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ECONOMIC INTELLIGENCE REPORT

MAJOR PROBLEMS OF TRANSPORTATION IN THE ECONOMIC DEVELOPMENT OF SOVIET ASIA BETWEEN THE URALS AND LAKE BAIKAL

CIA/RR 59-18
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S-E-C-R-E-T

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FOREWORD

The purpose of this report is to place in perspective the developments in transportation which have taken place since 1950 in Soviet Asia between the Urals and Lake Baikal. The report presents as a general background the state of rail transport in this area before 1950 and an analysis of the recent regional economic development of the area, with particular reference to the role played by transportation. The evolution of the transportation program is related necessarily to the tempo of the general economic development of the area. Estimates of present and future developments in the transportation system, therefore, have been tested, measured, and compared with planned levels of industrial and agricultural activity as well as with the strategic requirements of Soviet Asia between the Urals and Lake Baikal.

The statistics presented in the last section of this report are intended to illustrate primarily the interrelationship of the railroad system with the heavily industrialized economy and also to illustrate the demand for transportation materials occasioned by current investment in the Siberian areas.

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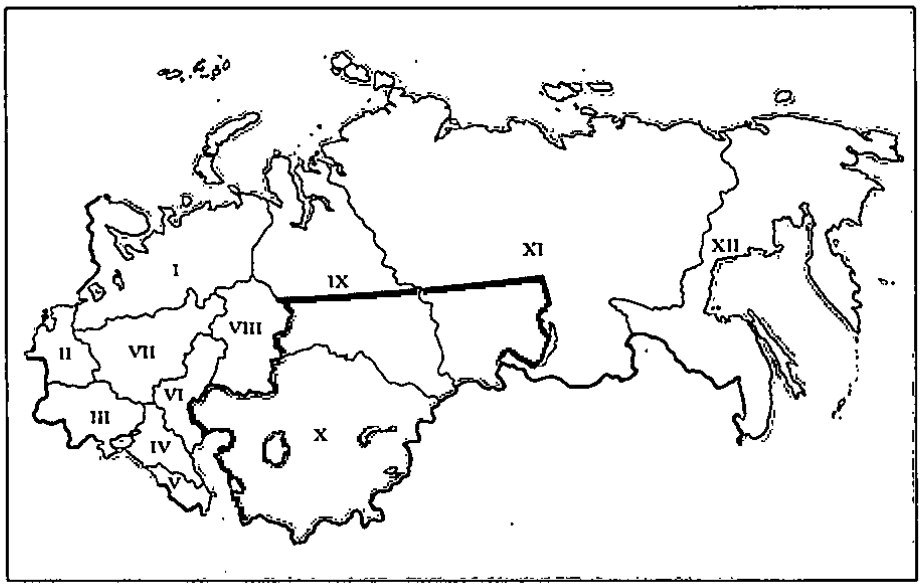
MAJOR PROBLEMS OF TRANSPORTATION IN THE ECONOMIC DEVELOPMENT OF SOVIET ASIA BETWEEN THE URALS AND LAKE BAIKAL*



Summary and Conclusions

The period of reconstruction of industry and transportation in the USSR following World War II came to a conclusion about 1949. To maintain industrial security in depth and to permit further continuation of economic growth, Soviet leaders since then have looked increasingly to the Asiatic areas of the USSR.

The development of these areas has required a substantial investment in the transportation system, both to tap isolated resources and to handle an increasing volume of traffic. This investment has been concentrated in railroads and petroleum pipelines, particularly in Soviet Asia between the Urals and Lake Baikal.** The rudimentary system of transportation which connected the primitive economy of Siberia

* The estimates and conclusions in this report represent the best judgment of this Office as of 1 May 1959.

** The area studied in this report includes all Soviet territory south of the 60th parallel lying between the Urals and Lake Baikal (see the inset above).

with the principal areas of production of the western USSR and with the eastern and southeastern frontiers of the USSR before 1950 has been undergoing an increasingly significant expansion and modernization since that time.

New construction is planned to provide greater flexibility of east-west transportation. More important, however, will be the interconnection of the widely dispersed resource bases and agricultural areas in this area with the expanding processing and manufacturing centers of the USSR to create an additional cohesive and vital asset for the Soviet economy. The expanded railroad network will facilitate settlement in the area and exploitation of hitherto untouched indigenous resources.

In the Fifth Five Year Plan (1951-55) the initiation of a significant growth in heavy industry and agriculture in Siberia was reflected in sharply increased investment in transportation. In that period, 3,390 kilometers (km) of new line were opened to traffic; 1,032 km of the line were double tracked, and 945 km of double-track line were electrified at an approximate cost, exclusive of equipment, of 6,507 million rubles.* Total investment in transportation during those years was 45 billion rubles for the entire USSR (see Table 17**).

During 1956-60, Soviet policy dictated an intensification of the programs for expanding heavy industry in Siberia and for utilizing the mineral and agricultural resources of Soviet Asia between the Urals and Lake Baikal. The Twentieth Party Congress authorized a resurvey of this area for raw material and mineral resources. No petroleum was discovered in West Siberia or East Siberia (Economic Regions IX and XI***), but some deposits were located in Kazakhstan and Central Asia (Economic Region X), where natural gas also was present. Development of hydroelectric resources was projected on a large scale. The new lands program brought extensive acreages of the northern Kazakh steppe into production of grain. Forestry and lumbering were expanded greatly in East Siberia.

Following these developments, programs were initiated to expand the ferrous and nonferrous metal industries. A "third" ferrous metal

* Except where otherwise indicated, ruble values in this report are expressed in current rubles and may be converted to US dollars at the official rate of exchange of 4 rubles to US $1. This rate of exchange, however, does not necessarily reflect the true dollar value.

** P. 63, below.

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base* was projected for Siberia, and Kazakhstan became the leading area of the USSR in mining and refining nonferrous ores. Production of new basic metals was planned for various centers in Siberia. Large, new plants manufacturing rolled steel products, agricultural equipment and chemicals were provided for. The cement, lumber, and paper industries also were included in a major phase of this expansion.

The resultant demand for transport service led to a further substantial increase in investment in transportation in Soviet Asia. Although the program retains its emphasis on the railroads, the expansion of trunk pipelines for oil also is receiving attention. Approximately 4,800 km of new rail line are planned for completion; 1,415 km of line are to be double tracked, and 3,010 km of line are to be electrified by 1960, at an estimated cost of about 10.3 billion rubles. Planned line improvements, including heavy rails, concrete ties, rock ballast, and modern signaling, will require 4.3 billion rubles in addition. The cost of new equipment to be utilized on the line during 1956-60 is estimated to be about 8.8 billion rubles. In contrast with this total of about 23.4 billion rubles, the original plan for 1956-60 for investment in transportation in the USSR as a whole amounted to 70 billion rubles.

To relieve the railroads of the costly movement of petroleum to the industries of Siberia and Communist China, a network of high-capacity pipelines is being constructed eastward as far as Irkutsk, with plans for continuing to the Pacific in the future. A total of 6,800 km of pipe are planned for the Urals and eastward, at an estimated installed cost, exclusive of refineries, of 5.1 billion rubles, with an eventual capacity through to Irkutsk of more than 20 million metric tons** per year.

Present indications are that most of the Soviet goals for investment in transportation in 1956-60 either will be met or will not be missed sufficiently to affect the planned flow of freight traffic. The primary objective of Siberian transportation in 1960, the completion of electrification from Moscow to Irkutsk, is about on schedule and should be accomplished. Some electric locomotives, however, may have to be imported from the European Satellites and the West in order to complete the equipment program for this line.

The current plan for the Eastern Regions (Regions VIII through XII) is a crucial part of the Soviet aim to overtake and to surpass the most advanced capitalistic countries in per capita production, and

* For discussion, see p. 44, below.

** Tonnages are given in metric tons throughout this report.

its impact has been heavily concentrated in Soviet Asia between the Urals and Lake Baikal.

I. Introduction.

A. Importance of Soviet Asia.

The area treated in this report is defined to include all Soviet territory south of the 60th parallel lying between the Urals and Lake Baikal. It includes all of Region X -- Kazakhstan and the four Central Asian republics (Kirgiz SSR, Uzbek SSR, Tadzhik SSR, and Turkmen SSR) -- and much of Region IX (West Siberia) and of Krasnoyarskiy Kray and Irkutskaya Oblast in Region XI. This area is an integral part of the Eastern Regions (Regions VIII through XII), which, by Soviet definition, encompass all of Siberia proper, including the Urals, Kazakhstan, and Central Asia.*

An examination of transportation and related activities in Soviet Asia between the Urals and Lake Baikal between 1950 and 1970 is significant because this area is scheduled to receive the major emphasis in an intensive program of economic growth and industrial development, with an output in magnitudes of worldwide significance. This development will take place particularly in the fields of metallurgy, electric power, and fuel.

Associated with the development of heavy industry in Soviet Asia is a program for expansion and modernization of transportation facilities, calling for a large increase in capital investment in railroads and pipelines (see the map, Figure 1**). There will be far greater expenditures for line improvement and new facilities in the northern portions of Kazakhstan and along the main line of the Trans-Siberian Railroad than in the Central Asian republics.

The Trans-Siberian Railroad, which has served various portions of Siberia since 1898, is undergoing electrification and substantial rebuilding to enable the line to accommodate high-density, high-speed

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* In the release of certain information, particularly statistics on production of petroleum, the term Eastern Regions in Soviet usage sometimes appears to include also that portion of the Volga Region (Region VI) east of the Volga River.

** Following p. 4.

traffic. To the south, the parallel main line of the South Siberian Railroad is being completed from the Urals to Tayshet. In northern Kazakhstan, between Kustanay and Barnaul, the Central Siberian Railroad is being constructed.

The railroad network of Economic Region X, once an area of isolated lines, is coming to resemble a section of a spiderweb, with the radii extending from north to south, southeast, and east, and the perimeter formed by the main lines of the Turkestan-Siberian, Tashkent, and Ashkhabad Systems.* Radial lines, new and old, are directed toward points on or near the frontier of the USSR, from which contact with neighboring countries can be made. The railroad plan includes cross links which will make possible shifts from one radius to another and will provide access to isolated, newly developed mineral, agricultural, and industrial concentrations. Nearly all these lines are to be single track. As recently stated by Boris P. Beshchev, Minister of Railroads of the USSR, the new railroad lines are transforming the economy of these areas. 1/**

B. Status of Rail Transport in 1950.

In 1950, Soviet Asia between the Urals and Lake Baikal was served by all or a part of 12 different railroad systems. The general pattern consisted of the double-track main line of the Trans-Siberian Railroad running in an east-west direction across Siberia, the Trans-Caspian and Central Asian Railroads extending from Krasnovodsk on the eastern shore of the Caspian Sea to the border of Afghanistan and the Fergana Valley, the Orenburg System connecting the southern Urals with Central Asia, and the Turkestan-Siberian System joining a branch of the Trans-Siberian Railroad with the eastern extremity of the Trans-Caspian Railroad. Substantially all lines other than the main line of the Trans-Siberian Railroad were single track.

The railroads in Siberia were built originally for a number of reasons, mainly political and strategic, but by 1940 considerable economic traffic had begun to move over these railroads, particularly on the portions of the main line of the Trans-Siberian Railroad crossing West Siberia. The principal cargo by weight was high-grade coal moving westward from the Kuznetsk Basin (Kuzbas) to the steel, heavy machinery, and armaments industries in the Urals. The principal cargoes on the Turkestan-Siberian Railroad were grain, coal, and wood moving southward from Siberia to Central Asia and oil moving northward, whereas the

* The term system as used in this report refers to the railroad systems defined and numbered on map 13739 (first revision, 12-56) USSR: Railroads Systems, 1956.

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Orenburg System had become the chief artery connecting the cotton-growing and fruit-growing districts of Uzbek SSR with the central regions of European USSR. The Trans-Caspian lines in turn were becoming a means by which petroleum from Baku was moved to the oil-barren areas of Siberia.

In Irkutskaya Oblast, besides through traffic on the Trans-Siberian Railroad, shorter movements stemming from the Cheremkhovo coal fields were assuming significance. The opening of the branch line to Ulan Bator in Mongolia in 1949 added to the through traffic and to the strategic importance of the rail lines in Irkutskaya Oblast, as did the progress eastward of the Baikal-Amur Magistral (BAM) line from Tayshet to the port of Lena (Osetrovo) on the Lena River.

There were no trunk pipelines for petroleum in 1950 in the portion of Siberia dealt with in this report.

II. Development and Planned Objectives Since 1950.

Efforts to expand the raw material base of the Soviet economy since 1950 have emphasized the resources of West Siberia and Kazakhstan, principally coking coal, iron ore, and nonferrous minerals, along with a number of sites suitable for the development of hydroelectric power. This area also encompasses the principal belt of the new lands, recently cultivated on a large scale to provide an increase in Soviet grain supply. Moreover, West Siberia is a communications zone between the western USSR and the Far East, including Mongolia and Communist China. All such factors add to a prospect for heavy movement of bulk commodities over an extended period of time.

Rail transport has been critical to development in these areas because of the long distances between commodity bases and markets and because of the remoteness of the region from the sea. The river systems do not provide an effective or reliable channel of movement, because their general direction of flow is from south to north when the need is for east-west transport. Furthermore, these rivers are frozen for 6 months of the year.

A. West Siberia (Region IX).

Traffic on the Trans-Siberian Railroad was comparatively light from the time the USSR took over its operation until the Third Five Year Plan (1938-42). In those years the type of operation was more like that on railroads in Europe than on those in the US. By the mid-1930's, however, the constantly increasing traffic on the Trans-Siberian Railroad caused the USSR to adopt a trend toward US standards and away from those of Europe. More powerful locomotives (mountain-type) were introduced, and a gradual conversion of the freight car park from 2-axle

cars with a capacity of 15 to 25 tons to 4-axle cars with a capacity of 50 to 60 tons, equipped with automatic couplings and airbrakes, was begun. During World War II, considerable up-to-date rolling stock was received from the US.

Line modernization was renewed under the Fourth Five Year Plan (1946-50) with the installation of heavier rail (101 pounds per yard), tie plates, creosoted ties, sand and rock ballast, and automatic signaling on intensively used sectors of the Trans-Siberian Railroad. 2/ Yards and passing tracks were too short to accommodate freight trains of increased length. Operating speeds were slow, and servicing stops were long and frequent.

The railroad systems operating in West Siberia are the South Urals, Omsk, and Tomsk. These systems operate the lines with the heaviest freight densities in the USSR. Three other systems, the Sverdlovsk, the Krasnoyarsk, and the Turkestan-Siberian, enter the region for short distances.

1. Railroads.

a. Openings of New Lines.

New lines opened to traffic in West Siberia since 1950 are estimated to have amounted to 636 km under the Fifth Five Year Plan (1951-55) and were to amount to 906 km during 1956-60. These routes and their lengths are shown in Table 1.* The total additions of new lines between 1950 and 1960 represent a 30-percent expansion of the network of railroads of West Siberia which existed in 1950. (See Appendix A.) The two most important stretches opened between 1950 and 1955 were the lines between Barnaul and Kulunda and between Artyshta and Chesnokovka. These single-track lines completed the main line of the South Siberian Railroad from the Kuzbas and Altayskiy Kray to the Urals. Another important line opened in this period was the stretch from Kurgan just across the Kazakh border, in the direction of Peski, where it is to join other lines in Kazakhstan. It is intended to be a feeder to the trunk lines from the more westerly portion of the new lands. Several hundred kilometers of narrow-gauge line also were laid, either to tap forests and virgin land or to serve as a base of construction for broad-gauge lines in that area. 3/

Repeatedly announced as under construction in 1956-60 was a Barnaul-Omsk line. Apparently, much of this line will be part of the east-west main line of the Central Siberian Railroad which is to connect Barnaul with Kustanay. Most of the West Siberian portion

* Table 1 follows on p. 8.

Table 1

Rail Lines Opened to Traffic in West Siberia
1951-55 and 1956-60 Plan

	Kilometers
1951-55 Actual	
Kurgan-Kazakh border a/	93
Artyshta-Chesnokovka	200
Barnaul-Kulunda	343
Total	636
1956-60 Plan	
Stalinsk-Luzhba b/ (East Siberian border)	150
Kulomzino-Irtyshkoye (Kazakh border)	160
Kazakh border - Karasuk	76
Karasuk - Kamen'-na-Obi	250
Kamen'-na-Obi - Chesnokovka	230
Inskaya-Sokur (Burlak)	40
Total	906

a. That portion of the Kurgan-Peski line in West Siberia only.
b. That portion of the Stalinsk-Abakan-Abaza line in West Siberia only.

of this line will lie between Karasuk and Barnaul. Traffic has already started between Karasuk and Kamen'-na-Obi, and rail laying is under way southward from Kulomzino opposite Omsk to Irtyshskoye, where the line will cross the Irtysh River. 4/ The Barnaul-Omsk line is designed primarily to provide a new outlet for grain from the new lands and to relieve the Omsk-Novosibirsk sector of the main line of some of the coal traffic between the Kuzbas and the Urals.

The most widely heralded line construction accomplished since 1955 is the single-track railroad from Stalinsk to Abakan which was partly opened to traffic in December 1957. 5/ A branch of this line in East Siberia presently serves the Abaza ore mining areas. As other branches are completed and the line becomes fully operational, the exploitation of areas with coal, iron ore, and manganese deposits will be facilitated. Although regarded as an extension of the main line

of the South Siberian Railroad, the Stalinsk-Abakan line probably never will compete with the Trans-Siberian Railroad for fast through traffic, because of the tortuousness of the roadbed and the grades. Much improvement of the line remains to be done. Adequate passing tracks and preferably centralized traffic control will be needed to offset the limitations of a single track. Alos, it is probable that the line eventually will be converted to diesel or electric traction.

Most of the other lines in West Siberia planned for operation by 1960 are small branch lines designed to facilitate the exploitation of timber and of agricultural and mining resources. Some of these proposed branch lines will provide short cuts from existing centers of exploitation to the main lines of the Central Siberian and Trans-Siberian Railroads.

An important aspect of the construction of new lines in West Siberia is the bypassing of congested areas. A cutoff from the important Inskaya classification yards south of Novosibirsk to the main line station of Sokur, 36 km east of Novosibirsk, has recently been completed. 6/ This cutoff and current improvements under way at Inskaya will speed up traffic and enable all through freight to bypass Novosibirsk. A similar bypass is planned for Sverdlovsk. The vital traffic center of Omsk, however, remains without a bypass. The single-track loop built there in 1946-47 has fallen into virtual disuse, and new station and yard arrangements are currently under construction. 7/ A truly effective bypass line, however, would require construction of another bridge across the Irtysh River.

b. Electrification.

