--	781	781
	1958	--	--	--	--		--	--	--	--	--	554	--	--	554	544
Czecho-	1959	--	--	--	--		--	--	--	--	--	1,108	--	--	1,108	1,108
slavakia	1960	--	--	--	--		--	--	--	--	--	1,524	--	--	1,524	1,524
	1961	--	--	--	--		--	--	--	--	--	2,275	--	--	2,275	2,275
	1962	--	--	--	--		--	--	--	--	--	1,699	--	--	1,699	1,699
	1958	--	--	--	--	--		--	--	--	--	1,662	--	--	1,662	1,662
East	1959	--	--	--	--	--		--	--	--	--	1,662	--	--	1,662	1,662
Germany	1960	--	--	--	--	--		--	--	--	--	1,662	--	--	1,662	1,662
	1961	--	--	--	--	--		--	--	--	--	2,900	--	--	2,900	2,900
	1962	--	--	--	--	--		--	--	--	--	1,605	--	--	1,605	1,605
	1958	--	--	--	--	1,140	--		--	--	--	2,770	--	--	3,910	3,910
	1959	--	--	--	--	1,160	--		--	--	--	3,047	--	--	4,207	4,207
Hungary	1960	--	--	--	--	863	--		--	--	--	3,213	--	--	4,076	4,076
	1961	--	--	--	--	1,020	--		--	--	--	3,225	--	--	4,245	4,245
	1962	--	--	--	--	989	--		--	--	--	2,738	--	--	3,727	3,727
	1958	--	--	--	--	--	--	--	--	--	--		--	--	--	--
	1959	--	--	--	--	--	--	--	--	--	--		--	--	--	--
Poland	1960	--	--	332	--	33	20	--	--	--	--		--	55	385	440
	1961	--	--	--	--	--	--	--	--	--	--		--	--	--	--
	1962	141	--	406	--	58	58	--	--	--	--		--	28	663	691
	1958	--	3,278	--	--	--	--	--	--	--	--	8,310		78,225	11,588	89,813
	1959	--	3,311	--	--	--	--	--	--	--	--	6,925		81,881	10,236	92,117
Rumania	1960	1,904	2,324	--	--	--	--	--	--	--	--	5,263		78,197	9,491	87,688
	1961	1,496	1,474	--	--	--	--	--	--	--	--	7,425		64,403	10,395	74,798
	1962	705	1,441	--	--	--	--	--	--	--	--	7,387		55,178	9,533	64,711
	1958	680	12,605	104,542	--	34,246	22,255	25,330	7,458	990	2,720	42,049	--		--	252,875
	1959	1,224	16,826	128,626	--	44,590	35,499	28,395	8,025	2,409	4,046	48,641	--		--	318,308
U.S.S.R.	1960	816	22,512	122,965	24,237	43,957	42,846	33,138	7,194	2,046	4,386	56,868	23		--	360,988
	1961	564	29,721	120,048	40,290	63,060	49,248	34,721	11,352	2,376	4,828	57,800	23		--	414,031
	1962	--	40,977	75,354	45,155	77,930	56,978	38,255	14,454	3,201	5,610	71,390	23		--	429,327
Bloc	1958	--	4,470	--	--	1,368	990	2,220	--	--	--	14,792	--	--	23,840	--
Excluding	1959	--	4,515	--	--	1,508	1,970	1,800	--	--	--	13,462	--	--	23,255	--
U.S.S.R.	1960	1,904	3,528	794	--	1,179	2,235	1,315	--	198	--	12,161	--	--	23,314	--
Imports	1961	1,496	2,600	1,232	--	1,460	2,622	400	132	132	--	16,900	--	--	26,974	--
	1962	846	2,541	2,408	--	1,474	2,464	398	132	132	--	14,562	--	--	24,957	--
	1958	680	17,075	104,542	--	35,614	23,245	27,550	7,458	990	2,720	56,841	--	82,962	--	359,677
Grand	1959	1,224	21,341	128,626	--	46,098	37,469	30,195	8,052	2,409	4,046	62,103	--	87,366	--	428,929
Total	1960	2,720	26,040	123,759	24,237	45,136	45,081	34,453	7,194	2,244	4,386	69,029	23	86,617	--	470,919
Imports	1961	2,060	32,321	121,280	40,290	64,520	51,870	35,121	11,484	2,508	4,828	74,700	23	69,478	--	510,483
	1962	846	43,518	77,762	45,155	79,404	59,442	38,653	14,586	3,333	5,610	85,952	23	55,206	--	509,490

Source: Volume from Appendix 14
Prices by Committee estimate

* Cuban exports and imports subject to revision.

