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ECONOMIC INTELLIGENCE REPORT

THE VOLUME AND CHARACTER OF TRAFFIC ON THE TRANS-SIBERIAN RAILROAD IN 1953

CIA/RR 82
9 November 1956

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

~~SECRET~~

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S-E-C-R-E-T

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(ORR Project 40.425)

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FOREWORD

The main purpose of this report is to furnish a graphic analysis of traffic estimated to have moved over the Trans-Siberian Railroad between Omsk and Vladivostok in 1953. The analysis was restricted to lines east of Omsk in order to permit concentration on that portion of the Siberian rail network on which all through traffic had to pass over one main line. The object has been to compile data on the major commodities hauled and to present them in such a form as to be immediately recognizable to persons familiar with similar studies on US railroads and to be readily comprehensible to the general reader. The over-all traffic charts* for the main line and branches of the Trans-Siberian Railroad which accompany the text should be considered as the end product of the report and should be examined with some care before reading the text on the railroad itself and on the individual commodities. The charts have been drawn up in a form somewhat similar to the Freight Traffic Density Charts published from time to time on individual US railroads by H.H. Copeland & Son of New York. The supporting text attempts to explain the principal movements shown on the charts, together with the reasons both economic and strategic for their existence.

This report is intended to be useful in pointing up past, present, and future economic developments and vulnerabilities of the USSR in the Far East. It has been prepared in response to a request of the Economic Intelligence Committee that CIA prepare traffic studies for various important transportation routes in the USSR [redacted] 50X1 [redacted] . 50X1

* Figures 3 and 4, inside back cover.

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S-E-C-R-E-T

THE VOLUME AND CHARACTER OF TRAFFIC ON THE TRANS-SIBERIAN RAILROAD IN 1953*

Summary

In 1953 the section of the Trans-Siberian Railroad** between Omsk and Vladivostok consisted of a double-track main line and a number of important branch lines, of which one was double track and the rest were single track. The rail line distance from Omsk to Vladivostok was 6,618 kilometers (km) (4,112 miles). The railroad was operated entirely by steam power except for the double-track Kuznetsk branch and the main line from Chulym to Novosibirsk, which were electrically operated. It was the only overland rail route connecting the European USSR with the Orient and the Pacific.

Traffic the length of the line was characterized by a through movement eastbound to the Soviet Far East and Communist China of about 6.1*** million metric tons**** of grain and strategic items; a return

* The estimates and conclusions contained in this report represent the best judgment of ORR as of 1 May 1956.

** Officially, there is now no railroad by this name. For the purposes of this report, the Trans-Siberian Railroad is regarded as the main railroad line extending 6,618 km east in Soviet territory from Omsk in West Siberia to Vladivostok in the Far East. In fact, the line is divided into seven administrative systems -- the Omsk, Tomsk, Krasnoyarsk, East Siberian, Transbaykal, Amur, and Far Eastern Railroads. (See the map, Figure 1, following p. 4.)

*** The data include all commodity and miscellaneous freight for civilian and economic purposes; for military industry; for logistical support of military operations in the Far East; for equipping and training new Communist units in China, North Korea, and the Soviet Far East; and for the construction of new military installations, military transport, and airfields. They do not include uneconomic hauling of commodities, such as crosshauls and duplicate hauls, nor do they include transportation in any direction of organic equipment of military units on the move. It is certain that both of these types of movement did take place to some extent during 1953, but they are not believed to have exceeded 2 million ton-kilometers per km over any portion of the line.

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

movement westbound of 3.3 million tons of nonferrous and agricultural commodities; and numerous local, regional, and interregional movements of major bulk commodities. The preponderance of flow was split from the center outward, with the bulk coal traffic which emanated both ways from Cheremkhovo, near Irkutsk, providing the main basis for the division. Although a high density resulted from the imposition of regional hauls upon through traffic over certain stretches and although some seasonal and operational tie-ups are believed to have taken place, the railroad fulfilled most of its economic and strategic assignments and accomplished its slated task in a generally satisfactory manner during the year.

The heaviest movement of freight over any portion of the Trans-Siberian Railroad east of Omsk in 1953 was on the partially electrified section (which was wholly electrified by October 1955) between Omsk and Novosibirsk. The eastbound movement on this section is believed to have been more than 16 million tons, and the westbound movement, in excess of 33 million tons. The latter included over 24 million tons of coal and coke bound from the Kuznetsk Basin coalfields mainly to the heavy industries of the Urals.

The section of the railroad from Irkutsk to Ulan-Ude around the southern shore of Lake Baikal, known as the Circumbaykal section, is regarded as its main physical bottleneck. Within this section the Trans-Siberian Railroad is estimated to have handled in excess of 8.8 million tons of eastbound freight and about 4.9 million tons of westbound. (The capacity of this section in 1953 has been separately estimated to be 12 million tons each way per year.) Traffic tonnages included 1.5 million tons eastbound to Communist China and North Korea and a return westbound movement of 1.9 million tons from China and North Korea. Of the total eastbound traffic, 4.6 million tons, including 400,000 tons of bituminous coal, were destined for points in the USSR east of Tarskiy. Taking into consideration the manner of loading commodities, it is estimated that from 260,000 to 300,000 cars were moved each way through the Circumbaykal section during the year. This is equivalent to an average of from 19 to 21 freight trains of 40 cars each per day.

The section of line with lightest traffic density in 1953 was the 501-km stretch between Ksen'yevka and Skovorodino. These points are east of Tarskiy, the westernmost junction point on the Trans-Siberian main line affording a connection with the Manchurian lines of Communist

China. Over 5.05 million tons were carried eastbound between Ksen'yevka and Skovorodino, and 1.65 million tons westbound.

In the Far Eastern sections of the Trans-Siberian Railroad, eastbound traffic between Khabarovsk and Vladivostok was estimated to be between 4 million and 6 million tons. Westbound traffic on various stretches of this section appears to have fluctuated between 2 million and 3 million tons.

Principal commodities carried on the railroad were coal; coke; petroleum and its products; timber; agricultural commodities; ferrous ores and metals; and a miscellaneous group which included nonferrous ores and metals, nonmetallic minerals (sand, stone, gravel, cement, and the like), chemicals, weapons and ammunition, paper, manufactured goods, and other items.

A small through movement of goods, 100,000 tons or less in each direction, between Communist China and North Korea on the one hand and Finland and the European Satellites on the other probably took place in 1953.

The requirement for specific types of cars to haul basic commodities in opposite directions resulted in a two-way movement of empty cars between Omsk and Novosibirsk and over other stretches of the main line as well as on some of the principal branches.

Traffic patterns generally similar to those of 1953 appear to have been sustained through 1954 and 1955, although there have been slight changes in proportion. Efforts were and are being made to relieve the railroad of long through movements of bulk commodities by the use of alternative facilities and routings with cheaper costs and by plans for increased and more appropriate use of indigenous natural resources for the supply of deficit areas.

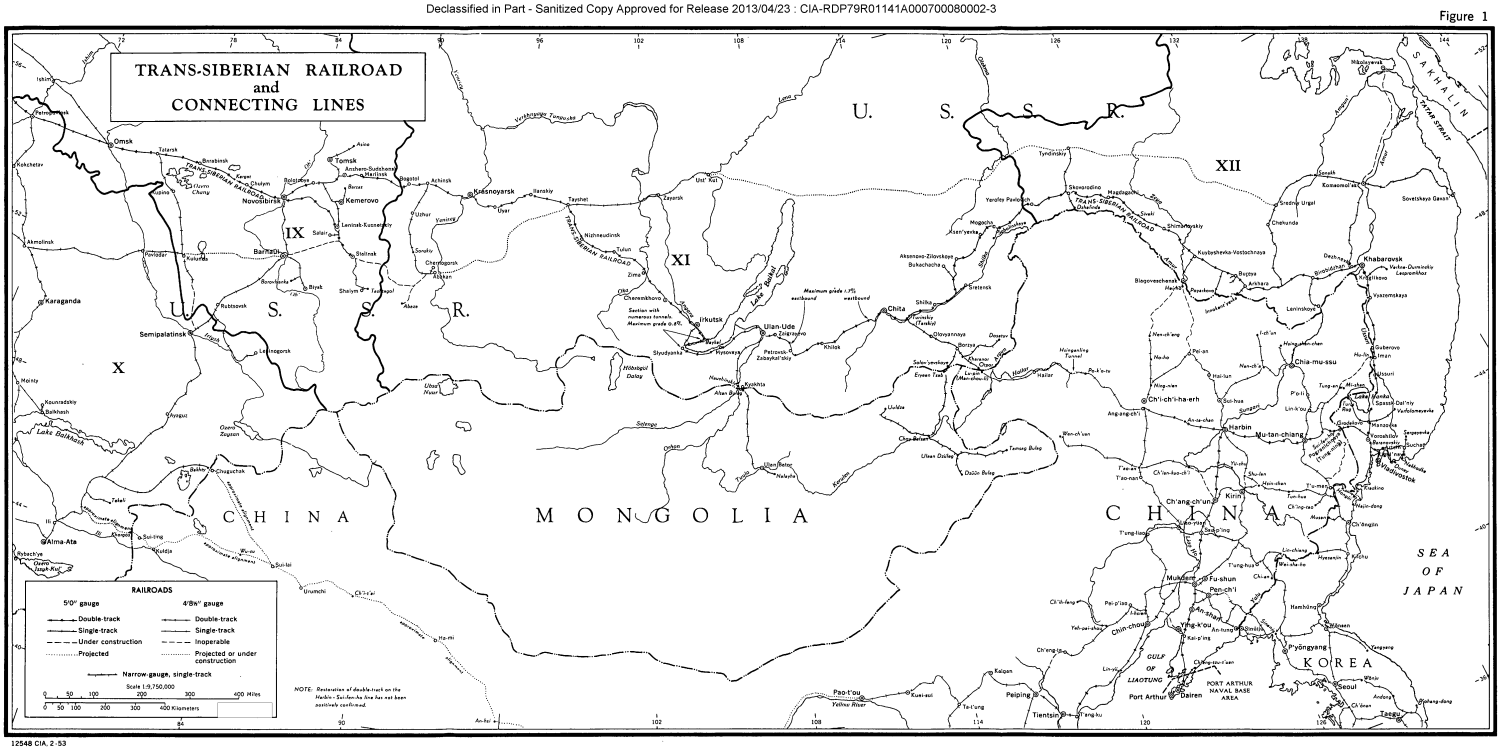
In assessing the strategic importance and vulnerability of the Trans-Siberian Railroad, the degree to which the position and influence of the USSR in the Far East and Pacific area is dependent on this railroad should be remembered, as should the extraordinary effort, in terms of actual labor, which has been expended in building, expanding, and modernizing it and which is being spent daily in keeping it operating at its present level.

The strategic importance of the Trans-Siberian Railroad has been illustrated by the manner in which the railroad has been used to support a buildup of Soviet air and naval strength in Northeast Asia and to circumvent the trade controls placed on Communist China following its entry into the Korean War. With continued peace, much Soviet traffic with the Far East and Pacific areas could revert in time to shipment by sea, particularly bulk traffic from and to points in the European USSR. Such a change to shipment by sea would have the effect of easing, if not actually reducing, the transport burden on the lines of the Trans-Siberian Railroad east of Lake Baikal. On the other hand, the build-up of Communist armed strength in the Far East continues, along with the retention by the USSR of all of maritime Siberia in a zone of military security. Should there be an intensification of the cold war or should open hostilities break out, the railroad again would be called upon to provide overland logistical support, probably to a greater extent than heretofore.

The most vulnerable section of rail line has been the Circumbaykal section, through which have had to pass all petroleum and its products, weapons, and ammunition bound from the west to the Far Eastern areas of the Sino-Soviet Bloc. The physical location of much of this section of line has added to its vulnerability from a military point of view. Despite construction of a cutoff from Irkutsk to Slyudyanka, the rest of the line along the south shore of Lake Baikal between Slyudyanka and Mysovaya remains strategically the most critical stretch because of the degree of effort which would be required to add to its trackage or to bypass it in time of emergency.

In the next few years the Trans-Siberian Railroad can be expected to retain its considerable economic and political importance and to increase in capability and performance because of the priority which is being attached to the installation of technical additions and improvements. The Sixth Five Year Plan (1956-60) calls for complete modernization of the main line, heavier rails, more electrification and dieselization, longer trains, automatic signaling, improved yards, and centralized traffic control. Although as much as one-third of the Chinese Communist traffic through Otpor may be diverted to the new Mongolian route, the Far Eastern lines will remain strategically important and may in due course be extended into undeveloped and remote regions not now served by rail. The main traffic growth, however, should continue to take place in the areas between the Urals in the west and Irkutsk and Ulan-Ude in the east, where there can be little question of the extent of the groundwork at present being laid.

Figure 1



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I. Introduction.

A. Evolution of the Line.

There were three main considerations that prompted the Tsar on 17 March 1891 to issue an Imperial Rescript to proceed actively with rail construction to the east. 1/* These were (1) the need to develop West and Central Siberian resources, (2) the need to protect Russian territory in the Far East and to increase Russian influence in that area,** and (3) the desire to open a new commercial route for exchange of products between Europe and the Orient. 2/

Although the utility of an overland line for movement of military traffic was recognized initially, the railroad was not conceived as a competitor for through bulk freight as it was believed that the water route via the Suez Canal would continue to offer lower rates for this traffic. Through passengers, mail, and high-value and refrigerated goods could, however, be expected to move over the new route in preference to the longer and hotter journey by water. 3/

B. Construction.

The first stone for the railroad was laid in Vladivostok on 19 May 1891. 4/ In order to speed construction, work was started on three sections at once, the line east of Lake Baikal being worked on separately from the tracks approaching from the west and east. The most difficult sections, those around Lake Baikal and along the Amur River, were given lowest priority because they were paralleled by navigable waterways and would place a disproportionately heavy strain on the construction forces. 5/

The target date for completion of the line originally was 1900. The Sino-Japanese war of 1895, however, with Japan victorious, caused the Russians to reconsider their plans. In 1896 the Russian Minister

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** Great Britain and other European countries had been instrumental in halting Russian expansion in the Balkans and at the borders of Afghanistan and Korea. The Canadian Pacific Railway had put fast liners into service in the Pacific, and Chinese steamers were plying the Sungari and Amur Rivers. The possibilities of Russia's being omitted from participation in the exploitation of China or of being thwarted elsewhere in the Far East were influential in the timing of construction.

Cassini obtained a concession from the Chinese government to build the railroad across Manchuria to Vladivostok with the right to guard it within Manchurian territory. 6/ This route would save 570 miles over the route north of the Amur River and, by going through easier country with plentiful labor, would permit of more rapid construction.

In early 1897, surveys were started for the Manchurian line, known as the Chinese Eastern Railway, and construction was commenced on 16 August. 7/ As a result of the change of routing, plans to construct the costly and circuitous Amur Railroad were suspended. 8/ The Far Eastern, or Ussuri, Line, from Vladivostok to Khabarovsk, however, was opened on 3 September 1897 9/ and was connected with Sretensk in the ice-free season by a system of steamers and barges on the Amur and Shilka Rivers. On 27 March 1898, Russia arranged a 25-year lease of Port Arthur and Talien (Dairen, or Port Dal'niy) from China, with the right to extend a railroad line southward from Harbin, on the Chinese Eastern Railway, to the leased area. 10/ This was bitterly resented by the Japanese.

The Siberian track from the west reached Irkutsk on 16 August 1898, 11/ but the Transbaykal section to Sretensk at the head of navigation on the Shilka River was not completed until 28 December 1899. 12/ A large ice-breaking ferry capable of transporting 25 loaded freight cars per trip 13/ was placed in operation in Lake Baikal in the autumn of 1900. 14/ The Chinese Eastern Railway was completed toward the end of 1901, 15/ giving Russia a strong position in Manchuria.*

As originally commissioned, the Siberian Railroad was single-track, 5-foot gauge, and was visually hand-signaled at intervals of about 1 km, except on curves where obstructed views necessitated shorter distances. Rail for much of the distance was 54 pounds per yard. Wood was used as locomotive fuel. 18/ The distance from Omsk via Harbin to Vladivostok was approximately 5,510 km, of which the water or ice route across Lake Baikal accounted for 70 km.

* This was the time of completion to Vladivostok. The Southern Manchurian branch was opened to Port Arthur on a limited basis at about the same time, with one mixed train per day moving in each direction. 16/ It was fully completed in July 1903. 17/

From 1900 to 1904, Russia received protests from many countries that its effective occupation of Manchuria was violating the "Open Door," but Russia, in turn, was dilatory and contemptuous. Japan eventually decided to take action before the Russians could complete the stretch of the Trans-Siberian around Lake Baikal. On 12 February 1904, 19/ when the lake was frozen and Russia was in a business recession, Japan commenced hostilities. The Japanese were victorious on land and on sea, and Port Arthur fell on 1 January 1905.

On 25 September 1904, however, the Circumbaykal stretch of railroad was completed, and the Russian flow of troops and supplies to Manchuria was stepped up from 2 trains each way per day to between 9 and 12. 20/ Nevertheless, the unpopularity of the war at home caused the Russians to agree to cease hostilities and finally to sign the treaty of Portsmouth on 5 September 1905. By this treaty, Russia ceded to Japan Port Arthur and Dairen together with the railroad from Kwan-cheng-tze (now a suburb of Ch'ang-ch'un) southward. The Japanese subsequently changed the gauge of this line (the South Manchurian Railroad) to European standard gauge, and for approximately 30 years Ch'ang-ch'un was the transloading point between gauges. 21/

Although left in control of the line across northern Manchuria, the Russians decided to revive the original plan for constructing the Amur Railroad which would connect Vladivostok with the Transbaykal in purely Russian territory. This portion of the line was started in March of 1908 and completed in 1914,* the main-line distance being 2,000 km, with branches adding approximately 300 km more. 22/ During this period, double tracking of the main line from Omsk to Tarskiy was also undertaken and, with the exception of a few bridges, was completed in 1918. In effect, Russia then had two tracks running from west of the Urals to Vladivostok. 23/

C. Function Under Soviet Control.

After the Soviet government came into control, over a decade passed before significant new construction took place. The First Five Year Plan (1928-32) included the development of the Kuznetsk

* The cost of this piece of line as a single-track railroad was estimated at US $100 million, or about US $50,000 per km. Tunnels and some earthworks were initially built to provide for two tracks.

Basin (Kuzbas) coal and the Magnitogorsk iron deposits in order to provide steel-making facilities in the Kuzbas so that a portion of the gondolas moving west with coal could return eastward loaded with ore. In 1932 this plan resulted in the double tracking of the main line west of Omsk to Chelyabinsk. 24/ In 1930 the Turkestan-Siberian (Turk-Sib) Railroad connecting Semipalatinsk, which was on a branch line from Novosibirsk, with Tashkent was put into operation, 25/ and in 1940 the line from Dezhnevka (near Khabarovsk) to Komsomol'sk on the lower Amur was constructed. 26/ During the 1930's a considerable extension of trackage in the Kuzbas was also completed. Coal-mining spurs were built into other coal centers, and wood for locomotive fuel was practically eliminated. All of these undertakings were intended to effect a general raising of the level of Siberian industrial activity based on local resources.

Regarding the more easterly lines, the USSR did not regain the Chinese Eastern Railway which during the Russian Revolution had fallen more or less under the influence of Japan. On 2 October 1920, control was turned over to the Chinese, with many Russians still employed by the company. 27/ A dual Sino-Russian management was set up in 1924 which continued until 1929, when the Communists tried to use their influence in the line as a means of provoking a revolution in Northern Manchuria. The Chinese expelled them, diplomatic relations were severed, and in November the USSR invaded Manchuria for a short distance, causing some destruction. 28/ In December the Chinese yielded, and, in accordance with the Khabarovsk Protocol, joint control was resumed. In the Japanese conquest of Manchuria (18 September 1931 to 31 May 1933), however, the USSR showed no disposition to defend the rail line. Instead, it pulled out a considerable portion of the rolling stock 29/ and on 11 May 1933 offered to sell the road and appurtenances to Japan. After much bargaining, the sale, for 140 million yen,* was concluded on 23 March 1935. 30/ The line soon afterward was converted by the Japanese to European standard gauge, with transloading points for the USSR at Manchouli and Pogranichnaya. Interchange traffic for a decade was practically suspended. The Soviet government, in evident reaction, started in 1933 to double-track the all-Russian route from Tarskiy around Manchuria and completed the undertaking to Voroshilov in 1939. 31/

* Equivalent at the contemporary rate of exchange to US $40 million.

Other than these changes, development of the Trans-Siberian Railroad in the 1930's was intensive rather than extensive, with a considerable program for increasing the number and enlarging the capacity of yards, sidings, and junctions. 32/ Rails of heavier weights were introduced, the standard being 88 pounds per yard on Class I lines.* 33/ Ballasting was undertaken in the most heavily traveled sectors, and a start was made on the provision of new equipment. 34/

Developments on the Trans-Siberian Railroad during and after World War II have included the construction of the branch lines to Sovetskaya Gavan', Urgal, and Ust'-Kut, the Irkutsk-Slyudyanka cutoff, the line across Mongolia to Communist China and the connection with North Korea at Hongui, together with partial electrification and dieselization of the main lines; the procurement of much new and modern equipment; and the continued improvement of the right-of-way with heavier ballast, treated ties, and rail in excess of 100 pounds per yard.

Regarding the Manchurian lines, a Soviet treaty with the Chinese Nationalists signed in 1945 established for 30 years joint Soviet-Chinese administration of the Chinese Eastern Railway. On 16 September 1952, with China in the hands of the Communists, it was announced in an official Soviet communiqué that the USSR had agreed to transfer to the Chinese without compensation full title to the Chinese Eastern Railway. 35/ The announcement was implemented on 31 December 1952, when Soviet representatives were withdrawn from the management, 36/ and the railroad is now completely operated by the Chinese Communists.

D. Traffic Developments.

On the western end the Trans-Siberian Railroad found at its inception a quantity of readymade freight in the form of agricultural and animal products. In 1898, large quantities of grain were brought to the railroad from the fertile districts of western Siberia and northern Kazakhstan for further transmission. 37/ In that year, Petropavlovsk shipped 50,000 tons of freight westward, 20,000 tons of which consisted of grain and most of the remainder of animal products. 38/ In the late summer there were about 220,000 tons of wheat available between Kurgan and Tomsk awaiting transportation. 39/ For the whole year the West

* In 1940, Soviet railroads were divided into four classes for the purpose of controlling roadbed standards. Class I was the highest class, with the heaviest standards.

Siberian Railroad (the present Tomsk and Omsk system*) carried about 500,000 tons of freight, and the Mid-Siberian Railroad (the present Krasnoyarsk and East Siberian systems*), carried 180,000 tons. 40/ In addition to grain and cattle, contemporary photographs also showed a movement of timber. 41/ On the Transbaykal section, however, there appears to have been comparatively little freight traffic before the Russo-Japanese War other than eastbound construction and military goods. 42/

During World War I the attempt was made to supply the Russian armies in Europe via Vladivostok and the Trans-Siberian Railroad, but serviceable equipment was scarce and movements of railroad coal and other supplies were poorly planned. 43/ By late 1918, many of the supplies had not moved beyond Vladivostok. In the Revolution which followed, a number of bridges and tunnels on the railroad were destroyed, and for several years traffic east of Lake Baikal was seriously interrupted.

As the Soviet government gained strength, the line was rebuilt. A Soviet traffic chart for the years 1927-28 shows a movement of tonnage on the main line with a pattern somewhat similar to that of today on a much smaller basis: for example, Cheremkhovo to Irkutsk eastbound, 760,000 tons, and westbound, 160,000 tons. 44/ Table 1** is an abridgement of the Siberian section of this chart. In 1928 there was one important exception to the 1953 pattern: the flow of goods through Otpor - Lu-pin (Manchouli) was negligible, with 60,000 tons going east and 10,000 tons returning west. Not all of this may have been for Chinese account, as the line was still Soviet-gauge and, at the risk of banditry, could have been used for through shipments to Vladivostok. The eastbound tonnage through Grodekovo to Vladivostok, however, showed a certain similarity to 1953, with 1,569,000 tons moved, divided approximately into two-thirds grain and one-third miscellaneous freight. Thus even in 1928 the Soviet Far East was importing Manchurian supplies, some of which, in turn, were transshipped or re-exported through Vladivostok.

During World War II the Trans-Siberian Railroad was heavily used to transport military and other Lend-Lease goods from east to west, and when the Donets Basin and the Ukraine were cut off, it moved extra supplies of coal and grain from Siberia to the Urals and

* See the map, Figure 2, inside back cover.
** Table 1 follows on p. 11.

Table 1

Freight Density on the Trans-Siberian Railroad a/
1927-28

Thousand Metric Tons

Main Line b/	Eastbound (Down) c/		Westbound (Up) c/	
Omsk-Tatarsk	680	670	2,600	2,610
Tatarsk-Novosibirsk	660	640	2,650	2,540
Novosibirsk-Yurga	510	500	2,560	2,610
Yurga-Tayga	480	490	1,820	1,860
Tayga - Anzhero-Sudzhensk	440	420	1,450	1,620
Anzhero-Sudzhensk - Achinsk	480	440	780	850
Achinsk-Cheremkhovo	470	470	610	610
Cheremkhovo-Irkutsk	760	760	160	160
Irkutsk-Tarskiy	720	590	140	150
Tarskiy-Skovorodino	450	300	130	140
Skovorodino - Kuybyshevka-Vostochnaya	260	330	170	170
Kuybyshevka-Vostochnaya - Khabarovsk	310	470	150	150
Khabarovsk-Voroshilov	360	650	280	220
Voroshilov-Ugol'naya	2,170	2,180	830	840
Ugol'naya-Vladivostok	2,510	2,240	210	250
Otpor Branch				
Tarskiy-Otpor	150	60	10	30
Grodekovo Branch				
Pogranichnaya-Voroshilov	1,560	1,580	280	260

a. 45/
b. The place names used are as they were in 1953.
c. The first of each pair of figures is the total tonnage departing from the initial point of each stretch. The second is the total of arrivals at the final point terminating the stretch. Thus in the westbound column the left-hand figures appertain to the second place names on each line, and the right-hand figures to the first place names.

Central regions. At the most critical moment of the German advance the railroad was used to draw upon the military component of the Soviet Far East, and the consequent weakening of that area momentarily left it vulnerable to possible Japanese incursion. The situation for the USSR was eased somewhat when the Japanese chose to strike east at Pearl Harbor instead of northward into Siberia.

In the first phase of the postwar period before the outbreak of hostilities in Korea, main-line traffic appeared from the only available observations 46/ to be running at an annual rate of not over 14,250,000 tons westbound from Novosibirsk to Omsk, the most heavily used portion. The roadbed was moderately good, and maintenance and ballasting gangs were observed in many places. No electrification of the main line had been begun, and relatively little postwar equipment was in evidence. Two-thirds of the freight cars observed were the 2-axle type. New 4-axle cars were almost all coal gondolas.