With the exception of electrification of the 141-km line from Stalinsk to Belovo in the Kuzbas before World War II, no electrification of a main line was undertaken in Siberia east of the Urals until 1951 (see Table 2*). Between 1951 and 1955, electrification of 811 km of main line was accomplished in West Siberia (see Table 3**). Most of this electrification was on the high-density line between Omsk and Novosibirsk as well as from Omsk westward to Isyl'-Kul'.

According to Soviet railroad officials, the plan for 1956-60 has as first priority the completion of electrification of the main line of the Trans-Siberian Railroad from Moscow to Irkutsk as part of the planned electrification to Vladivostok by 1970. About 1,600 km of this electrification will take place in West Siberia. The

* Table 2 follows on p. 10.
** Table 3 follows on p. 11.

Table 2

Estimated Increase in the Length of Electrified Railroads in the Eastern Regions of the USSR Compared with the Increase in the USSR as a Whole 1951-55 and 1956-60 Plan

Route Kilometers

	USSR	Urals	Siberia	Total Eastern Regions	Eastern Regions as Percent of USSR
Status, end of 1950	3,085	1,181	141	1,322	42.9
Fifth Five Year Plan (1951-55)	2,265	341	945	1,286	56.8
Plan for 1956-60	8,100	952	3,162 a/	4,114	50.8
Planned Status, end of 1960	13,450	2,474	4,248	6,722	50.0

a. 143 km of this distance are east of Irkutskaya Oblast (Ulan-Ude to Petrovskiy Zavod).

plan was to electrify the Tomsk System of the main line of the Trans-Siberian Railroad to Tayga by the end of 1958 and probably to extend electrification to Mariinsk by the end of 1959. The intention is eventually to electrify the complex of lines leading to Kemerovo, Stalinsk, and other points in the Kuzbas via Yurga, 8/ but apparently this electrification will be done after 1960. The plan for 1956-60 for electrification is on schedule at present.

Individual lines electrified in West Siberia before 1950 and under the Fifth Five Year Plan (1951-55), as well as those in Kazakhstan and East Siberia planned for electrification by 1960, are shown in Table 3.* No lines in Central Asia have been electrified, and as yet, apparently, there are no plans for any such electrification.

In accordance with the original plan for 1965, at the close of that year three electrified lines would extend from Moscow to the Urals, converging to two at Kurgan and to one at Omsk, 9/ with a fourth line branching off at Abdulino and extending to Karaganda.

* Table 3 follows on p. 11.

Table 3

Electrification of Railroads in Soviet Asia
Between the Urals and Lake Baikal
Before 1951, 1951-55, and 1956-60 Plan

	Kilometers
Before 1951	
West Siberia	
Belovo-Stalinsk	141
Total before 1951	141
1951-55	
West Siberia	
Omsk-Novosibirsk	627
Novosibirsk-Inskaya	19
Ob'-Inskaya	27
Isil'-Kul' - Omsk	138
Subtotal, West Siberia	811
East Siberia	
Irkutsk-Slyudyanka	134
Total, 1951-55	945
1956-60 Plan	
West Siberia (including Omsk System stretch across North Kazakhstan and South Urals stretch in Urals Region leading to Chelyabinsk)	
Chelyabinsk - Isil'-Kul'	660
Omsk-Nazyvayevskaya	149
Novosibirsk-Itat	475
Inskaya-Sokur	40
Inskaya-Belovo	289
Subtotal, West Siberia	1,613

Table 3

Electrification of Railroads in Soviet Asia
Between the Urals and Lake Baikal
Before 1951, 1951-55, and 1956-60 Plan
(Continued)

	Kilometers
Kazakh SSR	
Ust' Kamenogorsk - Ul'ba Perevalochnaya	30
East Siberia (Krasnoyarskiy Kray and Irkutskaya Oblast only)	
Itat-Irkutsk	1,376
Total, 1956-60	3,019
Grand total	4,105

Eighty-five percent of all double-track lines will have a capacity of up to 35 million tons per year in the loaded direction,* and 15 percent will have a capacity of more than 35 million tons per year in the loaded direction.** 10/

c. Double Tracking and Improvement of Line.

Besides electrification, the original Sixth Five Year Plan (1956-60) called for a number of other projects designed to advance railroad standards and to increase the volume and speed of traffic through the area under study, including line improvements such as double tracking, heavier rails, and modern communication and signaling installations. Late in the period of the Fifth Five Year Plan, double tracking was started from Sverdlovsk in the direction of Omsk, but the work progressed less than 50 km before the end of 1955.

The recently built connection from Artyshta in the Kuzbas to Chesnokovka across the Ob' River from Barnaul is to be double

* The term loaded direction refers to the direction in which the greater flow of freight moves annually and which, as a rule, controls the movement of cars in both directions.
** See the tabulation, p. 57, below.

tracked, and double tracking of the line from Barnaul southwestward to Semipalatinsk has already been completed. The two railroads leading in a southeasterly direction from Sverdlovsk to Kurgan and Omsk, respectively, were scheduled to be double tracked. The extra track on the line to Omsk is supposed to be installed by 1960, 11/ and, if feasible, electrification of this line will be completed simultaneously. Double tracking of the Kurgan-Sverdlovsk line is reported to have been finished on time. 12/

The line with the heaviest density traffic in the USSR is the stretch of the main line of the Trans-Siberian Railroad between Omsk and Novosibirsk. Soviet railroad officials indicate that they have begun a program for installation of R-75 rail (151 pounds per yard) on the Omsk-Novosibirsk and Petropavlovsk-Chelyabinsk stretches of the Trans-Siberian Railroad in West Siberia and on a line of the Karaganda System, believed to be the stretch from Karaganda to Tobol, in northern Kazakhstan. The rail first became available in January 1957. When the work is completed, these sections of line should be comparable to the best main-line divisions of such heavy-density systems as the Norfolk and Western and Pennsylvania Railroads in the US. Other heavily used lines in West Siberia are being relaid with R-65 rail (131 pounds per yard).

At present, increases in the weight of trains and hence in line capacity are limited by length of the station tracks on many main lines. With short headway traffic such as exists on the Omsk-Novosibirsk run, it is customary for trains to overtake each other at the more important stations, where they stop primarily for light servicing and often for loading and other necessities as well. Station centers or small yards are provided for this purpose, the standard track lengths of which, up to 1956, were 850 meters. By 1960, station tracks on the Omsk-Novosibirsk route are to be lengthened to 1,050 meters, 13/ a distance which will permit the addition of approximately ten to fifteen 4-axle cars per train. These extra cars can be handled easily by the N-8 electric locomotive on the straight and level sections of line between Omsk and Novosibirsk.*

In conjunction with the heavy rail being laid, new ties now being installed in the main line generally are creosoted and are spaced closely on lines carrying the heaviest traffic. Programs for replacing ties, however, tend to fall short of established plans, and experiments are continuing with prestressed ferroconcrete and asbestos silicalcite ties.

* For the N-8 to move its maximum load of 8,000 gross tons, however, station tracks or sidings 1,500 meters long will be required. The Sixth Five Year Plan did not provide for such tracks or sidings.

Most Soviet railroads have sand or sand and rock ballast, but present plans call for ballasting 61,000 km of track with crushed rock throughout the USSR by 1961. 14/ The Trans-Siberian Railroad appears to have a priority in this program.

d. Extra Trackage Versus Alternate Routes.

Investments in new automatic signaling, centralized traffic control, improved communications, and revamped classification yards constitute another approach designed to speed up rail traffic through West Siberia, Kazakhstan, Central Asia, and East Siberia. The high densities of traffic encountered on the runs between Omsk and Novosibirsk and between Omsk and Chelyabinsk, however, continue to pose serious questions of railroad operation. Planning announcements generally have stressed a preference for opening new routes over multiple tracking as a means of relieving pressure on the capacity of old lines. New routes offer a means of developing wider stretches of country and of reducing the risk of interruption to traffic owing to accidental or natural disaster. On the other hand, the Soviet press states that double tracking of an existing railroad triples its capacity at 60 percent of the cost of building a new line.

2. Pipelines.

The building of pipelines for conveyance of oil and natural gas constitutes an additional investment program which will promote capacity in this area by relieving the railroads of a large tonnage of coal and petroleum. Movement of petroleum by rail has become a costly burden to the USSR, not only because petroleum must travel long distances but also because there is no suitable commodity for the return haul to the area of origin of the petroleum. The movement of coal and coke has put the Omsk System portion of the main line in West Siberia close to capacity operations. The substitution of natural gas for some of this fuel will give corresponding relief to the railroad, even though the relief may be temporary.

Oil pipelines built in West Siberia under the Fifth Five Year Plan consisted mainly of the crude oil pipeline between Tuymazy and Omsk and a parallel pipeline for petroleum products from Ufa to Omsk. These pipelines were not opened until 1956, but soon thereafter the round trip movement of tank cars between Ufa and Omsk was greatly reduced, probably by between two and three 60-car trains per day. Currently, work is under way on a 28-inch pipeline to carry crude oil from Tuymazy to Irkutsk and on a 20-inch petroleum products pipeline from Ufa to Novosibirsk, with extension later also to Irkutsk. Nearly 6,000 km of the total distance of 7,500 km is scheduled for completion by the end of 1960.

B. Kazakhstan and Central Asia (Region X).

In Kazakhstan (Region Xa) and Central Asia (Region Xb) the development program for the railroads consists primarily of building new lines. Most lines are single track and are slated for the present to remain so. Other than some petroleum which transits the area in an easterly direction, almost all traffic in Central Asia is originating, terminating, or local. Kazakhstan, on the other hand, has several significant transit movements, and one important haul originates within its borders for movement out of the region -- that of Karaganda coal to the Urals.

1. Kazakhstan (Region Xa).

Before the start of the Fifth Five Year Plan, there were about 8,500 km of rail lines in Kazakhstan. (See Appendix A.) The major systems operating in Kazakhstan were the Karaganda, Turkestan-Siberian, and Orenburg, along with lines projecting from the South Ural and Tashkent Systems and a short stretch of the Omsk System. In a major reorganization of the railroads in June 1958, all the trackage of the first three systems within Kazakhstan, together with a long spur of the Tashkent System, were combined into a new Kazakh System, 15/ which then became the longest railroad system in the USSR with the greatest amount of annual movement in ton-kilometers.

a. Openings of New Lines.

Under the Fifth Five Year Plan the main sections of line newly opened to traffic were the Sorokovaya-Pavlodar stretch of the Karaganda System and the Mointy-Chu line of the Turkestan-Siberian System (see Table 4*). The former constituted a necessary link in the main line of the South Siberian Railroad through the new lands and tapped the important coal deposits at Ekibastuz and the copper ores at Boshche-Kul' (Bozshakul'). The latter made possible the movement of Karaganda coal southward to Central Asia. Total distance opened to traffic was about 1,140 km.

During 1956-60, more than 2,700 km of new railroad construction may go into service in Kazakhstan, much of the work having been planned or started before 1956. This entire line will be single track, but at the outset it will be built strongly with rail of 101 or more pounds per yard. Starting in the west, a complex of new lines is being installed around Kustanay for the triple purpose of (1) serving the immense new iron ore workings of Sokolov-Sarbay, the Kushmurun soft coal mines, and a promising asbestos deposit near Dzhetygara 16/;

* Table 4 follows on p. 16.

Table 4

Rail Lines Opened to Traffic in Kazakhstan
1951-55 and 1956-60 Plan

	Kilometers
1951-55 Actual	
Sorokovaya-Pavlodar	400
Kokchetav-Chkalovo	80
Tuz-Kala - Uspenka	32
Zashchita-Zyryanovsk	184
Mointy-Chu	447
Total	1,143
1956-60 Plan	
Kustanay-Peski	270
West Siberia border - Peski	167
Kustanay-Tobol-Dzhetygara	218
Yesil'-Turgay	226
Turkestan-Kentau	70
Atasu-Karazhal	74
Syr-Dar'inskaya - Uzbek border (Central Asia)	100 a/
Peski-Kokchetav	180
Chkalovo - West Siberian border b/	65
Solonichki-Aktogay c/	659
Gur'yev - Volga Region border d/	280
Irtyshskoye (Kazakh border) - West Siberian border c/	135
Aktogay-Gosgranitsa	308
Total	2,752

a. Estimated.
b. Chkalovo-Irtyshskoye line.
c. May not be opened until after 1960.
d. Gur'yev-Astrakhan' line.
e. Irtyshskoye-Karasuk line. The total length of line is 205 km, of which 76 km are in West Siberia.

(2) providing westerly connections for the Central Siberian Railroad; and (3) opening up a short cut between the industrial centers of Karaganda and Orsk, the latter being a consumer of coking coal in the southern Urals.

The north-south line from Utyak (a suburb of Kurgan) to Peski will provide for movement of coal and grain from northwest Kazakhstan to the main line of the Trans-Siberian Railroad and the northern Urals.

The main line of the Central Siberian Railroad was developed to serve the new lands, and construction began in 1954 on a 1,850-km narrow-gauge network operated by steam locomotives. Plans were modified shortly afterward, however, and by mid-1955 it was evident that many of the supposedly narrow-gauge lines were being built as broad-gauge railroads. 17/

It was then suggested that the entire 830 km of narrow-gauge lines, between Kustanay on the west and Kaymanachikha on the east (later changed to Kustanay-Irtyshskoye, 710 km), be converted to broad gauge by 1960. This route generally has been referred to since by the USSR as the "Central Siberian." In addition to its primary function of carrying grain, the Central Siberian Railroad will provide an east-west route paralleling the routes of the Trans-Siberian and the South Siberian Railroads. The Central Siberian Railroad is to be joined in 1959 or 1960 by a rail line being constructed southward along the left bank of the Irtysh River. This new railroad from Kulomzino (Omsk), which is being constructed as a single-track line, will serve the dual purpose of providing a new route from Barnaul to Omsk when the Central Siberian Railroad is completed and a northern outlet for the coal mining center of Ekibastuz. The broad-gauge link between Irtyshskoye and Karasuk across West Siberia and northern Kazakhstan, which is needed to complete both the Central Siberian Railroad and the Omsk-Barnaul route, probably will not be completed and opened until after 1960.

Until June 1958 the western part of Kazakhstan was served by the Orenburg System, which formed the crossroads of two major routes. The northwest to southeast route connects the Central and Volga Regions with Uzbekistan and the southwest to northeast route brings together the Emba oil fields and the industrial cities of the Urals. Extension of this latter route from Gur'yev to Astrakhan' is to be completed by 1960. A third through route is projected west of and parallel to the first route to connect the middle Volga district near Saratov with Central Asia, crossing the southwest-northeast line of the Orenburg System at Makat. 18/

Another new route of importance due to be opened in 1956-60 is a north-south connection of 95 km between Orenburg and Yermolayevo. When established, this line will furnish a direct link between Orenburg, the Ishimbay oil field, and Ufa. The Orenburg System is steadily being used more intensively as a transit network as well as an originator of bulk freight from important deposits and industries located along its lines.

The Druzhba (Friendship) Railroad, a new link between the USSR and China, is being built from Aktogay on the Turkestan-Siberian System for a distance of 308 km to the Sinkiang border of China in 1956-60. 19/ There are conflicting reports, some stating that the USSR will continue construction as far as Urumchi in Sinkiang and others that construction from the border to Urumchi will be accomplished by the Chinese.

Projected for opening soon after 1960 is a connecting radius line from Solonichki to Aktogay, work on which undoubtedly will advance far in 1956-60. 20/ This line will shorten the distance by rail between the Chinese frontier connection and the Southern Urals and will complete a southern through route between Moscow and Peking.

b. Traction.

In 1955, railroad lines in Kazakhstan were predominantly steam operated. Diesel locomotives were operating on 2,614 km of route, whereas steam engines provided traction on 7,196 km. Of the lines dieselized in 1955, 1,661 km were operated by the Orenburg System in western Kazakhstan. Diesel locomotives will take over a number of additional stretches from 1956 to 1960. The only trackage which may be electrified consists of the portions of the new Omsk-Barnaul route to be built in Kazakhstan and possibly the main line from Karaganda to Kartaly, which was double tracked in 1955. 21/

2. Central Asia (Region Xb).

The railroads of Central Asia are now administered mainly by the Ashkhabad and Tashkent Systems. In Kirgiz SSR, there are also 280 km of line which, until recently, were administered by the Turkestan-Siberian System and now are under the new Kazakh System. (See Appendix A.)

The Ashkhabad System is located in the southwestern part of Central Asia. Since the end of World War II, new rail construction has been concentrated on a line along the west shore of the Amu Dar'ya River. The stretch from Chardzhou to Urgench was put in operation in 1953 and extended to Kungrad for temporary operation by July 1955 (see

Table 5). The Chardzhou-Kungrad line provides transportation for cotton and dried fruits from the lower Amu Dar'ya oasis, previously inadequately served by river transport on the shallow Amu Dar'ya River and by expensive motor and air transport and camel caravan. After 1960 this rail line is to be extended northwest to Makat on the Orenburg System and eventually to Aleksandrov Gay on the Volga System.

The Tashkent System serves the northeastern part of Central Asia. Its length at the end of 1950 was 2,375 km of which about 865 km were outside Central Asia. The system interchange point now is being shifted southward, however, to align the systems with the republics, as was done previously in Belorussia and the Baltic Republics. 22/ Under the Fifth Five Year Plan the Tashkent System in Central Asia was increased only 88 km -- believed to be minor industrial spur lines.

Table 5

Rail Lines Opened to Traffic in Central Asia
1951-55 and 1956-60 Plan

	Kilometers
1951-55 Actual	
Chardzhou-Takhia Tash	511
Miscellaneous short stretches of the Tashkent System	88
Total	599
Abandoned	
Uch Adzhy - Chamkakly	40
1956-60 Plan	
Dzhizak - Kazakh border	22
Takhia Tash - Kungrad	127
Mukry-Gaurdak	40
Total	189

Extensions planned for the Ashkhabad System in 1956-60 include a line about 127 km long from Takhia Tash to Kungrad, which completes the Chardzhou-Kungrad route.

In the entire 10-year period 1951-60, only 788 km of new line were opened or planned for opening in Central Asia. Incentive for expansion of the railroad network in this region was lessened by difficult terrain, dry climate, and a scarcity of natural resources.

About 1,500 km of gas pipelines are to be built in Central Asia in 1956-60. No significant amount of oil pipelines is to be laid.

C. Krasnoyarskiy Kray and Irkutskaya Oblast.

1. Railroads.

a. New Lines.

The Krasnoyarsk System, the only railroad system operating in Krasnoyarskiy Kray, administers the 649 km of the main line of the Trans-Siberian Railroad within the kray and for short distances in each direction in West Siberia and Irkutskaya Oblast. The principal branches in Krasnoyarskiy Kray are the single-track lines from Achinsk to Abakan and from Reshety to Poyma (see Table 6*).