APPENDIX 15

COAL TRADE WITHIN THE SINO-SOVIET BLOC AND CUBA
(Thousands of Metric Tons)

Exporter \ Importer		Albania	Bulgaria	Mainland China	Cuba*	Czecho-slavakia	East Germany	Hungary	Outer Mongolia	Poland	Rumania	U.S.S.R.	Bloc Exports Excluding U.S.S.R.	TOTAL EXPORTS
Albania	1958		--	--	--	--	--	10	--	--	--	--	10	10
	1959		--	--	--	--	--	20	--	--	--	--	20	20
	1960		--	--	--	--	--	10	--	--	--	--	10	10
	1961		--	--	--	--	--	--	--	--	--	--	--	--
	1962		--	--	--	--	--	--	--	--	--	--	--	--
Bulgaria	1958	--		--	--	--	--	60	--	--	--	--	60	60
	1959	--		--	--	--	--	60	--	--	--	--	60	60
	1960	--		--	--	--	--	60	--	--	--	--	60	60
	1961	--		--	--	--	--	60	--	--	--	--	60	60
	1962	--		--	--	--	--	60	--	--	--	--	60	60
Mainland China	1958	--	--		--	--	--	--	--	--	--	200	--	200
	1959	--	--		--	--	--	--	--		--	200	--	200
	1960	--	--		--	--	--	--	--		--	208	--	208
	1961	--	--		--	--	--	--	--	--	--	185	--	185
	1962	--	--		--	--	--	--	--	--	--	201	--	201
Czechoslavakia	1958	--	--	--	--		700	530	--	--	100	--	1,330	1,330
	1959	--	100	--	--		1,400	620	--	--	400	--	2,520	2,520
	1960	--	200	--	--		1,300	800	--	--	500	--	2,800	2,800
	1961	--	200	--	--		1,300	810	--	100	600	--	3,010	3,010
	1962	--	200	--	--		1,500	800	--	130	500	--	3,130	3,130
East Germany	1958	--	--	--	--	200		60	--	1,100	--	--	1,360	1,360
	1959	--	--	--	--	300		220	--	1,800	--	--	2,320	2,320
	1960	--	--	--	--	800		400	--	700	--	--	1,900	1,900
	1961	--	--	--	--	700		600	--	900	--	--	2,200	2,200
	1962	--	--	--	--	825		400	--	700	--	--	1,925	1,925
Hungary	1958	--	--	--	--	--	--		--	--	--	50	--	50
	1959	--	--	--	--	--	--		--	--	--	50	--	50
	1960	--	--	--	--	--	--		--	--	--	60	--	60
	1961	--	--	--	--	--	--		--	--	--	50	--	50
	1962	--	--	--	--	--	--		--	--	--	50	--	50
Poland	1958	10	40	--	--	1,600	7,800	900	--		100	4,300[a]	10,450	14,750
	1959	10	40	--	--	1,300	8,900	1,000	--		100	4,700[a]	11,350	16,050
	1960	10	40	--	2	1,400	8,300	900	--		100	5,200[a]	10,752	15,952
	1961	10	30	--	45	1,600	8,300	1,000	--		100	5,100[a]	11,085	16,185
	1962	12	35	--	25	1,100	8,200	1,100	--		100	5,300[a]	10,572	15,872
U.S.S.R.	1958	--	100	--	--	1,000	5,700[a]	700	40	400	400			8,340
	1959	--	100	--	--	1,000	6,000[a]	700	40	600	400			8,840
	1960	--	100	--	7	1,000	6,100[a]	800	53	800	400			9,260
	1961	--	600	--	134	1,900	6,800[a]	1,000	29	900	400			11,763
	1962	--	1,000	--	24	2,900	8,200[a]	800	181	1,000	800			14,905
Bloc Imports Excluding U.S.S.R.	1958	10	40	--	--	1,800	8,500	1,560	--	1,100	200		13,210	
	1959	10	140	--	--	1,600	10,300	1,920	--	1,800	500		16,270	
	1960	10	240	--	2	2,200	9,600	2,170	--	700	600		15,522	
	1961	10	230	--	45	2,300	9,600	2,470	--	1,000	700		16,355	
	1962	12	235	--	25	1,925	9,700	2,360	--	830	600		15,687	
TOTAL IMPORTS	1958	10	140	--	--	2,800	14,200	2,260	40	1,500	600	4,550		26,100
	1959	10	240	--	--	2,600	16,300	2,620	40	2,400	900	4,950		30,060
	1960	10	340	--	9	3,200	15,700	2,970	53	1,500	1,000	5,468		30,250
	1961	10	830	--	179	4,200	16,400	3,470	29	1,900	1,100	5,335		33,453
	1962	12	1,235	--	49	4,825	17,900	3,160	181	1,830	1,400	5,551		36,143