Reports received in the years 1950-52 indicate a sharp increase in the eastbound movement, beginning in the early spring of 1950 and increasing with the entry of Communist China into the Korean War. 47/ Simultaneously, coal traffic on the western sections from the Kuzbas to the Urals appeared to be steadily increasing.

E. The Instant Function.

As viewed from Moscow in 1953, the main economic importance of the railroad probably lay in the portions of the main line extending from Omsk eastward as far as Tarskiy, and in principal connecting branches in the same area including the line from Tarskiy to the Chinese Communist border at Manchouli, since movement of most Siberian bulk resources and of Chinese imports was encompassed there. The westernmost portion of the system served the grain lands of Siberia lying slightly south of the line in the flat steppe regions which it traverses between the Urals and the Ob' River and in Altayskiy Kray. 48/ Bread grains, as previously stated, had been raised in this region before the construction of the railroad, but the latter provided a major boost to their movement to markets in the west. In 1953 the extensive "new lands" program which was to take place in this region had not yet materialized.

From Novosibirsk eastward for some 300 km, the line skirts the Kuzbas, which contains Siberia's most important known coalfield. 49/ These bituminous deposits are reported to have reserves sufficient for

centuries. There are also major deposits of iron ore in the South Kuzbas area and the neighboring Khakasskaya Oblast, which are currently being opened for exploitation. On the surface the land takes a prairielike form, with low hills and ridges and timber appearing more frequently than on the steppes. 50/ The bulk of the coal and ferrous traffic is brought in on branches coming in from the south.

Coal deposits on the main line between the Kuzbas and Cheremkhovo are mostly lignite, exploitable for electric power and space heating, but not useful for metallurgical purposes or desirable for locomotive fuel. Principal loading points are Kansk-Yeniseysk, and Zaozernyy. Cheremkhovo, on the other hand, is an important source of low-volatile bituminous coal, which is usable for railroad and river boat fuel and for industrial and heating purposes. 51/

From Achinsk east to Lake Baikal the line passes for some distance through a hilly, heavily forested area. This portion together with the section between Ulan-Ude and Chita constitutes the main source of timber in Eastern Siberia. The branch line connecting Tayshet with the Lena River has recently become important for carrying forest products, penetrating as it does large stands of virgin timber to the north and providing a point of contact for numerous streams and winter roads. Along this section in Krasnoyarskiy Kray there is also a limited grain-producing area. 52/

The Circumbaykal section is scenic and picturesque and with its many rock tunnels could become a bottleneck or obstacle in the event of active hostilities. 53/ A newly constructed cutoff eliminates a portion of the distance. 54/ Relatively small but important tonnages originate in this area -- for example, mica, which is actively mined at Slyudyanka.

East of Ulan-Ude and extending as far as Chita the major commodity loaded is timber. Here the line ascends to the summit of the Yablonovyy Mountains, which it crosses at an elevation of 3,400 feet, descending again to Chita at 2,150 feet, which lies in more open plain country. 55/ Some bread grains are grown in this region, and beef cattle are raised in fairly large herds in the surrounding country. The climate is relatively dry, with a rainy spring.

At Tarskiy the single-track line leading to Manchouli, the transloading point for the Chinese Eastern Railway, branches off to the southeast.

Between Chita and Ksen'yevka lies an extensive district consisting first of an open, rolling prairie and later of the same type of terrain with a stunted tree cover. In this area are many deposits of nonferrous metals and nonmetallic minerals which have been under exploitation for years. At Bukachacha there is a fairly large deposit of bituminous coal which is mined chiefly for the use of the railroad. Spotty agriculture is carried on, but the country is not regarded as self-sustaining.

For most of the distance from Ksen'yevka to Khabarovsk the line passes through Amurskaya Oblast, which is one of the least hospitable regions encountered. The country consists of hills and swampy forest-land, and much of the soil is permanently frozen close to the surface. Such traffic as is originated consists principally of timber and bricks for building supplies. Blagoveshchensk, 108 km off of the main line, is an important transshipment point between the railroad and the river vessels moving in the open season down to points on the lower Amur River and on Northern Sakhalin. 56/ There are large open-cut lignite mines at Raychikhinsk on a branch line a short distance from the main line near Bureya.

Khabarovsk, on the Amur River, which the railroad reaches by crossing the river over a bridge a mile and a half long with 22 spans, is an important manufacturing center and the seat of government for Khabarovskiy Kray. From refineries here and at Komsomol'sk, products of the Sakhalin oilfields reach the main line. The country immediately south of Khabarovsk has excellent timber which is being actively cut.

For most of the distance south of Khabarovsk the railroad passes through the Ussuri valley, with timber-covered hills in the distance. Toward its southern end there is much cultivation, but along the main line mineral products are few. There is a large cement mill at Spassk-Dal'niy. The spur from Manchuria joins the double track at Voroshilov-Ussuri. At Ugol'naya a branch runs to Nakhodka, a recently developed port primarily for commercial vessels (some naval craft being based there also), with Vladivostok remaining the main naval base. On the way to Nakhodka are Artem and Suchan, where the best of the Soviet Far Eastern coals are mined, some Suchan coal rating as bituminous and being preferred for locomotive use over other local types.

A marked feature of Siberia with a bearing on transportation is the number of larger rivers flowing from south to north which the railroad must cross. Numerous substantial steel bridges mark these crossings, the two tracks frequently being carried on separate bridges short distances apart.

The eastern end of the Trans-Siberian Railroad in 1953 was regarded as of great strategic importance. 57/ Actual economic value of national consequence in the eastern regions of the USSR stems mostly from fishing, trapping, and the mining of nonferrous metals, but the area east of Chitinskaya Oblast is in the main a deficit area. Aside from the resources mentioned, there is little to attract industry or settlers. Russian governments up to and including the present have consistently encouraged or forced immigration into the Amur and Primorskiy areas, apparently regarding as essential the exploitation of the country's resources to provide a strong local economy for support of the military ground, air, and naval strength which they have sought to establish in the area.

Further east are the outlying areas consisting of Sakhalin Island, the Kuriles, the Kolyma district, Kamchatka, Anadyr', and Chukhotsk. These areas have in recent years been placed in the strategic category, and as such, they have to be furnished with foodstuffs, building materials, and military equipment and supplies from western areas of the USSR. Although some use has been made of the Northern Sea Route for such purposes, most of this movement has been across Siberia by rail and then by vessel from Vladivostok, Nakhodka, or Sovetskaya Gavan' to the port for the area of destination.

Some compensation to Soviet Far Eastern deficit requirements has periodically been forthcoming in the form of commodity imports from China. The most recent movement, starting in late 1949 or 1950, began to appear from Communist China. Local availability has the effect of reducing the requirement for shipping certain commodities long distances eastward across Siberia. This would be true of meats, a number of agricultural commodities, and salt used in fish packing. Other bulk commodities which Communist China produces in this area are also produced or could be produced across the line in Siberia, but Soviet supplies are either insufficient or raw materials are inadequate in quality. Under one or the other of these captions fall cement, crude iron, and bituminous coal. Barter payment for these heavy goods can be made in the form of Soviet petroleum and its products, weapons, and manufactured goods sent to China via rail

through Otpor. 58/ The Soviet Far East thus has been able to benefit from indigenous Chinese labor, whereas Soviet labor, which produces goods in compensation, has remained in the manufacturing centers of the western portions of the country.

Petroleum resources in Siberia which were being exploited in 1953 lay for the most part on Sakhalin Island, where current output was insufficient to meet the regional requirements of the Soviet Far East alone. Consequently, although oil did not originate at any point on the line, the Trans-Siberian Railroad was a heavy hauler of petroleum products from oilfields east of Omsk and south of Novosibirsk to points in Western and Eastern Siberia, to the Soviet Far East, and to China. To offset temporary local shortages, the Soviet government has established along the railroad line regional storage points apparently for spotting reserve supplies pending consignment to ultimate destinations.

II. Status of Main Line and Branches.

The location of the main line and branches of the Trans-Siberian Railroad east of Omsk in 1953 is believed to be substantially as shown on the accompanying map (see Figure 1*). The main line has been uniformly reported to be double track throughout its length from Omsk to Vladivostok except for the Amur River bridge west of Khabarovsk, which is single track.** All other lines leading to and from the Trans-Siberian Railroad have been reported as single track, with the exception of the electrified Kuznetsk branch line, which is double track from Novosibirsk to Stalinsk (Novokuznetsk Station). 59/

From reports of travelers over the Trans-Siberian Railroad in 1948, 1949, and 1950, 60/ there appears to have been a sizable amount of line rehabilitation done in those years, with much relaying of rails, replacement of crossties, and rock ballasting. Later travelers have noted that the line seems to be in relatively good condition. 61/ Numbers of creosoted crossties have been installed on the main line, although there are still many untreated crossties, particularly on branches. The main line rail is believed to weigh about 50 kilograms per meter (or about 110 pounds per yard). Women were observed to be doing most of the rehabilitation. No prisoners of war apparently have worked on the main line, 62/ although on branches and at ports, Japanese prisoners of war have done construction and maintenance work.

In 1953, except for the main line stretch from Novosibirsk to Chulym and the Kuznetsk branch line from Novosibirsk to Stalinsk, which were electrified, the railroad was operated wholly by coal-burning steam power. Double-heading of loaded freight trains of 40 cars and more seems to have been a common practice on many divisions.

Whereas the condition of the Trans-Siberian main line east of Omsk has been directly reported, the status of a number of important branch lines, newly constructed or in various stages of construction, is not

* Following p. 4, above.

** There is [redacted] a standby single-track tunnel under the Amur close to the Khabarovsk bridge. 50X1

equally clear. Opening of certain of these lines could produce immediate changes in the traffic pattern and would in any event provide alternative routes or additional capacity for meeting emergencies.

The segments of the South Siberian Railroad from Kulunda through Barnaul to Artyshta and from Stalinsk to Abakan appeared from 1953 reports to be nearing completion, and the former has since been put into operation. 63/ This system should be able to relieve the Trans-Siberian Railroad of all coal traffic bound from the Kuzbas for Barnaul and points south, of a substantial portion of the coal bound from the Kuzbas for Magnitogorsk, and of the iron ore returning from Magnitogorsk to the Kuzbas.

There is some question about the existence of a branch line directly connecting Anzhero-Sudzhensk with Barzas and Kemerovo. In this report, traffic therefore has been plotted as moving via Yurga and Topki. A cutoff line would be a reasonable expectation if a large eastbound movement of coal were anticipated.

There is no on-the-spot information on the so-called BAM (Baykal-Amur Magistral) line indicating that work was being pushed eastward from Ust'-Kut in 1953. The indications on the map, Figure 1,* of the Trans-Siberian Railroad regarding this line are based on previous planning information. The line from Urgal to Duki (on the way to Komsomol'sk), which is believed to possess special fortifications** in the Duse Alin mountain sections, was estimated to be open but not used for through freight to Komsomol'sk. 64/

Although little is known about a possible direct rail connection between Raychikhinsk and the Amur River port of Poyarkovo, the project would be so logical and simple that, based on a few indications, the line has been presumed to exist and traffic has been plotted as moving directly instead of round about via the main line. 65/

From repatriates' reports it is estimated that the port of Nakhodka grew from 5 to 6 times in size between September 1949 and August 1953, and there are indications that at least parts of the branch line leading from Nakhodka to Ugol'naya are being double-tracked. 66/ This port is still

* Following p. 4, above.
** Subterranean troop and storage rooms connected with the Duse Alin tunnel.

receiving much emphasis and apparently is to serve as an alternative to Vladivostok, particularly with regard to such foreign-flag ships as are permitted to approach the Soviet Far East.

In a recent Soviet announcement it was stated that the Sixth Five Year Plan (1956-60) would embody "strengthening the material and technical base of the railroad line, increasing its transportation and traffic capacities, and other large-scale construction work." 67/* Thus reports of further material progress may be expected in the future from travelers over the main line.

* It has also been announced that the Sixth Five Year Plan would include electrification of the entire distance from Moscow to Irkutsk, with later plans to extend electrical operations to Vladivostok. 68/ Automatic and up-to-date signaling and traffic-control devices are being installed on the Urals - West Siberia route. 69/ Heavy rails and rock ballast are becoming the complete order of the day. Diesel engines have been introduced on the stretches in the driest country of the Transbaykal and Omsk systems. 70/ They are being used exclusively to operate the Mongolian Railroad.

III. Traffic.

A. Volume, by Section.

The volume of traffic which was moved over the Trans-Siberian Railroad in 1953 varied by section, depending upon the points of origin and destination of the major bulk resources. Manufactured goods were of little influence in altering the comparative density from point to point.

Table 2* shows totals of tonnages moved on the main line, by section, and on branches connecting with Communist China in 1953. These totals were derived by accumulating for each segment the commodity estimates described individually in IV, below.

The estimate of traffic density on the Tatarsk-Novosibirsk section, based on movements of commodities of recognized identity, totals slightly less than 40 million tons, with 9.2 million tons moving east and 30.65 million tons moving west. There are several Soviet statements, however, which upon analysis of actual application provide three unusually consistent figures of density for the Omsk system over a period of 5 years. 71/ These lead to the conclusion that the average density for all traffic (in this case including all military traffic as well as cross and duplicate hauls) for the main line between Chulym (near Novosibirsk) and Omsk came to nearly 50 million tons in 1953. This was by far the greatest traffic density for any portion of the Trans-Siberian Railroad covered in this report and, [redacted] one of the most heavily used pieces of track in the USSR. 72/ 50X1 50X1

The proper division of the approximately 10 million tons of unaccounted-for freight by direction of flow has been difficult to determine, but on the assumption that the underestimates were principally in petroleum and its products and in nonferrous building materials, both of which would have moved eastward, a split of 7 million tons eastbound and 3 million tons, largely of coal, westbound for points beyond the Urals 73/ is believed to constitute a logical, if somewhat crude, supplementary set of figures. The otherwise empty coal cars returning from the Urals to the Kuzbas would have provided suitable shipping space for stone, gravel, slag, and brick, whereas cement would have had to move in closed cars.**

* Table 2 follows on p. 22.
** Continued on p. 24.

Table 2

Estimated Tonnage Moved on the Main Line of the Trans-Siberian Railroad, by Section, and on Branches Connecting with Communist China
1953

Thousand Metric Tons

Section	Eastbound (Down)		Westbound (Up)	
Main Line a/*				
Omsk-Tatarsk	9,000	+ 7,000 b/	29,900	+ 3,000 b/
Tatarsk-Novosibirsk	9,200		30,650	
Novosibirsk-Yurga	7,700		19,950	
Yurga-Tayga	8,300		14,950	
Tayga - Anzhero-Sudzhensk	7,550		15,150	
Anzhero-Sudzhensk - Mariinsk	7,700	+ 2,500 b/	9,500	+ 1,500 b/
Mariinsk-Achinsk	7,750		9,800	
Achinsk-Krasnoyarsk	8,250		8,150	
Krasnoyarsk-Kansk	7,050	+ 1,500 b/	13,350	+ 1,000 b/
Kansk-Tayshet	7,050		10,500	
Tayshet-Zima	7,050		9,200	+ 500 b/
Zima-Cheremkhovo	7,400	+ 1,000 b/	8,550	
Cheremkhovo-Irkutsk	12,150		4,650	
Irkutsk-Mysovaya	8,800		4,850	
Mysovaya - Ulan-Ude	8,550		4,700	
Ulan-Ude - Petrovsk-Zabaykal'skiy	8,200		4,200	
Petrovsk-Zabaykal'skiy - Chita	7,800		4,150	
Chita-Tarskiy	7,000		3,700	
Tarskiy-Kaganovicha	5,000		1,700	
Kaganovicha-Ksen'yevka	5,400		1,400	
Ksen'yevka-Skovorodino	5,050		1,650	
Skovorodino - Kuybyshevka-Vostochnaya	4,700		2,250	
Kuybyshevka-Vostochnaya - Bureya	4,350		2,850	
Bureya-Birobidzhan	6,750		1,450	
Birobidzhan-Dezhnevka	6,100		1,350	

* Footnotes for Table 2 follow on p. 24.

Table 2

Estimated Tonnage Moved on the Main Line of the Trans-Siberian Railroad, by Section, and on Branches Connecting with Communist China
1953
(Continued)

Thousand Metric Tons

Section	Eastbound (Down)	Westbound (Up)
Main Line a/ (Continued)		
Dezhnevka-Khabarovsk	5,050	2,000
Khabarovsk-Kruglikovo	4,050	2,700
Kruglikovo-Guberovo	4,250	2,100
Guberovo-Ussuri	4,300	2,150
Ussuri - Spassk-Dal'niy	4,350	2,350
Spassk-Dal'niy - Manzovka	4,600	2,750
Manzovka-Voroshilov	4,600	3,050
Voroshilov-Ugol'naya	5,400	2,800
Ugol'naya-Vladivostok	6,200	650
Branches Connecting with Communist China c/		
Otpor Branch		
Tarskiy-Otpor	1,830 to 1,700 d/	2,080 to 2,220 d/
USSR-Communist China and North Korea trade only	1,470 e/	1,930 e/
Transit only	50 e/	100 e/
Grodekovo Branch		
Pogranichnaya-Voroshilov	1,780	470
USSR -- Communist China and North Korea trade only	1,450 e/	380

Table 2

Estimated Tonnage Moved on the Main Line of the Trans-Siberian Railroad, by Section, and on Branches Connecting with Communist China
1953
(Continued)

a. Rounded to nearest 50,000.
b. Supplemental adjustment to meet Soviet announced volume.
c. Rounded to nearest 10,000.
d. The first figure indicates the amount leaving the initial point; the second figure indicates the amount arriving at the other end of the branch.
e. Included in total above.

For the sections from Yurga as far east as Irkutsk, the tonnage moved in both directions taken together has been estimated at varied levels between 15 million and 23 million tons. Here again a statement in a recent Soviet article leads to the belief that an underestimate of about 4 million tons may have been made for this distance as a whole, with the split roughly calculated at 2.5 million tons eastbound and 1.5 million tons westbound. 74/

In a 1954 speech, Lazar M. Kaganovich, First Deputy Chairman of the Council of Ministers of the USSR and formerly Peoples Commissar of Railroads, alluded to the Omsk and Tomsk systems as having routes with the heaviest loadings and densities in the USSR and meeting their transport plans with difficulty. 75/

A traveler interviewed upon his return from the Far East in 1953 was under the impression that between Irkutsk and Novosibirsk his train had met 25 freights during the daytime headed east. 76/ Other more careful traffic counts are discussed in Appendix A.

The amount of freight which moved up the Otpor branch line from Communist China and North Korea in 1953 has been estimated to have been 2.03 million tons. (See Figure 2* for a map of the overall railroad system of the USSR.) Most of this freight passed over the main line to points west of Omsk, but a sizable amount, consisting of Chinese agricultural products, is believed to have been

* Inside back cover.

dropped off at Siberian towns en route, so that its volume steadily diminished with its progress. Traffic moving in the opposite direction to Communist China and North Korea was about 1,520,000 tons upon reaching the border, the largest single item being oil. The manufactured items and most of the oil originated west of Omsk.

In the section between Irkutsk and Mysovaya the oriental traffic consisted of 1.9 million tons westbound and 1.5 million tons eastbound. The remaining Soviet traffic through the section around the lake consisted of 2,950,000 tons westbound (including more than 1 million tons of timber), and 7.3 million tons eastbound. The latter pair of figures illustrates the comparative tonnages to and from the Transbaykal and Soviet Far Eastern areas in 1953. The Irkutsk-Mysovaya stretch includes the part of the Circumbaykal line, which was most difficult to construct and is hence regarded as a long-term bottleneck.

The traffic at Skovorodino, 1,829 km further east than Mysovaya, consisted of 1,650,000 tons headed west as opposed to 5,050,000 tons arriving from the west, both figures presumably including Soviet freight only. Comparison of figures for Skovorodino and Mysovaya would give the impression that 2.6 million of the 7.3 million tons eastbound in the Circumbaykal section was destined for the Transbaykal area (Buryat-Mongol'skaya ASSR and Chitinskaya Oblast). This figure is probably realistic in view of the scant amount of goods picked up in this region for movement further east.

It is difficult to estimate the volume of traffic in the Pacific coastal area, because of lack of observations and absence of tangible data in Soviet publications. Local announcements in the press and radio give the impression of a much greater degree of activity in this area than the population and raw material resources seem to warrant. On the other hand, concerning the exchange of goods between the USSR and China through Pogranichnaya, it was reported in 1952 that both the movement and the goods were there. 77/ In addition to oil from Komsomol'sk, large quantities of military supplies were being sent to China, including torpedoes, search lights, tanks, self-propelled guns, artillery, and many motor vehicles. The Chinese Communists were exporting primarily soybeans, with lesser amounts of rice, flour, peanuts, meat, and vegetables, together with cement, salt, alcohol, and nonferrous concentrates. It would thus appear that in 1952, for some reason not altogether clear, a considerable amount of Soviet-Chinese traffic must have avoided Otpor and moved around

Manchuria on the Amur and the Far Eastern systems to Grodekovo. The possibilities of a traffic problem at Manchouli or the use of Manchouli facilities for specialized military purposes are strong. Since 1952 a large new transfer station has been constructed at Otpor, the progress of which has been witnessed by travelers in successive years. 78/ In making the 1953 estimates, therefore, it was assumed that all items which more logically should have moved to China via Otpor and Manchouli rather than via Grodekovo and Pogranichnaya actually did so.

A few of the traffic conditions considered in preparing volume estimates should be mentioned. [redacted] 50X1 50X1 From reports of prisoners of war, particularly those working at storage points, however, it was apparent that some commodities were being shifted around in an illogical manner. Remarks in the speeches of Soviet leaders and articles in the press criticizing railroad performance confirm that flaws in centralized planning resulted in wasted transportation of this type. 79/ Despite this news, it was not believed advisable to attempt to provide allowances in the commodity estimates for uneconomic movements such as backhauls, crosshauls, or duplicate hauls. Movements of military units with organic equipment have also been omitted, even though units on the move have been seen by observers and such movements would in any event be expected. There is no method of determining how great movements of both these types were or where they were concentrated, but it would seem safe to say that on no section of the line would their combined weight in both directions have exceeded 2 million ton-kilometers per km of route, and it is probable that over most of the line they came nowhere near this figure.

The volume of waterway interchange was another problem. For this purpose, it was necessary to give some consideration to the availability of river transport. Waterways in Siberia are used from only 6 to 7 months a year, and then largely for transportation of such goods as timber, oil, and grain. Of the total Soviet movement of these items, the proportion which is carried on the railroads is generally less than that of coal, ferrous metals, and miscellaneous freight. For example, of total coal mined in the USSR in 1953, 90 to 95 percent was carried by rail, and most of the remainder was consumed at or near the mines. Rail movement of timber, however, was only about 50 percent of the total cut, with waterways accounting for most of the balance. 80/

In 1953 the Trans-Siberian Railroad was not paralleled by a significant volume of motor transport. Road vehicles were engaged mainly in performing short hauls, such as delivering goods to railroad stations and river ports and carrying freight to smaller towns and villages not served by either rail or river. There were exceptions, such as the Aldan highway from Bol'shoy Never to Yakutsk and various roads in Primorskiy Kray and the Kolyma River area, but highway transport was in a relatively undeveloped state in 1953 and requires little consideration in estimating through rail movements.

It was difficult to estimate traffic on branch lines, because of lack of observations. A few reports of prisoners of war who did construction and improvement work on the branches included traffic observations, but as a rule such reports were out of date and vague as to freight volume. On most branches where movements of individual commodities were uncertain (and in any event appeared too small for charting purposes), they were for convenience lumped together under miscellaneous freight.

Observations in 1953 and at later dates are uniform in stating that there seemed to be a considerable park of spare locomotives on the Trans-Siberian Railroad, 81/ so that the volume estimates did not need to be restricted by this type of shortage factor.

B. Directional Imbalances in Traffic Flow.

The greater weight of traffic movement over stretches of the Trans-Siberian Railroad west of Cheremkhovo in 1953 moved toward the west, whereas east of Cheremkhovo the preponderance was generally eastbound. This pattern was due to the facts that (1) the bulkier Siberian resources, such as coal, coke, and timber, which are needed in Kazakhstan, the Urals, and the European USSR, were available in quantity from Cheremkhovo west, while (2) on the eastern extremity of the line, regions which normally supply mainly fish, nonferrous ores and concentrates, and furs had for strategic reasons to be supported from the west with heavier foodstuffs, construction materials, oil, military equipment, and manufactured goods.

In 1953 the Trans-Siberian Railroad was faced with a disproportionate volume of traffic of over 2 to 1 westbound between Novosibirsk and Omsk and of about 2-1/2 to 1 eastbound average between Chita and Khabarovsk. Owing to its length and the three major types of freight for which the railroad was originally designed --

(1) Siberian resources, (2) strategic support items for the Far East, and (3) overland international trade -- there have developed on its main line separate zones of unbalanced movement, the components of which cannot readily be made to counteract one another. Contributing factors to the inflexibility of this situation are (1) the location on branch lines of major points of origin and destination, (2) intervening distances between zones having opposed traffic balances, and (3) scarcity of bituminous coal of good quality along the Transbaykal and Amur systems.

C. Traffic versus Capacity.

The traffic accounted for in this report falls considerably short of the capacity of the Trans-Siberian Railroad, which was estimated to have been 33,000 tons each way per day (33 trains of 1,000 tons each) in 1953 for the Circumbaykal section. 82/ These daily capacity figures would convert to 12 million tons per year as against the eastbound traffic of 8.8 million and the westbound traffic of 4.9 million, the latter movement being lighter in tonnage but presumably equal in number of cars moved, since the Trans-Siberian Railroad was the sole artery of transportation between east and west at this point. The cushion between 1953 traffic and capacity was thus about 3 million tons per year eastward. The car movement has been estimated to have been from 260,000 to 300,000 cars each way per year, or 18 to 21 trains per day of 40 cars each.

Should a crisis occur in the Far East within the foreseeable future, the logistical support of the Sino-Soviet Bloc in Asia would fall almost entirely upon the Trans-Siberian Railroad between Novosibirsk and the Chinese Communist border stations. The best way of forcing traffic up to a capacity level in the event of hostilities would be to deprive the Far Eastern areas of the Sino-Soviet Bloc of local sources and imports of petroleum, large quantities of which would then have to be hauled through the Circumbaykal bottleneck. As time passes, civilian requirements for petroleum and its products in East Asia will also undoubtedly rise.