Major openings of new lines include the Stalinsk-Abakan and Askiz-Abaza lines previously described** and a line northward from Achinsk to Abalakovo. The latter line, in addition to aiding construction of a new hydroelectric development at Abalakovo and opening iron ore deposits, apparently constitutes the first leg of a route which is to extend northward adjacent or parallel to the Yenisey River, giving transportation during all seasons to Yermakovo, Igarka, Noril'sk, and other remote arctic areas. Construction of the northern extension of this line is a long-term project, however, and neither the terminal point nor the completion date has been announced.

Rail lines in Irkutskaya Oblast are few. (See Appendix A.) Rather than new feeder lines, emphasis has been placed on improvement of east-west communication on the main line of the Trans-Siberian Railroad, which is the principal railroad in the oblast, traversing the area for a distance of 943 km. Administration of the main line in Irkutskaya Oblast is performed mainly by the East Siberian System, with the short distance of 42 km west of Tayshet assigned to the Krasnoyarsk System. The latter also operates the single-track BAM line extending eastward from Tayshet to Lena.

* Table 6 follows on p. 21.
** See p. 8, above.

Table 6

Rail Lines Opened to Traffic
in Krasnoyarskiy Kray and Irkutskaya Oblast
1951-55 and 1956-60 Plan

	Kilometers
1951-55	
Actual	
Reshety-Poyma	185
Irkutsk-Slyudyanka	127
Tayshet-Lena	700
Total	1,012
Abandoned	
Irkutsk-Baykal	66
1956-60	
Plan	
Bratsk bypass line	130
Achinsk-Abalakovo	258
Krasnoyarsk-Shumikha	70
Krasnoyarsk - Krasnoyarsk GES	150
Krasnaya Sopka - Goryachegorsk	55
Border of West Siberia - Abakan (including branches)	212
Askiz-Abaza	78
Total	953
Abandoned	
Vikhorevka-Vidim	120

Although natural resources are widely distributed throughout the oblast, their development has been hindered by remoteness and inaccessibility. The planning of railroads to reach the major mineral deposits has been deferred owing to long distances and rugged terrain.

The double-track, electrified cutoff from Irkutsk to Slyudyanka was constructed between 1950 and 1955. This new line permitted abondonment of through movement over the old section along the

Angara River, which was below the water level of the reservoir to be created by a dam being constructed on the Angara River at Irkutsk.

The BAM line in Irkutskaya Oblast stems from the division point of Tayshet on the main line of the Trans-Siberian Railroad and extends eastward for a distance of 700 km to the port of Lena. 23/ The BAM line is a single-track, steam-operated railroad planned in the 1930's as a second route to the Far East to supplement the Trans-Siberian Railroad. By 1951-52 the line was in temporary operation only as far as Lena. The remainder of the railroad, planned to be built between 1960 and 1970, will either run northeast from Lena through Kirensk and Olekminsk to Aldan or head more directly eastward through Nizhne-Angarsk to Chul'man or Mogocha. Such a railroad, if built, would give year-round access to newly investigated mineral deposits and greatly aid in the economic development of the upper Lena Basin. The influence on Irkutskaya Oblast of the extension of the BAM line presumably would be concentrated at Tayshet.

A 120-km section of track of the Tayshet-Lena line is being relocated to avoid the Bratsk reservoir. 24/ The relocated line will not be opened until 1960, because it must cross the Angara River via the Bratsk Dam. The Tayshet-Lena line transports chiefly timber in westbound movement, whereas construction materials for the Bratsk hydroelectric power project (GES) move in the opposite direction to the site of the dam. Petroleum and logistical supplies move eastward, with a transfer point to the Lena River at Lena.

Grade construction on the eastern end of a line from Tayshet to Abakan was begun in mid-1958, but this line will not be completed until 1963. An eastward extension of the main line of the South Siberian Railroad, it will cross difficult terrain, requiring some 7 tunnels and 25 bridges. Initially, it will have diesel traction and later will be converted to electricity. 25/ This line will permit Abakan iron ore to move directly to Tayshet, where a metallurgical combine is planned for 1961-65.

b. Electrification.

Through both Krasnoyarskiy Kray and Irkutskaya Oblast, the entire main line of the Trans-Siberian Railroad is to be electrified by 1960 as far east as Slyudyanka. Electrification of the 130-km Irkutsk-Cheremkhovo sector is believed to have been completed in the latter part of 1958 and probably will be in full operation by the spring of 1959. 26/ An interurban electric trolley car line is operating between Irkutsk and Cheremkhovo carrying commuters, thereby relieving the main line of this service.

2. Pipelines.

Two large oil pipelines to Angarsk near Irkutsk are due to be completed by 1960, and the next decade should see the construction of an oil pipeline for the remaining distance to the Soviet Far East. Along with seagoing tankers and railroad shipments, the latter pipeline will serve to meet the growing requirements of transporting petroleum into the oil-deficit eastern areas.

3. Base for Industrial Traffic.

The Sixth Five Year Plan (1956-60) for Krasnoyarskiy Kray and Irkutskaya Oblast provides for an expansion of the industrial base, including new oil refineries, steel mills, and aluminum plants, in addition to a substantial enlargement of present coal mining operations.

Plants making end products such as aircraft, agricultural equipment, and machine tools are already in operation in Irkutskaya Oblast. The requirements for transport of such a base above those of through traffic will be facilitated by means of electrification and modernization of the main line of the Trans-Siberian Railroad, possibly with additional trackage between Cheremkhovo and Irkutsk. The shifting of inbound petroleum traffic to pipelines should expand the capacity of the Trans-Siberian Railroad throughout this area.

D. Equipment.

The principal bottleneck in carrying out plans for electrification of Soviet railroads seems to be a shortage of electric locomotives. Locomotives that operate on alternating current will be needed soon for the Krasnoyarsk System. The USSR has a few pilot models undergoing tests but has not yet succeeded in building an engine which can operate from the wire on both 22,000 volts alternating current and 3,000 volts direct current. 27/ Several experimental locomotives built in Pilsen, Czechoslovakia, are now being tested, with a sizable order in the offing. 28/ Fifty electric locomotives operable on alternating current have been ordered from a French firm to help fill the requirement, and undoubtedly orders have been placed or are in process of negotiation with other countries. In the meantime, plants in the USSR expected to furnish 346 new electric locomotives (mostly for operation on direct current) and 375 new 2-section diesel locomotives in 1958.* 29/ Production of steam locomotives has stopped, but parks of spare steam locomotives have been observed at various points, so that the effect on traffic of the shortage of alternating current locomotives probably will be negligible.

* Actual production was later reported as 344 electric locomotives and 712 single-section diesel units.

The carrying capacity of freight cars is an important factor in increasing performance of rail lines in the Eastern Regions. According to Soviet railroad officials, the USSR will construct and place in service 6,000 6-axle gondola cars by 1960, each with a capacity of 93 to 95 tons. The trucks of these cars are to be equipped with roller bearings and are designed to operate under full loads at speeds up to 100 km per hour. 30/ The cars are intended to promote economy and speed in cargo turnover and would be well suited to carrying coal from the Kuzbas to the Urals.

The Soviet program for 1957 called for 500 gondola cars with a capacity of 93 to 95 tons each, but deliveries are reported to be behind schedule. Production is being carried on in two plants, and if the target for 1960 is not met punctually, the extent of lag should not be significant. A rough estimate of the ability of the 6,000 high-capacity gondolas on order to transport coal from the Kuzbas to Magnitogorsk, with a 20-percent inoperative allowance, would be 33 million tons per year. The USSR foresees the use of these cars as having a visible effect on the national economy.

III. Interrelationship with the Economy.

A. Demands of the Economy on Transportation.

The new railroads and pipelines and related technical improvements in Soviet Asia between the Urals and Lake Baikal are designed to absorb the impact on transportation of planned industrial and agricultural development. In the decade before World War II, the railroads generally were able to meet the demands placed upon them by the economy of the area by building new branch lines to tap mineral deposits and by acquiring additional rolling stock, both locomotives and cars. In 1940 the average density of freight moving in the "loaded direction" -- that is westward on the Omsk-Novosibirsk route -- was 15.6 million tons and this route had become one of the most heavily traveled stretches in the USSR.

The abnormal traffic conditions which arose during World War II have not been recounted in detail by Soviet publications, but evidently the Siberian railroads were used intensively for the support of the fighting front and the national economy. The equipment park was not placed under so great a strain as might be imagined, owing to Soviet success in withdrawing the greater part of the rolling stock from the path of the advancing Germans and having it available for use on a much reduced rail network. US aid equipment arriving via the Pacific and Vladivostok also added to the park.

The Fourth Five Year Plan (1946-50) was devoted to the reconstruction of the war-torn sections of the European USSR, and although the Siberian areas were drawn on for raw materials, there was not much enlargement of plant. Under the Fifth Five Year Plan (1951-55), however, northern Kazakhstan and the part of West Siberia south of the main line of the Trans-Siberian Railroad received a highly significant economic boost from two programs -- the new lands development program starting in 1954 and the expansion of the industrial base in the Urals for increasing the defensive capabilities of the USSR. In the last 3 years of the plan, marked increases were evident in the production and transportation of coal, ferrous and nonferrous metals, nonmetallic minerals, grain, and timber in West Siberia and northern Kazakhstan. In southern Kazakhstan and Central Asia, production of cotton, petroleum, and mineral fertilizer was pushed upward, but growth in other commodities was less pronounced. In Krasnoyarskiy Kray, coal mining in particular was expanded. In Irkutskaya Oblast the construction of a new industrial center was begun. All through these areas, preparations were made for building hydroelectric power stations wherever the volume of water and the terrain suited the purpose. A significant start was made on electrification of railroads.

The overriding industrial objective of the USSR is "to overtake and surpass the most advanced capitalist countries in per capita production." 31/ In accordance with directives of the Twentieth Party Congress of the Soviet Communist Party (1955), plans were prepared for further expanding the metallurgical base of the USSR. There were a number of reasons why the original objectives of the Sixth Five Year Plan should have included an increasing share of over-all capital investment for the Siberian areas. For example, in Siberia east of the Urals are major reserves of basic raw materials which can be collected and made available for use at costs relatively lower than in the European USSR. In the Eastern Regions are situated 75 percent of all known coal reserves of the USSR, 32/ 80 percent of the timber reserves, 33/ and approximately 50 percent of the reserves of iron ore. 34/ In the areas east of the Urals alone are 29.5 percent of the reserves of iron ore, exploration and prospecting of which are far from complete. Particularly large and rich deposits of iron ore have been found in Kustanayskaya Oblast of northern Kazakhstan, and 90 percent of the country's nonferrous deposits are located in the Eastern Regions. 35/

Also, production costs which are substantially lower than those of the European USSR make the Eastern Regions attractive for future investment. A ton of Siberian coal costs one-fifth to one-sixth as much as a ton of Moscow Basin coal, and the calorific value is 20 percent higher. One ton of pig iron in the Kuzbas costs 230 rubles compared with 300 to 350 rubles for 1 ton in the Ukrainian SSR. The cost of hydroelectric power on the Angara and Yenisey Rivers is

estimated to be from 0.8 to 1.0 kopek per kilowatt-hour 36/ in contrast with 1.4 kopeks per kilowatt-hour on the Volga River.

In exploiting the mineral resources of Siberia, the USSR has in mind the eventual creation of a so-called "third" steel base in the east, the Ukrainian being the first and the Urals the second. The Urals, however, will receive both coal and iron ore in major proportions from West Siberia and Kazakhstan. The iron ore deposit at Magnitogorsk is becoming depleted and more difficult to mine, and limitations on the facings mean that Magnitogorsk will have to receive ores from more remote locations to maintain capacity operations. 37/ In the long run, therefore, there may be greater dependence on materials shipped from Siberia. In addition to their basic cost, these materials will bear freight charges at rates of from 2.5 to 3 kopeks per ton-kilometer for long distances. Thus it seems more reasonable to construct new basic industrial plants nearer the deposits of raw materials.

By 1960, several large hydroelectric powerplants are scheduled to commence operations to take advantage of the large untapped potential available in Siberia.

Increased development of industrial, forest, and agricultural resources in Siberia will require an adequate transportation system for maintenance. For this purpose, as previously pointed out, the waterways are not well suited, and the railroad network must be strengthened. In 1955 the railroads carried 89.8 percent of the traffic in Siberia. 38/ It was planned that 82 percent of the freight movement in the USSR in 1958 would be carried by rail. Even though some relief may be obtained by construction of oil pipelines, by 1960 the proportion of traffic transported by rail in Siberia still will exceed that planned for the nation as a whole in 1958. In general, new railroads will be built, and existing railroads will be improved to accord with the planned development of the coal, steel, and nonferrous industries in the Eastern Regions. To serve timber operations, narrow-gauge lines, trucking, and floating are used more frequently. If it actually happens that in 1956-60 about half of all capital investment of the USSR takes place in the Eastern Regions, there certainly will be a need for a great increase in transportation to accompany the opening of mines and industrial plants and the enlargement of the sown area.

1. Principal Commodities and Commodity Groups.

a. Coal and Coke.

Coal and coke constitute the leading item of freight in Soviet Asia between the Urals and Lake Baikal. In 1955, loadings

of coal and coke amounted to 108 million tons, or approximately 48 percent of total loadings in the area (see Table 7*). The impact of expansion programs in a number of major industries, particularly the steel industry, falls on coal as the basic source of energy. In spite of planned shifts in the energy base from coal to hydroelectric power, natural gas, and petroleum, the important position of coal and coke in Soviet Asia between the Urals and Lake Baikal should not change materially through 1960. The Eastern Regions will continue to produce almost one-half the coal mined in the USSR. The new demands of an expanding heavy industrial base and the continuing net requirements of industry in the Urals for coal will maintain if not increase current high levels of coal traffic on Kazakh and Siberian railroads.

Figures 2** and 3** show the volume and flow of coal produced in Soviet Asia between the Urals and Lake Baikal in 1955 and 1960, respectively.

(1) West Siberia.

The center of greatest activity and importance in the coal and coke industry in Soviet Asia is the Kuzbas, with its located coal reserves estimated at 900 billion tons, including 260 billion tons of coal of coking quality. Coal is consumed in the Kuzbas itself by the Kuznetsk Steel Combine, which produced 2.7 million tons of steel in 1955. 39/ In the first 6 months of 1958, construction was started on a second large steel mill to be known as the West Siberian Steel Combine. Also, several coking plants of importance are located in the Kuzbas. Besides meeting local demands, the Kuzbas supplies more than half of the requirements of the steel and other industries of the Urals for coking coal, and some coal from the Kuzbas moves as far west as Moscow. Although such a long haul generally is regarded as uneconomical, 14 million tons of coal were transported an average of 1,900 km from the Eastern Regions to the Central and Volga Regions in 1955, 40/ and 1.1 million tons of Kuzbas coal were shipped to Region VII in 1956 solely for use by the railroads. 41/ In 1955 the Kuzbas produced 58.5 million tons of coal, and the goal for 1960 is 88 million tons (see Table 8***). In the recent past the Kuzbas**** has consumed about half of its own entire output of coal. 42/ It is estimated that more than 29 million tons of Kuzbas coal were transported to the Urals and beyond in 1955, supplemented by approximately 2 million tons of coke. About 1 million tons of coal from East Siberia also is believed to have traveled this distance. In addition, it is estimated that 4 million tons of Kuzbas coal have moved westward through Novosibirsk for distribution to Omsk and other cities of West Siberia.†

* Table 7 follows on p. 28.
** Following p. 30.
*** Table 8 follows on p. 29.
**** Novosibirsk is believed to have been included with the Kuzbas in this announcement.
† Text continued on p. 30.

Table 7

Total Railroad Loadings and Coal and Coke Loadings
in Specified Regions and Oblasts of Soviet Asia
Compared with Similar Loadings in the USSR as a Whole
1955

Area	All Commodities (Thousand Metric Tons)	Coal and Coke	
		Thousand Metric Tons	Percent of Total
West Siberia	103,367 a/	57,600 (estimated) b/	55.7
Kazakhstan	58,046 c/	27,098 c/	46.7
Central Asia	25,741 c/	5,400 c/	20.9
Krasnoyarskiy Kray	14,723 a/	6,000 d/	40.8
Irkutskaya Oblast	21,938 a/	12,346 e/	56.3
Total	223,815	108,444	48.4
USSR	1,267,000 c/	389,000 c/	30.7

a. 43/
b. Coal loadings were 15.0 percent of total coal loadings of 370.6 million tons in the USSR, 44/ and coke loadings were estimated at 2 million tons on the basis of data in source 45/.
c. 46/. Totals for all commodities in Kazakhstan and Central Asia have been adjusted to reflect the data in Table 12, p. 52, below.
d. Estimated 90 percent of coal production.
e. 47/

Table 8

Production of Coal in Soviet Asia Between the Urals and Lake Baikal
1950-57 and 1960 Plan

Thousand Metric Tons

Area	1950	1951	1952	1953	1954	1955	1956	1957	1960 Plan
West Siberia	38,526	41,284	44,104	46,519	50,584	58,539	66,200	72,500	88,000
Kazakhstan	17,364	18,759	19,838	21,404	23,680	27,974	31,450	30,600	44,758
Central Asia	3,800	3,800	4,400	4,800	5,300	5,900	6,400	7,100	11,200
Krasnoyarskiy Kray	3,781	4,300	4,800	5,400	6,000	6,700	7,800	9,200	15,000
Irkutskaya Oblast	8,476	8,850	9,596	9,970	11,680	13,393	14,755	15,500	18,000

The major impact of this movement fell on the Novosibirsk-Omsk stretch of the main line of the Trans-Siberian Railroad. In 1955, coal and coke traffic on this line was at its point of highest movement -- 36 million tons. In addition, 12.7 million tons of other freight were moved westward that year.* In 1956 and in 1957, total shipments were even greater.

The plan for 1960 calls for moving 33 million tons of coal from the Kuzbas to the Urals and beyond. 48/ In addition, 2.5 million tons of coal from East Siberia and 4 million tons of coke from the Kuzbas also will move west. Five million tons of coal will be required west of Novosibirsk for distribution within West Siberia. The total movement of 44.5 million tons represents a steady traffic of 52 trains of 4,200 gross tons per day (2,400 net tons) -- that is, 2.2 trains per hour leaving Novosibirsk. On the return eastward, more than 80 percent of these cars probably will be empty. This estimate ultimately may prove to be too conservative, especially if more coal should become available as the result of improved mining methods and conditions.

Plans to shorten the length of haul and take the pressure off the railroads in West Siberia by providing a rail link between the Pechora coal fields and the North Urals are not yet being effected. Until such alternate sources are made available, the Kuzbas will continue to be the main external supplier of coal for the Urals.

(2) Kazakhstan.