[a]Poland's exports to U.S.S.R. are actually shipped to E. Germany for Russian account. U.S.S.R. exports to E. Germany include these volumes.

Source: 1958-1961, United Nations, "The Coal Situation in Europe."
1962, Committee Estimate

* Cuban exports and imports in 1960, 1961 and 1962 subject to revision.

APPENDIX 15-A

COAL TRADE WITHIN THE SINO-SOVIET BLOC AND CUBA
(Thousand Dollars)

Exporter \ Importer		Albania	Bulgaria	Mainland China	Cuba*	Czecho-slovakia	East Germany	Hungary	Outer Mongolia	Poland	Rumania	U.S.S.R.	Bloc Exports Excluding U.S.S.R.	TOTAL EXPORTS
Albania	1958		--	--	--	--	--	225	--	--	--	--	225	225
	1959		--	--	--	--	--	450	--	--	--	--	450	450
	1960		--	--	--	--	--	225	--	--	--	--	225	225
	1961		--	--	--	--	--	--	--	--	--	--	--	--
	1962		--	--	--	--	--	--	--	--	--	--	--	--
Bulgaria	1958	--		--	--	--	--	1,350	--	--	--	--	1,350	1,350
	1959	--		--	--	--	--	1,350	--	--	--	--	1,350	1,350
	1960	--		--	--	--	--	1,350	--	--	--	--	1,350	1,350
	1961	--		--	--	--	--	1,350	--	--	--	--	1,350	1,350
	1962	--		--	--	--	--	1,350	--	--	--	--	1,350	1,350
Mainland China	1958	--	--		--	--	--	--	--	--	--	2,600	--	2,600
	1959	--	--		--	--	--	--	--	--	--	2,600	--	2,600
	1960	--	--		--	--	--	--	--	--	--	2,590	--	2,590
	1961	--	--		--	--	--	--	--	--	--	2,450	--	2,450
	1962	--	--		--	--	--	--	--	--	--	2,653	--	2,653
Czechoslavakia	1958	--	--	--	--		12,390	11,925	--	--	2,260		26,575	26,575
	1959	--	2,200	--	--		24,780	13,950	--	--	9,040	--	49,970	49,970
	1960	--	4,400	--	--		23,010	18,000	--	--	11,300	--	56,710	56,710
	1961	--	4,400	--	--		23,010	18,225	--	1,670	13,560	--	60,865	60,865
	1962	--	4,400	--	--		26,550	18,000	--	2,171	11,300	--	62,421	62,421
East Germany	1958	--	--	--	--	3,160		1,350	--	18,370	--	--	22,880	22,880
	1959	--	--	--	--	4,740		4,950	--	30,060	--	--	39,750	39,750
	1960	--	--	--	--	12,640		9,000	--	11,690	--	--	33,330	33,330
	1961	--	--	--	--	11,060		13,500	--	15,030	--	--	39,590	39,590
	1962	--	--	--	--	13,035		9,000	--	11,690	--	--	33,725	33,725
Hungary	1958	--	--	--	--	--	--		--	--	--	610	--	610
	1959	--	--	--	--	--	--		--	--	--	610	--	610
	1960	--	--	--	--	--	--		--	--	--	722	--	722
	1961	--	--	--	--	--	--		--	--	--	583	--	583
	1962	--	--	--	--	--	--		--	--	--	583	--	583
Poland	1958	220	880	--	--	25,280	138,060	20,250	--		2,260	76,110	186,950	263,060
	1959	220	880	--	--	20,540	157,530	22,500	--		2,260	83,190	203,930	287,120
	1960	220	880	--	278	22,120	146,910	20,250	--		2,260	90,184	192,918	283,102
	1961	220	660	--	620	25,280	146,910	22,500	--		2,260	90,579	198,450	289,029
	1962	264	770	--	348	17,380	145,140	24,750	--		2,260	93,810	190,912	284,722
U.S.S.R.	1958	--	2,200	--	--	15,800	100,890	15,750	400	6,680	9,040		--	150,760
	1959	--	2,200	--	--	15,800	106,200	15,750	400	10,020	9,040		--	159,410
	1960	--	2,200	--	114	16,764	106,948	19,450	543	13,210	12,498		--	171,727
	1961	--	7,685	--	1,864	29,434	123,814	20,019	304	14,493	8,575		--	206,188
	1962	--	12,800	--	334	45,530	145,960	16,480	1,810	16,600	17,680		--	257,194
Bloc Imports Excluding U.S.S.R.	1958	220	880	--	--	28,440	150,450	35,100	--	18,370	4,520	--	237,980	
	1959	220	3,080	--	--	25,280	182,310	43,200	--	30,060	11,300	--	295,450	
	1960	220	5,280	--	278	34,760	169,920	48,825	--	11,690	13,560	--	284,533	
	1961	220	5,060	--	620	36,340	169,920	55,575	--	16,700	15,820	--	300,255	
	1962	264	5,170	--	348	30,415	171,690	53,100	--	13,861	13,560	--	288,408	
TOTAL IMPORTS	1958	220	3,080	--	--	44,240	251,340	50,850	400	25,050	13,560	79,320		468,060
	1959	220	5,280	--	--	41,080	288,510	58,950	400	40,080	20,340	86,400		541,260
	1960	220	7,480	--	392	51,524	276,868	68,275	543	24,900	26,058	93,496		549,756
	1961	220	12,745	--	2,484	65,774	293,734	75,594	304	31,193	24,395	93,612		600,055
	1962	264	17,970	--	682	75,945	317,650	69,580	1,810	30,461	31,240	97,046		642,648