It is estimated that the through capacity estimate of 33 1,000-ton trains each way per day for the Circumbaykal bottleneck was exceeded in 1953 performance on various segments east of Novosibirsk (with an estimated 40 trains each way per day) and west of Novosibirsk (with an estimated 56 trains each way per day). There are indications

that lines and yards in the latter areas, particularly in the electrified Omsk-Novosibirsk section, can now handle somewhat more than 56 trains each way per day. 83/

A form of increasing Soviet railroad efficiency and hence capacity which was started in 1952 and has been stressed in the USSR in the last 3 years is the operation of above-norm-length trains. The norm for coal trains on the Kuznetsk-Chelyabinsk line has been raised in successive stages from about 3,000 tons in 1950 to 4,000 tons in 1955, with 4,500 tons prescribed for 1956. 84/ (These figures are believed to represent gross tons rather than net tons, since few trains of 70 cars were observed on this line in 1953.) In order to support traffic increases planned for the next 5 years, heavier trains would seem to be essential unless additional tracks are to be laid. [redacted] by 1960, coal shipments alone are supposed to rise 60 percent over 1953 for the whole of the USSR. 85/ Shipments from the Kuzbas are expected to be between 36 million and 40 million tons per year in 1960. 86/ 50X1

Although the present general pattern of commodity movements on the Trans-Siberian Railroad may be expected to continue for several years, new forces and situations, both economic and military, are constantly influencing the transport plans of the USSR. Whereas in 1953, for example, the Trans-Siberian Railroad had a monopoly of all east-west traffic moving across Asia, alternative routings are being brought into existence with the progress of new railroad construction -- for example, the Trans-Mongolian Railroad, which has been opened to traffic, adds capacity to the Soviet railroad system from Ulan-Ude to the east. 87/ An extension of the Chinese Lung Hai Railroad through Sinkiang to Kazakhstan is also under way. The South Siberian Railroad, now open for most of its distance, makes possible a direct routing of coal, chemicals, fertilizers, and steel from the Kuzbas to the Turk-Sib Railroad at Barnaul, to the "new lands" area, and to points west; of grain in both directions; and of iron ore, salt, and oil into the Kuzbas from the west and south. It provides a route parallel to the main line of the Trans-Siberian Railroad from Stalinsk to Magnitogorsk. An eastward extension to Abakan will soon be open. Since Karaganda coal is already being shipped to the Urals over the western portion of the South Siberian Railroad, the routing of Kuzbas coal to consuming centers in the Urals other than Magnitogorsk over this single-track line rather than over the electrified double-track line of the Trans-Siberian Railroad

would under ordinary conditions be of doubtful efficiency and economy. The line is nevertheless available to provide additional east-west capacity in this part of Siberia, and there are already plans afoot for its double tracking. 88/

D. Car Distribution and Empty-Car Movement.

A complicating factor in handling traffic over the long distances of the Trans-Siberian Railroad has been the inability to load back to area of origin types of freight cars which are used for bulk movement of particular commodities. This necessitates a sizable return movement of empty cars over parts of the line and, where certain commodity flows overlap, a two-way movement of empties.

The volume estimated for the major commodities together with their respective patterns of shipment suggests several routes of probable empty movement. For example, with Cheremkhovo a center of preponderant outloading in both directions, there would have had to be an inbound movement of empties. These empty movements have been confirmed by Soviet announcements and critiques and by US and other Free World visual observations.*

It would be interesting to analyze for each major system of the Trans-Siberian Railroad the movement pattern of loaded cars and the consequent problem of empty cars with which the railroad was faced. For instance, it is very likely that the Transbaykal system, receiving a large flow of westbound empty, closed cars at Ksen'yevka from farther east and facing a demand for this type of car at Otpor, moved a quantity of these empty cars back down the branch from Tarskiy to Otpor to be loaded with goods imported from China and destined for points west. The same sort of situation probably arose at Yurga, with stricter qualifications for types of cars regarding Kuzbas traffic.

Oil tank cars were a particular problem. Only a relatively small portion of those hauled east could be return-loaded at all: vegetable oils were loaded on a few after they had been carefully cleaned, but the rest of the tank cars had to be hauled back empty. At Novosibirsk, which was itself a large oil-consuming center, petroleum from the west and south converged. The main flow went from Novosibirsk eastward on the main line, and a lesser amount

* See Appendix A.

moved southeastward into the Kuzbas. There was also a downstream water movement of petroleum and its products on the Ob' River, seasonal in nature, with a major loading point near Novosibirsk. Some of the oil coming from Central Asia may have been transloaded onto barges near Barnaul, where a transfer point has been sighted. 89/ The net effect of these moves, however, seems still to have left over 120,000 empty tank cars to move west from Novosibirsk toward Omsk and probably 15,500 more to return southward toward Tashkent. This situation can only be mitigated by shipping oil in tankers from the Black Sea to the Far East and by construction of pipelines from the Ural-Volga fields to Siberia. Both of these steps are now being taken. 90/

Considering the partially electrified stretch from Novosibirsk to Omsk* as an example by which to illustrate the magnitude of the empty car problem, it appears that in addition to tank cars some other types of cars were involved. For 1953 the net eastward balance of gondolas returning empty to the Kuzbas from Omsk and the Urals after delivering their loads of coal and coke has been estimated to be approximately 480,000 cars (assuming average westward loading of 45 tons of coal to the car). 91/ These cars could not be loaded east for points much beyond Anzhero-Sudzhensk, because most of them were required to pick up coal in the Kuzbas area for movement west. 92/ In an effort to reduce this movement, coal has been loaded west upon low-sided flatcars arriving with merchandise or coming to the Kuzbas from timber regions, a practice which itself has been publicized as uneconomical. 93/

Empty flatcars showing signs of having recently carried timber have been sighted bound eastward in the Omsk-Novosibirsk section and in the distance between Barnaul and Novosibirsk bound northward. This observation leads to the belief either that the points of delivery for the timber were near enough to the points of origin to warrant returning the cars empty rather than sending them farther afield in search of a return load or that the quantity of suitable return loads between the two areas was less than the requirement for timber shipments.

50X1

* Partially electrified in 1953; wholly electrified by the end of 1955.

50X1

50X1

the actual westward movement in 1952 may have included empty boxcars reserved for special purposes, such as grain and agricultural products, and it is probable that despite imports of such goods from China, which would fill some of the cars, suitable return loads from the Central Siberian and Kuzbas areas as a rule could not be found. In 1954, one observer reported that over 50 percent of the westbound boxcars between Omsk and Novosibirsk seemed to be empty. 95/ This proportion may be high, but it seems safe to assume that boxcars reserved and perhaps especially constructed for the movement of bulk grains, flour, and other edibles would not be used on the return trip for either coal or timber.

Since the Trans-Siberian Railroad was the only east-west line operating across West Siberia in 1953 (there being no alternative route by which eastbound cars could return west), the car movement pattern would have had to remain in close balance over a period of a year, even with allowance for seasonal movements, tieups, and emergencies, in order to avoid either a buildup of idle cars or the creation of shortages at points east of Omsk. 96/ With the opening of portions of the South Siberian Railroad the following year, this statement would no longer be valid west of Novosibirsk.

Figures breaking down the commodity estimates into presumed numbers of cars required and other statistics showing resulting minimum car trial balances on the Tatarsk-Novosibirsk section are shown

in Tables 3 and 4.* By minimum car trial balance is meant a theoretical car balance including the assumed movement of a minimum number of empties based on accurate planning and the practical elimination of seasonals. Performance probably did not match such a trial balance in 1953 any more than was indicated in the 1952 reference, and undoubtedly a substantial number of empty cars moved in both directions over and above the minimum. Moreover, if the westbound movement of miscellaneous freight actually was lower than the estimate presented in this report, the effect would have been for more boxcars to return west empty.

It is interesting to note that the total number of cars calculated in the trial balance in Table 4 as having moved in each direction between Tatarsk and Novosibirsk came to 1,007,390 (or 995,050 if the small offset is deducted), whereas in Appendix A of this report the average daily equated car movement figure resulting from five observation trips in 1953 and 1954 was calculated as 2,487, which multiplied by 360 days per year gives 895,320 cars.

In the light of these calculations, this report concludes that approximately 1 million cars were moved each way in 1953 between Tatarsk and Novosibirsk. Taking the average length of train as observed at 50 cars, the average daily traffic would consist of 56 trains each way per day, besides which there were 10 passenger trains each way and an occasional extra train for military or displaced persons together with work equipment required for maintenance of the line, clearing wrecks, and installing new rail.**

In the same manner as was done for the Tatarsk-Novosibirsk section, analyses were made of the traffic east of Novosibirsk and through the Circumbaykal stretch, with the resulting freight car density showing as 580,000 cars each way per year between Yurga and Krasnoyarsk, or 40 trains per day of 41 cars each, and 260,000 to 300,000 cars each per year for the Irkutsk - Mysovaya - Ulan-Ude line, or 18 to 21 trains per day of 40 cars each, the train lengths being the observed sample averages for the respective sections.***

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* Tables 3 and 4 follow on pp. 34 and 37, respectively.

** In 1953 it appears that all Trans-Siberian right-of-way maintenance was done from railborne vehicles, but consideration is currently being given to taking maintenance equipment off the rails. 97/

*** Continued on p. 39.

Table 3

Movement of Loaded Cars on the Tatarsk-Novosibirsk Section of the Trans-Siberian Railroad
Calculated on the Basis of Commodity Tonnage Estimates,
Supplemental Estimates from Soviet Announcements,
and Estimated Average Loads per Car
1953

Cargo	Westbound Novosibirsk to Tatarsk: Amount (Thousand Metric Tons)	Average Load per Car (Metric Tons)	Number of Loaded Cars	From
Coal	22,000	45	488,890	Kuzbas
	+2,000 a/		44,440 a/	
Coal	500	45	11,110	Main line east
Coke	2,090	35	59,710	Kuzbas
Timber	1,085	35	31,000	Main line east
	+400 a/		11,430 a/	
Ferrous metals	1,205	35	34,430	Kuzbas
Ferrous metals	37	35	1,060	Main line east
Agricultural commodities	1,345	30	44,830	Main line east
Nonmetallic construction materials	+300 a/	35	8,570 a/	Main line east
Miscellaneous freight	1,320	20	66,000	Main line east
	+300 a/		15,000 a/	
Miscellaneous freight	343	20	17,150	Novosibirsk local and Barnaul net b/
Miscellaneous freight	700	20	35,000	Kuzbas
Total	33,625		868,620	

* Footnotes for Table 3 follow on p. 36.

Table 3

Movement of Loaded Cars on the Tatarsk-Novosibirsk Section of the Trans-Siberian Railroad
Calculated on the Basis of Commodity Tonnage Estimates,
Supplemental Estimates from Soviet Announcements,
and Estimated Average Loads per Car
1953
(Continued)

	Eastbound Tatarsk to Novosibirsk			
Cargo	Amount (Thousand Metric Tons)	Average Load per Car (Metric Tons)	Number of Loaded Cars	To
Petroleum and its products	2,450	35	70,000	Main line east
	+1,000 a/		28,570 a/	
Petroleum and its products	125	35	3,570	Novosibirsk local and Ob' River
	+150 a/		4,290 a/	
Petroleum and its products	280	35	8,000	Kuzbas
	+350 a/		10,000 a/	
Timber	50	35	1,430	Kuzbas
Ferrous ores	1,270	50	25,400	Kuzbas
	+200 a/		4,000 a/	
Ferrous metals	156	35	4,480	Kuzbas
Ferrous metals	82	35	2,340	Novosibirsk net b/
Ferrous metals	477	35	13,630	Main line east
Agricultural commodities	1,049	30	34,970	Main line east
Agricultural commodities	137	30	4,570	Novosibirsk local and Barnaul net b/
Agricultural commodities	244	30	8,130	Kuzbas

Table 3

Movement of Loaded Cars on the Tatarsk-Novosibirsk Section of the Trans-Siberian Railroad
Calculated on the Basis of Commodity Tonnage Estimates,
Supplemental Estimates from Soviet Announcements,
and Estimated Average Loads per Car
1953
(Continued)

	Eastbound Tatarsk to Novosibirsk			
Cargo	Amount (Thousand Metric Tons)	Average Load per Car (Metric Tons)	Number of Loaded Cars	To
Nonmetallic construction materials	+1,200 a/	35	34,290 a/	Main line east
Nonmetallic construction materials	+3,000 a/	35	85,710 a/	Novosibirsk local and points en route
Nonmetallic construction materials	+800 a/	35	22,860 a/	Kuzbas
Miscellaneous freight	2,009	20	100,450	Main line east
	+300 a/		15,000 a/	
Miscellaneous freight	474	20	23,700	Novosibirsk local and Barnaul net b/
Miscellaneous freight	410	20	20,500	Kuzbas
Total	16,213		525,890	

a. Supplemental estimate from Soviet announcements.
b. Net signifies the difference between loaded cars going to a point and loaded cars originating at the same point, destined to continue in the same direction for points farther on. The offsetting balance is treated as through movement.

Table 4

Minimum Car Trial Balance for the Tatarsk-Novosibirsk Section of the Trans-Siberian Railroad
1953

Estimated Carloads

Cargo	Traffic Moving Between Tatarsk (and Points West) and Novosibirsk (Including the Kuzbas and Altayskiy Kray): Eastbound to Novosibirsk, Barnaul, and the Kuzbas	Traffic Moving Between Tatarsk (and Points West) and Novosibirsk (Including the Kuzbas and Altayskiy Kray): Westbound from Novosibirsk, Barnaul, and the Kuzbas
Coal		533,330 (open cars)
Coke		59,710 (open cars)
Petroleum and its products	25,860 (tank cars)	
Timber	1,430 (open cars)	
Ferrous ores	29,400 (open cars)	
Ferrous metals	6,820 (open cars)	34,430 (open cars)
Agricultural commodities	12,700 (closed cars)	
Nonmetallic construction materials	108,570 (open cars)	
Miscellaneous freight	44,200 (open and closed cars)	49,750 (open and closed cars) 2,400 (tar tank cars)
Balance of empty cars	2,400 (tank cars for tar, unsuited to petroleum and its products) 479,100 (open cars)	5,000 (closed cars reserved for agricultural commodities) 25,860 (return of tank cars suited for petroleum)
Subtotal	710,480	710,480

Table 4

Minimum Car Trial Balance for the Tatarsk-Novosibirsk Section of the Trans-Siberian Railroad
1953
(Continued)

Estimated Carloads

Cargo	Through Traffic Moving Between Tatarsk (and Points West) and Points East of West Siberia (Region IX): Eastbound to Regions XI and XII and to Communist China and North Korea	Through Traffic Moving Between Tatarsk (and Points West) and Points East of West Siberia (Region IX): Westbound from Regions XI and XII and from Communist China and North Korea
Coal		11,110 (open cars)
Petroleum and its products	98,570 (tank cars)	
Timber		42,430 (open cars)
Ferrous metals	13,630 (open cars)	1,060 (open cars)
Agricultural commodities	34,970 (closed cars)	41,830 (closed cars) 3,000 (tank cars for vegetable oils)
Nonmetallic construction materials	34,290 (open cars)	8,570 (open cars)
Miscellaneous freight	115,450 (open and closed cars)	81,000 (open and closed cars)
Balance of empty cars		95,570 (return of tank cars suited for petroleum) 12,340 (open and closed cars) a/
Subtotal	296,910	296,910
Total loaded cars	525,890	868,620
Total empty cars	481,500	138,770
Total cars moved	1,007,390	1,007,390

a. Open cars could be used as offset by loading westbound in Kuzbas.

IV. Commodity Movements.

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The principal commodities handled on the Trans-Siberian Railroad in 1953 were coal, coke, oil, timber, ferrous metals, and certain agricultural and animal products. Other items may for convenience be grouped into the miscellaneous category.

50X1

Charts (Figures 3 and 4*) have been prepared which show the total of individually estimated commodity movements in both directions over the Trans-Siberian Railroad in 1953. Eastbound movements are shown below the rail line, and westbound movements above. Figure 3 is a chart for the main line, and Figure 4 for the branch lines. These charts were compiled by aggregating for various segments of the line and for certain of the branches the estimates made for each major commodity or commodity group. Traffic figures stated in terms of tons moving per kilometer would perhaps most accurately be a summation of ton-kilometers hauled within each delineated section as applied to the number of kilometers in the section. The Copeland studies 99/ define this factor for US railroads as ton-miles per mile of road. This permits dividing the railroad into sections controlled by main shipping points and expressing the aggregate of through traffic plus numerous short-haul movements to and from way stations as a series of horizontal bars between such control points. Whereas the drafting technique in these charts is much the same as that of the Copeland studies, the horizontal lines depict representative averages of tonnage movements rather than total ton-kilometers per kilometer moving within each section. Available information and detail would not permit of the latter method

An individual chart (Figure 5*) has been prepared in a similar manner particularly for coal, which represented by far the greatest amount of tonnage loaded of any one single commodity.

Coal, the principal commodity handled by the railroad in terms of weight, was loaded on the rails at a number of large mining centers along the main line and its various branches and was hauled to important

* Inside back cover.

centers of consumption as well as to smaller places along the line for the use of electric power plants; diversified industries; consumer cooperatives; and most important, for the railroad itself. A Soviet publication has recently carried a statement to the effect that rail transport consumes 25 percent of all coal mined in the USSR. 100/

The heaviest demand for coal appears to have come from the Urals, where coking coal of good quality was urgently required, resulting in the through movement of approximately 20 million tons from the Kuzbas to that area. Additional coal from the Kuzbas went beyond the Urals; some stopped at Omsk before reaching there. Other important movements of coal in Siberia originated at Cheremkhovo and Raychikhinsk. The prevailing movement of coal was westerly from Cheremkhovo toward the west and easterly from Cheremkhovo toward the east. Coal mined in Amurskaya Oblast at Raychikhinsk was lignite, some of which possibly was briquetted to improve its qualities for railroad usage.

Owing to the severe climate, one major use for coal throughout Siberia was for space heating. This applied principally to industrial complexes and to places where housing units were in use and lent more emphasis than in the past to terminations at the larger cities.

There were only a few sustained movements of coke on the Trans-Siberian Railroad in 1953. By far the largest movement was the transportation of coke from Kemerovo and Stalinsk in the Kuzbas to the metallurgical plants of the Urals.

The movement of petroleum and its products in Siberia took the form of a sustained general movement toward the east from the Ural-Volga and Central Asian fields. The two flows converged at Novosibirsk, and from there eastward the volume of movement tapered off, reflecting consumption along the line, with particular emphasis upon large cities and river intersections. Of the balance finally arriving at Vladivostok, a large proportion is assumed to have moved on small Soviet tankers to the far northern and eastern extremities of Siberia. In 1953 the USSR was short of tankers, and there were no indications of the existence of pipelines, except those from the Sakhalin fields to the Komsomol'sk refinery. COCOM controls would have made it difficult for the USSR to charter Western tankers at this time for movement of oil from the Black Sea to the Far East.

The general movement of timber on the Trans-Siberian Railroad was westward, except in Khabarovskiy Kray and Primorskiy Kray, where a considerable tonnage was hauled southward (east) toward the coal mines and ports. Main sources of timber loading were in East Siberia, including Chitinskaya Oblast, the Buryat-Mongol'skaya ASSR, and the forest areas along the branch line from Tayshet to the Lena River. Some cutting took place near enough to the track for convenient stacking and loading, but the bulk of the timber reached the rails by floating in streams, by narrow-gauge railroad, or by logging road. Timber cut in East Siberia was sent to mines for pit props; to the railroad for crossties; and to major centers of construction such as new plants, dams, and cities. It was also consumed in the manufacture of alcohol. Some firewood was moved by rail, but its relative importance was small and declining.

The principal flow of forest products originated in the mountains west of Chita, gathered momentum as far as the Irkutsk-Cheremkhovo area, diminished there, and immediately started again on a cumulative increase which was amplified at Tayshet by the contribution of the Lena branch. Through the Krasnoyarsk area, volume increased still further despite unloadings for coal mines and other purposes, with the highest density probably reached somewhere between Mariinsk and Yurga. At the latter point a large amount left the main line southbound for the mines of the Kuzbas. Farther on at Novosibirsk an even greater quantity was switched off in a southerly direction toward Barnaul. This timber, less dropoffs en route south, was delivered to the Turk-Sib Railroad and was ultimately dispersed to a wide area of Central Asia and South Kazakhstan which is low in timber resources. Timber moving west from Novosibirsk toward Omsk encountered cutting areas which provided the additional amounts required by the mines and industries of the Urals.

Ferrous metals had several characteristic movements in 1953. The principal source within Siberia was Novokuznetsk or Stalinsk, the output of which was divided, with the greater portion moving westward. There being many different types and kinds of steel, crosshauling in the industry is not necessarily irrational. Owing to varied requirements of construction programs in Siberia, steel from the Urals as well as from Stalinsk moved to the east. Communist China and North Korea received an estimated quarter of a million tons via Otpor. Despite efforts to develop iron ore in the South Kuzbas, 1.25 million tons of ore are believed to have moved to Stalinsk from Magnitogorsk. Farther east, smaller plants of the steel industry operated at Irkutsk, Petrovsk-Zabaykal'sky, and Komsomol'sk, with output serving the more remote shipbuilding, arms, and construction industries.

Bulk grain movements over the portions of the Trans-Siberian Railroad included in this report are estimated as having taken place mainly in an easterly direction from the western Siberian steppes and Altayskiy Kray. Considerable quantities of grain originated on the lines from Barnaul and Altayskaya to Novosibirsk and from Pavlodar and Kulunda to Tatarsk, as well as on the main line itself. Upon arrival at the far eastern end of the railroad, a substantial movement by sea to the outlying areas is believed to have occurred. This long rail-sea movement is the type which Soviet planners hope to reduce by the annual movement of ships over the Northern Sea Route or other ocean routings.

Manufactures and miscellaneous freight largely moved from west to east. Machinery manufactured in the European USSR undoubtedly constituted an important fraction of the miscellaneous category, particularly if motor vehicles, which were repeatedly sighted on open cars, are included. Agricultural machinery, mining equipment, oil rigs and pipes, electrical components, wire, boilers, stationary engines, and industrial plants were generally eastbound, including goods destined for Communist China, with the exception of a few items which were manufactured in Siberia and moved both ways.

Of tonnage originating in the Soviet Far East for westward movement, the bulkiest item was packed and canned fish. In carrying this commodity, the railroad is bearing out a major precept of its early days, its suitability for moving refrigerated goods. Also from the Far East came mineral concentrates. Most of the available minerals are in the high-value nonferrous categories and either constitute a relative light tonnage for movement west or are so situated as to warrant a partial if not total movement by sea. The more valuable metals are believed to be flown out of the Far North and the Far East. Valuable furs also originate in this country but add up to little in terms of weight. Thus traffic returning from the more eastern regions of Siberia did not counterbalance the outgoing freight from the west required to support the existing population and to provide for growth of economic and military strength.

In connection with all of the commodity shipment patterns, the impression is obtained that Soviet engineers, executives, and planners are constantly being reminded of the necessity of trying to find ways and means of reducing unnecessary and uneconomical rail hauls. This applies to petroleum and its products; timber; iron ore; and even coal, where properly located briquetting plants, by making possible the use of local lignites for locomotive boilers, save the hauling of bituminous coal for many hundreds of kilometers from mines to areas having

only lignite. Miscellaneous manufactured goods fare best in staying on the rails, as they do not necessarily conform for such long periods to a fixed pattern of distribution and the cost of moving them is relatively low compared with their value.

In 1953 there was practically no Soviet Far Eastern trade with countries other than Communist China and North Korea. Development of Soviet trade with countries of the Pacific could bring about a reduction of the movement of bulk rail freight from the European USSR to the Far East by substitution of imports, particularly of grain and oil. The growth of a Soviet Bloc tanker and dry cargo fleet or the relaxation of UN shipping controls could have a similar effect by bringing oil and grain east by water from Black Sea ports via the Suez Canal.

Table 5* shows the relative volume and direction of the movement in 1953 of major commodities on three representative sections of the line.

A. Coal.

Production of coal in Siberia is divided among Economic Regions** IX, XI, and XII (West Siberia, East Siberia, and the Far East). Each of these regions contains major producing areas, and the USSR is making an effort to limit the flow of coal among these three regions. A large amount of coal, however, is known to be moved from Region IX to Region VIII (the Urals) and even farther west. Because of the heavy proportion of coal tonnage moved to total tonnage moved, the individual traffic chart on coal movement only (Figure 5***), has been prepared, providing a more definite impression of coal as an isolated entity than can be obtained from inspection of the over-all charts (Figures 3 and 4***).

* Table 5 follows on p. 44.

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*** Inside back cover.

Table 5

Volume and Direction of Traffic of Major Commodities
over Selected Sections of the Main Line of the Trans-Siberian Railroad a/
1953

Thousand Metric Tons

Commodities	Tatarsk-Novosibirsk		Irkutsk-Mysovaya		Petrovsk-Zabaykal'skiy - Chita	
	Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound
Coal		22,500	2,528		1,254	457
Coke		2,090	5			
Petroleum and its products	2,855		2,266		2,169	
Timber	50	1,085	80	1,167	445	164
Ferrous ores and metals	1,985	1,242	502	93	511	132
Agricultural commodities	1,430	1,345	1,363	2,091	1,354	2,008
Manufactures and miscellaneous	2,893	2,363	2,056	1,523	2,052	1,365
Unidentified b/	7,000	3,000				
Total	16,213	33,625	8,800	4,874	7,785	4,126

a. With adjustments to attain figures derived from Soviet announcements.
b. Balance to attain total derived from Soviet announcements.

1. Region IX (West Siberia).

The great center of coal production in Region IX (West Siberia) and by far the largest anywhere in Siberia is the Kuzbas. This basin is estimated to have produced in 1953 45 million tons of coal, 14 percent of the total coal production of the USSR. Much of this coal is suitable for coking and for the manufacture of steel. The bulk of Kuzbas coal was produced on branch lines joining the Trans-Siberian main line from the south at Yurga and Novosibirsk. The branch coming in at Novosibirsk, which was double-tracked and electrified from Stalinsk north, carried most of this coal. The mining city of Anzhero-Sudzhensk was the only important coal outlet of the Kuzbas lying directly on the Trans-Siberian main line.

Analysis of movement of Kuzbas coal has resulted in a series of estimates which produced the pattern shown in the coal commodity chart (Figure 5). Outside of the Kuzbas itself, the main center of consumption was Region VIII (the Urals), which is reported to have taken 38 percent of Kuzbas production in 1952. Of the coal moving westward, however, from 18 million to 20 million tons were dropped off at or short of Novosibirsk for such purposes as (a) supplying power for mining the coal itself, (b) producing regional electric power, (c) operation of the Tomsk Railroad, (d) coking, (e) steelmaking and other industrial purposes, and (f) municipal and area heating. In 1953, allowing for a little over 3 million tons to move south to Barnaul and Biysk and to points on the Turk-Sib Railroad, there is estimated to have moved westward from Novosibirsk about from 22 million to 24 million tons of bituminous coal suitable for coking. A minor portion of this coal was distributed along the main line of the Trans-Siberian Railroad, including the city of Omsk and the railroad and power plants en route. The bulk of it, probably about 20 million tons, reached the Urals.