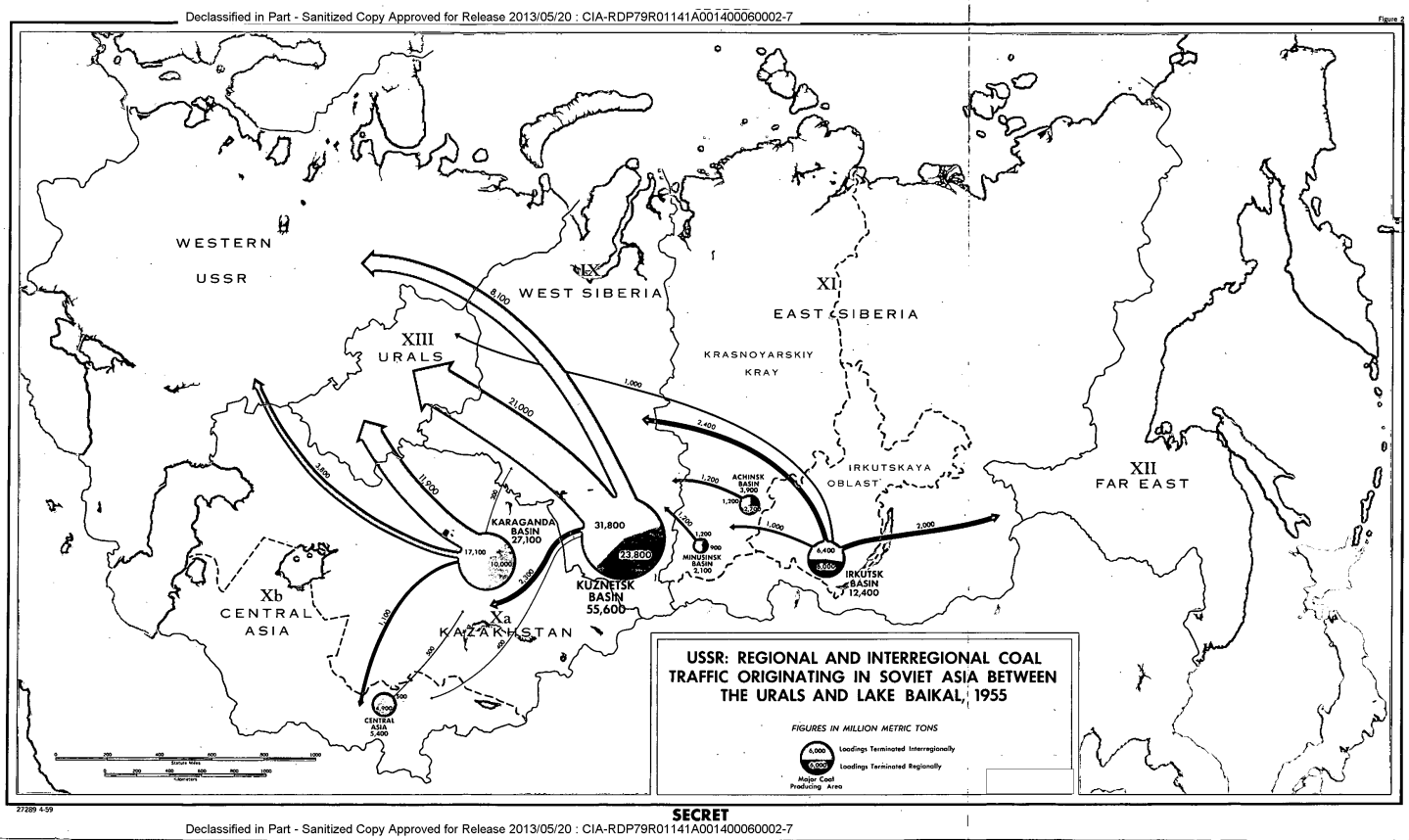
The second most important movement of coal in Soviet Asia between the Urals and Lake Baikal is the flow from Kazakhstan to the Urals. Of the 24.7 million tons mined at Karaganda in 1955, it is estimated that about 8.1 million tons were consumed in the Karaganda area. Approximately 1.9 million tons moved southward for consumers in southern Kazakhstan and in Uzbek SSR. The remainder of about 14.7 million tons of Karaganda coal was shipped in the direction of the Urals.

In 1955, of 2.3 million tons of coal mined at Ekibastuz, indications are that 2 million tons reached Akmolinsk, from where it was dispatched by different routes to the Urals.

It is estimated that the Karaganda-Akmolinsk route will transport in 1960 approximately 10 million tons of coal (4.7 million tons less than in 1955). By that time, it is expected that the South Siberian Railroad will be operated largely with diesel traction

* See Table 16, p. 60, below.

Figure 2



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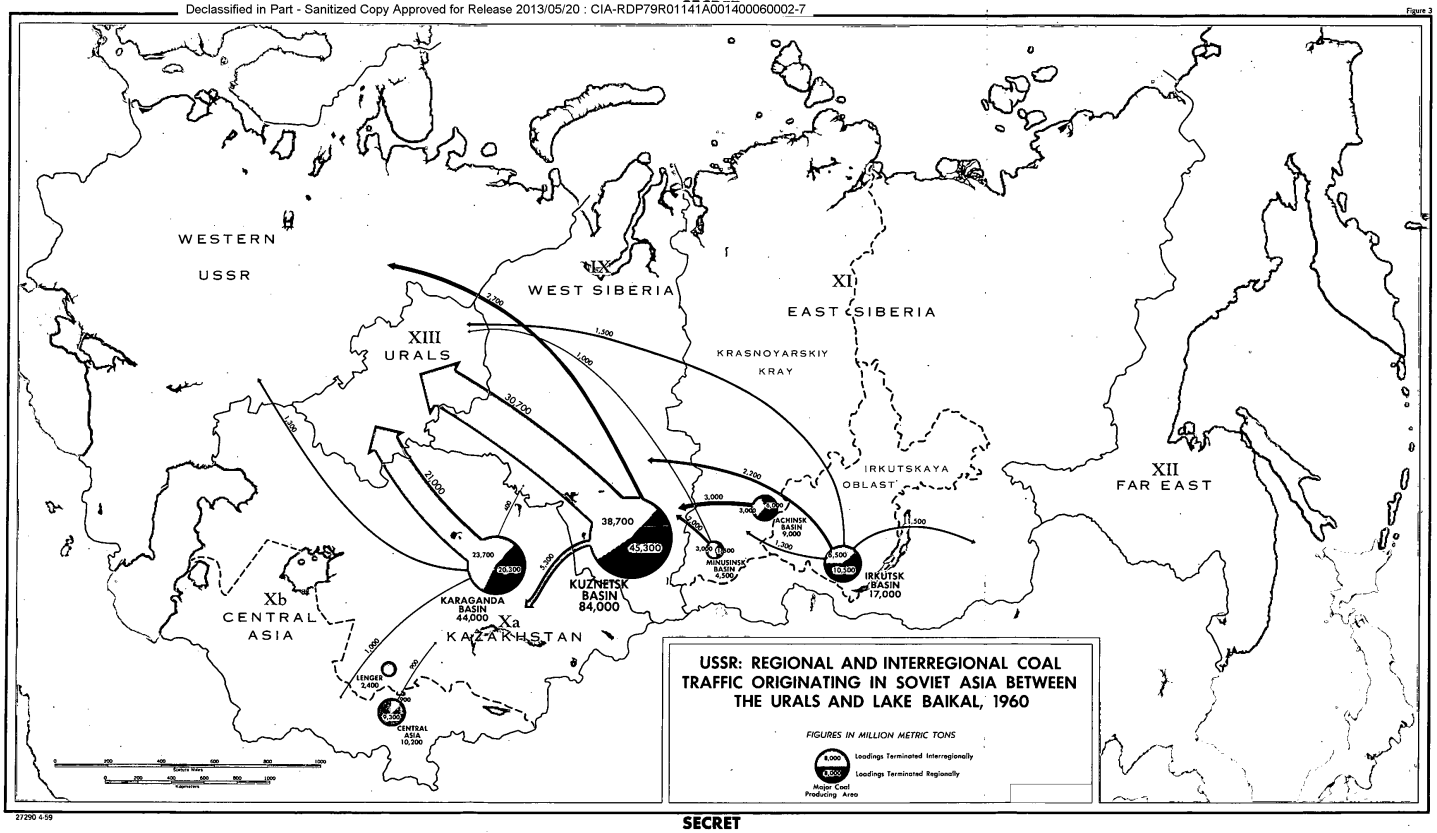
SECRET

50X1

Figure 3



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SECRET

and hence will require little coal. Expansion of local industry in the Karaganda area in 1960, including a new steel producing center at Solonichka is expected to require 10 million tons more of the native coal than in 1955, leaving less Karaganda coal for shipment westward. Coal mined at Ekibastuz in 1960, however, will be sufficient in quantity to permit the loading of approximately 10.5 million tons for shipment west of Akmolinsk.

The anticipated increases in production of Kushmurun lignite by 1960 could add 2 million to 3 million tons to the load on the Akmolinsk-Kartaly line. At a later date the Kushmurun-Kustanay cutoff line should be completed, providing a direct route to the Sokolov-Sarbay iron ore mining and concentrating combine near Kustanay.

Production of coal in Kazakhstan for pertinent years is given in Table 8.*

(3) Central Asia.

Production of coal in Central Asia in 1955 amounted to about 5.9 million tons, of which 5.4 million tons originated on the railroads of Turkmen SSR, Kirgiz SSR, Tadzhik SSR, and Uzbek SSR. This figure is about 21 percent of the tonnage of all freight originated there. 49/ The goal for production of coal in 1960 is 11.2 million tons.

In spite of efforts to increase the output of coal in Central Asia, especially at Angren, the local demand for coal has continued to exceed the supply, so that Central Asia has been a net importer of coal for many years (see Table 9).

Table 9

Coal Originated and Terminated on the Railroads of Central Asia a/
1940, 1950, 1955, and 1956

Thousand Tons

	1940	1950	1955	1956
Originated	1,498	3,474	5,376	6,007
Terminated	1,903	4,413	6,370	7,183
Net imports	405	939	994	1,176

a. 50/

* P. 29, above.

The actual volume of coal shipped into Central Asia in 1955, primarily over the Mointy-Chu line, was about 1.5 million tons. A short-distance counterflow of brown coal from Central Asia to Kazakhstan amounted to 500,000 tons, as indicated by a net inflow close to 1 million tons. (See Table 9.*)

In following the present and anticipated movement of coal by rail in Central Asia through 1960, it appears that the maximum density of coal traffic in 1960 over any one stretch of track will not exceed 6.2 million tons, and for this density, from Angren to Tashkent, the haul will be a short movement of 119 km by branch line. On no other line of Central Asia is the coal density likely to exceed 3 million tons in 1960.

(4) Krasnoyarskiy Kray.

The principal coal mining centers of Krasnoyarskiy Kray are Kansk-Yeniseysk and Zaozerny on the main line and Nazarovo and Chernogorsk on the Achinsk-Abakan branch. None of these places produces high-quality bituminous coal, and three-fifths or more of production is consumed within the kray itself, requiring short-haul rather than long-haul transport. The remainder of the coal moves to nearby points in West Siberia. Coal traffic generated in 1955 amounted to 6 million tons, and by 1960 it should reach 13.5 million tons.

Because of low costs, a sizable expansion of strip mining of coal in Krasnoyarskiy Kray is expected in the next few years, with an estimated goal of producing 15 million tons by 1960. New steam powerplants and industries in the kray will absorb most of this increase. The remainder should move to West Siberia as at present.

(5) Irkutskaya Oblast.

The principal coal mining center of Irkutskaya Oblast is Cheremkhovo, where 12.9 million tons of high-quality, low-volatile bituminous coal were produced in 1955. 51/ The main handicap of the deposit is its remoteness from the major consuming centers of the Urals and the European USSR.

In Irkutskaya Oblast a diverse, though comparatively small, concentration of industries is gradually shaping up. The energy base, hitherto entirely coal, soon will be shifted more to hydroelectric power and to petroleum coming by pipeline from the west, but coal will still be needed for liquefaction and for the chemical industry. Later, a steel plant is proposed for Tayshet, which should obtain about half of its coal from the Irkutsk Basin and half from the Kuzbas.

The demand for Cheremkhovo coal for railroad and industrial uses causes some of the output each year to move both eastward and westward from Irkutskaya Oblast. In 1955, 4.4 million tons

* P. 31, above.

are estimated to have moved westward, with about 1 million tons reaching the Urals. Close to 2 million tons are believed to have moved eastward, and the remainder of approximately 6 million tons was consumed within the oblast.

It is estimated that Irkutskaya Oblast will produce 18 million tons of coal in 1960. Whereas the eastward movement probably will decrease from the 2 million tons estimated in 1955, the future of the westbound movement has not been made clear. A preliminary estimate of westbound movement of coal in 1960 would be about 5 million tons. The amount consumed in the general area along the main line between Irkutsk to Tayshet then would be 10.5 million tons, less whatever was shipped down the Angara River in barges (probably about 250,000 tons). On the relatively short eastbound movement, many cars loaded with coal may return to the environs of Irkutsk with loads of timber, cement, building materials, and steel, but the majority of cars loaded with coal and moving westward is likely to return empty.

(6) Conclusion.

The requirement for moving coal constitutes the principal element in planning rail transport in 1956-60 in Soviet Asia between the Urals and Lake Baikal. Coal flows steadily the year around and necessitates heavy roadbed construction and the use of powerful locomotives and strongly built cars. In spite of a partial shift in the energy base in favor of petroleum, gas, and hydroelectric power, production of coal will continue to increase, so that requirements for its transportation will remain predominant with the railroads. The general westerly direction of flow and requirement for open-top cars matched against movements of other commodities poses the problem of a sizable two-way movement of empty cars which is most difficult to eliminate.

b. Petroleum.

(1) West and East Siberia.

The importance of petroleum in an expanding industrial economy is apparent from the fact that the USSR has for the past three decades, and particularly since World War II, been engaged in intensive prospecting for oil in all parts of the country. The result has been that petroleum production in the USSR has risen from 38 million tons in 1950 to 71 million tons in 1955, with a goal of 135 million tons for 1960. 52/ The most important discoveries have been in

the Ural-Volga field, which in 1955 produced 40.5 million tons, or 57.2 percent of petroleum in the USSR. Sakhalin Island, where for many years an operation of modest extent has been conducted (950,000 tons produced in 1955), 53/ remains the only producing area in all Siberia. In spite of persistent efforts, the search for petroleum in mainland Siberia so far has brought no results.

Considering the importance to the USSR, both economically and strategically, of developing the Siberian areas, Soviet authorities have found it necessary in recent years to ship large quantities of petroleum eastward by rail. The volume was increased as an element of Soviet policy in connection with the Korean War and more recently the Suez crisis. These strategic requirements, added to the growing needs of the Siberian economy, resulted in a long-distance bulk movement involving more than 25 billion ton-kilometers in 1955. 54/ Whereas this movement was in what Soviet officials describe as the "empty direction" (that is, the direction of lighter movement), the net result was to add a large number of tank cars to the movement in both directions. On the return haul from the east, very few tank cars could be loaded. Because of the rapidly rising flow of petroleum to Siberia and Communist China, the Soviet tank car park was at times under a severe strain to meet scheduled requirements at loading points. Movements of ocean tankers via the Suez Canal were limited by available vessels and regarded by the USSR as uncertain in an emergency.

Actual figures for movement of petroleum to Siberia never have been published, but the tonnage moving east from Omsk in 1955 is estimated to have been between 6.5 million and 7.5 million tons. From Chinese Communist statements and from observations of shipments by sea to the Far East, it is estimated that Communist China took delivery of about 1.1 million tons of petroleum overland in 1955. Other published Soviet data indicate that about 3.4 million tons may have been destined for East Siberia and the Soviet Far East. Net railroad unloadings of petroleum products in Novosibirskaya Oblast and Irkutskaya Oblast in 1955 were 749,000 and 735,000 tons, respectively. 55/ These figures may be contrasted with the total of 1.3 million tons of petroleum products shipped to Siberia in 1937. 56/

Recognizing the necessity for the eastward shipment of petroleum, the inadequacy of waterways, and the increasing burden on the railroads, the USSR under the Fifth Five Year Plan embarked

on an ambitious program of pipeline construction. For the country as a whole, about 5,000 km of petroleum trunk pipelines were laid. The goals for 1960, originally set at 14,500 km of petroleum and 9,000 km of gas trunk pipelines, 57/ now call for 10,000 km of petroleum and 16,000 km of gas trunk pipelines. 58/ Of the petroleum pipelines, 6,800 km are to be placed in the Eastern Regions (see Table 10*), and 1,500 km of the gas pipelines will be laid in Central Asia. The intention of the USSR is that by 1960 almost all crude petroleum will be taken to refineries through pipelines. This network of pipelines, together with a number of new and enlarged refineries, is intended to extend considerably the fuel basis of the Soviet national economy and in particular to improve the supply of fuel to industry and agriculture in Siberia.

The principal pipelines constructed in Siberia under the Fifth Five Year Plan were a pipeline for crude petroleum and another for petroleum products, the former originating at Tuymazy and the latter at the refinery at Ufa and both terminating at Omsk. The Soviet press has announced the capacity of the pipeline for crude petroleum to be 7.2 million to 7.5 million tons per year. The pipeline for petroleum products probably handles less tonnage than does the pipeline for crude petroleum. Thus when all the pumps have been installed, the maximum annual deliveries of these two pipelines to Omsk will be about 14.4 million tons.

Under the Sixth Five Year Plan a 720-millimeter (28-1/2-inch) pipeline for crude petroleum and a pipeline believed to be 20 inches in diameter for petroleum products are being constructed from Tuymazy and Ufa, respectively, through Omsk to Irkutsk. The two new pipelines, when completed with pumping stations, should be able to provide, in addition to the 14.4 million tons which should already be reaching Omsk, a supply of from 18 million to 25 million tons per year. 59/ It is not supposed at the outset that all the pumping stations needed to reach this rate of flow will be installed, but it should be noted that a maximum capacity of pipeline will exist to move nearly 40 million tons of petroleum and its products per year into Omsk and more than half of this amount on to Irkutsk. Together with the new refineries, the network of pipelines should be sufficient to effect a significant change in the Siberian economy. At the same time, the rail lines and particularly the tank car park should be relieved. The average length of haul in West Siberia and Kazakhstan should drop. Many of the tank cars can be transferred to runs east of Irkutsk and to major branch lines in areas not served by pipeline.

* Table 10 follows on p. 36.