Source: Volume from Appendix 15
Prices by Committee estimate

* Cuban exports and imports in 1960, 1961 and 1962 subject to revision.

APPENDIX 16

ENERGY IN CUBA

Cuba is almost entirely dependent on imports of energy to meet internal demand. Although there were 1,300 B/D of oil production in 1956, this had declined to 300 B/D by 1960, and is believed to have completely stopped by 1963. Cuba produces no coal or natural gas and its only indigenous source of energy is fuelwood.

Imported petroleum is the principal source of energy in Cuba. Of a total of 6 million tons of standard fuel energy consumption in 1961, petroleum accounted for 97% or 80,000 B/D. All of Cuba's petroleum imports were from the Soviet Union. In addition, the USSR has supplied Cuba with about half of its total coal supply in recent years.

CONSUMPTION OF PRIMARY ENERGY [a]

	COAL		OIL		TOTAL	OIL AS A PERCENT OF TOTAL CONSUMPTION
	THOUSAND TONS	MMTSF[b]	BARRELS PER DAY	MMTSF[b]	MMTSF[b]	
1958	107	0.08	64,500	4.61	4.69	98
1959	160	0.12	73,000	5.22	5.34	98
1960	80	0.06	80,000	5.71	5.77	99
1961	240	0.18	81,500	5.82	6.00	97

a/ Source: U.N. World Energy Supplies, Series J, No. 6, Page 15.
b/ MMTSF = Million Metric Tons of Standard Fuel.

CUBAN OIL IMPORTS FROM THE USSR
(Thousand B/D)

	CRUDE OIL	PETROLEUM PRODUCTS	TOTAL
1960	33	10	43
1961	59	21	80
1962	72	16	88
1963	70	25	95

The Soviet crude is run in three nationalized refineries with a total design capacity of 84,000 B/D. Because of the high sulfur content of Soviet crude, lack of familiarity with operating procedures, and catalyst problems, two of the three refineries have been subject to frequent shutdown. A fourth refinery, designed by the Soviets, is scheduled to go on stream in 1965 with a capacity of 36,000 B/D.

In 1962, Cuba imported $U.S. 45 million of oil from the Soviet Union. This accounted for 12% of her total imports of $U.S. 370 million from the USSR. Cuba's exports to the Soviet Union consisted primarily of sugar, which accounted for 87% of her total exports to the USSR.