This coal movement from the Kuzbas to the Urals was heavier than any other movement on the Trans-Siberian Railroad and in Siberia was approached in magnitude only by the movement of coal from Karaganda to the Urals. It has been indicated in speeches by Kaganovich that in 1953 a considerable tonnage of Kuzbas coal moved on past the Urals and was consumed in Region VII (Central), which is mainly served by the Moscow and Donets Coal Basins. Kaganovich expressed disapproval of so long a movement as being against the economic interest of the country. This

movement must have resulted either from an over-all shortage of coal in the Moscow Basin or from the inability of the Donets Basin, which is much closer to Moscow, to allocate the volume of high-quality coal needed by Region VII.

The heavy movement of westbound coal from the Kuzbas poses a problem of empty-car movement because eastbound empties bound for the coalfields cannot be used for cargoes with destination farther to the east. A relatively small portion of these returning cars, however, can be used for transporting Ural iron ores back to the Kuzbas, where the iron ore resources have not yet been adequately opened up.

Within the Kuzbas itself there is a flow of the best coking coals into Stalinsk and Kemerovo, at each of which are located large coke ovens. In the case of Kemerovo, prisoner-of-war observations have consistently shown coal arriving to supplement that mined in the immediate vicinity including Barzas. Most of this coal is believed to have come from the south, but lesser amounts apparently came in from Anzhero-Sudzhensk also; the short two-way movement on the inbound stretch south of Yurga was probably accounted for by differences in grades of coal mined. For Stalinsk, a short southeastward movement, or back haul, of about 3 million tons for the year of coking coal mined at Kiselevsk and Prokop'yevsk, has been reported, this coal passing coal of lower grade moving northwestward over the same stretch.

No Kuzbas coal is believed to have moved eastward over any part of the main line with the exception of a minor amount bound over the very short stretch from Yurga to Tayga on its way to Tomsk. On the other hand, some coal from Region XI (East Siberia) is estimated to have moved westward into Region IX and possibly as far as Region VIII. Whereas there is little if any open-cast mining in the Kuzbas, the production of the open-pit mines around Cheremkhovo may well have resulted in a local surplus of bituminous coal especially well suited for railroad locomotives. That a movement of this sort did take place is substantiated in some of the remarks of Kaganovich.

Kuzbas coal which is not suitable for coking is used locally for heating and power and for blending with higher grade coals in locomotive tenders.

2. Region XI (East Siberia).

The major coal-producing center in Region XI (East Siberia) is Cheremkhovo, located on the Trans-Siberian main line 130 km northwest of Irkutsk. The grade of coal produced here is bituminous, and it is in demand for mixing with lower grades of coal found elsewhere in Region XI for railroad locomotive firing. Most of the coal mined at Cheremkhovo comes from open-pit mines. It has in the past been shipped long distances east and west, but with the development of mines nearer to points of consumption in both directions, a larger proportion of Cheremkhovo coal appears to have been used for local consumption in the Irkutsk area, where it has served as a base for a growing heavy industry and where it is being, or soon will be, used for liquefaction. A minor amount of this coal generally moves down the Lena during the open season.

Out of an estimated 8 million tons produced at Cheremkhovo in 1953, it is believed that about 2 million tons of coal were consumed in the Cheremkhovo area itself, involving either a very short rail haul or a mere switching movement. This haul is depicted on the traffic chart (Figure 5*) by showing the coal as dropped off at Zima or Irkutsk, the nearest stations plotted. Included also in what is shown as the Irkutsk drop-off is a substantial quantity of Cheremkhovo coal actually moved to Irkutsk to supplement lower grades of coal mined in the vicinity of Irkutsk city.

An important share of coal mined at Cheremkhovo is believed to have been delivered for use in the Krasnoyarsk area in 1953, and some probably went as far as Novosibirsk, where logically it should stop, owing to railroad electrification west and southeast and to the availability of Kuzbas coal. In an easterly direction, Cheremkhovo coal is believed to have been consigned to the railroad for use as far east as Bureya, the main-line station for Raychikhinsk. Press articles appearing in Gudok in 1953 were repeatedly critical of such long movements and called for the construction of a coal-briquetting plant at Raychikhinsk to make unnecessary the bringing in of higher grade coal for blending.

* Inside back cover.

In Region XI the only other mining center producing bituminous coal is Bukachacha, which is located at the end of a 73-km branch to the north which joins the main line 390 km east of Chita. Being so remote from other sources of good-quality coal, Bukachacha coal is in high demand for stoking locomotives. A Soviet publication states that 80 percent of this coal was used for stoking locomotives in 1952. 101/ It is estimated that in 1953 Bukachacha delivered about 1 million tons to the main line, two-thirds of which is thought to have moved east away from Cheremkhovo and in the direction of a deficit area for bituminous coal, with the remaining one-third moving west for nearby transportation and industrial uses.

Other mining centers in Region XI consist of the Kansk Basin, located along the main line from Zaozernyy to Tayshet; the Khakasskaya field centering on Chernogorsk near Abakan on the southerly branch to that city; the Gusinoye Ozero mines at Zagustay on the branch south of Ulan-Ude; the Tarbagatay-Khalyarta-Kuli field, a rather small and strung-out series of mines along the main line east of Ulan-Ude; Chernovskiye Kopi and Kadala on the eastern outskirts of Chita, which in 1953 are estimated to have produced about 1,750,000 tons; a minor operation around Kharanor, on the branch line to Otpor; and the small Arbagarskiy field near Kholbon, a station on the main line 260 km east of Chita. All of these mines produce lignite, which is used chiefly for power plants; space heating; and, by blending with higher grade coals, for railroad and industrial purposes. The Chernogorsk mine is believed to provide coal for a liquefaction plant adjacent to the mine head, which, if operational, would reduce transportation on the Abakan branch line of outbound coal and inbound gasoline. A new mining center at Nazarovo, which is about 40 km south of Achinsk on the branch to Abakan, appeared to be in active operation in 1953, but only an approximation could be made of its output.

In all, between 17 million and 18 million tons of coal are estimated to have moved from mining centers in Region XI on the rails of the Trans-Siberian Railroad in 1953, some for very short distances and some for distances which are among the longest experienced on the railroads of the USSR.

3. Region XII (Far East).

In 1953, production and shipment of coal in Region XII (Far East) served by the Trans-Siberian Railroad, was centered upon the two major mining fields of Raychikhinsk and Artem-Suchan, located on branch lines in Khabarovskiy Kray and in Primorskiy Kray near Vladivostok, respectively. Whereas some acceptable bituminous coal was produced at Suchan and a limited amount came from the moderately exploited Bureya field at Chagdamyn and Urgal, the bulk of all coal mined on the mainland of the Soviet Far East was lignite. To supplement the bituminous coal of Suchan for purposes for which lignite could not be used, a quantity of Chinese bituminous was imported through Grodekovo.

The Raychikhinsk mining center consists of a number of operations, most of them open-pit with fairly light overburden. In 1953 the center produced about 5 million tons of a lignite which had to be blended with bituminous coal to produce a coal satisfactory for railroad locomotives. Thus the long haul of Cheremkhovo and Bukachacha coal was necessary for additive purposes in 1953. There was talk of constructing a briquetting plant near Raychikhinsk to permit the using of Raychikhinsk coal for locomotive fuel without additives, thereby eliminating long-haul distribution of coal, but there is no available evidence that action had started in 1953. Large amounts of Raychikhinsk coal moved by rail to Komsomol'sk and Khabarovsk, and in the open season through the river port of Poyarkovo by barge to both of these cities and to other points on the Amur River. Most maps show only one rail route to Poyarkovo, a route which leaves the main line at Zavitaya; from construction indications furnished by prisoners of war as of 1949, however, it is believed that the relatively short distance over easy terrain from Raychikhinsk to the port had by 1953 been bridged by at least a single track. 102/ Thus the 900,000 tons believed to have moved by river has not been plotted on the chart on the main line of the railroad (Figure 3*).

Of 4.3 million tons of coal mined at Artem and Suchan, most is used in the Vladivostok area and on the lines of the Far East system of the Trans-Siberian Railroad in Primorskiy Kray. Some of the best grades are believed to have been shipped as far north as Khabarovsk and Komsomol'sk for special industrial uses.

* Inside back cover.

Smaller mines in southern Primorskiy, active in 1953, were located at Lipovtsy, Voroshilov, Tavrichanka, and Ugol'naya. These mines produced about 1.1 million tons, which were used locally and in the Vladivostok area for railroad, power plant, boiler-room and space heating, and other industrial uses. Imports of 500,000 tons of high-grade Chinese bituminous coal were received at Grodekovo. This coal probably was used for special purposes such as fueling express trains or bunkering ships at Vladivostok and Nakhodka.

Coal mined on Sakhalin Island is not believed to have moved over lines of the Trans-Siberian Railroad in 1953, although it may have been used at Sovetskaya Gavan' and Vanino for railroad purposes.

The single-track line from Ugol'naya to Nakhodka is believed to have borne a heavier load of coal and other traffic in proportion to its capacity than the main line in Primorskiy Kray. Nakhodka has been for several years in process of development as a commercial port with limited military facilities, one of the purposes evidently being to keep foreign ships and personnel away from Vladivostok.

4. General.

In all, about 70 million tons of coal were loaded on the rails of the Trans-Siberian east of Omsk in 1953, constituting the principal base for industrial, utility, and transport activity in Siberia and the Urals during that year. The pattern of shipment of coal in Siberia in 1953 showed a few slight changes from the previous year, notably the shift of a small balance of Cheremkhovo coal from east to west, and a consequent release of Kuzbas coal from Region IX to the Urals. Over-all production and shipment for the area gained about 7 percent over 1952. In the past there have been changes more marked than these, and in the controlled economy of this developing region, further changes may be expected. Indications up to the present are that the USSR is continuing to reduce or eliminate long-haul movements of coal from Cheremkhovo and Bukachacha to the Far East, and in turn to provide more bituminous coal for the Irkutsk chemical center and more coking coal for the Urals.

Coal is generally considered to be an item of low strategic significance, but owing to its bulk in comparison to its energy yield, the effort required to move it, and the fact that many types of coal do not store well, it is more vulnerable in the economic sphere than may be generally realized. This fact is particularly true in Siberia,

where the infrequency of deposits of high-grade coal and the geography of the country combine to force long hauls and some back hauls. Interference with the steady flow of coal along the established routes therefore would have a fairly prompt damaging effect upon the economy of this region.

B. Coke.

The principal coke ovens from which coke was moved significant distances over the Trans-Siberian Railroad in 1953 were those at Stalinsk and Kemerovo in the Kuzbas. In addition, a small coke oven at Suchan in Primorskiy Kray has been frequently mentioned in reports of Japanese prisoners of war.

The movement of coke out of Stalinsk consisted of surplus coke from the Stalinsk Steel Combine, estimated in 1953 to have amounted to 700,000 tons. About 10 percent of this coke is believed to have been distributed to foundries and metalworking shops adjacent to large coal mining enterprises in the Kuzbas. About 70,000 tons are estimated to have been shipped in the direction of Barnaul, and an equivalent amount is estimated to have moved eastward via Yurga to Krasnoyarsk and Irkutsk, including a small remainder for the carbide plant at Ulan-Ude. The residual of 560,000 tons from Stalinsk moved westward via Novosibirsk to Omsk and the Urals.

The large coke chemical plant at Kemerovo produced products for the chemical industries in its immediate area, but it also is estimated to have shipped in bulk some 1.6 million tons of coke to the Urals. This movement plus the coke from Stalinsk augmented the heavy coal movement over the stretch from Novosibirsk to Omsk and the West. Several travelers have noted this coke on its way.

The coke oven at Suchan appears to have produced coke for shipment to metals plants and shipyards in the Vladivostok area, and movement between the two points has been estimated at 35,000 tons for 1953.

Smaller movements of coke and local deliveries undoubtedly occurred within the area covered by this report, but they would be most difficult to determine with any degree of accuracy on the basis of available data and would not be of significance. On less important branch lines, all small movements of coke would be included under miscellaneous freight.

C. Petroleum and Its Products.

The pattern of shipments of petroleum and its products on the Trans-Siberian Railroad in 1953 was simpler than that of coal because no crude oil in recognizable quantities was produced along the main line or on any of the branch lines east of Omsk. The urgent need of the Far Eastern areas of the Sino-Soviet Bloc for petroleum products resulted in a through movement of petroleum and its products which tapered off from west to east and was supplemented at Dezhnevka by a limited south and eastbound movement from Komsomol'sk.

Sakhalin Island, the principal source of petroleum in the Soviet Far East, is judged to have produced more than 1 million tons of crude oil in 1953, most of which was carried up the Amur River by barge in the open season or was piped to Komsomol'sk and Khabarovsk where it was refined and its products distributed to other areas by rail. Although data are lacking, it is assumed that substantially all of the products of these refineries were consumed in the Far East.

The actual points of origin for eastbound oil over the main line have not been clearly established, but it was originally estimated that on the order of 3 million tons came from the Ural-Volga field or points farther west and that about 500,000 tons originated in the Caspian area and Central Asia, moving to Novosibirsk via the Tashkent and Turk-Sib systems.

Over half a million tons of oil were believed to have been distributed in Novosibirsk, to points in its immediate area, to the Kuzbas, and by vessel to destinations up and down the Ob' River. The balance of approximately 3 million tons moved eastbound over the Trans-Siberian Railroad on a diminishing scale because of estimated amounts dropped off along the line at the major cities and their environs and at points of junction with branch lines and rivers for delivery to the more remote hinterland. About 2,250,000 tons are estimated to have moved eastward through the bottleneck section around Lake Baikal.

At Tarskiy, about 750,000 tons of petroleum and its products are believed to have been shifted from the main line and moved down the 354-km branch to Otpor for delivery to Communist China and North Korea. For the most part, 1953 was a wartime year, and this large transfer of petroleum and its products is estimated to have been supplemented by 100,000 tons going to China via the Sungari River, by an additional

250,000 tons moving from Komsomol'sk and Khabarovsk to Manchuria via Grodekovo, and by a further movement of about 100,000 tons to Vladivostok 103/ and thence by seagoing tankers to Chinese ports.

The balance of petroleum and its products remaining for movement over the main line east of Tarskiy around the northern tip of Manchuria was about 1.2 million tons. This amount, plus 920,000 tons coming from Sakhalin and less the 450,000 tons of petroleum and its products already mentioned as destined for Communist China and North Korea via the Sungari River, Grodekovo, and Vladivostok, left about 1,670,000 tons to satisfy the needs of the USSR east of Skovorodino.

The principal destination of that portion of the 1,670,000 tons which moved by rail is believed to have been Vladivostok, from which point approximately 0.5 million tons of petroleum and its products are estimated to have been moved by vessel to areas of the USSR farther north and east,* with an additional and substantial amount undoubtedly used for bunkering and fueling ships at Vladivostok and Nakhodka. About 50,000 tons of petroleum products are estimated to have moved by rail from Komsomol'sk to Sovetskaya Gavan', largely for naval use.

Apparently, little if any petroleum or its products moved westward in the tank cars returning from the lengthy eastbound journey, and with the exception of a relatively small number of such cars, which, after cleaning, were backloaded with Chinese vegetable oils from Otpor, the bulk of the cars of this type had to return the length of the railroad empty. In the stretch between Omsk and Novosibirsk, these empty westbound tank cars passed much larger numbers of empty eastbound coal gondolas returning from the Urals to the Kuzbas. Thus coal and petroleum and its products contributed to the substantial two-way empty-car movement discussed in detail in III, D, above.

In 1953, except for the pipelines from Sakhalin to the Komsomol'sk refinery, 104/ there were no oil pipelines in Siberia. Plans were under way, however, to alleviate the burden of oil transport on the railroad. [redacted] pointed to the possible construction of several syntheti 50X1

* Heavy tanker shipments were sighted going from Vladivostok to Sakhalin, the Kuriles, Magadan, Kamchatka, Anadyr', and Chukhotsk. These must have included substantial shipments of aviation fuel for the Soviet Air Force.

gasoline plants in Siberia, using coal as a base and located near active coal mines. The one most frequently mentioned by prisoners of war and believed to be the largest was being built alongside the Trans-Siberian main line at Kitoy near Irkutsk. 105/ This refinery was seen by observers in 1953 and 1954, and it is believed to have gone into pilot rather than full-scale production in the latter part of 1953. Products of this plant, when it is fully operative, probably will be consumed mainly in the Irkutsk-Cheremkhovo area, in the territory to the north along the Angara River and Lake Baikal, and possibly in the Transbaykal region. Indications are that in accordance with present plans, as much as 1 million tons of gasoline from Siberian bituminous coal may be produced within a few years. This much production would require the mining of 9.5 million tons of bituminous coal for such a purpose alone, and it could affect the pattern of railroad traffic by cushioning future needs for gasoline from the west to supply the growing requirements of the region. Construction of such a plant would be in line with top-level reaction to the disproportionately large effort involved in filling the needs of the Soviet Far East and China by rail from the European USSR, the Caucasus, and Central Asia. Kaganovich pointed this out in his 26 April 1954 speech to the Supreme Soviet, 106/ and Boris P. Beshchev, Minister of Transportation, USSR, on 23 April 1954 107/ was quoted as saying: "There has been an increase /in 1953/ in the long hauls of petroleum from the Caucasus and Volga regions to Siberia and the Far East." Soviet transportation planners regard it as necessary to remove from the rails as large a share as possible of the through traffic of petroleum and its products to Communist China and the Soviet Far East, since, in addition to tying up line capacity and straining the tank car park, it increases the annual bill for fuel, labor, maintenance, and repairs and accelerates depreciation. Moreover, the through movement is primarily strategic and contributes little to the advance of the national economy. Kaganovich was particularly concerned about the future rail burden of petroleum in view of the over-all plan to increase railroad "handling" (probably loadings) of petroleum 70 percent by 1960. 108/

Other steps being taken to lessen the problem of long-distance movement of petroleum include a program for the building of seagoing tankers and the construction of east-west pipelines. 109/ The principal reasons for the effort being made to provide Soviet tankers for movement of oil to the Pacific were ones related to rail costs and burden on the internal transport system. 110/ With future plans calling for increased requirements, the railroad would necessarily have to face a continually mounting burden and higher transport costs.

Until the combined capacity of alternate sources or means of transport begins to approach the net petroleum requirement of West and East Siberia, the Soviet Far East, and Communist China, the policy of carrying a substantial movement of petroleum and its products on the rails is expected to continue.

D. Timber.

Timber is the principal visible natural resource of Siberia and is available in extremely large quantities in virgin stands. Trees between 100 and 300 years old predominate in many sections. The timber stand of the Siberian area in 1938 consisted of some 400 million hectares, which was about 12 percent of the total timber area of the world. In the krays and oblasts served by the Trans-Siberian Railroad, there were some 12 billion cubic meters of mature or nearly mature trees. 111/ Coniferous trees constituted from 79 to 85 percent of the total. 112/

Of this large reserve, less than one-quarter of 1 percent was cut in 1953 and less than one-tenth of 1 percent is estimated to have moved over standard-gauge tracks. From another point of view, timber in 1953 constituted over 10 percent of all freight loaded on the railroads of the USSR, 113/ and the percentage in Siberia alone appears to have been somewhat higher.

Among the largest consumers of wood were coal mines 114/ and railroads, which require large numbers of pit props and crossties, respectively, as well as considerable timber and lumber for other purposes. Replacement requirements for railroad crossties were relatively high, since less than 10 percent of those on the Trans-Siberian Railroad appear to have been creosoted,* and according to Kaganovich the average life of an untreated crosstie in the USSR is 10.5 years. 115/

Shipments of wood and wood products differ somewhat from those of coal and petroleum in that the commodity itself has less uniformity, and each size of cutting (length and shape of timber) or product is subject to different economic pressures and controls. Method of shipment is also unusual in that river transportation by floating or by barge is resorted to wherever and whenever possible. Thus, whereas 90 to 95 percent of coal was transported by rail in the USSR in 1954, only 45 to 50

* General impression gained from travelers' reports.

percent of timber was so shipped. 116/ As against movement of coal, petroleum, and ferrous ores and metals, shipment of timber on Siberian rails has a marked seasonal fluctuation, with the first and fourth quarters of the year being somewhat higher than the second and third. Again, although the sources of the major minerals are relatively stable, timber-loading points frequently change. Instead of being concentrated in a few locations as are mineral sources, timber is loaded at many points along the line. Most important loading points are at stream crossings, at narrow-gauge branch railroad connections, and in heavily forested areas contiguous to the line.

The 1953 pattern of timber shipments on the Trans-Siberian Railroad, which has been derived from piecemeal basic information and checked against occasional visual observation, appears with a few exceptions to have consisted of a generally westward and southward movement throughout the length of the network. This movement was marked by traffic bulges (areas of heavy concentration) and other areas of relatively light traffic. In some parts of the system, in the course of the year, timber moved in opposite directions because of differences in type of wood, the nature of cutting or finished product, and seasonal changes in routing. Timber moved mainly to cities, ports, rivers, and construction and mining centers. Crossties for the railroad which actually were dropped off at numerous points along the line have been depicted for plotting purposes in this report as distributed to central control points. Other crossties were moved to industrial centers and construction sites.

Specifically, the largest timber-producing area on the line was the Krasnoyarsk - East Siberian area, in which approximately 5 million tons were loaded on rails. (Timber quantities [redacted] are generally expressed in terms of cubic meters, and although the specific gravity of different types of wood varies, a hypothetical ratio of 2/3 ton per cubic meter has generally been used in this report for conversion purposes.) About one-third of this rail-transported timber was delivered within the region -- that is, to points along the line from Ulan-Ude to Krasnoyarsk. Most of the balance was moved either into the Kuzbas, westward through Omsk, or southward from Novosibirsk into Altayskiy Kray, Kazakhstan, and Central Asia, where timber supplies are limited. 117/ Other timbering operations along the line west of Krasnoyarsk increased this haul or provided timber for shorter hauls to plants and cities along the way. Novosibirsk, although it had a timber operation of its own, also was a sizable consumer of timber from the east.

50X1

A little over 1 million tons of forest products are estimated to have moved westward from Novosibirsk toward the Urals. This estimate was not larger, because the Omsk timbering area situated on the way to the Urals presumably provided a substantial tonnage and the Urals themselves contain large forest reserves now under exploitation. In 1945, shipments of timber from East Siberia westbound through Omsk were embargoed by government decree. 118/ Nevertheless, as sighted by travelers, considerable timber did appear to be moving regularly by this route in 1953.

About 60,000 tons of timber are estimated to have entered the USSR from Communist China in 1953 via Otpor. 119/ On the eastern end of the line, between Khabarovsk and Skovorodino, are several large forest areas, many of them distant from the railroad line but connected with it by streams, truck roads, and narrow-gauge railroads. In 1953, enough timber came from these areas to take care of the local economy of the region plus a moderate surplus for the west. There is a timber deficit area between Aksenovo-Zilovskoye and Chita, to which most of the surplus eastern timber was delivered. From Khabarovsk southward to Vladivostok the prevailing movement was toward the east with the exception of a short stretch below Khabarovsk, where there was apparently a two-way movement of some magnitude. Timber was hauled to the south and east in Primorskiy Kray for coal mines; military installations, manufacturing plants, particularly the large veneer plant at Okeanskaya near Vladivostok; and the port cities of Vladivostok and Nakhodka. At these ports, considerable wood was shipped on vessels to northern and eastern extensions of Siberia, where there is little or no standing timber. Some may have gone to Kamchatka, which has a stand of timber under exploitation, the quality of which probably would not meet all local requirements. A great deal of material of all sorts, including timber, was shipped from Nakhodka and Vladivostok to Kamchatka.

The quantities of timber shipped over railroad line segments in accordance with this routing have been difficult to estimate owing to scarcity of published material. [redacted] 50X1 50X1 the range of error involved may be greater than with other commodities. Nevertheless, the ratios of timber to coal and to over-all traffic seem reasonable.

The fact appears to have been that despite mechanization and detailed planning timber production was rather low in terms of 1953 plans compared with output of other basic commodities. 120/ In January 1954, percentage of plan fulfillment was running at about 85 percent, and much mechanical equipment was standing idle. 121/ This was primarily the result of the labor shortage occasioned by poor conditions in the lumber camps. 122/ The USSR was attempting to overcome this by building and equipping new camps. 123/ Shortages of railroad cars were frequent also, the cause of this apparently being the low priority enjoyed by timber shipments as against shipments of such items as military goods, vehicles, and coal. 124/

One point which should be borne in mind in considering the shipment of timber is the long-distance hauling of round timber which was still prevalent in 1953. Kaganovich, Beshchev, and others have repeatedly stressed the need for reducing the length of timber hauls, but instead the distances, particularly in Siberia, appear to have been growing longer. 125/ (The average length of haul in 1940 was 1,019 km; in 1953, 1,193 km.)

In the US, round timber (except timber for poles) is seldom shipped long distances on the railroad.. It is converted into lumber which, however, is often shipped on very long rail hauls to market. In the USSR, no doubt, it is the intention of the Ministry of the Timber Industry to establish more sawmills at major points where timber reaches main lines or main branches so that it can be loaded on cars as lumber. Some progress since 1948 may be noted in this connection, but in 1953 considerable round timber, both large and small, was seen being moved westward on the main line of the Trans-Siberian Railroad. In view of the absence of sawmills, one reason may have been that had the cars not been loaded with timber, they might have been returned west empty. Moreover, there was a sizable demand for pit props and round construction timber in the Kuzbas, the west, and the south.

In this connection, although it is not entirely clear why timber which was cut in the forests of Irkutskskaya Oblast and the Transbaykal area was shipped through the timbering regions of the Yenisey, Tom', and Ob' Rivers to destinations farther west, the main objective may have been to avoid the repeated unloading and reloading of standard-gauge railroad cars. It may have been possible to move local timber from the more western forests to nearby streams by truck, tractor, or narrow-gauge

railroad, thus avoiding the main-line hauling operation. 126/ The cheapest method of satisfying the demand in the Urals and Central Asia would then be by through rail haul from farther east, given the geographical pattern of logging and lumbering operations which is believed to have existed. In the event that some local timber had to be hauled by main line rail to the rivers and cities, the relatively short haul would have given the local shipper and railroad operator a much tighter control of both cargo and cars than would a longer haul relay or chain type of movement involving two or more systems and possible reclassifications.

A simpler explanation and one which may be even more valid would be that the East Siberian timber was the most readily accessible and the best timber available. 127/

Before the development of coal mining in Siberia to its present level, firewood constituted a major item of freight in Siberia. Since World War II, however, it no longer stands as a major commodity. Firewood is moved from timber stands to points of use, principally cities, industrial towns, and employees' and military camps. The main sections of the Trans-Siberian Railroad over which firewood is believed to have moved to any extent in 1953 were the Far Eastern and Eastern Siberian sections. 128/ Estimates for firewood have been included for each section in the timber totals.