Table 10

Oil Pipelines Constructed
in the Urals, West Siberia, and Northern Kazakhstan, 1951-55,
and Plan for the Eastern Regions, 1956-60 a/

	Kilometers
Urals, West Siberia, and North Kazakhstan	
Oktyabr'skiy-Tuymazy-Ufa	227
Tuymazy-Chelyabinsk-Omsk	1,332
Shkapovo-Ishimbay	140
Ufa-Chelyabinsk-Omsk (1)	1,130
Ufa-Chelyabinsk-Omsk (2)	380 b/
Krasnokamsk-Perm'	31
Ust'-Kachka - Perm'	15
Tobanovo-Perm'	22
Total	3,277
Eastern Regions	
Kaltasy-Chekmagush-Ufa	90
Ufa-Chelyabinsk-Omsk (2)	750 b/
Tuymazy-Omsk	1,350
Omsk-Irkutsk	2,450
Omsk-Novosibirsk	800
Al'met'yevsk-Subkhankulovo	110
Al'met'yevsk-Perm'	446
Subkhankulovo-Shkapovo	94
Tatarsk-Pavlodar	400
Ishimbay-Orsk	310
Total	6,800

a. 60/
b. 380 km of pipeline constructed in 1951-55 and 750 km in 1956-60.

Pending the completion of the pipelines, however, through 1960 the railroads may find themselves under a greater strain than ever to move petroleum and its products because of the expanding production of the Ural-Volga Field. Figures comparing the over-all movement of petroleum by different forms of transport in the USSR during

1955 with the movement of petroleum forecast by Soviet authorities for 1960 are shown in Table 11.

Table 11

Movement of Petroleum and Its Products
by Different Modes of Transport in the USSR a/
1955 and 1960 Plan

Million Ton-Kilometers

	1955	1960 Plan
Railroad	101,600	146,000
Pipeline	13,700	83,000
Waterway	25,900 b/	102,000
Total	141,200	331,000

a. 61/
b. Of this amount, 13.2 billion ton-kilometers were accomplished by inland waterways. The corresponding goal for 1960 has not been announced.

The requirement for rail transport is an increase of major proportions above that for 1955 and 1956 and reflects the pressure on all forms of transportation resulting from gains in oil production. This requirement is offset partly by a planned increase by 1960 of approximately one-third in the inventory of tank cars. To carry out the task of transportation, the average daily car movement of the active tank car park must rise from 128 km in 1956 to 152 km in 1960.* This is an assignment of a high order, even considering the relative ease and speed with which tank cars now may be loaded and emptied. At present the pressure to supply and move tank cars must be heavy, and frequently the cars are observed moving in solid through trains between principal points.

With the demands of both eastern Siberia and Communist China increasing and in the event that the new pipeline and refinery combination at Angarsk should not be ready on schedule, there might be a heavy burden of petroleum traffic temporarily on the main line of the Trans-Siberian Railroad leading eastward from the Novosibirsk area. The refinery is regarded as more crucial because the pipeline can be opened in stages, each one shortening the remaining rail haul and permitting a faster turnaround of cars. When both

* This estimate assumes a 100-percent empty return movement of tank cars.

pipeline and refinery begin to operate, the drop in demand on the railroads of East and West Siberia west of Irkutsk should be noticeable, whereas on those lines east of Irkutsk the demand may rise appreciably.

The peculiar situation resulting from the complete lack of oil discoveries in the vast space of mainland Siberia and in most of Kazakhstan was stressed by the directive of the Twentieth Party Congress calling for an increase of 65 to 70 percent in prospecting in 1956-60 above that in 1950-55, with emphasis on "poorly explored" parts of Siberia. Should a major strike be made, it could serve to reduce the demand for overland oil transport.

(2) Kazakhstan.

The only known petroleum deposit in Kazakhstan is the Emba Field, which is situated in the extreme southwest of the republic directly north of the Caspian Sea. Annual production has run at about 1.4 million tons for several years past, and no phenomenal increase is expected. 62/ Emba petroleum is handled easily by the pipeline running northward to Orsk in the South Urals and by rail to Gur'yev on the Caspian Sea. The refinery at Gur'yev also is supplied annually with 600,000 tons of oil from loading points on the Caspian Sea. 63/ The products of this refinery are shipped by rail to the north. Kazakhstan was an importer in 1955 of nearly 3 million tons of petroleum products, of which two-thirds are estimated to have come from the Ural-Volga Field and one-third from Central Asia.

(3) Central Asia.

Petroleum, for a number of years a leading item of railroad freight in Central Asia, had total loadings of 4.8 million tons in 1955, an increase of 817,000 tons above that in 1950. 64/ Simultaneously, production of crude petroleum in Central Asia showed about the same net growth in tonnage, rising from 3.4 million to 4.3 million tons. 65/ The principal producing area lies in Turkmen SSR near the Caspian seaport of Krasnovodsk, where a refinery is located to which the nearby Nebit Dag, Kum Dag, and Cheleken Island Fields send their crude petroleum. In the Fergana Valley to the east is another smaller field, the output of which has not yet risen above the 1950 level of 1.3 million tons. Both fields are being expanded, and a production goal of 7.1 million tons for Central Asia has been set for 1960. 66/

At present the principal movement of petroleum oils by rail takes place in an easterly direction away from Krasnovodsk, the

site of the refinery. Owing to the limited capacity of this refinery, petroleum crosses the Caspian Sea in both directions, with products arriving in Krasnovodsk and crude and residual fuel oil being shipped out, possibly to Astrakhan' or Gur'yev. Net shipments of 434,000 tons left Krasnovodsk by sea in 1955, 67/ and it is estimated that 2.5 million tons were moved eastward by rail on the Ashkhabad System. Petroleum seems to have constituted about two-thirds of the eastbound traffic on this line in 1957.

(4) East Siberia.

There are no oil fields in East Siberia. The completion by 1960 of the two large pipelines from the west will ease the strain on rail transport and greatly increase the consumption potential of the area.

c. Wood and Timber.

Timber movement in Siberia is not only heavy, but much of it is interregional and of exceptionally long haul. East Siberia is a major supplier of timber for the USSR, and, therefore, timber must be considered as of prime importance in a rundown of demands of the economy on transportation in the Eastern Regions.

Because of the sharp distinction between surplus and deficit areas, the general pattern of timber movement in the Siberian regions has become well established and in the foreseeable future is not likely to undergo substantial change. A Soviet chart shows the principal flow starting on the main line of the Trans-Siberian Railroad in Buryat-Mongol'skaya ASSR, taking on added weight in Irkutskaya Oblast both from the main line and from the Tayshet-Lena branch and proceeding westward to Novosibirsk. 68/ On the way, drop-offs are made in construction and mining areas, particularly in the Kuzbas. At principal river crossing points, wood is transferred from river to rail and vice versa. At Novosibirsk the main flow of timber divides, with the major portion moving via the Turkestan-Siberian route to the timber deficit areas of eastern and southern Kazakhstan and Central Asia. The remainder, after local usage, continues west to Omsk. On the main line of the Trans-Siberian Railroad, timber continues on to the Urals and points west and south as it has for many years, except that at Petropavlovsk a substantial share is diverted to the Karaganda mining and industrial district.

The total volume of timber traffic moving westward from Irkutskaya Oblast in 1955 is estimated to have been about 6.5 million tons, consisting of loadings within the oblast in excess of deliveries of

4.8 million tons and shipments transiting the oblast from Chita Oblast and Buryat-Mongol'skaya ASSR of between 1.5 million and 2 million tons.

Cutting areas in Krasnoyarskiy Kray supplied a net addition of from 2.5 million to 3.5 million tons of timber, and the Tomsk forests supplied 3 million tons more, so that at the point of peak movement, probably between Tayga and Yurga, as much as 13 million tons may have been hauled westward in 1955. From this stretch on, the density of timber traffic declines. One million tons of the flow on the main line of the Trans-Siberian Railroad is estimated to have gone into the Kuzbas, where it supplements local timber resources. In Novosibirskaya Oblast, 640,000 tons were loaded, and 800,000 tons were unloaded, a net loss to westbound movement of 160,000 tons. 69/

Soviet figures for loadings and deliveries of timber in Kazakhstan and Central Asia show net deficits of 4.8 million tons for 1950 and 8.4 million tons for 1955. Railroad loadings of timber in Kazakhstan in 1955 were only 400,000 tons and probably are rising slightly, but terminations also should be rising above the 5.4 million tons of the same year. River and sea movements of timber in Kazakhstan and Central Asia in 1955 were less than 400,000 tons. 70/

Wood probably is the commodity accounting for the largest share of freight "imported" into Central Asia from other economic regions of the USSR. The average length of haul of wood freight terminated on the Tashkent System in 1952 was 3,525 km, whereas the corresponding figure for the Ashkhabad System was 3,950 km, and there is no reason to believe that the haul has been reduced in more recent years with the growing volume of wood shipments. Net imports of wood by rail into Central Asia amounted to 3.4 million tons in 1955 and rose the following year to more than 3.6 million tons. Although most of the unsawed timber probably originated in West Siberia and East Siberia, lumber shipments by rail from the European part of the USSR to Kazakhstan and Central Asia in 1954 totaled 604,000 tons. 71/ Among the larger consumers of wood in Central Asia are the Angren and Fergana Valley coal mines for pitprops and the Taskhent and Ashkhabad railroad systems for railroad ties.

The heavy flow of timber from the forests to the consuming regions may be consolidated ultimately into a greater proportion of lumber shipments and a lesser proportion of logs. Erection of more sawmills at the cutting centers is a natural development and should facilitate such consolidation, permitting the railroads to perform their function more efficiently.

Timber has been a principal item of movement in a westerly direction ever since the Trans-Siberian Railroad was built, but greater

loads are contemplated in the future. This situation, together with the growth of other commodity movements, will pose a question of line capacity. The movement of timber is in the loaded direction of both coal and grain and hence amplifies the imbalance on the high-density stretch of line between Novosibirsk and Omsk. The hauling of industrial timber from the Bratsk area will be heavy through 1960 because of the necessity of clearing the storage reservoir before flooding. The new railroads from Abalakhovo to Achinsk and from the lower Angara forests to Reshety on the main line of the Trans-Siberian Railroad should bring in more timber. An increase of 60 percent in logging activity above that in 1955 is anticipated by 1960. 72/ In that year the total increase in shipments of timber reaching Novosibirsk could be from 4 million to 6 million tons after allowing for a proportional absorption by the Kuzbas.

d. Iron Ore.

(1) West Siberia.

Iron ore and ferrous metals first took on significance in West Siberian rail traffic in 1933 when the Kuznetsk Steel Mill at Stalinsk started operations, using ore shipped a distance of 2,300 km from Magnitogorsk. The extension of rail lines southeastward from Stalinsk a few years later in an attempt to tap nearby reserves of iron ore in the Gornaya Shoriya area has been only partly successful, inasmuch as the Soviet press indicates that in 1956 about 1.5 million tons of ore still had to be shipped from Magnitogorsk eastward to Stalinsk. According to Soviet railroad officials, in 1957 the higher grade ore of the Magnitogorsk deposit was fast becoming depleted, and other ore bodies in the Urals were inadequate to supply Magnitogorsk. It was thus becoming urgent to make arrangements for obtaining a steady, long-term supply of ore from lower grade reserves which were known to be situated in the area of Soviet Asia between the Urals and Lake Baikal.

The largest workable deposits of lower grade ore seem to lie in the western part of Kazakhstan (Kustanayskaya Oblast) and at several locations in East Siberia. With the reserves of coking coal of the Kuzbas calculated at 260 billion tons, the USSR apparently has decided to "play it safe" on at least one of the major raw materials consumed in steel making by locating another large steel plant near Stalinsk. This decision means that the iron ore will have to do the traveling.

An excellent illustration of the tie-in between the opening of mineral deposits and the need for railroad construction is the new 400-km Stalinsk-Abakan line, operating for the first time in

1958 but with about 300 km of branch, approach, and industrial line remaining to be built. 73/ Connecting with a branch line from Askiz to Abaza, this line taps a body of iron ore with proved reserves of 83 million tons. Another branch will serve an iron ore deposit of 121 million tons proved reserves at Teysk, which is south of the line at a point about half way between Stalinsk and Abakan. The planned output of Abaza and Teysk is 5.6 million tons per year, all of which will be available for the Kuznetsk Steel Mill when needed. This ore would have to move westward over the new line. Existing mines in the Gornaya Shoriya area are expected to continue shipments, which in the past have reached 5.2 million tons per year. 74/ Therefore, the initial demand for ore from Abaza and Teysk should be moderate. With an additional annual requirement of about 8.5 million tons of ore when the West Siberian Steel Plant at Antonovka is opened after 1960, the Stalinsk-Abakan line conceivably could be called on to haul about 12 million tons of iron ore per year, plus several million tons of coal, manganese ore, limestone, and building stone. Although supplies of coal at railside are adequate for steam locomotives, the 6,000-foot climb which these ores must make on the journey to the mill probably will warrant an investment in diesel or electric traction before many years have elapsed.

(2) East Siberia.

The ore supply for the Kuzbas may come for a time in the future (a) from the Angara-Ilimsk Field (that is, the Korshunovskiy mine on the Tayshet-Lena branch line); (b) from the Rudnogorsk deposit, to which a rail connection will be constructed; or (c) from the Sokolovsk-Sarbay deposit near Kustanay, in addition to Abaza, Teysk, and the local mines. Later on, ores from the Lower Angara area would move by a new rail line from Yeniseysk to the main line at Achinsk, from where they would proceed either southward via the Abakan branch and the new line or westward via Yurga to Stalinsk. The 653-km Tayshet-Abakan line, which has just been started, no doubt will handle a significant share of the westbound movement of Angara-Ilimsk ore.

In neither Krasnoyarskiy Kray nor Irkutskaya Oblast will there be a mill operating before 1960, when one is due for construction at Tayshet. It is estimated, however, that several small furnaces at heavy industrial plants consume as much as 150,000 tons of scrap which would be shipped in by rail from the west.

(3) Kazakhstan.

With the gradual depletion of high-grade ore at Magnitogorsk and with other steel mills in the Urals facing future

shortages of ore, the USSR now is undertaking a major project for the mining and concentrating of the extensive iron ore deposits in Kustanayskaya Oblast of northern Kazakhstan. The first unit among several being planned is the Sokolovsk-Sarbay project, where stripping operations began in 1955.

The first movement of iron ore to the Urals occurred in August 1957, when a schedule for 275,000 tons for the remainder of the year was set up. The goal for 1960 is 5.6 million tons of concentrate, with expansion later to 9.1 million tons of processed ore.

In addition to Sokolovsk-Sarbay, the nearby Lisakovsk deposit will be mined and concentrated beginning in 1961, and the Ayat deposit by 1970. These plans are intended to help make up for ore deficiencies in the Urals and provide for an increase of about 75 percent in the steel output in the Urals during the next 10 to 15 years.

Also, some concentrate from Kustanay may be sent eastward to a new plant planned for Barnaul and to the Kuzbas or southward to Karaganda, inasmuch as empty gondolas will be moving in these directions to pick up coal.

By 1960 a pattern of traffic in iron ore should be well established between open-pit mines located near Atasu, a settlement on the Zharyk-Dzhezkazgan branch of the Karaganda System and the new Karagnada iron and steel plant at Solonichka near Temir-Tau. The output of Atasu ore is expected to reach approximately 2.5 million tons by 1960 and 3.5 million tons by 1965, practically all of which is planned for shipment to the new Karaganda steel plant.

e. Ferrous Metals.

(1) West Siberia.

Since World War II, movement of ferrous metals in West Siberia has been of a two-directional character. East of Novosibirsk, transportation of steel has been almost wholly eastbound, with surplus scrap metal returning westward. The eastbound movement in 1955, which involved some 200,000 tons of steel for Communist China, 75/ probably did not exceed 1.5 million tons. Because the empty direction is eastward, it poses no special transportation problem. From Novosibirsk southward, it is probable that up to 500,000 tons of steel moved to points in Kazakhstan and Central Asia. Shipments of steel from the Kuzbas in excess of its own requirements and deliveries to the east and south probably were between 500,000 and 1 million tons, undoubtedly

moving westward over the high-density stretch of the main line of the Trans-Siberian Railroad between Novosibirsk and Omsk in its loaded direction. This traffic not only adds to an already heavy burden but also crosses steel moving eastward from the Urals.

(2) Kazakhstan and Central Asia.

In 1955, deliveries of ferrous metals, including scrap, were 2.8 million tons, a figure which exceeded shipments by 1.2 million tons. 76/ Assuming that the entire 377,000 tons of steel produced in Kazakhstan and Central Asia plus an estimated 200,000 tons of scrap were both loaded and delivered within this area, the maximum inflow of finished steel would come to 2.2 million tons. The actual inflow, an unknown quantity, would have been less than this tonnage by the amount of any other local shipments. Such shipments, however, are believed to have been small.

(3) East Siberia.

In East Siberia, no steel mills were operating in 1955. At heavy industrial plants, however, there are several small furnaces which may have consumed as much as 100,000 tons of scrap metal, most of which would be collected locally or shipped in by rail from neighboring regions.

(4) Future Plans for the "Third" Steel Base.

For the future the longer term Soviet plan is to create by 1970 a "third" steel base east of the Urals (the Ukraine being first and the Urals second) capable of producing 20 million tons of pig iron annually. The share of West Siberia in this production would be 8 million tons; that of Kazakhstan, 4 million tons; and that of East Siberia, 8 million tons. 77/ The plan involves increases of capacity at existing mills and the addition of new plants at Antonovka and Karaganda. By 1960 the present Kuznetsk (Stalinsk) plant is expected to produce more than 4 million tons of steel, 78/ and in the same year the West Siberian (Antonovka) plant, with eventual capacity of 3.5 million tons, should commence operations. Also, there may be another new plant at Barnaul.

With the construction of the new Karaganda steel combine at Solonichki, steel output in Kazakhstan should rise to 4 million tons annually. Distribution of this steel, after local requirements, should encompass the needs of the various mining and industrial enterprises of Kazakhstan and Central Asia, the railroads, and the construction industry. Shipment of up to 1 million tons of steel to the west is a possibility.

In Central Asia, expansion on a small scale of the present plant is planned. In East Siberia, no new steel plants are contemplated before 1960. Thereafter, construction of mills is planned at Achinsk and Tayshet.

In view of long-range Soviet plans for extension of the steel industry eastward, it is difficult to forecast a future pattern of shipments. The ultimate objective of this expansion program is to develop the steel industry in every region so that, on the whole, self-sufficient areas will be created and long hauls of finished steel products eliminated. In the meantime, the predominantly eastward flow of steel should continue. Steel from the Kuzbas, after satisfaction of heavy local requirements, will be needed to contribute to the new expansion of plants in the more easterly areas. Because of differences of products and of demands, lesser tonnages probably will continue to move to points in the west and south. The flow of finished steel from the Kuzbas to the west may be about 2 million to 3 million tons by 1960.

f. Grain.

Grain is a perplexing traffic item because of the seasonal character of its movement, the uncertainty of the size of the harvest, and the fact that it must be collected and protected from moisture before loading and during transit. In West Siberia and Kazakhstan the problem is accentuated by the scope and character of the new lands reclamation program, which has already brought about some confusion in transport planning and operations.

The new lands program got under way in 1954, with its main belt being in the southern part of West Siberia and in northern Kazakhstan. Although further increases in planted acreage are anticipated, the period of major expansion is now past, and net increases in the total area actually planted to grain in the future should be relatively small.

Soviet data on grain loadings in Kazakhstan do give some indication of the impact of the new lands program on the railroads. In 1956, grain loadings in Kazakh SSR, which previously had been running on an annual level of between 2 million and 3 million tons,* jumped to 10.6 million tons. Of this amount, at least 7.4 million tons were for interregional delivery. 79/ Unfortunately, parallel data are not available for West Siberia, but Novosibirskaya Oblast has reported grain loadings of 700,000 tons for 1953, rising to nearly 1.5 million tons in 1955, with a net outflow from the oblast of approximately 900,000 tons

* Except for nearly 4 million tons shipped in 1954.

in the latter year. For the entire RSFSR a rise of 15.2 million tons in shipments of grain by rail was reported from 1950 to 1955.

Between 1955 and 1956 the net imports of grain by rail to Central Asia rose from the previous level of about 1.1 million tons to 3.5 million tons. 80/ This traffic came from the new lands area farther north by way of the main line and the Mointy-Chu division of the Turkistan-Siberian System.

The harvest was particularly good in 1956, and the railroads were so taxed that they could not furnish sufficient cars to move the entire crop. Moreover, planned expansion of facilities for grain storage in the new lands had not been completed. As a result, between 15 to 20 percent of the crop either spoiled or deteriorated badly in quality. Nevertheless, it is believed that between 15 million and 20 million tons of grain actually were loaded in the new lands in that year. Of this amount, about 7 million tons moved southward to points in Kazakhstan and Central Asia; from 1 million to 2 million tons are estimated to have moved eastward out of Novosibirsk; the Kuzbas probably consumed another million tons; and the remainder of between 6 million and 11 million tons moved out to the west. To facilitate this heavy movement, the trains on the main line of the South Siberian Railroad east of Akmolinsk during the harvest period were run in a westerly direction only, with the empty cars routed back east over the main line of the Trans-Siberian Railroad.

[redacted] by 1960 rail loadings of grain for the USSR are to be up 30 percent above those of 1955* and that increases on the systems of the Urals, Kazakh SSR, and Siberia where the new lands are being cultivated will be especially sharp. The increase in loadings in northern Kazakhstan from the drought year of 1955 to the bumper crop year of 1956 of 7.8 million tons probably would signify that loadings in 1960 would be less than those in 1956. 50X1

From the point of view of the railroad, the degree to which such tonnage constitutes a serious problem will depend on the status of storage facilities in the producing areas, the progress made in opening the new rail lines which are now being built, and the availability of rolling stock scheduled for delivery between 1956 and 1960. The principal hazard to planning will remain the uncertainty of the size of each crop, which depends primarily on the variable weather of northern Kazakhstan. The greatest technical problem in moving the large amount of freight offered in good years is the short harvest season.

* Probably based on a goal for grain for the whole country in the plan for 1960, which is regarded as overoptimistic.

g. Cotton.

A discussion of shipments of cotton and cottonseed on the railroads of Soviet Asia between the Urals and Lake Baikal is included for two main reasons: (1) about 87.5 percent of Soviet raw cotton in 1955 was grown in Central Asia and southern Kazakhstan, and (2) cotton is assuming new importance in trade of the Soviet Bloc because of large purchases of this commodity by the Bloc in the Middle East.

Total Soviet production of raw cotton in 1955 was 3.9 million tons, 81/ of which it is estimated that 3.2 million tons, or about 83 percent, came from Central Asia. 82/ Production for the USSR in 1960 is forecast at approximately 4.7 million tons.

Total rail shipments of ginned cotton leaving Central Asia in 1955 are estimated to have exceeded 1.2 million tons. Of this quantity, about 3 percent probably was shipped northward by the Turkestan-Siberian System to mills in Barnaul, Novosibirsk, and cities farther east. Normally, 95 percent of the cotton would be expected to move by the main Tashkent-Orenburg route to the Central Region of the European USSR, where most of the Soviet textile industry is located. The remainder moved via the Ashkhabad System to Krasnovodsk and the Caucasus.

Shipments of cottonseed are mainly local in nature, the seed being moved from gins to processing plants by rail and truck. In 1955 the railroads' share of this traffic in Central Asia as published amounted to about 1 million tons.

After processing, cottonseed oil is shipped from Central Asia. Loadings in 1955 were less than 300,000 tons and for 1960 will similarly correspond to the size of the cotton crop. It is believed that cottonseed oil is shipped mainly to the European USSR and hence, like the cotton, probably moved via the Tashkent-Orenburg route.

There is a continuing program to promote more intensified cultivation of cotton in Soviet Central Asia, and in time, with improved irrigation and an increasing supply of mineral fertilizer, the results should be successful. Traffic generated, however, would be well within the handling capabilities of existing and planned railroads in Kazakhstan and Central Asia.

h. Mineral Construction Materials.

Rail movements of mineral construction materials generally are characterized by short hauls. For the USSR in 1955 the

average length of haul of building materials of 334 km was less than half the national average length of haul of 766 km for all freight. Thus, even though loadings of mineral construction materials for the years 1950, 1953, 1955, and 1956 were all close to 19 percent of total loadings, ton-kilometer movements were consistently only about 8 percent of the total.

Separate figures on loadings of mineral construction materials are not available for either West Siberia or East Siberia. In Kazakhstan the relationship of loadings of mineral construction materials to total loadings averaged 19.2 percent over a period of 4 recent years (1950 and 1954-56), a figure almost identical with the national average. Loadings and deliveries of mineral construction materials within Kazakh SSR for the same years were nearly in balance. A trend is evident, however, in that Kazakhstan, because of the heavy investment program, has shifted from a "net exporter" of mineral construction materials to a "net importer" of almost 1 million tons.

In 1955, mineral construction materials accounted for 20 percent of total originations and 17 percent of terminations in Uzbek SSR. Actual loadings of such materials were 2.6 million tons, and "net imports" 500,000 tons.

Mineral construction materials in 3 recent years (1950 and 1954-55) averaged only 9 percent of total loadings in Irkutskaya Oblast, but deliveries were 18 percent of the total, probably owing to the large amount of cement for the Angara Dam being brought in from Timlyuy in Buryat-Mongol'skaya ASSR* and points farther east.

The capacity of the cement industry in Soviet Asia between the Urals and Lake Baikal is being increased sharply in 1956-60 from about 2.1 million tons to between 6.5 million and 8.5 million tons, meaning increased rail loadings. Most of the cement plants are located near large cities or consuming areas. There will be a notable concentration of plants around Tashkent, leading to the conclusion that shipments of cement northward from this area have been planned.

In the main, mineral construction materials, such as stone, sand, gravel, brick, and cement, move in a series of well-dispersed short hauls forming radial patterns around cities. These

* A new cement plant with an annual capacity of 750,000 tons began operations at Angarsk in Irkutskaya Oblast in November 1957. 83/

materials seldom have a significant impact on through main line movements. Where rivers serve large cities, it is natural to try to bring in mineral construction materials by barge, in view of the small investment required, the low cost of movement, and convenience in the open season. In 1955, 586,000 tons of mineral construction materials were shipped on rivers in Kazakh SSR as against only 88,000 tons in 1950, 84/ and 500,000 tons were unloaded. In Central Asia, very small quantities of mineral construction materials moved by inland waterway. In Irkutskaya Oblast, 433,000 tons were shipped, and 424,000 were unloaded. On the Ob' River the turnover amounted to 426,000 tons within Novosibirskaya Oblast, 85/ reflecting the short haul from points of origin to the city of Novosibirsk. On the inland waterways of the USSR as a whole, shipments of mineral construction materials rose under the Fourth and Fifth Five Year Plans from 2.6 million tons, or 7 percent of total loadings in 1946, to 30.8 million tons, or 22 percent of total loadings in 1955. 86/

On the railroads it is estimated that the proportion of total loadings represented by mineral construction materials will in the immediate future remain close to present levels. Should the USSR undertake construction of radial highways near large cities, a share of the present rail loadings eventually may be transferred to trucks.

i. Miscellaneous Freight.

Miscellaneous freight includes manufactured products of heavy industry, machinery and machine tools of all types, tractors, vehicles, motors, chemicals, paints, nonferrous metals and minerals, processed foods, consumer goods, and all other items not falling under one of the major commodity headings. Loadings of miscellaneous freight for 4 recent years (1950, 1953, and 1955-56) have been consistently about 18.2 percent of total loadings in the USSR and in ton-kilometers have been close to 24 percent of the national total. Miscellaneous freight in 1955 had an average length of haul of 952 km, which was 24 percent higher than the national average for all freight.

Miscellaneous freight is characterized by its generally lighter loading per car compared with the major bulk commodities. On the other hand, there is a better chance of loading back to area of origin the type of cars most commonly used for miscellaneous freight (boxcars and flat cars) than those customarily employed for the movement of bulk commodities.

Figures for loadings of miscellaneous freight in West Siberia are not available. In Kazakhstan, loadings for several recent

years (1953-56) have been about 10 percent of total loadings, a proportion which is slightly more than half of the national average, and deliveries have been higher, about 16 percent. In the last 3 years for which figures are available (1954-56), deliveries of miscellaneous freight were higher than loadings. Thus movement of miscellaneous freight ran counter to the flow of general commodity movement, which was increasingly weighted on the side of "net exports." In Novosibirskaya Oblast, loadings of miscellaneous freight as a percentage of total loadings are typical of the national level, but deliveries have been far lower, about 11 percent. In Irkutskaya Oblast, miscellaneous freight regularly accounts for 5.5 percent of total loadings and 10 percent of deliveries. The low proportion of loadings in Irkutskaya Oblast undoubtedly reflects the small amount of manufacturing or food processing and the relatively heavy shipments of coal and timber. The reason for the low regional proportion of deliveries of miscellaneous freight compared with the national share probably reflects the important position of the railroad and certain construction projects as consumers of heavy goods in the relatively undeveloped economy of the oblast.

In Uzbek SSR the proportion of loadings of miscellaneous freight to total loadings has characteristically varied between 41 and 45 percent, reflecting the low level of production of most of the major commodities and the loading of substantial tonnages of mineral fertilizer and cotton. Deliveries of miscellaneous freight as a percent of the total declined from 30 percent in 1954 to 25 percent in 1956, owing mainly to the rapid rise of grain deliveries, which weight the major commodity totals. Actual quantities of miscellaneous freight loaded and delivered were almost exactly the same in 1956.

It must be remembered that the statistics of loadings and deliveries which have been quoted do not include transit freight. The amount of transit movement of miscellaneous freight would be particularly important in West Siberia, Krasnoyarskiy Kray, and Irkutskaya Oblast, owing to the size of the economy to the east, but less so in Kazakhstan. The through movement of miscellaneous freight across West Siberia on the main line of the Trans-Siberian Railroad in 1955 is estimated in a range of 4 million to 7 million tons in the loaded direction of all traffic (westbound) and of 6 million to 10 million tons in the empty direction (eastbound).* Thus the preponderance of miscellaneous freight moves in the direction contrary to that of most of the bulk commodities.

* See Table 16, p. 60, below.

Projection of movement of miscellaneous freight on a quantitative basis to 1960 can be done only by generally speculating on the likelihood of its holding its proportionate share of total loadings and movement. This it seems likely to do because of the industrial investment program extending to 1970, which calls for large shipments of miscellaneous freight into the region, and because of the expansion of the nonferrous metals and nonmetallic minerals industries in Kazakhstan, Central Asia, and East Siberia. Furthermore, there are no indications that the transit movement to and from the Far East will decline from present levels. On the contrary, an expanded investment program is planned for the regions east of Lake Baikal starting in 1961-65.

2. Creation of Traffic -- Balances and Imbalances.

In case the general impression should be formed from the movement of commodities that Soviet Asia between the Urals and Lake Baikal is uniformly a vast gathering place for raw materials to support the centers of the Soviet economy in the west, it would seem useful to point out that the bulk of heavy goods moving westward originates in comparatively few, very active oblasts, with the remainder of the area on balance a consumer.

The direction of flow of a number of the major commodities within and through Soviet Asia between the Urals and Lake Baikal for 1955 is shown in Figure 4.* Coal, which has already been discussed, is not included, nor are mineral construction materials, owing to the quantity of short radial hauls leading into cities and major construction sites.

Loadings and deliveries by oblast throughout the area for the year 1955 are shown in Table 12.** It will be seen immediately that Kemerovskaya Oblast, which contains the Kuzbas, was by far the greatest originator of freight and the greatest "net exporter." Karagandinskaya Oblast was second; Irkutskaya Oblast, third; and Krasnoyarskiy Kray, fourth. Most of the other oblasts were net importers in that year, but on balance the region had a substantial net outflow. In the next 10 years the opening of many mineral deposits, in a far more scattered pattern than has existed hitherto, probably will change the balance of flow in a number of oblasts. Then, too, there is the relatively uncertain factor of the grain crop in the new lands.***

* Inside back cover.
** Table 12 follows on p. 52.
*** Text continued on p. 54.

Table 12

Railroad Loadings, Deliveries, and Net Exports of Areas in Soviet Asia Between the Urals and Lake Baikal a/
1955

Thousand Metric Tons

Area	Loaded	Delivered	Net Exports
Kemerovskaya Oblast	78,566	36,217	42,349
Karagandinskaya Oblast	27,867	9,190	18,677
Irkutskaya Oblast	21,938	12,568	9,370
Krasnoyarskiy Kray	14,723	12,054	2,669
Aktyubinskaya Oblast	4,509	2,872	1,637
Pavlodarskaya Oblast	3,394	2,001	1,393
Turkmen SSR	6,783	6,352	431
Kirgiz SSR	3,300	3,200	100
Kokchetavskaya Oblast	1,773	1,685	88
Gur'yevskaya Oblast	1,255	1,194	61
Surkhan-Dar'inskaya Oblast	922	1,002	-80
Tyumenskaya Oblast	2,575	2,680	-105
Semipalatinskaya Oblast	2,600	2,731	-131
Kara-Kalpakskaya ASSR	25	202	-177
Namanganskaya Oblast	619	846	-227
Ferganskaya Oblast	2,146	2,446	-300
Kashka-Dar'inskaya Oblast	293	595	-302
Khorezmskaya Oblast	343	717	-374
Taldy-Kurganskaya Oblast	833	1,298	-465
Kzyl-Ordinskaya Oblast	1,432	1,994	-562
Bukharskaya Oblast	565	1,138	-573

a. 87/

Table 12

Railroad Loadings, Deliveries, and Net Exports of Areas in Soviet Asia Between the Urals and Lake Baikal
1955
(Continued)

Thousand Metric Tons

Area	Loaded	Delivered	Net Exports
Severo-Kazakhstanskaya Oblast	1,729	2,335	-606
Andizhanskaya Oblast	673	1,290	-617
Tomskaya Oblast	2,350	3,015	-665
Tadzhik SSR	2,600	3,300	-700
Zapadno-Kazakhstanskaya Oblast	742	1,448	-706
Dzhambulskaya Oblast	1,714	2,472	-758
Samarkandskaya Oblast	1,288	2,191	-903
Yuzhno-Kazakhstanskaya Oblast	1,902	3,104	-1,202
Vostochno-Kazakhstanskaya Oblast	1,750	3,276	-1,526
Alma-Atinskaya Oblast	735	2,417	-1,682
Tashkentskaya Oblast	6,184	7,948	-1,764
Akmolinskaya Oblast	3,696	6,839	-3,143
Kurganskaya Oblast	2,504	5,700	-3,196
Kustanayskaya Oblast	2,115	5,423	-3,308
Altayskiy Kray	6,483	10,602	-4,119
Omskaya Oblast	2,994	8,088	-5,094
Novosibirskaya Oblast	7,895	14,467	-6,572
Total	223,815	186,897	36,918

Table 13* shows the relationship between production of coal in the Kuzbas, shipments of coal from the Kuzbas to the Urals and westward, and the net tonnage moving in the loaded, or westbound, direction on the Trans-Siberian Railroad between Novosibirsk and Omsk. The purpose is to show how sensitive is total movement of westbound freight on the main line of the Trans-Siberian Railroad to mineral production in the Kuzbas.

Table 14** contains a combination of loadings and deliveries in 1955 for major economic regions, set up geographically from east to west to show the net accumulations and diminutions of imbalances progressing in a westerly direction.

The logical result of the type and form of investment now being made in the Eastern Regions is that Siberia will become a major supplier of material needs for the economy of the west.*** In return, the west would provide needed sustenance, petroleum, vehicles, and capital goods. Eastbound traffic also would include food, weapons, ammunition, and other logistical supplies for the large military establishment which the USSR maintains in the Far East, as well as items for international trade with Oriental countries.

The net balance in 1955 of 32.7 million tons of freight moving westward does not provide a direct clue to the total interchange with the regions west of the Urals, which was greatly in excess of this amount.

Figure 5**** provides a comparison of loadings by year, for rail and inland waterway, showing originations for the years 1950 through 1955 of Soviet Asia between the Urals and Lake Baikal matched against originations of the Eastern Regionst and of the USSR as a whole. This chart shows that the proportion of total loadings in the east is increasing gradually. This proportion should rise more rapidly in the next few years.††

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* Table 13 follows on p. 55.

** Table 14 follows on p. 56.

*** The nature of originations in Kazakhstan is changing, with the net margin of "export tonnage" over "import tonnage," which has been gradually increasing, almost doubling from 1955 to 1956. In 1955, there were 7.8 million tons of loadings in excess of deliveries, and in 1956, there was an excess of 14.4 million tons. 88/

**** Following p. 54.

† Including the Urals but not the Volga.

†† Text continued on p. 57.