E. Ferrous Ores and Metals.

Shipments of ferrous ores and metals on the Siberian rail lines in 1953 did not nearly equal in tonnage those of either coal, oil, or timber. Nevertheless, they represented a far from inconsiderable tonnage and must be regarded as being among the most important freight movements on the railroad. Almost 100 percent of all Soviet ferrous ores and metals travel by rail.

It has not been possible to obtain from visual observation as accurate a pattern of shipments for ferrous ores and metals as for the more voluminous commodities, but since ferrous ores and metals are generally shipped in open cars, the direction of their movement on the Trans-Siberian Railroad can be fairly accurately reported. Moreover, with points of origin of raw material and finished products confined to a relatively few places and with destinations in the controlled economy restricted to locations of major users, it has been possible from known or estimated plant outputs of various types and shapes of metal to provide a pattern which observers can and generally do corroborate.

The heaviest movements of ferrous ores and metals in 1953 were centered on the western portion of the Trans-Siberian rail network, including the main line between Omsk and Novosibirsk and the branches in the Kuzbas. At least 1.3 million tons of iron ore are believed to have moved eastward from the Urals to the large steel combine at Stalinsk, representing the balance needed above the approximation of 3 million tons with the same destination believed to have originated at Tashtagol and Tel'bes south of Stalinsk. For some time the USSR has been trying to reduce and eventually to eliminate the eastbound movement of ore from the Urals by expanding production of the newly opened deposits in the Kemerovo and Khakass areas. 129/ The delay in accomplishing this has been criticized very recently in the Soviet press, 130/ evidencing the fact that the delay was still going on in 1955. Owing to difficulties encountered by observers in determining whether or not high-sided coal gondolas on the main line returning east from the Urals toward Novosibirsk contained iron ore or were empty, it has not been possible to form an independent on-the-spot estimate of ore movement as it was with coal, but the requirement is known and the division in the volume of movement as between sources is believed to be reasonably accurate. In any event, there is no shortage of cars to bring back ore, and thus a movement of several times the estimated amount of 1.3 million tons would present no serious problem to the railroad.

Pig iron and steel moving westward from the Stalinsk Combine is estimated to be slightly over 1 million tons, while approximately 500,000 tons from the Stalinsk plant and other smaller steel mills in the region is believed to have moved southward from Novosibirsk through Barnaul. (In 1956 this latter tonnage is bypassing the old route via Novosibirsk by traveling over the newly constructed line from Artyshta in the Kuzbas to Altayskaya, across the Ob' River from Barnaul.) A smaller mill at Gur'yevsk is estimated to have produced 92,000 tons of finished steel during 1953, and one at Novosibirsk is believed to have shipped by rail about 153,000 tons (of a somewhat greater estimated production) moving primarily to the west and south.

Within the Kuzbas itself were sizable local movements of scrap and pig iron resulting from the mining activity of the region, the operations of the steel mills, and the many auxiliary plants and projects located within the general area served by the Kuzbas branches of the Trans-Siberian Railroad.

The principal plants engaged in steel manufacture or conversion east of Stalinsk in 1953 were, in geographical order, the Siberian Heavy Machine Building Plant at Krasnoyarsk; the Irkutsk Heavy Machine Building Plant imeni Kuybyshev at Irkutsk; the Petrovsk Iron and Steel Plant at Petrovsk-Zabaykal'skiy; and the Amurstal' Steel Plant at Komsomol'sk. Together with a few smaller additional installations, these plants accounted for less than 500,000 tons of steel. There were no blast furnaces in operation. Consequently, no important requirement existed for movement of ore, although small amounts of local ores were used at Petrovsk and Komsomol'sk for enriching purposes. Some scrap could be collected locally, but additional scrap, billets, and pig iron had to be supplied from sources other than those in East Siberia and the Soviet Far East. Soviet sources from Stalinsk and points west are estimated to have supplied a part of this need, but between 130,000 and 140,000 tons of pig iron are said to have been imported from Manchuria, 131/ which would entail a much shorter rail haul to the plants in the east than would a movement from the Kuzbas or the Urals and would fit well into the international trade picture by providing a commodity of which Communist China is reported to have had a surplus adjacent to a Soviet deficit area. 132/

To meet the requirements of the Soviet Far East, the minimum requirements of Communist China, and those of North Korea, 133/ a substantial tonnage of finished steel had to move from the Kuzbas or from west of Omsk across the Trans-Siberian Railroad to various destinations in the USSR and to the border point of Otpor. This movement has been estimated through Krasnoyarsk at about 650,000 tons,* with 400,000 tons for the USSR, 225,000 for China, and roughly 25,000 for North Korea. The supply was augmented east of Lake Baikal by production of about 150,000 tons each from Petrovsk-Zabaykal'skiy and Komsomol'sk. Some sheet steel from Komsomol'sk was observed in 1952 moving to China via Grodekovo, and the movement is presumed to have continued through 1953. 134/ On this basis, the 1953 Soviet consumption of steel east of Krasnoyarsk would have amounted to between 650,000 and 700,000 tons, since there was an opposite movement of something over 50,000 tons from east to west at that point.

The pattern of shipments of finished Siberian steel in 1953 thus evolves into a two-way movement weighted in favor of the west over the Novosibirsk-Omsk stretch, and from Novosibirsk or Yurga east into a long

* Confirmations noted in trip reports.

tapering eastbound movement starting at about 667,000 tons and working down to about 200,000 tons at Dezhnevka. At Dezhnevka it was replenished by about 100,000 more tons from Khabarovsk. These 300,000 tons were distributed in the Soviet Far East and the offshore areas, and a small amount was sent to Communist China and North Korea. A much smaller countermovement westward, mainly of building rods and shapes from Petrovsk-Zabaykal'skiy, is also to be noted, as is a southbound movement from the Kuzbas via Novosibirsk toward Central Asia of about half a million tons.

The USSR does not appear anxious to expand production at Komsomol'sk or Petrovsk-Zabaykal'skiy, and no blast furnace has gone into operation at either point. It is estimated that in 1954 the USSR exported to Communist China about the same amount of steel as in 1953. A 1954 trip report showed similar amounts of steel moving eastward at comparable points. 135/

F. Agricultural Commodities.

The agricultural commodities which moved in greatest volume on the Trans-Siberian Railroad in 1953 were bread grains, sugar, vegetables, and cotton and cotton products. Also among the food items were fish, livestock, and animal products including hides and leather. Over most of the line covered in this report, bread grains, sugar, vegetables, and cotton moved eastward, whereas fish and animal products moved westward. In addition, a number of agricultural and animal products were imported by the USSR from Communist China via Otpor and Grodekovo and were moved for varying distances over the tracks of the Trans-Siberian in both directions.

The volume of shipments of food and other agricultural products could not be estimated for 1953 with as much assurance as could the volumes of coal and timber, because agricultural goods were almost without exception shipped in box or refrigerator cars where they could not be seen or distinguished from other items also shipped in closed cars. Moreover, information other than that supplied by travelers was scarce. A theoretical high limit could be placed on the magnitude of agricultural shipments by the size of the boxcar count as recorded by several observers, but in order to arrive at the actual quantity of such goods shipped, allowance would have to be made for manufactured goods, military supplies, and other miscellaneous freight plus empty closed cars. Therefore, although the statements in this section are not repeatedly qualified, it must be understood that these estimates are not so firm as those of the bulk mineral commodities.

Novosibirsk is a gathering point for grains from the western regions and from Altayskiy Kray. About 1.5 million tons are believed to have arrived at Novosibirsk in 1953, and about 300,000 tons were moved into the Kuzbas. On the main line the eastward movement of grain from Novosibirsk gradually tapered off as supplies were distributed to cities and smaller places in deficit areas. Krasnoyarskiy Kray, Buryat-Mongol'skaya ASSR, and Chitinskaya Oblast are believed to have had grain surpluses which could be shipped to consuming areas or storage centers farther east. Heavy offloading commenced in Amurskaya Oblast, with some grain moving in the open season through Blagoveshchensk and by river barge to points on the Lower Amur River. It is estimated that approximately 500,000 tons moved all the way through to Vladivostok and Nakhodka for local civilian and military consumption and for support of the armed forces and the civilian population in Kolyma, Kamchatka, Sakhalin, the Kuriles, and the Far North and Far East.

In 1953 the extensive "new lands" program which was to take place in West Siberia and North Kazakhstan had not yet materialized. If successful, its ultimate effect would be to reverse the direction of grain flow in the Omsk-Novosibirsk section from an estimated eastbound surplus in 1953 to one moving toward the west and similar in pattern to that reported in 1902 and again in 1927-28. That this may already have happened has been indicated in a recent Soviet broadcast. 136/ Movement of grains westward along the newly constructed South Siberian main line would also be a normal development. The Far Eastern areas would remain in need of grain, however, and unless their requirements could be met from Communist China or by sea from elsewhere, the movement of a considerable balance eastward from Novosibirsk, as shown on the charts, Figures 3 and 4,* would be expected to continue.

Cotton and cotton products--largely thread, cloth, clothing, and other textiles--have been estimated as reaching Novosibirsk from the west in an amount of over 50,000 tons and from Barnaul, of about 10,000 tons. The movement from Novosibirsk was entirely eastbound and tapering, with some 20,000 tons reaching Khabarovsk, where these commodities were distributed further by several different routes.

Sugar was another eastbound commodity. Although some sugar beets were grown in West Siberia and Primorskiy Kray, Siberia was chiefly a sugar deficit area, and the bulk of its supplies had to be brought across

* Inside back cover.

from the Ukraine. The amount moving east from Omsk was estimated to be about 200,000 tons, the movement eastward tapering off until supplemented in its easternmost phase by local production.

Miscellaneous agricultural commodities transported in some quantity included potatoes, other vegetables, butter and other dairy products, preserves, and canned goods. These also moved in an easterly direction. Estimates of their movement at best have been tenuous. A conservative estimate is that approximately 435,000 tons moved eastward through Omsk, with 147,000 tons coming through to Pacific ports for local consumption and for sea shipment to more remote portions of the USSR.

Livestock and products shipments were mainly westbound, starting at Borzya and Naushki, where cattle were received from Mongolia. Some animal products, probably pork, poultry, meat, hides, and wool, are believed to have entered the USSR from Communist China. Except for a small quantity covering the short Far Eastern stretches from Grodekovo to the Soviet ports, most goods of this type entered the USSR from China at Otpor and moved westward. East Siberia and the Kuzbas were the main consuming regions within the area served by the Trans-Siberian Railroad, and the balance of animal products, somewhat more than 100,000 tons, was shipped west through Omsk.

Hides and leather moved westward in relatively small tonnages, commencing at Birobidzhan and increasing at each large packing plant on the way across Siberia, with approximately 17,000 tons reaching Omsk. Since further manufacturing processes were involved, the shipping pattern of these items did not correspond exactly with that of livestock and other animal products, but the main direction of movement was the same.

Fish constituted the principal food item of domestic origin moving westward over the Trans-Siberian Railroad. Loadings of fish on railroad cars in the Soviet Far East for 1953 have been estimated at 450,000 tons, of which about 100,000 tons are believed to have been shipped to points along the line or on branches east of Omsk, with the remaining 350,000 tons moving on to Omsk and points farther west. Fish are believed generally to have been shipped in refrigerator cars.

Imports of Chinese agricultural products entered the USSR both at Grodekovo and at Otpor. Those entering at Grodekovo, about 200,000 tons, were distributed in the Soviet Far East, including Khabarovsk, Primorskiy Kray, and outlying areas. About 1 million tons are believed to have arrived via Otpor, more than half of which were probably destined for points in Siberia and Central Asia, with the remainder moving on to the Urals and the western sections of the USSR.

G. Manufactures and Miscellaneous.

The manufactures and miscellaneous category in effect constitutes a balancing tonnage between the sum of the major bulk commodities and the total tonnage moved over various line segments. This category accounts for all items not already included in the major commodity classifications, and, on branches with light movements, it includes all commodity movements under 20,000 tons. It also includes tonnage moving to and from Communist China and North Korea not readily identifiable as belonging to a major commodity classification.

Some of the items in the miscellaneous category may be grouped together into subcategories in order to establish the traffic pattern more closely and to reduce to a minimum the error between the amount of unidentified manufactured and military goods shipped and the presumed empty or underloaded capacity of moving cars. For purposes of this report, miscellaneous freight includes the following subcategories which were set up to deal with different types of clearly indicated freight: nonferrous metals, nonmetallic minerals, chemicals, paper, weapons and ammunition, and components for shipbuilding.

Other items, including manufactures, cannot be so easily grouped. At the end of Appendix A there is included a partial list of items reported on by travelers, prisoners of war, and others, which are covered by the miscellaneous category. This type of freight is presumed to have constituted the tonnage which could not be treated as part of a major commodity group or a subcategory of miscellaneous freight.

The shipment pattern of each of the subcategories varied within itself. Some of the minerals and metals moved westward in forms of concentrates, others as pigs and bars. Most movements of manufactured and military goods were eastbound from the western parts of the USSR to the Soviet Far East, Communist China, and North Korea. The preponderance of the miscellaneous movement appears to have been eastbound.

1. Nonferrous Metals and Concentrates.

Compared with the amounts of the major commodities moved, the amounts moved in the nonferrous subcategory were light in tonnage and at some points hardly discernible. The category does include, however, a number of strategic metals which are much needed by the Soviet industrial machine. The metals included in the chart totals were aluminum, antimony, barium, copper, lead, magnesite, nickel, tin, tungsten, and zinc, with a small additional tonnage of unidentified concentrates. These last may actually have been concentrates of a type already mentioned, but they could not be identified as such by prisoners of war and travelers.

Contrary to the general flow of traffic on the Trans-Siberian Railroad in 1953, most of these metals in the form of concentrated ore originated in the areas east of Chita and moved westward. Several of the metal concentrates originated at remote points in the eastern USSR and had to be moved by sea to the eastern terminals of the Trans-Siberian Railroad at Vladivostok and Nakhodka. Others came from Soviet mining fields not contiguous to the railroad and were trucked to the most convenient shipping point on the line. Still others arrived from North Korea and Communist China via Grodekovo and Otpor. Although relatively light in tonnage, these metals would have as high a value as a much larger movement of grain or petroleum and its products moving toward the east. Some of the most valuable metals mined in remote areas, such as gold and platinum, are believed to have been shipped westward by air.

Tin concentrate has been supplied by the Khingan Combine near Obluchye, but other supplies have been shipped in to the railroad at Vladivostok from Tetyukhe and the Kolyma. Tin concentrate also has reached the rails from the extensive polymetallic mining region in Chitinskaya Oblast northwest of Manchuria (the area between the Argun River, the Trans-Siberian main line, and the branch from Tarskiy to Otpor) and from Khapcheranga near the Mongolian border.

A considerable movement of lead and zinc ore from North Korea is believed to have entered the USSR at Grodekovo via Manchuria. The ore probably was taken to Vladivostok and loaded in vessels for Tetyukhe, where it could be concentrated and smelted. This movement [redacted] resulted from the destruction by bombing of the refineries and concentration plants at Chinnampo and Munpyong. The movement is inefficient and would normally disappear with reconstruction of local producing facilities. 50X1

Pig lead and zinc concentrate originating at Tetyukhe were probably shipped eastward from Vladivostok, the former being designated for principal plants on the line such as the battery factories at Komsomol'sk and Irkutsk, and the latter believed to be headed for the smelter at Ust'-Kamenogorsk south of Barnaul. Zinc metal produced at Ust'-Kamenogorsk and Belovo reached the main line at Novosibirsk and was shipped mainly to the west.

From Salair, barite was shipped via Novosibirsk and Omsk to the Urals.

A movement from Communist China to the USSR of certain nonferrous metals of which China in the past has been an exporter is believed to have taken place via Otpor. These would include tin, antimony, and magnesite, the tonnages of which would have been comparatively light. 137/

Only one large, well-integrated aluminum plant was located east of Omsk. This plant, at Stalinsk, had a production rate in 1953 of approximately 55,000 tons of ingot aluminum per year. It has been assumed that most of the output of this plant would move to the aircraft and parts plants in Siberia.

An annual movement of 10,000 tons of blister copper from Glubokoye via Novosibirsk toward the west is estimated to have taken place during this period.

2. Nonmetallic Minerals.

In 1953, nonmetallic minerals which moved in sufficient bulk over the Trans-Siberian Railroad to warrant separate analyses were cement, stone, sand and gravel, salt, bricks and clay, glass, and asbestos moving east, and slate, fluorite, bricks, stone, and cement moving west.

Estimates in this field were unusually speculative owing to the multiplicity of sources and destinations of many of the items and the possibility of numerous short-haul movements. Whereas shipments of salt and fluorite could be plotted with a degree of certainty based upon established locations of origin and a limited number of destinations, bricks and stone, which were produced in the environs of nearly every large city, may have been moved short distances to building sites either by truck or by a switching movement. Soviet statements support the supposition that efforts are constantly

being made to limit long-distance hauling of bricks; stone; and, in particular, ballast. The matter of ballasting for the railroad was one of the largest potential outlets for stone, sand, and gravel in Siberia. 138/ Owing to the manner of plotting commodity movements on the charts in Figures 3 and 4,* it has been necessary to depict short and presumably end-to-end, one- or two-way movements of ballast material as a continuous two-way movement on the main line and on all but the least significant branch lines.

Cement was manufactured in some cities, but it has not always been possible to distinguish mixing plants from actual kilns. The locations of certain large cement plants along the line are known, however, and estimates have been made based on the assumption that their calculated capacity output would be distributed in a logical manner according to presumed building activity and populations in both directions along the line.

Other nonmetallic minerals hauled in minor amounts for short distances included graphite and mica. The preponderant movement of both seems to have been westbound from the mining sites near Lake Baikal.

The total of nonmetallic mineral shipments as originally estimated when added together formed a checkered pattern running from Novosibirsk eastward to Chita at an average rate of about 450,000 tons. This rate tended to taper down to 350,000 tons until the Spassk-Dal'niy cement plant was reached in Primorskiy Kray, at which point it rose to over 600,000 into Ugol'naya on the outskirts of Vladivostok.

Westbound, fewer than 200,000 tons moved from Vladivostok to Spaask-Dal'niy, where some cement is believed to have been picked up for distribution as far north as Khabarovsk. From Khabarovsk west, the total remained close to 130,000 tons until Tarskiy was reached, where additional cement and fluorspar were added, the former from Communist China and the latter largely from the Abagatuy and Kalanguy deposits near Borzya. The flow of nonmetallic minerals then remained within a range of from 350,000 to 500,000 tons the remainder of the distance to Novosibirsk, where it is believed to have continued on to Omsk at the higher range limit.

The main weakness of these figures is the complete lack of basic information on rail shipments of rock, sand, and gravel, the uniform assumption made regarding railroad uses and shipments of these materials, and the method of plotting numerous short shipments as one continuous long haul.

* Inside back cover.

3. Chemicals.

In attempting to analyze movement of chemicals on the Trans-Siberian Railroad, it was usually impossible to isolate from the general miscellaneous category those chemicals originating west of Omsk for delivery to Pacific Coast ports and to various points along the line. The only chemical item of significant tonnage for which an estimate could be made was sulfur pyrite bound for Kemerovo, which is estimated to have been 70,000 tons. For the most part, the eastbound movement of chemicals on the Trans-Siberian Railroad is believed to have been relatively light in 1953 when compared with the movements of other commodity groups.

Chemicals on the whole were not produced in large quantities in Siberia, since there are few mineral deposits along the line which would provide the basis for a chemical industry. The largest chemical center is at Kemerovo in the Kuzbas, the basis for this center being coal. Other ingredients such as salt, sulfur, and chlorine have generally been shipped in. The products of Kemerovo included such items as tar, benzol, ammonium sulfate, and ammonium nitrate. A second point of production of coke by-products for chemicals was Stalinsk, part of the output of which moved to Kemerovo for further processing, with the balance believed to have gone mostly in a westerly direction through Novosibirsk. In all, slightly in excess of 300,000 tons of chemicals are believed to have arrived at Novosibirsk from the Kuzbas, the further pattern of distribution from there being vague but probably consisting of the city itself, the agricultural lands of Altayskiy Kray, the Omsk area, and points farther west.

Chemicals moving eastbound from the Kuzbas are believed to have been much lighter in tonnage and to have consisted of fertilizers, paint ingredients, and ethyl fluid.

A small quantity of chemical trade with Communist China was carried on over the Trans-Siberian Railroad in 1953. The USSR shipped such items as dyes and coloring matter, and Communist China shipped caustic soda and soda ash as well as an undetermined quantity of crude rubber, originally from Ceylon.

In addition to the chemicals mentioned, limited quantities of chemicals were produced by a number of smaller plants along the line. In all but a few cases, not even the source of the raw materials is known. About 25 percent of these plants were alcohol distilleries which

used as raw material either wood or grain. The materials put into these plants were generally produced locally and rarely arrived by main-line railroad. The total output of these plants is estimated to be between 100,000 and 150,000 tons of alcohol, some of which was used for motor fuel and the rest for solvents, beverages, and general chemical purposes. Very little of this production moved by rail, much of it being consumed in cities adjacent to the plants.

4. Paper.

At the end of World War II the USSR acquired a sizable Japanese paper industry on Sakhalin Island. Most of the output of the industry appears to have consisted of the rougher types of paper and cellulose, and during 1953 its principal movement is believed to have been westward via the ports of Vladivostok, Nakhodka, and Sovetskaya Gavan', although Nakhodka was the only point at which observations were actually made. It is assumed that both newsprint and packing paper from this source were used in the larger cities of the Soviet Far East, and it has been reported that some of this paper was shipped to Communist China, mainly by sea.

Other paper plants in the area include a tar-paper factory at Khabarovsk and a fairly large paper mill at Birakan, which was set up from machinery looted from Manchuria after the war. 139/ This plant produces paper and cardboard and was observed by prisoners of war to be in operation in 1948, using wastepaper for raw materials. Its output appears generally to move westward.

5. Weapons and Ammunition.

All estimates of air and ground weapons and ammunition comprise a preponderant flow from west to east. Although comparatively high in value, the over-all tonnage of weapons and ammunition moving past Chita in 1953 was believed to have been about 340,000 tons, including 150,000 tons for Communist China and North Korea. 140/ Shipped by rail was a very small tonnage of aircraft, most of the eastward deliveries being moved by aerial flight. The main weight of equipment consisted of tanks, guns, vehicles of all types, engineering equipment, searchlights, bridge sections, pontoons, and airfield equipment. Ammunition was moved eastward to remote parts of the USSR, and it is believed that as much as 90,000 tons reached Vladivostok for Soviet training and stockpiling. In addition, the USSR supplied ammunition for the Korean War during the year 1953 estimated at about 35,000 tons, the balance being supplied by the Chinese Communists themselves.

Westbound armaments and ammunition were composed mostly of light tonnages originating at Khabarovsk, Komsomol'sk, and Irkutsk and consisting of specialized integral parts for aircraft, guns, and tanks.

Neither weapons nor ammunition was produced in large quantities east of Novosibirsk in 1953, although heavy repairs to such equipment were performed in some of the plants in the larger eastern cities. Weapons damaged beyond repair were generally shipped to steel plants in the Far East for use as scrap metal instead of being returned long distances over the Trans-Siberian Railroad.

6. Components for Shipbuilding.

Owing to the isolation of Far Eastern shipyards from their suppliers, an estimate was included for manufactured shipbuilding components moving across Siberia in 1953. As might be expected, this movement was uniformly eastbound; it is estimated to be about 15,000 tons. Loadings per car may have been light owing to priority requirements and the different points of origin and destination involved in each type of shipment, and therefore a disproportionately large number of freight cars may well have been used. Destinations were mainly Vladivostok, Komsomol'sk, and Sovetskaya Gavan'.

This class of items could be considered strategic in nature and warrant expeditious delivery. In addition to rail movement, some instruments and electronic equipment may have been shipped across Siberia by air.

7. Miscellaneous Exports to and Imports from Communist China and North Korea.

In addition to weapons and identified items such as agricultural commodities, nonferrous concentrates, and oil and steel, there is believed to have been a considerable trade in manufactured goods moving from the USSR to Communist China in 1953. Such exports from the USSR to Communist China have been estimated to be between 100,000 and 200,000 tons. 141/ In addition, a quantity equal to about 35,000 tons probably was exported to North Korea. These estimates relate solely to civilian items, since weapons and other military goods have already been covered under the appropriate section. Such goods consisted of a wide variety of items with the emphasis being on vehicles, agricultural equipment, boilers, electrical generator stations, motors and other electric power apparatus,

stationary diesel engines, plant equipment and machinery, oil-well drilling machinery and other oilfield equipment, prospecting drills, coal-mining machinery, quarrying equipment, drugs, machine tools, pumps, batteries, tires, turbines, earth-moving equipment, railroad cars, and railroad axles, wheels, and trucks. 142/ Conversely, there was a steadily moving quantity of goods which could not readily be reckoned as to volume but which from border reports and trade announcements are believed to have been exported by Communist China to the USSR. 143/ Since nearly all of such items fell in the agricultural category, they have been included in the estimate of agricultural goods. Among them are believed to have been high-value, low-weight items such as tobacco, jute, ramie, silk, wool, bristles, furs, skins, and casings. All of these items were shipped in closed cars. Nearly all of the high-value items are believed to have been moved through Otpor to Siberia and the western regions of the USSR.

8. Transit Traffic.

Before 1953, transit traffic between Communist China and the European Satellites had been comparatively low. In that year, however, the Satellites were under great pressure to do business with China. During the first part of the year a heavy load of merchandise accumulated at the port of Gdynia, and it was believed advisable to ship the most urgent items, such as motor vehicles and agricultural equipment, to China via rail. Toward the middle of 1953 the Uniform Transit Tariff went into effect, thereby making it easy to compute the overland rate for each category of goods and in general establishing transit rates which were uniform and low but still considerably higher than typical sea rates on bulk commodities. On the long haul across Siberia the USSR would be the gainer of foreign exchange against a domestic expense outlay.

It has been estimated that transit traffic from the Satellites to Communist China and North Korea consisted of 50,000 tons of manufactured merchandise in 1953, with approximately 100,000 tons moving from Communist China to the Satellites, presumably largely agricultural goods, skins, and hides. North Korea is not believed to have exported enough merchandise to the Satellites in 1953 to warrant inclusion in the estimate.

9. Soviet Manufacturing in Siberia.

Although Siberia has a number of heavy industrial plants, the products of most of them fall under one or another of the categories already discussed. There remains the output of the metalworking and assembly plants, examples of which are the Irkutsk Heavy Machine Building Plant imeni Kuybyshev, the Tomsk Antifriction Bearing Plant, the Rubtsovsk Agricultural Equipment Factory, the Siberian Heavy Machine Plant at Krasnoyarsk, and the Khabarovsk Machine Building Plant imeni Kaganovich.

Each plant had a distribution pattern based on the nature of its product, but industrial distribution patterns are far more likely to shift than are patterns of movement of basic mineral commodities.

After the patterns had been studied and projected, the net total result showed a varying eastbound flow from Novosibirsk to Irkutsk of between 20,000 and 30,000 tons. From Irkutsk eastward the flow tapered down to 10,000 tons at Khabarovsk, and, except for local activity in the environs of Vladivostok, it remained at about that level for the rest of the distance.

Westbound manufactures from Khabarovsk and Komsomol'sk to Irkutsk have been estimated to be slightly less than 10,000, jumping to about 35,000 tons at Irkutsk and increasing at Krasnoyarsk to about 60,000 tons for the remainder of the distance to Omsk. Thus it would seem that Siberian heavy industry as far east as Irkutsk was oriented toward the west to a greater extent than toward providing economic support for the Soviet Far East and Communist China.

10. Soviet Manufactures, General and Unidentified.

The final subgrouping of freight in the miscellaneous category is one for which a controlled calculation would be impossible on the basis of available information. This subgrouping consists of manufactured and other freight which have not been included in any of the commodity categories or in the subgroupings of miscellaneous freight so far discussed. It does not include goods for export or imported merchandise but does include such items as motor vehicles, agricultural equipment, earth-moving equipment, turbines, generators, and large industrial components for Soviet use not manufactured in Siberia. Travelers have reported seeing these goods moving on open cars, as well as lift trucks, narrow-gauge equipment, cranes, cables, and transformer boxes, boats, cement mixers,

and mine cars. The subgrouping also is intended to cover a wide variety of smaller articles which were packed and shipped in closed cars and could not be observed.

Since these items remained within the USSR, it has not been possible to observe them at border points, nor were many reports of defectors or returnees available from principal destination points for the year 1953. An estimate for this type of traffic could only be made by applying judgment factors, which are described in Appendix A. The bulk of this traffic seemed to be eastbound, with a relatively small amount returning west. The estimates for each main-line segment were considered to be closely related to other miscellaneous freight plus steel. Coal, oil, and timber were excluded from the basis of computation because of the disproportion of their weight to that of other traffic and because their movement would in many instances have little relationship to other supplies moving in a similar direction.

The movement of miscellaneous goods from the west through Novosibirsk was estimated to be approximately 2 million tons, tapering down to a tonnage arriving at Vladivostok of somewhat less than one-quarter of this amount. Large quantities of these goods were bound for outlying areas of the USSR. Conversely, in the westbound direction, movements from Vladivostok were only 75,000 tons while over 75,000 tons moved from Novosibirsk to Omsk. Independent estimates had to be arrived at for each of the branches.

It was assumed that in this miscellaneous category would be included all types of items not specifically covered elsewhere, in addition to quantities of items for which estimates so far provided may have been insufficient. This tonnage, however, is not intended to cover back hauls and crosshauls of provisions and supplies for unplanned or emergency purposes or of military organizational equipment moving out to or back from a temporary location. No estimate has been made for such movements of goods, because they do not relate to the general economy. Nevertheless, many movements of this type undoubtedly took place and should be considered as adding to the tonnage in both directions. It is not believed, however, that such movements totaled over 2 million tons per ton-kilometer in both directions combined over any section of the line. In most instances they would have been far less than this amount.

APPENDIX A

METHODOLOGY

1. Individual Commodity Sections.

In formulating a method for estimating movement of freight over the Trans-Siberian Railroad, the decision first has to be made as to whether to approach the problem (a) from the point of view of total movement of freight per line section or (b) from the point of view of the over-all shipment pattern of each basic commodity. [redacted] 50X1 50X1

After major centers of production and consumption had been determined and the principal transfer points established, estimates by commodity were made of the net gains or losses of freight to the railroad at such points. A set of working charts was then prepared expressing for each commodity group the changes of volume in the flow pattern resulting from loading and unloading at pertinent points. Such changes did not necessarily

* See 2, p. 109, below.

take place in their entirety at the centers themselves but were reflected graphically at each center to show gains or losses of major commodities occurring within the portions of the adjacent line sections nearest to it. Representative averages of tonnage movements within each section were treated as typical of the section. This methodology, it is admitted, tends to deflate the final estimates appearing on the charts (Figures 3, 4, and 5*) in some sections by failing to give effect to bulk and other movements which may not have persisted for many kilometers within the section. Some of the sections selected for the charts (Figures 3, 4, and 5) are considerably shorter than others in order to minimize this type of distortion. It is well to bear in mind, therefore, the major distinction between the meaning of the horizontal lines on the above charts which show representative movements for each segment, and those on the Copeland charts,** which represent the total ton-miles for each section divided by the length in miles of the section itself.

As most of the major commodities had distinctly different properties, different methodologies had to be utilized in constructing the flow patterns for each of them. The problems in methodology encountered in each of the traffic categories with which this report is concerned are described below.

a. Coal.

(1) General.

In general, coal movements were established by determining (a) the main producing centers, the volume of production, and the approximate movement on rails away from each 144/; (b) the probable destination of major quantities of coal from each producing center; and (c) the probable destination of Chinese coal believed to be imported into Region XII (Far East) via Grodekovo. 145/ On the basis of available information, it has been assumed that certain proportions of the output of each of the mining centers would go to the railroad, to electric power plants, to major industrial centers, to river transshipment points, and to cities in an economical pattern corresponding to the location of the mines and the points at which the coal would be needed. 146/ In the case of the railroads, this has involved mathematical breakdowns based upon assumed over-all traffic movement and the main points of distribution to tenders

* Inside back cover.
** See IV, p. 39, above.

of coal destined for locomotive use. Prisoner-of-war reports as well as Soviet announcements, speeches, and written articles have served to clarify various aspects of the coal movement. 147/ Particular attention in such utterances is frequently given to Region XI (East Siberia) because of the exceptionally long hauls involved in spotting good-grade coal for railroad usage and the consequent problems which arise in the assembly of empty cars.

Further consideration has been given in this report to the requirements for special types of coal of locomotives, steamships, and certain industries such as coking plants and steel mills. These requirements account for certain long hauls and crosshauls which in 1953 were pinpointed in speeches and articles as being targets for improved planning. 148/

(2) Production.

Coal-mining areas in Regions IX (West Siberia), XI (East Siberia), and XII (Far East), located on and served by the Trans-Siberian Railroad and its branch lines east of Omsk, are estimated to have produced 74.7 million tons of coal in 1953, of which slightly over 70 million tons moved by rail. The remaining coal was used locally at such installations as mine power stations, forges, and heating plants. This area production of 74.7 million tons was arrived at by taking 23.3 percent of the total 1953 coal production of the USSR, which was stated to be 320 million tons. 149/ (Sakhalin Island, situated geographically within Region XII, has not been included among the areas producing the 74.7 million tons, because it seems unlikely that any of its production would have reached the rails of the Trans-Siberian Railroad.)

In estimating the area production of 74.7 million tons, consideration was given to the relationship of the production of Regions IX, XI, and XII (excluding Sakhalin Island) to total Soviet production of coal in previous years. In 1950 these areas produced approximately 61 million tons. This was about 23 percent of total Soviet production of coal in that year. In 1952 they produced 70.1 million tons, which again was close to 23 percent of total Soviet coal production in that year. As total annual Soviet coal production increased by 11 percent in 1950, 7.8 percent in 1951, and 6.7 percent in 1952, each over the preceding year, the mines in these areas consistently kept pace and continued to produce an average of 23.3 percent of the annual total. 150/ In 1953, total Soviet coal production was 6.2 percent greater than in 1952, and

as there is no further evidence relating the share of these areas to total Soviet production, their production for 1953 has been calculated at 23.3 percent of the total, or 74.7 million tons.

The production of this tonnage is estimated to have been divided in the following amounts and percentages among the mining fields within the three economic regions:

Economic Region	Amount (Million Metric Tons)	Percent of Total
IX (West Siberia)	45.5	61.0
XI (East Siberia)	17.2	23.0
XII (Far East)	12.0	16.0

These estimated area tonnages reflect in part the past relationship of the principal coal-mining fields in each area to total Soviet annual coal production and to normal changes in local mining conditions, which, from time to time, might be expected to alter productive capacities.

(3) Types and Qualities.

Data on types and qualities of hard coal and lignite were derived from a very large number of reports of prisoners of war who had been miners, supervisors, loaders, and outside observers.

50X1
50X1

(4) Distribution.

The pattern of distribution of coal was divided into two principal categories: (a) local and short-haul uses close to the mining region and (b) long-haul uses beyond the limits of the producing area. Some coal is generally used at the mines which produce it. The amount consumed per ton of production varies from mine to mine, depending in part upon the size of the mine and the type and quantity of equipment used in it. Electric power needed in mine operation is sometimes generated at the mine head but more generally is supplied by central thermal electric power plants which draw their coal needs from the nearby mines. Fueling of railroad locomotives serving the mining regions generally takes place at regional fueling stations at or near the mines. Many industrial plants using coal

for heat and power were originally located in close proximity to the coal mines to save raw material transportation service and costs. Coal used for the heating of miners' homes and cooking and by the general public in mining communities and nearby towns for space heating of homes, stores, and other public buildings was also drawn from the nearby mining operations and would have had no rail movement.

Balance of production remaining after local needs had been supplied moved out of the producing regions on longer transportation hauls to consumers in other industrial communities. Volume coming to rest in any specific consuming area was more difficult to determine. Coal requirements of large thermal electric power plants were separately estimated, and a proper amount was plotted as delivered to each from either an indicated coal mine or the most logical mining center, depending upon the availability of information. The volume of electric power generated in a town or city was assumed to be a dependable indicator of industrial and domestic activity. Certain types of consuming plants, such as metallurgical plants, give evidence of the special types of coal needed and indicate the producing area best qualified to serve them. The number and size of industrial plants using coal for raising steam also influence the long-haul pattern of distribution. So also does the distribution and density of the population.

Some of the principal sustained movements have been clearly pointed out by engineers, prisoners of war, and traveling observers and have been discussed in the Soviet press. 152/ Most prominently mentioned were the movement from the Kuzbas to the Urals, the two-way haul out of Cheremkhovo, and the eastbound movement from Raychikhinsk to Khabarovsk and Komsomol'sk. 153/ In addition to this type of information and that supplied by Soviet texts on the volume of coal inputs for each of the several categories of consumers, for the shorter as well as the longer hauls, the tonnages arrived at included estimates which reflected the best judgment of the analysts.

b. Coke.

Studies of coke plants based on earlier years' reports of engineers and prisoners of war have made possible a projection of the 1953 coke output of each plant and its probable destination. 154/ Coke, being used principally in heavy industry, would not be expected to undergo piecemeal distribution to small locations as do coal and food items. Coke is usually shipped to furnaces, smelters, and foundries by the shortest feasible

route. The movement of the surplus coke from the coke ovens at Stalinsk and the coke chemical plant at Kemerovo could be traced toward the steel industries in the Urals, where coal of coking quality is scarce, and also to smaller smelters and foundries along the Trans-Siberian main line, for which estimates have been made based on prisoner-of-war visual reports and probable requirements for coke established by industrial plant analyses.

Small quantities of coke on branches have been graphically depicted as a portion of miscellaneous freight.

c. Petroleum and Its Products.

For the purposes of this report, the pattern and rate of flow of petroleum and its products over the lines of the Trans-Siberian Railroad in 1953 were based mainly on net requirements in the Far East, allowing for oceanborne movements and local production, both in the USSR and in Communist China. Communist China had to be included in these requirements because the USSR and Rumania were the sole sources of external supply for that country during the year. Requirements of the Soviet economy, both civilian and military, from Omsk to Vladivostok and farther east, were estimated, and deliveries at known centers of consumption were allocated in accordance with such factors as size of population and industrial or military activity. No attempt was made to account for petroleum shipped to central storage points and later redistributed, even though numerous relatively short back hauls might have been involved.

Despite the inability of observers always to decide whether tank cars were full or empty, it was obvious from the direction of the seaborne traffic and the relative size of the overland movement that the direction of flow was eastbound the length of the line. No oil cargo was estimated to have been picked up between Novosibirsk, at which point a flow of petroleum and its products from the Caspian and Central Asian areas joined the main line, and Khabarovskiy Kray, where Sakhalin oil and refined products were fed into the system. There is believed to have been no source or connection with a source of petroleum and its products for this entire distance. The output of Sakhalin oil is estimated to have been considerably less than the requirements of the eastern areas, thus accounting for the deficit which occasioned the eastbound movement. Because of the location of a few scattered derricks seen along the line by observers, they are believed to have been gas wells or prospectings. Petroleum and its products produced by hydrogenation or liquefaction are not believed to have started moving in 1953, although

later it will undoubtedly be an important factor. The most important plant undergoing tests was Synthetic Fuel Plant No. 16 at Kitoy near Irkutsk, 155/ which was expected in due course to produce about 1 million tons of distillate fuels and chemicals per year from Cheremkhovo coal.

All estimates were checked against movements of tank cars reported by travelers and others where available. 156/ Except in the Omsk-Novosibirsk section, the results were found to be in close enough accord to lend some assurance that the estimated quantities were within a reasonable range of actual happenings.

The net requirement of Communist China was based upon coordinated estimates 157/ which showed inbound seaborne movement of 39,000 tons from Soviet Bloc ports in Europe and 100,000 tons from the Soviet Far East. Overland shipments of petroleum were estimated to be from 800,000 to 1 million tons. This range included at least 500,000 tons moving via Otpor and unknown quantities via Grodekovo and the Sungari River.

For purposes of plotting in this report, a range of figures could not be used, and medians estimated to have the least errors had to be substituted. There being very little to go on in the way of actual flow data, these medians were arrived at mathematically, and transfers of petroleum and its products at Manchouli and Grodekovo were plotted as 750,000 and 250,000 tons, respectively, these amounts to include approximately 200,000 tons for North Korea. Provision was also made for the movement to Vladivostok of 100,000 tons earmarked for Communist China. There were a number of observations supporting the transfer of petroleum and its products to Communist China at the border points, and whereas they usually described the movement as voluminous, they could not be definitely quantitative. 158/

It was next necessary to form a reasonable idea of the requirements of the Soviet Far East, or more precisely, of the USSR from Chita eastward, and from these to deduct available supplies of petroleum and its products from Sakhalin.

The following requirement figures were used:

	Thousand Metric Tons
Petroleum and its products shipped to more remote points of the USSR from Vladivostok 159/	500
(Naval observations of Soviet tanker movement -- rough estimate)	
Vladivostok	150
Nakhodka (including fueling of vessels)	100
Primorskiy Kray, including Semenovka 160/	150
Khabarovsk	150
Komsomol'sk	150
Sovetskaya Gavan' (including naval requirements) 161/	60
Blagoveshchensk	100
Miscellaneous points	160
Chita, including Air Force and Army	220
Total	1,740

For available supplies from Sakhalin, information was as follows:

	Thousand Metric Tons
Estimated production of crude oil	1,100 162/
Less transport loss (5 percent)	55
Less topping plant, Sakhalin	125 163/
Balance available at destinations, crude oil	920*

A rough estimate of the destination of this crude oil was as follows:

	Thousand Metric Tons
Komsomol'sk via pipeline and barge	600
Khabarovsk via barge	220
Communist China via the Sungari River	100 165/
Total	920

* The corresponding figure was estimated at 933,000 tons for 1951 by source 164/.

An estimate of the operations of the refineries at Komsomol'sk and Khabarovsk shows about 150,000 tons lost in the refining process at these two points. (The Khabarovsk refinery must use a considerable amount of crude oil from the west.) 166/

To strike a balance for a net requirement for this region, therefore, the following computation must be made:

	Thousand Metric Tons
Requirements of the USSR from Chita eastward	1,740
Communist China and North Korea via Grodekovo	250
Communist China via Vladivostok	100
Lost in refining at Komsomol'sk and Khabarovsk	150
Total	2,240
Less Sakhalin flow to Komsomol'sk and Khabarovsk (above)	820
Required for Chita and east (not including 750,000 destined for China and North Korea via Otpor)	1,420

This was the figure of petroleum and its products for the USSR plotted as moving eastward between Ulan-Ude and Chita.

Partial checks were provided in two ways. Although both must be considered rough, there appears to be no more precise information available.

First is a remark by Kaganovich 167/ in a 1954 speech to the Supreme Soviet in which he reportedly said: "The systematic lagging of oil extraction in the Far East necessitates the shipment of oil products there. This costs more than 1 billion rubles annually. It would be far more expedient to use this money to speed oil extraction in the Far East." The precise manner in which this billion-ruble cost figure was arrived at is unobtainable, but an approach along the following lines, with numerous factors subject to slight adjustment, might be logical.

Information pertaining to the plan for 1949 indicated that budgeted costs of hauling a ton of petroleum and its products 1 km were to average close to 5.75 kopeks.* 168/ A tariff applicable in 1954 showed a freight rate of 1,743 rubles for moving 20 tons of petroleum and its products 1,500 km, 169/ and this works out to 5.81 kopeks per ton-kilometer. (It has been stated by Soviet authorities that rates on certain bulk commodities such as coal and petroleum and its products are deliberately held close to or even below cost, the loss being compensated for by higher rates on other goods.) With some estimating and averaging at both ends, a typical length of haul of petroleum and its products from the west to the Far East has been assumed to be 7,700 km.** At 5.75 kopeks per ton-kilometer, the cost of moving 1 ton this distance would be 447.37 rubles. If 447.37 is divided into 1 billion rubles, the amount of 2,235,000 tons is obtained, which is to be compared with the estimated eastward movement of 2,170,000 tons of petroleum and its products used in this report for the stretch immediately west of Chita.

Another check is possible on the basis of tank car relationship to total car movement as established by car counts from visual observation. Although sample observations are very limited, those available have been tested for validity in developing actual equated movement. The results are shown in A, 2, below and in section IV of the text. For petroleum and its products, an average of the most reliable samples showed a probable movement of 410 tank cars each way per day between Omsk and Novosibirsk (1953), of 65 cars each way per day between Barnaul and Novosibirsk (1954),*** and of 387 cars each way per day between Mariinsk and Krasnoyarsk (1953).**** Observations made further east were less reliable because of the lower time-density factor and other causes. In 1953, 80 percent of the tank cars used on this run appeared to be of the largest type (50 tons), 170/ and the remainder probably averaged about 18 tons each. Thus an average capacity for cars counted by visual observations would be about 43 tons. With some allowance made for the lower specific gravity of oil, an average loading figure of 35 tons per car may be regarded as

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* One kopek equals 1/100 ruble.

** Giving effect to origins in Central Asia, Ishimbay, and Baku, with destinations split about evenly among Otpor, Khabarovsk, and Vladivostok.

*** Only recent information available.

**** See Table 6, p. 111, below.

reasonable and has been used in these calculations. Computed for 300 days per year (winter presumably being at a lower rate), these observations expand to 4,305,000 tons, 680,000 tons, and about 4,063,500 tons per year, respectively, for the movements cited above, whereas estimates in this report show 2,850,000, 500,000, and 2,900,000 tons, respectively. It will be noted that in this type of check all figures obtained were higher than the plotted estimates by 35 to 50 percent. It is possible that the conjecture of 35 tons average load per car may have been too high. Moreover, some tank cars of chemicals probably were included in these counts, and the Barnaul observation was for 1954. The car counts were made in the warmer seasons and were very limited in number. Nevertheless, there is a strong inference of an error on the low side in the plotted amounts, which if the facts were known might be of some consequence. This would be the result of lack of information on the Siberian petroleum requirement, which was the principal basis of the traffic estimates.

d. Timber.

In order to provide a basis for estimating timber movement on the Trans-Siberian Railroad, estimates of timber production in each oblast were made. Next calculated was the amount of timber that moved by rail, the percentage of the total being obtained by deductions derived from factors for local consumption and for waterways bypassing the railroad within each oblast supplying timber. For further refinement as to point of origin, each oblast was broken down into major timber-producing areas which were spotted to the line of the Trans-Siberian Railroad at the point of connection. [redacted] 50X1

50X1

[redacted]

In order to obtain an estimate of consumption of pit props, the estimated output of coal from the various mining regions was used, open-pit mining excluded, and timber requirements were computed at a fixed

ratio of 40 cubic meters of wood to 1,000 tons of coal mined. 172/ The sources of such props for individual mines were determined by scanning a large number of reports of prisoner-of-war observers at the sites for wood sawing and mining, those containing pertinent information being matched against basic information on the availability of timber.

Distribution of timber and crossties for railroad construction to definite points on the railroad line was difficult to assess, and, as a rule, where the quantities of these items produced could be estimated, the distribution was shown within the probable limits of a given area as equal to a computed requirement for replacement purposes.

Requirements of the railroad itself for crossties for both main line and branches were computed on the basis of 10 percent replacements per year. This over-all figure was intended to give effect to the type of maintenance believed to be in existence on the Trans-Siberian Railroad as a whole. These requirements were checked against timber available at points of supply along the line and against sawmill reports on certain sections to determine whether adequate amounts were available and whether the conclusions reached as to timber movement were realistic. From this check there appeared to be little occasion for long-distance (over 400 miles) hauling of timber for railroad ties except on the Transbaykal system east of Chita and from East Siberia to the timber-deficit areas of Central Asia and North Kazakhstan.

By checking certain reports of travelers who in 1953 and 1954 made traffic counts on a carload basis over portions of the Trans-Siberian and Turk-Sib Railroads, it was possible to determine what types of timber were moving over what stretches and in what sort of supply. On portions of the line with frequent traffic or on single-track stretches this could be most easily done, but the major factor of average tonnage per car remained a matter of speculation. It is known that the Soviet railroads are under orders to load heavily, but what is lacking is information on actual performance. If it is assumed that 60-ton-capacity cars are loaded with 12 meters x 2-1/2 meters x 2 meters, or 60 cubic meters, and that each cubic meter weighs two-thirds of a ton, the weight per 4-axle car on the average would be 40 tons. If a proportion of three 4-axle cars to one 2-axle car is assumed, the average loading would be 35 tons per physical car unit in the over-all count. [redacted] 50X1

13 to 28 May 1953, 173/ on the stretch between Novosibirsk and Achinsk, which is judged to have the densest movement of timber, leads to the conclusion that about 18.3 percent of the westbound cars were loaded with timber, mostly logs and pit props, and that the rate of movement was about 300 cars per day or a rate of 108,000 cars per year. At 35 tons per car this would be 3,780,000 tons per year. This tonnage corresponds reasonably closely with an average for several stretches which had been indicated in the method of estimating flow by availability and requirements. A corresponding check could not be made on the line between Irkutsk and Khabarovsk or between Khabarovsk and Nakhodka, because of the limited number of trips made recently into that area.

On the stretch from Omsk to Chulym, by the same process, the report of the naval attache yielded an estimated yearly westbound rate of about 1,250,000 tons, which is a figure slightly higher than our estimate of 1.1 million for this stretch. Although several other observations were made of this same portion of line in 1953-54, 174/ the speed and frequency of the trains appear to have made impossible the counting or even estimating of the number of cars carrying timber or lumber. Numerous references appear in the reports, however, to logs, timber, and lumber seen moving, which establish the pattern of directional flow as westward, sustained, and fairly heavy.

On two trips made over portions of the Turk-Sib Railroad in 1954 (none had been made in 1953), a northbound observer 175/ reported that about 30 percent of the traffic moving south from Barnaul to Alma-Ata was timber, while a southbound observer 176/ noted a train of 40 empty flatcars returning northward from Barnaul toward Novosibirsk, which could well have been headed to the timber-producing regions of East Siberia. A 1948 source 177/ estimated that about 860,000 tons of timber moved southward over the Turk-Sib Railroad in that year, but as early as 1937 the plan had called for 1.7 million tons. 178/

Assurance of typical day performance in the traffic counts made by travelers is of course an uncertain matter, particularly on lines which do not have a high density of traffic. On the densely traveled portions the risk is less, but seasonal adjustment must be considered in the case of timber.

With timber loading taking place at so many small points, it would be extremely difficult to give an accurate graphic representation of the precise pattern of movement. In most cases, therefore, totals for line sections have been plotted in the direction of major movement, including loadings for small, local back hauls. Tapering off of movement is indicated by dropping at the next main plotting point all timber presumably unloaded within the section.

e. Ferrous Metals.

The method used in plotting shipment of ferrous ores and metals was based on a combination of calculated plant output and consumption requirements in Siberia and the Soviet Far East, supplemented by information on Soviet-Chinese trade in these commodities as provided in finished [redacted]. 179/ The resultant supply-demand factors for particular raw materials, semifabricated metal, and finished steel were balanced out and plotted in accordance with the most economical pattern of movement presumed to be possible. Existing basic information on steel and ferrous products was utilized through the medium of ORR reports and working papers which had already been prepared on the principal iron and steel plants in Siberia. These were updated to 1953 [redacted] 180/ The demand for ferrous metals was more difficult to ascertain, but the requirements of principal consuming plants, the railroad, and the coal-mining industry could be estimated within reason, by plotting the tonnage of shipments of appropriate steel products from the nearest known point of production to appropriate central destinations. Estimates of demands of cities for building purposes and of off loadings at river junctions for further shipment by water were made on the basis of general background knowledge of industries, population, and construction activity. Where such knowledge was meager or completely lacking, the requirements of a larger area were estimated and arbitrarily plotted to a central unloading point within the area. In other words, as with other commodities examined in this report, the locations used as points of destination represent an attempt to generalize the pattern rather than to try to account with geographical precision for lesser shipments to individual locations.

50X1

50X1

In providing a comprehensive check of the estimates arrived at in this fashion, a review was made of all rail journeys made over portions of the Trans-Siberian Railroad in 1953 and 1954, and sightings of steel, which generally moves in open cars, were checked as to

proportion against total number of cars sighted moving, which number in turn was equated with two-way traffic to determine total movement of cars per day for the various sections of the line observed. Thus a sample rate of steel movement could be obtained for each day of observation. By comparing several samples, figures for a presumed steady movement were arrived at and expanded to an 8-month total, the theory being that there would be a considerably higher rate of movement of steel to Siberian destinations in the late spring, summer, and early fall when the observations were made, than would be the case in the winter months when the rivers were frozen and construction retarded.

As a result of this check, about 200,000 more tons of steel were estimated to have moved eastward from the Urals than had been previously estimated, and this was then added to the estimates so far made, with unloadings at principal points in the same manner as already described. Allowance was made for presumed sea shipments northward and eastward to points in the USSR remote from Nakhodka and Vladivostok, of between 25,000 and 35,000 tons, 181/ as more precise calculations could not be made from available sightings.

Indications of points of destination occasionally appear in prisoner-of-war reports and in Soviet broadcasts and local press reports. Such information has been checked against the estimated pattern and occasionally has justified its modification.