Figure 5

50X1

USSR: Total Railroad and River Transport Loadings Compared with Similar Loadings in the "Eastern Regions" and Soviet Asia, 1950-55

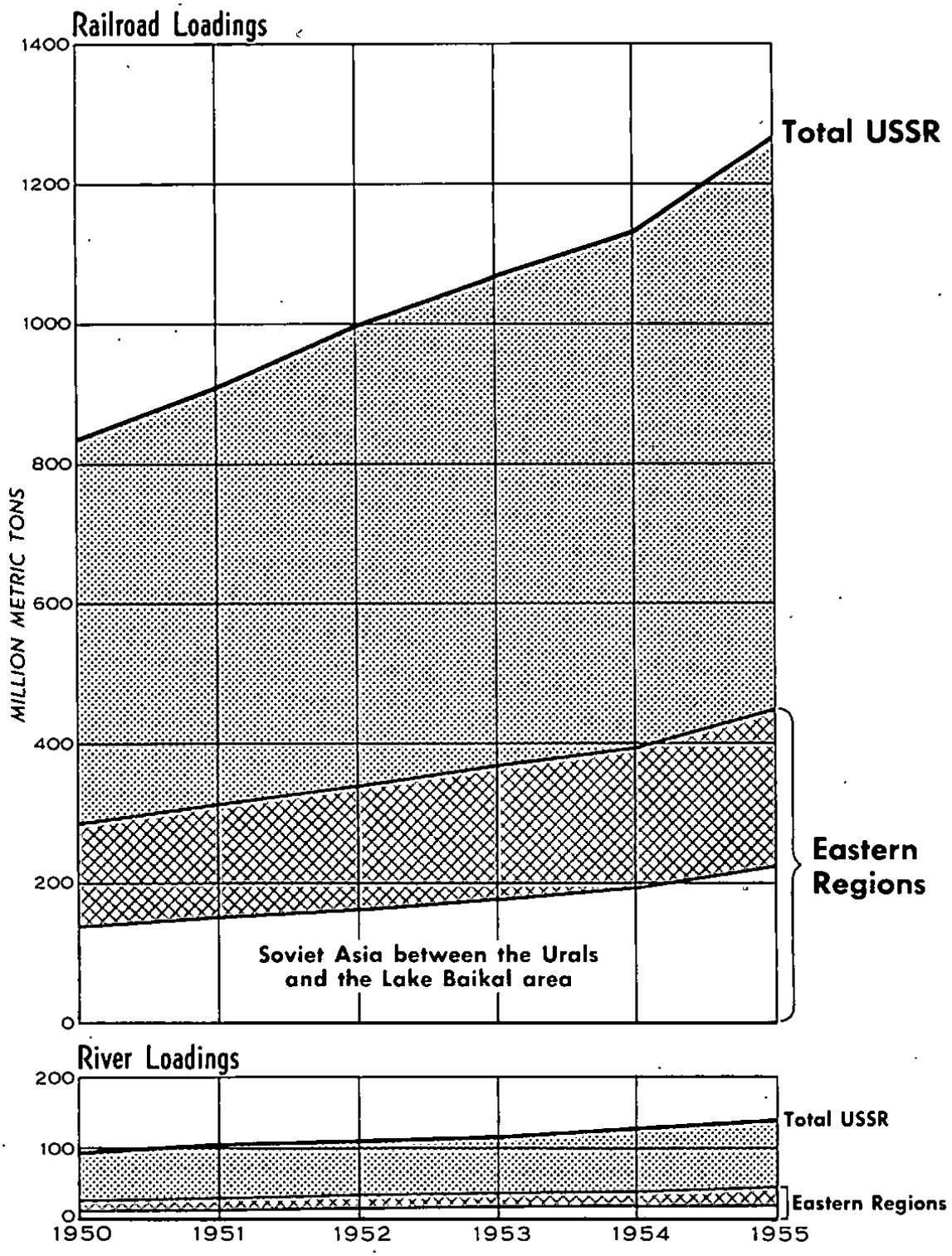

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Table 13

Comparison of Production of Coal in the Kuzbas,
Coal Shipped from the Kuzbas to the Urals and the West,
and the Average Density of All Westbound Freight
on the Novosibirsk-Omsk Stretch of the Trans-Siberian Railroad
1940, 1950-56, and 1960 Plan

Thousand Metric Tons

Year	Production of Coal in the Kuzbas	Estimated Coal Tonnage Shipped from the Kuzbas to the Urals and the West	Average Density of Westbound Traffic on the Novosibirsk-Omsk Stretch
1940	22,487	7,412	15,600
1950	38,526	14,791	28,500
1951	41,284	14,940	N.A.
1952	44,104	16,660	32,800
1953	46,519	19,591	37,800
1954	50,584	24,977	42,200
1955	58,539	28,802	48,700
1956	66,200	N.A.	52,200 a/
1960 (Plan)	88,000	33,000	66,000 to 70,000

a. Estimated.

Table 14

Loadings and Deliveries in the Eastern Regions of the USSR a/
1955

Thousand Metric Tons

Region	Loadings	Deliveries	Excess of Loadings over Deliveries	Net Balance Moving Westward (Cumulative)
Far East (Region XIII)	32,255	35,860	-3,605	-3,605
East Siberia (Region XI)	49,598	38,907	+10,691	+7,086
West Siberia (Region IX)	103,367	80,769	+22,598	+29,684
Kazakhstan and Central Asia (Region X)	83,787	81,506	+2,281	+31,965
Urals (Region VIII)	185,238	184,468	+770	+32,735
Total	454,245	421,510		+32,735

a. 89/

The major cities slated for industrial development in Siberia will be Omsk, Novosibirsk, Stalinsk, Krasnoyarsk, and Irkutsk. The eastern extremity of expected major increases in loadings is the region bordering Lake Baikal on the west. Long-range planning provides for the opening of resources in the more easterly areas at a later period.

3. Density.

Traffic density is the measure of utilization of the theoretical capacity of a rail line. In Soviet publications, density generally is expressed in net ton-kilometers per kilometer per year. The ability of the railroads of Soviet Asia between the Urals and Lake Baikal to meet the growing demands of the economy is determined not so much by the loads acceptable to the originating branches as by the operational capabilities of the principal segments of the trunk lines and the central classification yards.

The Ministry of Railroads of the USSR has set standards of maximum density in the controlling or loaded direction for various types of rail line for 1965, as shown in the following tabulation 90/:

Electrified single track	50 percent will have a density of up to 15 million tons* in the loaded direction
	20 percent will have a density of 15 million to 20 million tons in the loaded direction
	30 percent will have a density of more than 20 million tons in the loaded direction
Electrified double track	85 percent will have a density of up to 35 million tons in the loaded direction
	15 percent will have a density of more than 35 million tons in the loaded direction

On the basis of known Soviet railroad operating practices these traffic density objectives are realistic. Actual over-all densities by railroad system for 1955 were provided in a recent Soviet

* Net tons of freight movement per year.

publication. 91/ Table 15* shows the average densities of net freight movement in tariff ton-kilometers per kilometer for the railroad systems in the area under examination.

The densities of the main lines of these systems, most of which are heavy, are diluted in this type of table by the relative length and density of traffic movement on the branches. Thus the Tomsk System, which has several very dense traffic stretches, appears, on account of the length of its branches, to be a line of much less density than the Omsk System, which has but one long branch and a short split portion of its main line, the two arms of which can be combined in analyzing through traffic.

The most intensely used lines in the area are (a) the main line of the Trans-Siberian Railroad between Omsk and Novosibirsk, (b) the same line between Omsk and Chelyabinsk, (c) the main line through Krasnoyarskiy Kray and Irkutskaya Oblast, and (d) the line of the Karaganda railroad system between Akmolinsk and Karaganda. Largely for the sake of stimulating competitive internal transport effort, the USSR occasionally has made announcements relevant to the density of these stretches.

The most heavily traveled stretch of all is the Omsk-Novosibirsk sector, involving the Omsk and a short distance of the Tomsk Systems (see Table 16**). Actual two-way movement on this stretch has increased from 41 million tons in 1950 to an announced 74 million tons for 1956, and traffic is believed to have increased more since that date. The goal of westbound freight movement alone for 1960 has been set at from 66 million to 70 million tons, of which about 60 percent would originate in the Kuzbas.

After 1960 the USSR intends to handle further increases in traffic from the Kuzbas to the west via the South Siberian Railroad from Artyshta to Barnaul (Chesnokovka), and from there over the new route from Barnaul to Omsk. In spite of the availability of alternate routes, however, the basic problem of the heavy load on the main line of the Trans-Siberian Railroad may be expected to continue and may even increase because the latter has the most favorable route across West Siberia and is far cheaper to operate than the parallel lines to the south. 92/ The technological improvements introduced on the Omsk-Novosibirsk line (electrification, signaling, traffic control, heavy trains, longer sidings, 6-axle cars, steady movement of through trains, heavy rail, rock ballast, and the like) have substantially increased the capacity of this line. The principal measure

* Table 15 follows on p. 59.
** Table 16 follows on p. 60.

Table 15

Average Density of Net Freight Movements on Railroad Systems in Soviet Asia Between the Urals and Lake Baikal a/
1955

System	Average Net Freight Density (Thousand Ton-Kilometers per Kilometer)	Length b/ (Kilometers)	Net Freight Traffic (Million Ton-Kilometers)
Omsk	37,601	1,730	65,050
South Ural	20,528	2,885	59,225
Tomsk	17,524	3,025	53,011
East Siberian	16,675	1,706	28,447
Karaganda	8,932	3,000	26,797
Orenburg	8,219	3,107	25,535
Tashkent	7,371	2,463	18,156
Turkestan-Siberian	6,830	3,582	24,467
Ashkhabad	2,983	3,124	9,321

a. The national average freight density on the railroads of the USSR for 1955, including all branches, was 8.1 million ton-kilometers per kilometer. The plan for 1960 calls for an average freight density of 10.8 million ton-kilometers per kilometer.
b. The lengths of the systems presented in this table do not necessarily agree with the cumulative lengths of the systems as shown in Appendix A. The differences, though slight, are caused by dissimilarity of cutoff dates and by lack of specific information.

Table 16

Net Railroad Traffic Density on the Omsk-Novosibirsk Stretch
1940, 1950, 1952-56, and Forecasts for 1960 and 1965

Million Ton-Kilometers per Kilometer

Year	Total Both Directions	Westbound	Eastbound
1940	23.7 a/	15.6 b/	8.1 c/
1950	41.1 a/	28.5 b/	12.6 c/
1952	N.A.	32.8 b/	N.A.
1953	N.A.	37.8 b/	N.A.
1954	N.A.	42.2 b/	N.A.
1955	69.0 d/	48.7 b/	20.3 c/
1956	74.0 a/	N.A.	N.A.
1960 Forecast	N.A.	66 to 70 b/	N.A.
1965 Forecast	N.A.	66 to 70 b/	N.A.

a. 93/
b. 94/
c. Balance.
d. 95/

of relief in sight is the removal of the petroleum traffic and the accompanying return flow of empty tank cars, which should result in the next year or two from the opening of new pipelines.

Equipment in general has been concentrated in sufficient quantity to keep pace with traffic demands, and although excess capacity, particularly in tank cars, has been small, the current program for procuring equipment should offset increasing requirements for freight cars and traction. The proposed density of 70 million net tons in the loaded direction, however, is exactly twice the operational target of all but a very few double-track electrified lines.*

Although the USSR has made no announcement about multiple tracking any portion of the main line of the Trans-Siberian Railroad, it is believed that the prospects of dense traffic combined with economy

* In the US the double-track trunk line of highest average density, the Chesapeake and Ohio (Richmond and Allegheny Division), achieved 25 million ton-kilometers per kilometer in 1955, including both directions. The westbound movement was comparatively light. 96/

of construction and operation will prove to be a convincing combination and that on certain sectors, simultaneously with installation of the heavy rail, additional through tracks with frequent crossovers to the center tracks, will gradually appear. Electrification and ballasting of these tracks may not follow immediately, but eventually additions and modifications to existing signaling will have to be installed to secure optimum use of the trackage.

West of Omsk, additional through capacity is afforded by the railroad from Kulomzino to Sverdlovsk, which is presently being double tracked. At Petropavlovsk, however, traffic from Karaganda to the Urals joins the westbound flow which again becomes dense as far as Kurgan, from which a second line leads to Sverdlovsk. Thus the sector of greatest density is the portion of line between Petropavlovsk and Kurgan. Average density of the entire Omsk-Chelyabinsk line was reported as 50 million ton-kilometers per kilometer in 1956, which includes traffic in both directions.

Measures being taken to increase the ability of the Omsk and South Urals Systems to handle the increase in transit movement include (a) electrification of the main line; (b) installation of improved automatic block signals; (c) construction of the new line from Peski to Kurgan to provide an alternative to the Petropavlovsk-Kurgan sector for coal traffic from Karagandinskaya Oblast; (d) reconstruction of the roadbed with new ties, heavy rails, and crushed stone ballast; (e) lengthening of station (passing) tracks; (f) equipping stations with centrally controlled electric switches; and (g) accelerating movement of trains to speeds of 80 to 100 kilometers per hour. 97/

Certain sections of the Krasnoyarsk and East Siberian Systems will have by 1960 a freight density in both directions of 48 million to 50 million ton-kilometers per kilometer. In December 1957, Dmitriyev, deputy chairman of the Irkutsk Sovnarkhoz, stated that the East Siberian and Krasnoyarsk Systems are not now able to handle all of the goods (mainly coal, timber, and ores) produced in the portion of Irkutskaya Oblast west of Lake Baikal and that electrification cannot come too soon if a solution is to be afforded. He further asked for accelerated construction on the Tayshet-Abakan line, for more and longer passing tracks on the Tayshet-Lena line, and for electrification of the latter.

The problem of capacity on the Karaganda-Akmolinsk line appears to have been solved temporarily with dieselization. A rough estimate of loaded directional movement on this line is 22 million tons for 1955, with an increase to more than 35 million tons planned for 1960. Electrification of the line has been mentioned, but the project was not included in the original Sixth Five Year Plan (1956-60).

The announced program for construction and modernization of the railroads in the area discussed in this report seems sufficient to keep pace with projected densities on the busiest stretches of main line, except for the main line of the Trans-Siberian Railroad between Omsk and Novosibirsk, where additional trackage may have to be provided.

B. Demands of Transportation on the Economy.

The accomplishment of the transportation plan for 1960 and specifically the movement of the major bulk commodities stemming from production targets and distribution patterns oblige the railroads in turn to make substantial demands on the national economy, both for new capital investments and for operational inputs.

1. Investments in Railroads and Pipelines.

Capital investment in railroads of the USSR since World War II have risen sharply above the prewar period and are still rising. Under the Fifth Five Year Plan (1951-55) the Eastern Regions received a greater share of investment outlay than they had under the Fourth Five Year Plan (1946-50), when restoration of lines in the European USSR had priority of investment. In 1956-60, there was a further increase in funds for the east.

A breakdown of capital investment in railroads in the USSR as a whole by different periods of time is shown in Table 17.* The Soviet press reported that in 1956-60 about half of the over-all capital investment in all branches of the economy, including transportation, was to be directed to the Eastern Regions. Nationwide investments from 1956 to 1960 would be 67 percent higher than those between 1951 and 1955, whereas the amounts allocated to West Siberia, Kazakhstan, and East Siberia represent increases of 150 percent, 170 percent, and 180 percent, respectively, above their counterparts in 1951-55. 98/ On the basis of numerous announced projects, it appears that the regional investment pattern for the railroads will parallel that of the regional economy as a whole.

Capital investments in railroads in the USSR include numerous items which in other countries would not ordinarily be regarded as investments in railroad enterprises, such as workers' housing, buildings for social and cultural purposes (including schools, hospitals, and auditoriums), public utilities for railroad towns, and industries in some localities needed for the support of the railroad

* Table 17 follows on p. 63.

Table 17

Investment in Railroads of the USSR
by Selected Periods

Billion 1957 Rubles

Period	Total Investment	Yearly Average Investment
1928-40	69.6 a/	5.4
1946-50	35.4 b/	7.1
1951-55	45.0 c/	9.0
1956-60 (Plan)	70.0 c/	14.0

a. Calculated as 150 billion rubles less investments for 1946-50 and 1951-55. 99/
b. 100/
c. 101/

systems or their employees. Viewed in any light, however, the current rate of investment in Soviet railroads represents a major phase of expansion in transport.

In the 1960's, investment at an even more rapid rate appears to be contemplated, judging from the large amount of electrification and new construction which has been mentioned in various Soviet articles. Planned investment figures for 1959-65 have been announced as 110 billion to 115 billion rubles, which would mean an average rate of 16 billion rubles per year. It is safe to conclude that, in line with traffic demands, investment will be concentrated largely on the technical reequipment of the railroads, the introduction of electric and diesel traction, and the extension and development of the railroad network in the Urals, Siberian, Kazakhstan, and Volga Regions. Top priority will continue to be assigned to the electrification and modernization of the main line of the Trans-Siberian Railroad. In oil pipeline construction, equivalent priority is given to the completion of pipelines to Omsk, Novosibirsk, and Irkutsk.

In 1951-55 the investment in new line construction and double-tracking of railroads in Soviet Asia between the Urals and Lake Baikal was approximately 5.7 billion rubles. Estimated cost of this type of work for 1956-60, however, is 8.2 billion rubles. An additional investment, amounting to approximately 853 million rubles, was made in 1951-55 for electrification of lines in Soviet Asia between

the Urals and Lake Baikal. In 1956-60, however, it is estimated that electrification of lines in this area will require an investment of 2 billion rubles. Investment for rolling stock assignable to Soviet Asia between the Urals and Lake Baikal is estimated at more than 8.8 billion rubles. The estimated cost of pipeline construction is 5.1 billion rubles.* Thus total functional investment in railroads and pipelines should amount to about 24 billion rubles for this area during 1956-60.

Rolling stock or movable equipment is slated to be built in the USSR on a large scale between 1956 and 1960. There are also imports from the European Satellites, which probably are included in the plan of railroad "procurement" or "acquisition." For the program of electrification and dieselization, 4,500 new diesel locomotive units** and 2,000 new electric locomotives are required. The plan for acquisition of cars consists of 255,000 freight cars and 18,600 passenger cars. 102/ In the last 5 years, by way of comparison, US railroads have acquired 6,816 diesel locomotives, 280,000 freight cars, and 1,763 passenger cars.***

Present indications are that none of the targets for acquisition of equipment will be met completely by the end of 1960 (unless foreign purchases are soon stepped up), but the shortfalls should not be of major proportions. In the case of motive power, the steam locomotive park can be continued in operation to the extent necessary to offset tardy deliveries of the newer types of locomotives.

Based on estimated procurement for the country for 1956-60, the quantities of new equipment which may be attributable to Soviet Asia between the Urals and Lake Baikal because of planned power conversions and traffic movement, and their approximate value, are shown in Table 18.****

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* Methodology for these estimates will be found in Appendix B, p. 73.

** Stated in Bulganin's speech to the Twentieth Party Congress as 2,250 two-section diesel locomotives.

*** The outlook is for far lower US purchase rates in the next few years. The US is just completing conversion from steam to diesel power, whereas the USSR is still in its initial phase. US rail traffic, moreover, is suffering from competition and other economic pressures.

**** Table 18 follows on p. 65.

Table 18

New Equipment Attributable to Soviet Asia
Between the Urals and Lake Baikal
1956-60

Type of Equipment	Units	Value (Million Rubles)
Diesel locomotives	2,382	3,811
Electric locomotives	643	1,287
Passenger cars	2,525	538
Freight cars	63,884	3,194
Total		8,830

2. Inputs.

a. Capital Inputs.