It is advisable, moreover, to remember that owing to a variation in products and in time factors, a two-way movement of ferrous metals may be registered on particular stretches of track over a period of as much as a year. This was assumed to be true of the main-line stretch between Omsk and Novosibirsk and has been confirmed by observations. At present, however, data on shipment of ferrous metals are not adequate for a precise estimate. If at a later date, comprehensive and reliable information on Soviet steel movements should be received, these estimates might be corrected more than those for coal, petroleum, and timber.

The following list gives the main points of origin in Siberia for ferrous products and the centers of consumption associated with each, in order of importance:

	Percent
Stalinsk	
Finished and semifinished steel	
Omsk and west	50
Barnaul and south	20
Kuzbas	10
Novosibirsk	10
Irkutsk	5
Khabarovsk	5
Pig iron	
Kuzbas	30
Gur'yevsk	15
Omsk and west	15
Irkutsk	15
Barnaul and south	15
Novosibirsk	10
Gur'yevsk	
Finished steel	
Omsk and west	30
Kuzbas	30
Barnaul and south	25
Irkutsk	10
Khabarovsk	5
Novosibirsk	
Finished steel	
Omsk and west	50
Barnaul and south	15
Novosibirsk	10
Kuzbas	10
Irkutsk	10
Khabarovsk	5

	Percent
Petrovsk-Zabaykal'skiy	
Finished steel	
Irkutsk	20
Chita	20
Omsk and west	15
Khabarovsk and east	15
Krasnoyarsk	10
Novosibirsk	10
Barnaul and south	10
Komsomol'sk	
Finished steel	
Khabarovsk	30
Vladivostok	20
Chita	15
Komsomol'sk	15
Nikolayevsk	10
Sovetskaya Gavan'	5
Skovorodino	5

In the plant studies, enough information generally was available on production facilities to establish production of coke, pig iron, and semifinished and finished steel. Once production is known, inputs are a matter of calculation tempered by a knowledge of steelmaking practice as it varies from plant to plant. Information on the sources of raw materials has usually been available, although the size of mineral deposits and the rate of extraction are frequently hard to establish in the USSR, particularly in Siberia and the Far East. For these purposes, prisoner-of-war and defector reports, 50X1

[redacted] have been used, together with such fragmentary information as could be obtained from Soviet broadcasts and local press reports. 50X1

f. Agriculture.

Owing to the lack of reported data on movement of agricultural commodities, it was necessary to work from estimates of production and consumption in different areas of Siberia in order to establish presumptions for plotting movements. Thus locally available supplies of bread grain were determined for each oblast by calculating production from estimated acreage and average yields and by deducting from the results the quantities used for purposes other than food. Consumption in each oblast was calculated by multiplying the estimated population of the oblast by the annual per capita consumption rate of 161.1 kilograms for 1953. By subtracting consumption from local supplies available for food, the surplus and deficit oblasts were determined. For the offshore regions to the north and east of Vladivostok, the requirements of the population and the net deficit were nearly equal, since little grain can be successfully grown in these regions.

From available prisoner-of-war information on flour mills, it was estimated that the existing flour mills in the deficit oblasts had adequate capacity to process the bread grains needed for home consumption. It was assumed, therefore, that the grains were shipped to the deficit oblasts as grain rather than as flour.

Points of origin and destination selected for plotting grain traffic were the large shipping centers in the oblasts having surpluses and the larger population centers in the oblasts with deficits. In reality, loadings and unloadings were much more dispersed.

In determining points of origin and destination, it was assumed that the Russians would use their transportation in the most efficient manner. Actually this may not have been the case, as there have been frequent Soviet outbursts against crosshauling and hauling long distances. Any error occasioned by this assumption would thus be one of underestimating. It was felt that the difference between closed-car capacity moving east, as estimated from trip reports, and total eastbound movement of commodities ordinarily shipped in closed cars, as estimated from individual commodity shipment patterns, would provide a cushion which could easily absorb any additional load factor occasioned by crosshauling, since eastbound closed cars in the portions of the railroad east of Novosibirsk are almost certain to be loaded.

In order to determine the volume of shipment of cotton and cotton products over the Trans-Siberian Railroad east of Omsk, the consumption of cotton goods in Regions IX, XI, and XII was determined by multiplying the total population by the annual consumption rate per capita of 3.5 kilograms. Since no cotton was produced in these regions, it was assumed that cotton goods were shipped from the textile combines west and southwest of Novosibirsk. Based on the production of cotton products by the Barnaul textile combine and estimated distribution of these products, it was estimated that about 11,400 tons moved eastward over the railroad from Barnaul and that the remainder, about 54,000 tons, moved from Omsk or points west of Omsk.

Movement of sugar was estimated on the basis of available data, not all of which pertained to the year 1953, but which was believed to be representative. Per capita consumption was assumed to be 13.5 kilograms per year, a figure used in other studies for 1953. Area requirements for Regions IX, XI, and XII were computed on the basis of the best population figures available, and estimated supplies produced in each area were deducted. The remainders were divided among major cities in proportion to populations of metropolitan areas and hinterlands, with amounts similarly estimated for Sakhalin and the offshore areas of the Pacific. Thus the total of sugar moving east from Omsk was estimated at 176,000 tons. The movement tapered down to 5,000 tons out of Khabarovsk but was supplemented by considerable production in Primorskiy Kray for local consumption, a minor movement to China, and ocean shipment to remote eastern areas of the USSR.

Movement of miscellaneous agricultural commodities such as vegetables, dairy products, preserves, and canned goods was estimated on the basis of requirements set up on a per capita basis; it was assumed that the cities located away from the main railroad line required 160 kilograms per capita per year and that inland cities on or near the line required half that, or 80 kilograms per capita per year. This difference was based on the assumption that outlying areas had no appreciable support from production of local kolkhozes and sovkhozes and were therefore entirely dependent on shipments arriving from the outside, whereas near most of the inland cities there were regions of agricultural support. There is practically no source material dealing specifically with the movement of miscellaneous agricultural products, but from prisoner-of-war reports covering storage and shipping centers and border transshipment points it is known in general what these products are. A considerable movement is obvious. Potatoes and beets appear to have been among the vegetables most commonly shipped and stored.

Westbound agricultural commodities, as stated in the text, consisted mostly of animal and fish products and of imports of grains, soybeans, and a variety of less bulky items from Communist China.

Shipments of livestock and livestock products from Mongolia and Manchuria were based on estimates of exports from these areas to the USSR. It was assumed that the livestock products moving from Manchuria were destined for the meat-processing centers in Region XII. The destination of the livestock shipped from Mongolia was determined on the basis of the location and estimated capacity of the meat-processing centers in Region XI.

Destination of the livestock products moving from the meat combines was based on estimates of Soviet storage facilities and consumption patterns.

Production of hides and leather products in the regions east of Omsk was determined from an estimate of the slaughter of livestock in these regions. Consumption of these products was calculated by multiplying the population by an estimated consumption rate per capita. By subtracting consumption from production, it was determined that all three regions were surplus-producing areas. Thus it was assumed that the hides and leather products moved from the major processing plants along the railroad to consuming areas west of Omsk.

Fish constituted the principal food item of domestic origin moving westward over the Trans-Siberian Railroad. Estimates of fish shipments were based on previous studies embodying Soviet official catch releases, canned-fish statistics, and numbers of fish barrels produced for Primorskiy Kray. Fish shipments were shown as originating mostly at Vladivostok, with smaller additional tonnages from Sovetskaya Gavan' and Blagoveshchensk joining the main-line westward movement at the junction points of Dezhnevka and Kuybyshevka-Vostochnaya, respectively. Figures on requirements for cities and their environs and for industrial regions were based on population estimates, using an average consumption rate per capita of approximately 25 kilograms per year. The main portion of the movement appeared on balance to be a through one.

In order to obtain a proper order of magnitude for agricultural commodities imported from Communist China by the two main gateways, Otpor and Grodekovo, it was estimated tentatively that 1-1/2 to

2 million tons went to the Soviet Bloc. 182/ Taking the midpoint of this range, 1,750,000 tons, and allowing for approximately one-third to go to the European Satellites and North Korea, the balance available for the USSR would be about 1.2 million tons. It was then necessary to apportion this quantity between Otpor and Grodekovo.

In 1953 there were few border point observers at either station, but reports for both were available from previous years. Whereas in 1952, activity at Grodekovo had included a quantity of agricultural goods, the impression generally gained is that in 1953 a far larger movement went through Otpor toward the west. Rice, soybeans, and vegetable oils from Communist China complement Soviet indigenous foodstuffs in Siberia and obviate the necessity of a long haul to the Far East. Moreover, these commodities can reach points in Regions IX and XI (West and East Siberia) by moving in the direction opposite to the main flow of traffic east of Novosibirsk and hence tie in conveniently with car movement requirements.

For purposes of this estimate, the division as between Otpor and Grodekovo was made in the relationship of 5 to 1, or 1 million tons via Otpor and 200,000 via Grodekovo. Distribution of Chinese Communist agricultural goods to the Soviet Far East was made in the same manner as the movement prevailing in 1927 and 1928 prior to the Japanese occupation of Manchuria, when Soviet demands for foodstuffs were similar in geographical pattern to those of 1953. 183/ From Otpor west, distribution was made only on a judgment basis, using probable demands of population centers as a guide. The estimated balance reaching Omsk for movement farther west was 320,000, which is a tenuous estimate and in all probability on the low side. Despite embargoes and exhortations against long-distance hauling and cross-hauling, the likelihood of policymakers' favoring the European USSR in the distribution of Chinese products may well have outweighed a more logical distribution pattern embodying the full requirements of the Siberian industrial centers.

g. Manufactures and Miscellaneous Freight.

In the general category of manufactures and miscellaneous freight, the principal groupings for which probable points of origin and destination could within reason be established were set apart and analyzed individually. The usual rule in such cases was to try to establish the pattern, starting with fixed points of origin and then,

on the basis of all available intelligence, laying out logical lines of flow to probable points or regions of consumption. The volume at the shipping point would in many cases approximate production estimates, with a nominal deduction for local deliveries to nearby consuming centers allowed where appropriate. The next step would be to distribute the product in the correct proportions to the various flow lines. After all preliminary estimates had been formulated and the lines of flow compared, final adjustments would usually be necessary.

In commodity groups where points of origin and destination were widely scattered, formulas were established to take the place of point-to-point movement. Such goods as sand, stone, and gravel were treated in this manner.

The final balancing group consisted mainly of manufactured goods originating west of Omsk and south of Barnaul, for which exact points of origin would not be visible on the charts, Figures 3, 4, and 5. Commodities in this group moved eastward across Siberia, with regional deliveries diminishing the flow as it progressed. A small movement in the opposite direction of unknown items may have included excesses of some of the commodities already discussed or even a return haul of manufactured goods slated for cannibalization or repairs.

In making estimates for this group a method of calculation involving the level or rate of flow was evolved on the basis of US experience, using unpublished 1952 estimates of Soviet figures as a check on the result. In some instances where the method obviously would not apply [redacted] judgment estimates which tied in with the general level of economic activity in the local area were substituted. 50X1

(1) Nonferrous Metals.

Estimates of mining, concentration, and shipment of nonferrous ores were based originally on available geological studies, prisoner-of-war reports, translations of Soviet documents and periodicals on mining, radio announcements, and reports of the US Bureau of Mines.

In the field of nonferrous metals from Siberia, the shipment pattern for ores and concentrates was relatively clear and easy to follow, since mines, concentrating plants, and rail loading

points were few, and points of destination such as smelters were fixed and were not numerous. Because the prevailing movement of nonferrous items in 1953, including Chinese trade, was westbound, most of the aggregates were either dropped at smelting centers or carried through to destinations west of Omsk. Refined metals moved mostly to the Urals and the west.

For Chinese Communist trade the estimates made for 1952 were increased slightly and rounded for tin and antimony. Although strategic and valuable, mercury was not included, because its total bulk was considerably less than 1,000 tons. On the basis of Chinese production, magnesite has been estimated at a little less than 50,000 tons and is believed to have been bound for the Urals. 184/

Gold has been omitted, as it is believed to be handled by air. Silver may have been shipped by rail, but its tonnage would be very low. Blanket estimates have been made to cover small tonnages of unidentified concentrates and metals arriving at Nakhodka and Krasnoyarsk by water from the east and north. Nickel was probably the main item transloaded from river craft at Krasnoyarsk. Several other metals have been mentioned by prisoners of war returning from the Lower Yenisey and Kolyma districts, tonnages of which would be difficult to determine. The amounts in tons are believed to have been relatively small, and conservative blanket allowances for them have been entered with a westbound movement past Omsk.

(2) Nonmetallic Minerals.

(a) Cement.

Approximately 20 percent of the cement produced in the USSR in 1953 185/ was produced in Regions IX, XI, and XII which comprise the area covered in this report. In 1953, total production of cement in the USSR was 16 million tons, 186/* indicating that approximately 3.2 million tons of cement were produced within the shipping area of the Trans-Siberian Railroad.

* This estimate is supported by announced fulfillment figures as follows: 97 percent of the 1950 plan of 10.5 million tons, or 10.2 million tons; a 19-percent increase in 1951 over 1952; a 15-percent increase in 1952 over 1951; a 15-percent increase in 1953 over 1952, which gives the final figure of 16 million tons.

In projecting a movement pattern and volume estimate for cement, the fixed-point-of-origin and probable-destination method was used. The large cement mills at Iskitim, Yashkino, Stalinsk, Krasnoyarsk, Cheremkhovo, Timlyuy, Teploye Ozero, and Spassk-Dal'niy were taken for points of origin.* Fifty percent of the estimated production of each plant was treated as the amount shipped out, and a pattern was arrived at by studying important construction projects or construction areas which in 1953 would have been heavy consumers of cement and were served by the facilities of the Trans-Siberian Railroad or connecting carriers. Some 180,000 tons of cement are believed to have been imported from Communist China, and in the absence of more detailed information, this was arbitrarily divided in equal portions between Otpor and Grodekovo. 187/

(b) Ballast.

As a means of estimating average movements of ballast, a statement was taken from a Soviet periodical 188/ that the average haul for ballasting was 150 km and that 8,000 cars on the average were loaded daily. These figures were prewar, but they may not have changed perceptibly. (It has been announced that the rate of tie replacements per year remains about the same as the prewar rate.) A conservative increase might bring the 1953 ballast figure to 10,000 cars per day. No announcement giving a definite postwar figure is available, but there have been several statements indicating a stepped-up ballasting program for the Trans-Siberian Railroad.

The ratio of trackage east of Omsk to all Soviet trackage is about 11.5 percent on a route distance basis and about 15.5 percent on an individual track distance basis. Ballasting in Siberia is believed to be proceeding at a higher rate than in the rest of the country, possibly loading 17 percent of the 10,000, which would be 1,700 cars per day. If 1,700 cars each hauling 25 tons of ballast were loaded on an average of 360 days per year, 15.3 million tons of ballast would be hauled during the year. At an average distance of 150 km, a total of 2,295 million ton-kilometers would result, which, divided by the route distance of about 13,000 km, would give a rough average of 177,000 tons moved during the year over each

* In cases where 1953 plant production was unknown, adjustments were made to the estimated production of individual plants so that the over-all total production for the production area would be reasonably accurate.

kilometer of line. This is admittedly not an accurate figure nor would the average apply as an actual density in many locations. Nevertheless it provides guidance as to the scope of the work. Perhaps a better figure would be obtained by dividing the ton-kilometers by the total route distances of single track covered in this study, or about 20,000 km. This would give 115,000 tons per kilometer of single track, with a weight of double for the double-track stretches. In terms of average cars per day, this would be 13 cars with 25 tons each, but actually there would be a considerable seasonal variation.

In making a final rough estimate for ballast, consideration was also given to the stretches of heaviest traffic, which incidentally were those where most ballasting was reported by observers. These were arbitrarily boosted, and those on less active portions of line were correspondingly lowered. Typical final estimates used were 150,000 tons per year for each track on the Omsk-Novosibirsk section; 125,000 for each track on the Krasnoyarsk-Irkutsk stretch; 75,000 for each track of the line from Chita to Kuybyshevka-Vostochnaya, where not much ballasting was reported; and an average of 50,000 tons per track on branches.

The estimate of ballast moved was taken as the traffic estimate for stone, sand, and gravel, all of which were used for ballast and trackwork and which, in Siberia, probably were hauled principally for such a purpose.

(c) Bricks and Clay.

It has been estimated that 3.1 billion bricks, or 12.4 million tons of brick, were produced in plants along the Trans-Siberian Railroad in 1953. 189/ Of this amount, only 10 percent, or about 1,240,000 tons, is believed to have been handled by rail shipment. Again, much of the brick moved is believed to have been moved only for short distances which could not be plotted on the traffic chart.

Few Soviet statements have been published on shipments of bricks and clay. The statements which are available give the impression that efforts constantly are being made to keep bricks and clay from being hauled for long distances. Industrial Register listings show brickyards and kilns in the neighborhood of most Siberian cities, with numerous brickyards in the environs of the larger ones.

It has been possible from some Soviet statements to determine a few long-distance movements of bricks, and these have been plotted as a subdivision of miscellaneous freight. 190/ Other movements adding up to somewhat less than 1.2 million tons have been plotted in stretches where shipments have been indicated by observers, the effect being to omit the balance of actual short-distance movements (described by numerous prisoners of war employed at kilns) which could not have been realistically expressed in the chart.

(d) Fluorspar.

The most active known workings of fluorspar in Siberia were at Abagatuy and Kalanguy in Chitinskaya Oblast. A concentrating plant was located at the latter point, and the concentrate was trucked to Khadabulak where it was loaded for westward shipment on the Trans-Siberian Railroad. Borzya has been used as the chart plotting point for Khadabulak in this report.

On the basis of prisoner-of-war reports on production of previous years 191/ it has been estimated that approximately 70,000 tons of fluorspar concentrate were moved westward from Khadabulak past Omsk in 1953.

(e) Salt.

Movement of salt was from west to east, the demand on the Pacific coast coming from the fish-packing industry. Sources of salt for the Soviet Far East were Communist China, 192/ Usol'ye-Sibirskoye near Irkutsk, 193/ Pavlodar south of Tatarsk, 194/ and possibly other small salt dome workings. In addition to its use for packing fish, salt was also consumed by chemical installations, principally at Kemerovo and Cheremkhovo.

Whereas the pattern of flow of salt was fairly clear, volume was difficult to determine. An estimate finally arrived at on the basis of Far East requirements less Chinese Communist imports (via sea) and requirements for chemistry of the Kuzbas and Irkutsk regions came to about 300,000 tons from Tatarsk to Novosibirsk, 200,000 from Novosibirsk to Cheremkhovo, and an equal amount from Cheremkhovo to the Far East region where the flow divided, the greatest portion reaching the sea at Vladivostok.

(f) Other Materials.

A few other materials made up the nonmetallic minerals field, estimates of each being incorporated in the total. As a rule, tonnages were small: the main exception was limestone, 800,000 tons of which are believed to have moved from Gur'yevsk to Stalinsk in the Kuzbas for use in blast furnaces. This movement was a continuation of the pattern of previous years, and the volume was calculated on the basis of estimated production of steel at Stalinsk.

In comparing the estimates of movement of nonmetallic construction materials made by these methods with the over-all average for the USSR as recently announced for the year 1954, 195/ the results have shown a variation of from 1.6 percent to 9.2 percent of total movement on various stretches for 1953 as compared with the announced over-all average of 8 percent for the following year. In particular, the 1.6 percent for the Omsk-Novosibirsk distance is therefore regarded as far too low in view of the fact that the West Siberian flat lands lack surface mineral resources, 196/ and in making the traffic adjustment to conform with the Soviet announced movement of the Omsk system, a liberal tonnage has been accorded nonmetallic building materials, presumably moving in an easterly direction from the Urals, where slag and rock are plentiful. This movement corresponds with the direction of availability of empty open freight cars.

(3) Chemicals.

The chemical pattern was based on the point-of-production-to-area-of-distribution method, using established routings of principal products such as sulfur pyrite, tar, and ammonium sulfate. With chemicals, the movement was frequently a point-to-point and plant-to-plant flow of materials, which was not difficult to trace. Volume was determined by estimated requirements and capacities of plants.

Principal chemical centers were located at Stalinsk, Kemerovo, and Cheremkhovo, with coking plants constituting the base for numerous smaller plants producing specialized chemicals. The latter moved out in tonnages which were extremely small by comparison with most of the commodities covered in this report to areas of consumption which were occasionally identified but mostly were supplied by logical and educated guesses of analysts in the field.

(4) Paper.

Paper movements were plotted principally on the basis of presumed relationships to production of Sakhalin plants. Paper is believed to have moved through Vladivostok, Nakhodka, and Sovetskaya Gavan'. Direction of rail movement has been indicated as westward.

Tonnage estimates were hampered by scantiness of information, but 80,000 tons have been entered as moving in from the southern Primorskiy ports to Khabarovsk and 50,000 tons as moving west from Sovetskaya Gavan', making a total of 130,000 tons of which 100,000 tons are estimated to have reached Omsk.

These figures are analysts' best guesses based on capacity of plants and potential needs for paper in various locations. Prisoner-of-war observer information was almost completely lacking, and paper cargoes shipped in closed cars were unobservable in transit. Since the tonnage is comparatively small, however, a sizable percentage error here would be minimized in the miscellaneous totals.

(5) Weapons and Ammunition.

Weapons and ammunition were manufactured principally west of Omsk, so the points of origin and capacities of plants could not be used in the estimating process. The figures for weapons and engineering equipment* were based principally on calculated net annual requirements of the Soviet Far East armed forces 197/ plus an auxiliary requirement for the forces of Communist China and North Korea. Requirements for arms were calculated as a replacement flow to provide for restocking of depots plus shipments of new types of material. New equipment was assumed to be shipped with a goal of fully equipping troops in 5 years. 198/

Ammunition shipments from Omsk eastward to various points of destination were calculated on the basis of one-quarter unit of fire for troops in the area. Eighty percent of ammunition components were assumed to have arrived from west of Omsk, 10 percent from south of Novosibirsk, and the remaining 10 percent from the Novosibirsk area. 199/

* Class II and IV supplies, which consist of clothing and organizational equipment such as weapons, vehicles, boats and bridges, mobile laboratories, and communications assemblages. In effect, the two classes encompass most military goods required by ground forces but specifically exclude food, petroleum and its products, and ammunition.

Exports of weapons and ammunition to Communist China and North Korea were entered as 160,000 tons, with 150,000 tons assumed to have moved through Otpor and 10,000 tons through Grodekovo. 200/

Movements by rail of aircraft and aircraft components were extremely light in terms of weight and were computed on the basis of the point-to-point method. Inputs to aircraft plants were based on an existing study 201/ with adjustments to take care of requirements for the manufacture of consumer goods.* Inputs of commodities for which local area inbound estimates had already been made were checked against such estimates to insure consistency.

Outbound shipments were based on the results of another study with due allowance made for flyaways which would not move by rail. 202/

(6) Components for Shipbuilding.

Components for shipbuilding were very light in weight compared with other commodities. All significant tonnage moved from west of Omsk across Siberia to shipyards in the Amur and Far East areas. The bulk of the hardware went to Vladivostok, Komsomol'sk, and possibly Sovetskaya Gavan'. Total movement across Siberia is not believed to have exceeded 15,000 tons.

Estimates of tonnage moving were made on the basis of requirements for parts and equipment not locally manufactured as related to currently reported activities in the yards. These estimates [redacted] included conclusions tentatively reached in the course of preparing reports. 203/ 50X1

(7) Miscellaneous Freight to and from Communist China and North Korea.

Tonnages for miscellaneous freight which were moved to and from Communist China and North Korea in 1953 were based entirely on general estimates which have been coordinated and published. 204/

* It will be recalled that, in the latter half of 1953, much publicity was given to Soviet intentions to emphasize production of consumer goods.

The westbound miscellaneous freight tonnage without doubt included some unidentifiable commodities belonging to general categories for which estimates based on identified commodities already have been provided, presumably agricultural goods and nonferrous metals and concentrates. Their inclusion here, even though less appropriate, would therefore not constitute a duplication, but rather an addition.

(8) Transit Traffic.

Estimates of volumes of transit traffic are unsubstantiated, but the initiation of the movement was played up extensively in the 1953 Soviet press and in propagandistic broadcasts. Use of the overland route was encouraged by the establishment of the Universal Transit Tariff. Ostentatiously marked freight cars moving eastward have been seen by travelers over the Trans-Siberian Railroad. 205/ It was fairly certain that the route was a through passage between Omsk and Otpor.

50X1

(9) Soviet Manufacturing in Siberia.

During the period of existence of the USSR and even earlier, efforts have been made to set up heavy industry along the line of the Trans-Siberian Railroad and in the Kuzbas. The USSR has given much publicity to construction of such plants as do exist in Siberia, but as matters stood in 1953, a very small portion of Soviet heavy industry was in operation east of the Urals. In order to isolate the movements of the product of these plants, some of which would be westbound, from the main eastbound current of manufactured goods, an attempt was made to estimate the tonnage and destinations of the output of the principal plants in Siberia producing heavy industrial goods.* This report indicated that approximately 65,000 tons of westbound goods may have reached Omsk and

* The method used in the case of each plant was the same as the plant-to-consuming-area approach for miscellaneous freight.

that 10,000 tons may have moved from Novosibirsk toward Barnaul and points farther south. On the other hand, about 34,000 tons of products of Siberian plants appear to have moved eastbound out of Irkutsk. These figures include only the estimated output of the major Siberian plants engaged in heavy industry. 207/ Shipment of light industrial products could not be estimated with any degree of accuracy and therefore were not included in estimates of traffic. Also omitted were locomotives and railroad rolling stock produced in Siberia which left the manufacturing plant on their own wheels.

(10) Soviet Manufactures, General and Unidentified.

The methodology used in constructing the balancing tonnage figure, which embodies mostly manufactures and unidentified and unsuspected commodities, is based on the assumption that certain relationships in traffic on the Trans-Siberian Railroad might bear a similarity to parallel relationships in the US.

The theory as originally conceived was to obtain by a process of comparison and elimination a list of items shipped on US railroads which would constitute a remainder of items similar to those which remain to be covered for the Trans-Siberian Railroad. The total loadings for these items would then be matched against a second list for US railroads comprising the items of miscellaneous freight already dealt with. The relationship thus established would next be applied to the total estimates so far obtained for miscellaneous freight, on a section-by-section basis for traffic moving in each direction, and the amounts so obtained would be added on to constitute the ultimate totals.

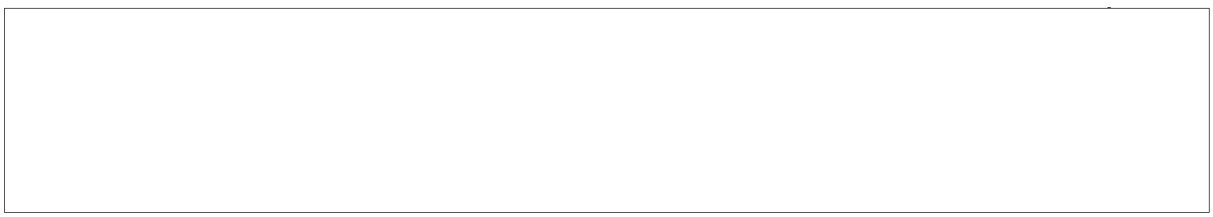
To obtain basic percentage figures, the US Interstate Commerce Commission's Summary of Freight Traffic Originated for all US railroads, 1952, was used. 208/ After eliminating all items similar to those dealt with in the bulk commodity sections of this report, the balance of items was divided again between those so far covered as miscellaneous items and those not so far covered. It was believed advisable at this point to modify the original concept by reinstating on both the Trans-Siberian and the US railroads, as a base for the comparison only, tonnage of fabricated steel. The resulting relationship came to 77 percent: that is, the loadings of items not yet estimated would be presumed to equal 77 percent of those miscellaneous items so far included, such as cement, chemicals,

paper, and nonferrous metals. As a check on this figure, the 1954 report of the Southern Railway of the US which moves freight of a nature similar in many respects to that of the Trans-Siberian Railroad, was also analyzed in the same manner. The relationship in this case proved to be 80 percent. In making the projections, 77 percent was the figure used.

In order to obtain a fair comparison, all estimates of traffic to and from Communist China and North Korea were eliminated from the Trans-Siberian base figure. The percentages were then applied and the results added. Finally the total resulting miscellaneous estimates were compared, section by section, and in a few cases, moderate increases or decreases were made on the basis of judgment. For instance, the impact of a substantial amount of sulfuric acid or tar loaded west out of Kemerovo and reaching the main line at Yurga would not warrant a proportionate and parallel increase in westbound miscellaneous freight shipments at that point. The judgment changes were kept track of in work tables for use in case new information should become available.

In effect, a total-loadings comparison has been used to solve a ton-kilometer problem. This would be most unsound were bulk commodities included in the base. The degree of potential error is lessened considerably by the fact that only miscellaneous freight has been dealt with. With the miscellaneous field isolated, the relationships of tons loaded and ton-kilometers are apt to be more uniform than would be over-all figures, which would be heavily weighted by basic commodity patterns.

It is felt, nevertheless, that the westbound miscellaneous movement may have been overestimated by this method and the eastbound possibly underestimated. An attempt was made, therefore, to check the over-all relationship of miscellaneous freight to total freight resulting from the calculations.



50X1

[redacted] 50X1

The results were as follows:

Thousand Metric Tons

	Miscellaneous Freight per Original Estimate	Miscellaneous Freight per Check	Judgment Figure Used
Eastbound			
Omsk to Tatarsk	1,841	2,693	2,673
Krasnoyarsk to Tayshet	2,210	2,564	2,220
Westbound			
Tayshet to Krasnoyarsk	1,913	3,468	2,121
Tatarsk to Omsk	3,702	2,904	2,893

It can be seen that the totals fluctuate considerably, [redacted] 50X1
[redacted] In no case, however, does the indicated difference as applied to the total estimated freight movement exceed the maximum margin of error estimated and discussed elsewhere in this report. 50X1

Following are sample lists of miscellaneous freight items [redacted] shipped over the Trans-Siberian Railroad in the years 1952 and 1953: 50X1

[redacted] 50X1

Machinery and industrial equipment

- Airport building machinery, heavy
- Boilers
- Bulldozers
- Cable
- Cement mixers
- Cranes
- Drag lines
- Dredges
- Electric motors and generators
- Food-processing machinery
- Foundry furnaces
- General industrial machinery, not otherwise specified
- Internal combustion engines, stationary
- Machine tools
- Machinery, special for coal distillation and liquefaction plants
- Mining machinery
- Oil well drilling equipment and other oilfield accessories
- Pumps
- Railroad car wheels
- Road construction machinery
- Shovels, steam, electric, diesel, and gasoline
- Tanks, commercial
- Transformers
- Turbines
- Valves

Vehicles and equipment

- Automobiles
- Light trucks
- Prime movers
- Tires
- Tractors
- Trailers
- Trucks, diverse types
- Wagons
- Spare parts

Light Manufactures

- Clothing
- Furniture
- Hand tools
- Household equipment
- Lighting equipment
- Radio central receiving stations
- Telephone equipment

Agricultural equipment

- Combines
- Harrows
- Harvesters
- Ploughs
- Tractors

Marine equipment

- Patrol boats
- Sport boats
- Pontons

2. Observation Trips.

[redacted]

50X1

It is possible, by equating the numbers of cars met and overtaken in fixed stretches and by making proper allowance for the speed of the travelers' own train, to arrive at the number of cars moving in both directions which should pass a stationary point within each stretch in a 24-hour period. The basis for such a procedure is the theory that on a heavily traveled line which has a monopoly of the traffic between important regions, the car movement in both directions should remain closely in balance. This theory appears sound, but limited observations may encounter wide variations resulting primarily from traffic delays or offsetting speed-ups. The sparser the traffic, the greater will be the possibility of error. [redacted] 50X1 50X1

On the basis of calculations made in accordance with the foregoing, Table 6* has been constructed to show the number of cars per day which appeared to be moving each way on the various stretches at the time the car counts were made. Certain comparisons are at once conspicuous. First is the declining traffic density encountered as the travelers progressed from west to east, with a slight increase indicated around Khabarovsk. Next is the sizable growth of the 1953 and 1954 densities over those of 1948. Finally, there is the interesting relationship of the results of 5** different observations in the Omsk-Novosibirsk section of 1953 and 1954, which taken together averaged 2,487 cars per day each way.

In only the traffic opposed to the observers' trains, counts of individual types of cars, such as tank, box, open-bulk, and open-miscellaneous, were checked and related percentagewise to the total opposed car counts for each stretch. It was hoped in this manner to obtain typical or average daily consists of cars for various line sections, which might permit checking the estimates of certain bulk commodities, particularly oil and coal, by applying to them for an appropriate number of days per year estimated average tons loaded per car. The percentages were taken only on the basis of opposed traffic because the opposed samples were much greater and more representative than those of overtaken traffic. In overtaken traffic, the trains most

* Table 6 follows on p. 111.

** The sixth sample, number 3 in Table 6, was not included, owing to obvious trouble in the eastbound movement, which resulted in an abortive count.

Table 6

Daily Balances of Moving Freight Cars on the Trans-Siberian Railroad
Estimated from Various Trip Logs, Equated Traffic by Sections of the Line

Trip	Section of the Line							
Westbound trip, 1 to 11 October 1948 a/*	Omsk-Chulym 495 km 8 October 1948	Mariinsk-Krasnoyarsk 385 km 7 October 1948	Tayshet-Zalari 473 km 6 October 1948	Tankhoy - Petrovskiy Zavod 365 km 5 October 1948	Darasun-Bushulei 359 km 4 October 1948	Urusha-Magdagachi 284 km 3 October 1948	Arkhara-Khabarovsk 442 km 2 October 1948	Voroshilov-Vladivostok 113 km 1 October 1948
Total cars	1,320		385	391	259	192	199	No count made
Boxcars	b/			(Based on no trains overtaken)				
Tank cars								
Eastbound trip, 13 to 18 May 1953 c/	Omsk-Chulym 495 km 16 May 1953	Bolotnaya-Achinsk 455 km 17 May 1953						
Total cars	2,346	1,594						
Boxcars	352	382						
Tank cars	375	351						
Westbound trip, 23 to 28 May 1953 d/	Kalachinsk-Novosibirsk 583 km 25 May 1953	Novosibirsk - Anzhero-Sudzhensk 269 km 25 May 1953	(Eastbound movement apparently tied up on this day. These figures were not used in averages.)					
Total cars	1,382	338						
Boxcars	55							
Tank cars	774							
Eastbound trip, 25 June to 5 July 1953 e/	Omsk-Chulym 495 km 28 June 1953	Mariinsk-Zaozernoye 505 km 29 June 1953	Tayshet-Cheremkhovo 537 30 June 1953					
Total cars	2,015	1,627	1,136					
Boxcars		504	238					
Tank cars		423	227					

* Footnotes for Table 6 follow on p. 112.

Table 6

Daily Balances of Moving Freight Cars on the Trans-Siberian Railroad
Estimated from Various Trip Logs, Equated Traffic by Sections of the Line
(Continued)

Trip	Section of the Line						
Eastbound trip, 25 August to 3 September 1953 f/	Omsk-Ubinskaya 408 km 28 August 1953	Mariinsk-Krasnoyarsk 442 km 29 August 1953	Alzamay-Polovina 495 km 30 August 1953	Tankhoy-Kharagun 574 km 31 August 1953	Shilka-Mogocha 462 km 1 September 1953	Bolshoy Never - Kuybyshevka-Vostochnaya 544 km 2 September 1953	Birobidzhan-Khabarovsk 172 km 3 September 1953
Total cars	2,978	Cannot equate due to apparent jam on eastbound line	973	760	321	501	Sample too small
Boxcars	207		292	327	135	235	
Tank cars	445		224	137	87	90	
Eastbound trip, 3 to 13 June 1954 g/	Omsk-Chulym	Mariinsk-Krasnoyarsk	Alzamay-Cheremkhovo 468 km 8 June 1954	Tankhoy-Kharagun	Onon-Mogocha 382 km 10 June 1954	Kuybyshevka-Vostochnaya - Ruzhino 1,062 km 11 to 12 June 1954	
Total cars	No observation	No observation	1,632	No count made	610	655	
Boxcars			698		259	250	
Tank cars			348		92	59	
Eastbound trip, 13 to 18 August 1954 h/	Omsk-Kokoshino 472 km 17 August 1954						
Total cars	2,726						
Boxcars							
Tank cars	226						
Westbound trip, 14 to 18 September 1954 i/	Tebisskaya-Novosibirsk 359 km 17 September 1954	Chernorechensk-Ilanskaya 423 km 16 September 1954	Zima-Baykal 325 km 15 September 1954	Balyaga-Chita 394 km 14 September 1954			
Total cars	2,368	1,141	921	1,038			
Boxcars	379	114	202	134			
Tank cars	426	262	359	126			

a. 211/
b. Could not identify by type.
c. 212/ d. 213/ e. 214/ f. 215/ g. 216/ h. 217/ i. 218/

frequently reported were the heavily loaded marshruty (point-to-point through trains or cuts of cars carrying a single commodity), whereas more lightly loaded trains were apparently able to maintain headway with the passenger trains. In the case of petroleum and its products, calculations based on traffic counts resulted in considerably higher figures than the estimates based on requirements for the more westerly line segments,* whereas in the Transbaykal and Amur areas, the results of the petroleum and its products traffic count ran somewhat lower than requirement estimates. An accurate count of loaded cars of coal proved to be difficult because the sides of the cars were too high in many cases to observe the load, which might have been some such commodity as coke, timber, or gravel instead of coal.

Rather than attempt a series of individual commodity comparisons, since there are other unknown variables such as average load per car, ratio between numbers of 2- and 4-axle cars, empty-car movement, seasonal variations in the sample and number of days per year for which a sample would be valid, Table 7** has been constructed to show the total load moved east under 3 different average car loading assumptions: 15 tons per car, 25 tons per car, and 40 tons per car, using average sightings from the car counts of the 2 years in the various count stretches, and comparing them with total estimated tonnage moved.

Table 8*** shows tonnage calculated from the same sightings moved west under assumptions of 30, 40, and 50 tons, compared with total estimated tonnage. The higher assumptions made on the westbound sightings are due to the fact that westbound traffic consists mostly of bulk commodities, whereas eastbound shipments include a higher proportion of manufactured goods which could be expected make up lighter carloads. (See Tables 7 and 8.)

From these tables, it will be noted that based on an average capacity of 40 tons per car, the estimated movements of the various commodities were almost always much lower than the equated car capacity seen moving. This would be a normal characteristic of US railroads and reflects the empty movement resulting from the specialized requirements for cars of a specific type to move particular commodities over****

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* See p. 80, above.
** Table 7 follows on p. 114.
*** Table 8 follows on p. 115.
**** Continued on p. 116.

Table 7

Comparison of Estimates of Annual Rates of Eastbound Traffic
on the Trans-Siberian Railroad
1953

Thousand Metric Tons [a]

Line Section	Charted Traffic Estimate	Expansions of Equated Car Movement Sightings		
		15 Metric Tons per Car	25 Metric Tons per Car	40 Metric Tons per Car
Omsk-Tatarsk	9,000	13,450	22,400	35,800
Tatarsk-Novosibirsk	9,200	13,450	22,400	35,800
Anzhero-Sudzhensk - Mariinsk	7,750	8,700	14,500	23,200
Mariinsk-Achinsk	8,250	8,700	14,500	23,200
Achinsk-Krasnoyarsk	7,050	8,700	14,500	23,200
Tayshet-Zima	7,050	6,300	10,500	16,800
Zima-Cheremkhovo	7,400	6,300	10,500	16,800
Mysovaya - Ulan-Ude	8,550	4,100	6,850	10,950
Ulan-Ude - Petrovsk-Zabaykal'skiy	8,200	4,100	6,850	10,950
Kaganovicha-Ksen'yevka	5,400	3,300	5,500	8,800
Skovorodino - Kuybyshevka-Vostochnaya	4,700	2,700	4,500	7,200
Bureya-Obluchye	6,550	3,550	5,900	9,450

a. Rounded to nearest 50,000.

Table 8

Comparison of Estimates of Annual Rates of Westbound Traffic
on the Trans-Siberian Railroad
1953

Thousand Metric Tons a/

Line Section	Charted Traffic Estimate	Expansions of Equated Car Movement Sightings		
		30 Metric Tons per Car	40 Metric Tons per Car	50 Metric Tons per Car
Obluchye-Bureya	1,400	7,050	9,450	11,800
Kuybyshevka-Vostochnaya - Skovorodino	2,250	5,400	7,200	9,000
Ksen'yevka-Kaganovicha	1,400	6,600	8,800	11,000
Petrovsk-Zabaykal'skiy - Ulan-Ude	4,200	8,200	10,950	13,700
Ulan-Ude - Mysovaya	4,700	8,200	10,950	13,700
Cheremkhovo-Zima	8,550	12,600	16,800	20,950
Zima-Tayshet	9,200	12,600	16,800	20,950
Krasnoyarsk-Achinsk	8,150	17,400	23,200	29,000
Achinsk-Mariinsk	9,800	17,400	23,200	29,000
Mariinsk - Anzhero-Sudzhensk	9,300	17,400	23,200	29,000
Novosibirsk-Tatarsk	30,650	26,850	35,800	44,750
Tatarsk-Omsk	29,900	26,850	35,800	44,750

a. Rounded to nearest 50,000.

stated distance and routes for which little or no return cargo can be found. By comparison it will also be noted that for eastbound traffic on the leaner stretches of the Transbaykal and Amur systems where few empties should be involved, estimated tonnage movements as against equated car counts indicate an average loading of between 25 and 30 tons to the car. If the estimates and sightings are at all reliable this range probably reflects a relatively low proportion of loadings of coal to loadings of manufactured goods and other commodities.

The only sections on which estimated traffic movement divided by equated car sightings exceeded an average loading of 30 tons were westbound on the line from Novisibirsk to Omsk and eastbound on the line from Mysovaya to Petrovsk-Zabaykal'skiy. In both cases, coal would have played a large part in pulling up the average, supported in the latter instance by petroleum and its products and grain. Reservation, however, must be made for possible uneconomical and unseasonal hauling of commodities owing to changes of plans at distribution echelons and difficulties at control and storage points, as well as for unknown military movements. Moreover, the samples for this portion of the line are admittedly infinitesimal in quantity.

The greatest proportional haulage of empties was reported to have taken place in the eastbound Omsk-Novosibirsk movement and in the westbound movement between Khabarovsk and Tarskiy. If the USSR continues to increase the westbound haulage of coal and coke from the Kuzbas to the Urals, it is difficult to vizualize any type of commodity freight which might economically be loaded back in compensation. Regarding the Far East, an increase in the Soviet merchant fleet (dry and tanker) or a relaxation of international shipping controls could provide the means for narrowing the imbalance of movement perceptibly.

3. Estimated Margin of Error.

The degree of accuracy of the figures submitted in the different commodity estimates is subject to variation in accordance with [redacted] observations. On the Omsk-Novosibirsk section of line, the consistency of the Soviet announcements over a span of 5 years gives assurance of reasonable accuracy of the over-all density estimate. The same cannot be said of the directional or the individual commodity estimates, where data were lacking and considerable analyzing and projecting of related information was necessary. Regarding movements of coal and coke over

50X1
50X1

this section, the error should be somewhat less than 20 percent, if Soviet statements and articles can be taken at face value. Coming as they did at different times and from different persons and publications, there is reason to believe that they were accurate if allowance is made for the interpretations which had to be placed on Soviet statements which were intentionally vague. On other individual commodities the margin of error could be much greater.

The results of the trip samples with equated car counts which could be used as bases for average movements over particular stretches of line also served to limit the probable margin of error, allowance being made for empties.

Taking into consideration the consistency of the Soviet announcements for the Omsk system, it is probable that for the main line stretch between Omsk and Novosibirsk, the maximum range of error for total traffic (the deviation of the sum of the estimated movements in both directions from the actual) was less than 10 percent. Commodity estimates in which principal errors are suspected are (1) oil (too low eastbound), 219/ and (2) miscellaneous freight (too low in both directions owing to lack of data on non-ferrous construction materials).

Between Novosibirsk and Irkutsk, timber has a greater relative weight than elsewhere. The timber estimate is shaky because information was not available by oblast or by cutting area, and there were many press statements to the effect that plans were not being met. The pattern, however, is believed to be generally accurate. 220/ The maximum range of error for the adjusted estimate of total density including both directions should be about 15 percent for the entire distance, although there are individual short stretches in which this error may be exceeded.

50X1

Between Tarskiy and Khabarovsk, owing to (1) the high relative weight of miscellaneous freight versus total traffic as well as to (2) an almost complete dearth of information on movements, and considering (3) the possible alternative routings of freight to Communist China, a range of error of as much as 30 percent would be a possibility for some of the plotted sections.

The portion of the line between Khabarovsk and Vladivostok posed the greatest enigma of all, inasmuch as no complete observation of line traffic was available, and at least one opportunity to gather information on activity in the environs of Vladivostok was missed. Much has been reported by FBIS on division point performance, but the Soviet figures generally contain duplications and are difficult to interpret beyond the general impression that activity has been increasing. It is possible that owing to the proximity of the Khabarovskiy and Primorskiy Krays to the Korean War area, extra movements of military equipment, reserve items, and other goods took place between storage points and that much of the announced information represents duplicate hauling. The margin of error believed to be maximum for the line in this area, with due consideration given to numerous traffic factors and possibilities, is 35 percent.

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Figure 2

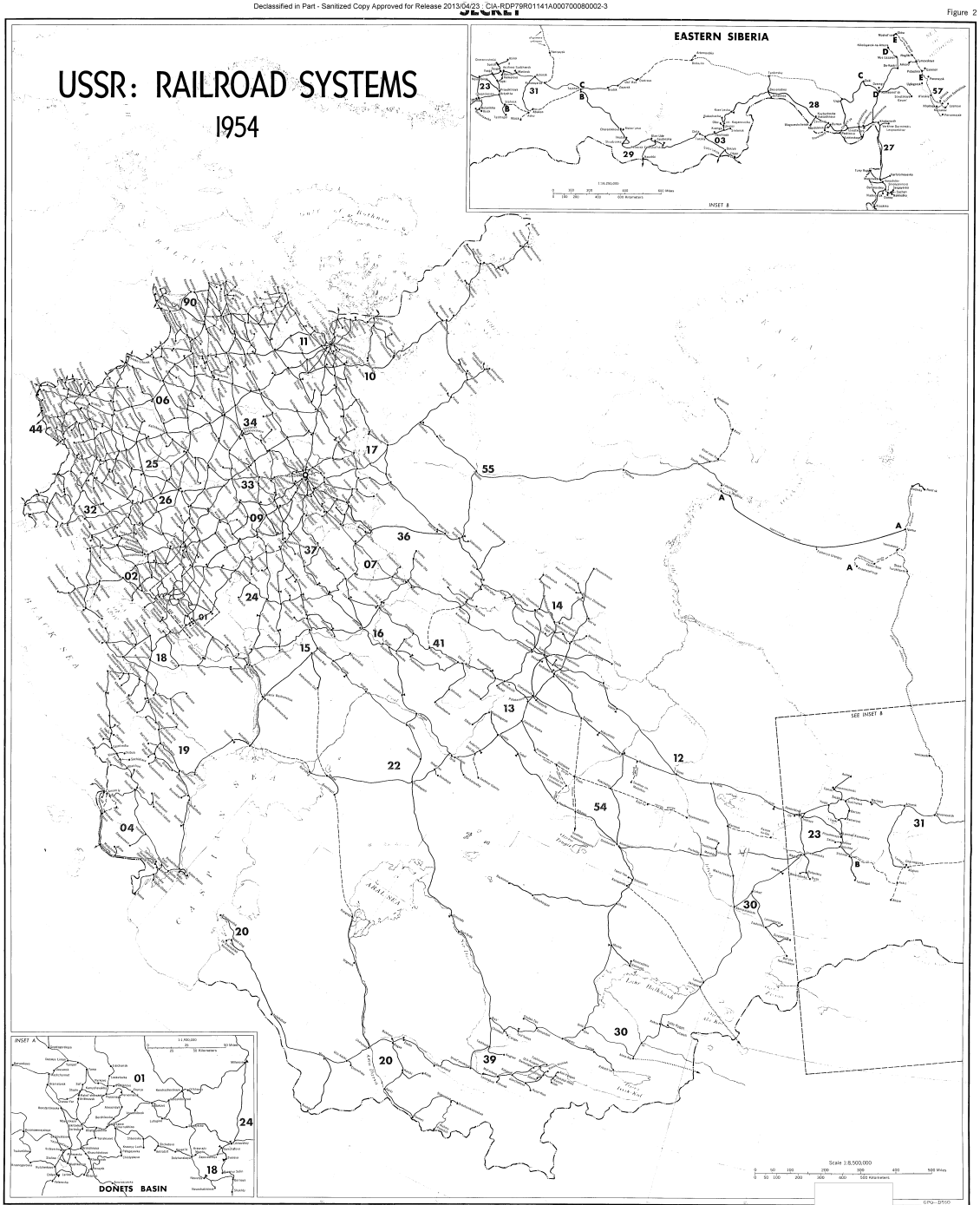

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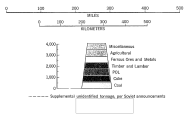
FIGURE 3

TRANS-SIBERIAN RAILROAD
MAIN LINE TRAFFIC
1953

(In Thousands of Metric Tons)

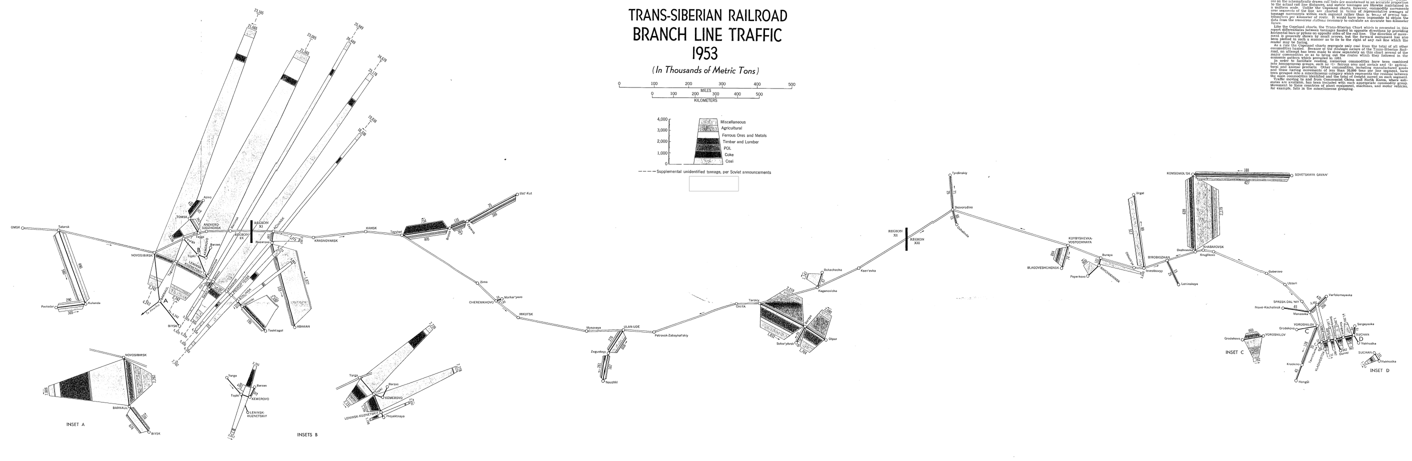


Linear Scale

FIGURE 4

TRANS-SIBERIAN RAILROAD BRANCH LINE TRAFFIC 1953

(In Thousands of Metric Tons)



NOTE

This chart has been drawn up in a form somewhat similar to the Freight Traffic Density Charts published from time to time on individual US railroads by H. H. Copeland & Son of New York. The line and its branches, which are shown schematically, have been segmented at various points for the purpose of indicating changes in the volume, nature, and direction of goods moving as well as to indicate general changes in the geographical direction of the railroad. Distances on the schematically drawn rail lines are maintained in an accurate proportion to the actual rail line distances, and metric tonnages are likewise maintained in a uniform scale. Unlike the Copeland charts, however, commodity movements over segments of the line are charted in terms of representative averages of tonnage movements within each segment rather than in terms of precise ton-kilometers per kilometer of route. It would have been impossible to obtain the data from the numerous stations necessary to calculate an accurate ton-kilometer figure.

Like the Copeland charts, the Trans-Siberian Chart which is presented in this report differentiates between tonnages hauled in opposite directions by providing horizontal bars or pylons on opposite sides of the rail line. The direction of movement is generally shown by small arrows, but the forward movement has also been plotted in such a manner as to lie to the right of any rail line which the reader may be facing.

As a rule the Copeland charts segregate only coal from the total of all other commodities hauled. Because of the strategic nature of the Trans-Siberian Railroad, an attempt has been made to show separately on this chart several of the major commodities so as to bring out the routes which they followed in the economic pattern which prevailed in 1953.

In order to facilitate reading, numerous commodities have been combined into homogeneous groups, such as (1) ferrous ores and metals and (2) agricultural and animal products. Other commodities, including manufactured goods and those having movements of less than 20,000 tons per line segment, have been grouped into a miscellaneous category which represents the residual between the main commodities identified and the total of freight moved on each segment.

Traffic moving to and from Communist China and North Korea, where estimates are available, has been included with each appropriate commodity group. Movement to these countries of plant equipment, machines, and motor vehicles, for example, falls in the miscellaneous grouping.

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TRANS-SIBERIAN RAILROAD
COAL TRAFFIC
1953

(In Thousands of Metric Tons)