Within the realm of investments in railroads and pipelines are capital inputs of ferrous metals, copper, wooden ties, and ballast, which amount to a visible share of the national production totals of these commodities for each 5-year period. Table 19* represents the results of a calculation of such inputs, based on Soviet statements, for only the railroads and pipelines of the area under study, contrasted with actual and planned production totals of each commodity for the entire country. Allowance is not made in Table 19 for a possible partial conversion from wooden to prestressed reinforced concrete ties, because the latter are regarded as being still in the experimental stage. The USSR, nevertheless, is constructing a number of casting plants to produce such ties, especially in dry, treeless areas. Should the outcome be successful, it could have a strong impact on investment in right-of-way and line maintenance costs subsequent to 1960.

b. Operational Inputs.

In each of the 5-year periods under discussion, the railroads of Soviet Asia between the Urals and Lake Baikal will have consumed large quantities of fuel (coal, fuel oil, and diesel fuel) in addition to electric power. The amount of petroleum fuels, coal, and**

* Table 19 follows on p. 66.
** Text continued on p. 68.

Table 19

Amount, Value, and Share of National Production of Selected Basic Materials Required in Construction of Railroads and Pipelines in Soviet Asia Between the Urals and Lake Baikal 1956-60

Material	Capital Inputs (Thousand Metric Tons)	Value (Million Rubles)	Percentage of National Production
Ferrous metals			
Railroads			
Rail	3,500 a/	2,279 b/	
Line structure	350 c/	232 d/	
Brake shoes	146 e/	95 f/	
Railroad equipment	1,745 g/	1,105 h/	
Total	5,741 i/	3,711	
Oil pipelines	1,500 j/	1,451 k/	
Total	7,241	5,162	3.4
Copper and alloys			
Electrification	18.6 l/	141 m/	
Locomotives and substations	6.6 l/	50 m/	
Maintenance	0.9 l/	7 m/	
Total	26.1	198	1.1
Wooden ties (only)	3,750 a/	1,856 n/	25
Ballast, crushed rock (thousand cubic meters)	22,000 a/	330 o/	25
Total value		7,546	

a. Estimated at one-quarter of the total laid.
b. Value based on price of P-50 rail at 651 rubles per metric ton as of 1 July 1955 and on a ruble-dollar ratio of 5.8 rubles to US $1. 103/

Table 19

Amount, Value, and Share of National Production of Selected Basic Materials Required in Construction of Railroads and Pipelines in Soviet Asia Between the Urals and Lake Baikal 1956-60
(Continued)

c. Estimated at 10 percent of figure for rail and accessories.
d. Value based on railroad right-of-way accessories at 664 rubles per metric ton as of 1 July 1955 and on a ruble-dollar ratio of 5.0 rubles to US $1. 104/
e. Estimated at 29.2 percent of total based on the relationship of freight traffic in this area to over-all Soviet freight traffic in 1955. 105/
f. Value based on an estimated price of 650 rubles per metric ton. This price is approximately the same as of 1 July 1955 for most of the ferrous metals used in railroad construction and rolling stock. 106/
g. Estimated at 34.9 percent, the relationship of utilization of new equipment in this area to the total.
h. Value based on the average price per metric ton of channel and plate steel as of July 1955, when the ruble-dollar ratios for the prices of these items were 5.7 and 5.4 rubles to US $1, respectively. 107/
i. The magnitude of total ferrous metal inputs may be somewhat offset by the return to the economy for other uses of scrap metal resulting from the removal of side buffers from rolling stock.
j. Length of pipelines times published weight factors for announced and estimated sizes of pipe. 108/
k. Value based on the price of pipe steel at 967 rubles per metric ton as of 1 July 1955 and on a ruble-dollar ratio of 6.2 rubles to US $1. 109/
l. Estimated at 37.2 percent of total, based on relationship of electrification in this area, 1956-60, to total Soviet electrification in the same period.
m. Value based on price of 7,600 rubles per metric ton of copper wire as of 1 July 1955. This price is an estimate based on the price per metric ton of cathode copper (6,600 rubles, 1 July 1955) plus the value added by the process of wire manufactured amounting to 15 percent above the price of cathode copper, according to the judgment of the analyst.
n. Value based on an estimated price for wooden ties of 495 rubles per metric ton as of 1 July 1955. This price was estimated on the basis of the price of 33 rubles per tie 110/ and 15 ties per metric ton.
o. Value based on the price of 15 rubles per cubic meter for gravel as of 1 July 1955. 111/

electric power consumed by the railroads of Soviet Asia between the Urals and Lake Baikal for the 1956-60 period, the share of total national production, and the value of each are shown in Table 20.

Table 20

Amount, Value, and Share of National Production of Basic Sources of Power Estimated for Operation of Railroads in Soviet Asia Between the Urals and Lake Baikal 1956-60

Source of Power	Inputs a/ (Thousand Metric Tons)	Value (Million Rubles)	Percentage of National Production
Diesel fuel	3,500	819 b/	3.0
Fuel oil	5,200	1,097 c/	3.0
Coal	66,000	5,484 d/	2.7
Electric power (million kilowatt-hours)	22,441	2,738 e/	1.9
Total		10,138	

a. Estimated.
b. Value based on a price of 234 rubles per metric ton as of 1 July 1955. (An appropriate ruble-dollar ratio is 8.8 rubles to US $1.)
c. Value based on a price of 211 rubles per metric ton as of 1 July 1955. (An appropriate ruble-dollar ratio is 13.3 rubles to US $1.)
d. Value based on a price of 83.09 rubles per metric ton as of 1 July 1955. (An appropriate ruble-dollar ratio is 18.8 rubles to US $1.)
e. Value based on a price of 12.2 kopeks per kilowatt-hour as of 1 July 1955. (An appropriate ruble-dollar ratio is 13.3 rubles to US $1.)

The input of diesel fuel, fuel oil, and electric power is expected to increase during 1956-60, whereas consumption of coal should decline. Consumption of diesel fuel in Kazakhstan and Central Asia (Region X) is rising rapidly, and by 1960 this area should be operating almost entirely on oil fuels. Electric traction is not expected to come into use in Krasnoyarskiy Kray until the latter part of 1960.

3. Labor.

For capital construction, an estimated contingent of 81,000 workers and employees would be required to complete the average annual increment of lines in Soviet Asia between the Urals and Lake Baikal from 1951 through 1960. 112/ By comparison, a total contingent of only 92,000 construction workers is estimated to be required to install the total average annual kilometrage of new line in the entire USSR between 1951 and 1960. 113/ The estimated contingent of workers required to install the average annual kilometrage of new electric catenary construction in this area between 1951 and 1960 is about 20,000 persons, whereas the comparable estimate for the entire USSR is 61,000 workers. The greater emphasis then on construction of new lines in this area rather than on electrification of existing lines, in contrast with the performance of the nation as a whole, may be readily seen.

It is estimated that 500,000 workers and employees, or about 25 percent of the total operational labor force of the railroads in the USSR in 1955, were engaged in the operation of railroads in Soviet Asia between the Urals and Lake Baikal. 114/ Labor productivity on these systems ranged from 47 percent of the national average on the Ashkhabad System to 155 percent on the highly efficient and intensely utilized Omsk System. Both the level of traffic and the productivity of labor in this area are expected to increase by 1960 somewhat in excess of the over-all national increase because of the regional tempo of development.

APPENDIX A

LENGTH OF RAIL LINES OPENED TO TRAFFIC IN SOVIET ASIA BETWEEN THE URALS AND LAKE BAIKAL AS OF 1 JANUARY 1958

Table 21

Kilometers

Period of Construction	West Siberia (Region IX)							Kazakhstan (Region Xa)							Central Asia (Region Xb)				Krasnoyarskiy Kray and Irkutskaya Oblast (East Siberia, Region XI)			
	Sverdlovsk	South Urals	Omsk	Tomsk	Turkestan-Siberian	Krasnoyarsk	Total	South Urals	Karaganda	Orenburg	Omsk	Turkestan-Siberian	Tashkent	Total	Ashkhabad	Tashkent	Turkestan-Siberian	Total	Krasnoyarsk	East Siberian	Total	Grand Total
Built by:																						
Czarist government Before 1918	175	333	1,446	1,470	182	112	3,718	166	0	1,115	150	120	836	2,387	1,977	1,014	0	2,991	1,150	901	2,051	11,147
Communist regime 1918-50	0	237	189	860	100	0	1,386	176	2,547	1,091	0	2,237	29	6,080	670	496	280	1,446	0	28	28	8,940
Under Fifth Five Year Plan (1951-55)	0	93	0	543	0	0	636	0	512	0	0	631	0	1,143	511	88	0	599	885	127	1,012	3,390
Under Sixth Five Year Plan (1956-60) (original)	0	0	486	270	0	150	906	655	1,204 a/	280	135	308 b/	170	2,752	167	22	0	189	953	0	953	4,800
Total	175	663	2,121	3,143	282	262	6,646	997	4,263	2,486	285	3,296	1,035	12,362	3,325	1,620	280	5,225	2,988	1,056	4,044	28,277
Less abandonment															40			40	120	66	186	226
Grand total	175	663	2,121	3,143	282	262	6,646	997	4,263	2,486	285	3,296	1,035	12,362	3,285	1,620	280	5,185	2,868	990	3,858	28,051

a. Including the 659-km line from Solonichki (Karaganda) to Aktogay not specifically announced for completion in the original goals of the Sixth Five Year Plan but believed to be possible of accomplishment in connection with the Druzhba line.
b. Druzhba line to the Chinese border, to connect with the new Trans-Sinkiang Railroad, which is under construction.

APPENDIX B

METHODOLOGY

The information contained in this report was gathered mostly from open sources [redacted] 50X1
[redacted] The procedure consisted of sifting out and combining in an 50X1
orderly manner a large number of factual statements and statistics published in the Soviet press and in railroad and pipeline technical journals, radiobroadcasts, and official handbooks of the USSR and its subdivisions pertinent to this report. Textbooks by prominent experts on transportation and publications of the Ministry of Railroads of the USSR were consulted for numerous facts and figures. Wherever possible, corroboration was sought, and in cases of contrary information the answer generally was obtained by comparing the most recent sources.

The figures making up the tables were gathered from many channels, but nearly all could be checked back indirectly to official Soviet sources. Estimates of imported equipment for years omitted in the publications were derived by interpolation between years for which data were announced. Traffic densities on certain stretches of main line were calculated on the basis of direct observations as a means of checking on Soviet statements, with results in close enough accord to evidence substantiation.

Investment costs were obtained by applying announced Soviet costs per kilometer for new construction, according to type of terrain, to the stretches built and planned for single and double track. Double tracking of existing single-track line was estimated to cost three-eighths of the cost of a new single-track line in equivalent terrain, this fraction based on a Soviet statement. Electrification was estimated on the basis of double-track kilometrage with different values for the Fifth Five Year Plan (1951-55) and the original Sixth Five Year Plan (1956-60), both given by the USSR. The figure for the latter period was about three-quarters that of the former owing to improved logistics and training of personnel. New cars attributable to movement within Soviet Asia between the Urals and Lake Baikal were assumed to relate to total procurement in a manner corresponding to the relative share of the area to the total traffic movement (ton-kilometers) of the USSR for 1955. The share of new locomotives attributable to Soviet Asia between the Urals and Lake Baikal was worked out in a more detailed pattern to reflect the priority in electrification and dieselization assigned to this area. Investment costs of new pipelines were computed on the basis of a Soviet statement giving the relationship of construction costs of pipelines to costs of railroad construction and making allowance for the difficult conditions of subsoil and terrain encountered in Siberia.

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Figure 4

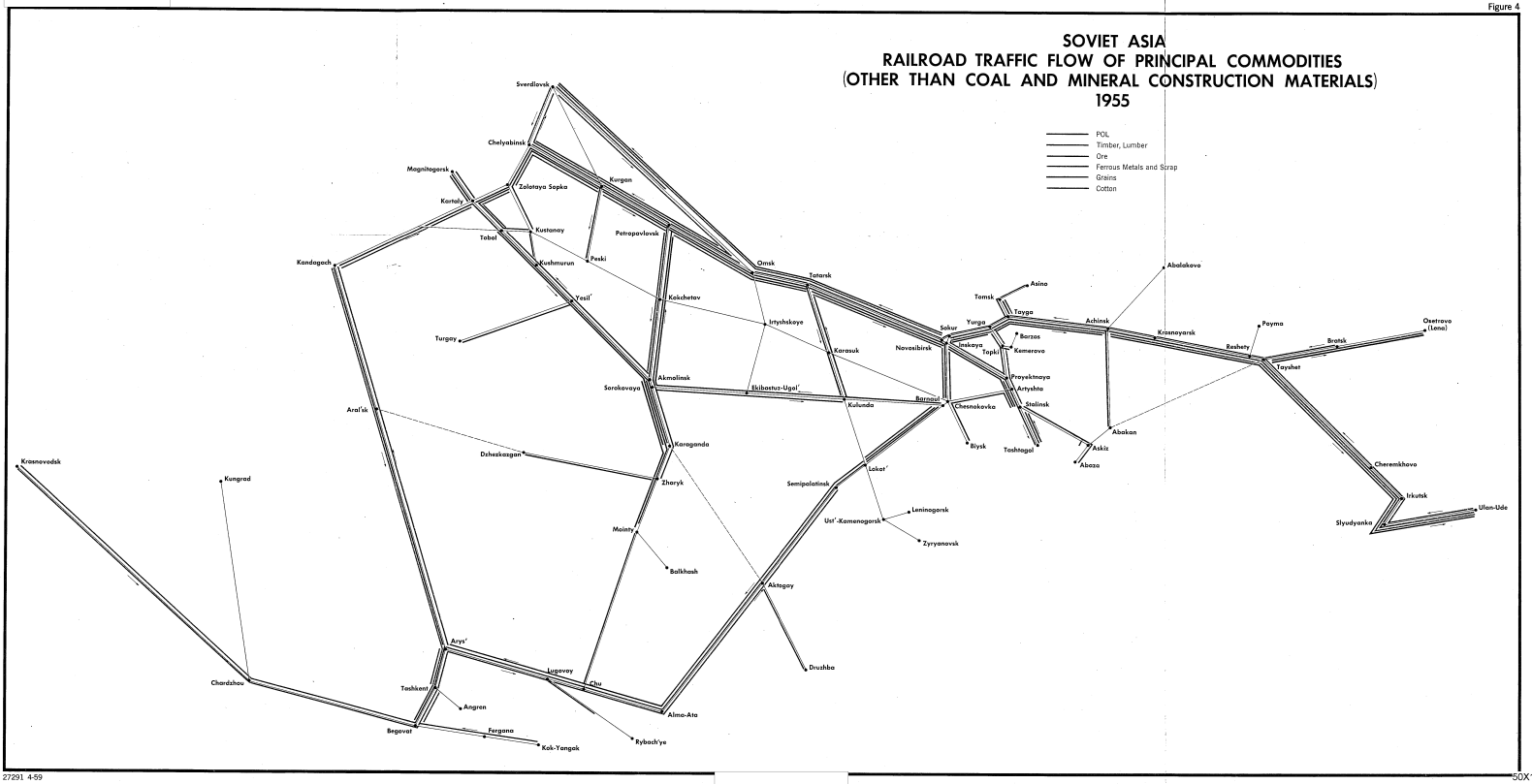
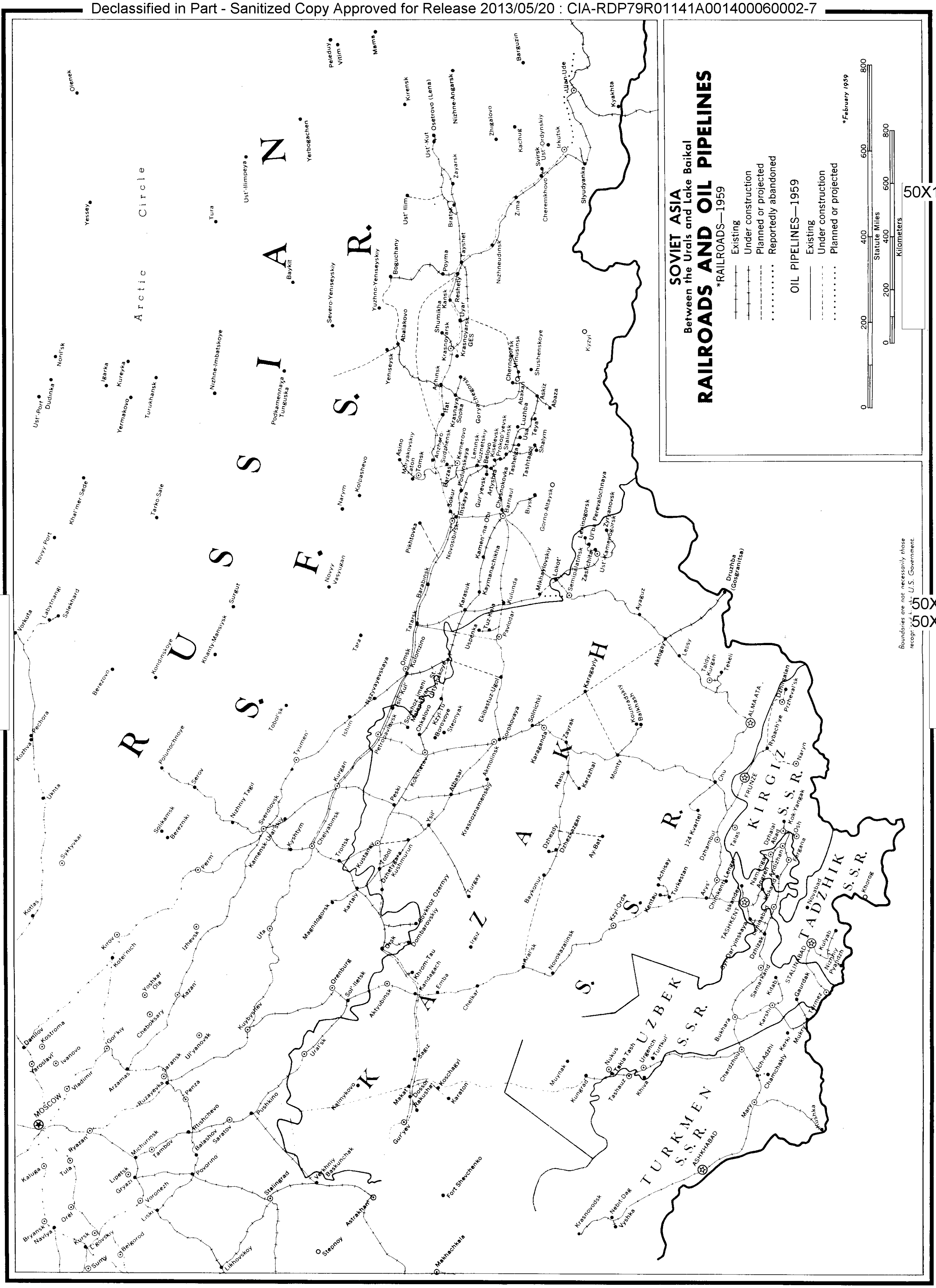


Figure 1



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