SECRET

ECONOMIC INTELLIGENCE REPORT

RAILROAD TRANSPORTATION IN COMMUNIST CHINA 1950-54

CIA/RR 72
28 May 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 43.541)

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FOREWORD

The increasing dependence of the growing economy of Communist China on rail transport emphasizes the need for a comprehensive evaluation of the Chinese rail system. Widely differing estimates of rail activity, however, thus far have prevented agreement among members of the intelligence community on the performance of Chinese railroads. This report attempts to provide a basis for reconciling the existing differences and to provide an over-all assessment of the role of railroads in the Chinese economy. Although this report has been written for those having a general interest in the subject, it also gives supporting analyses of controversial aspects for the specialist in the appendixes.

The report has been coordinated within ORR but not with other IAC agencies.

CONTENTS

Appendixes

Tables

50X1

50X1

Illustrations

RAILROAD TRANSPORTATION IN COMMUNIST CHINA* 1950-54

Summary

The 26,500 kilometers (km)** of Chinese Communist railroads, measured in terms of current performance, are adequate to meet the needs of the economy, although on certain key sectors of lines traffic and capacity are almost identical. Between 1950 and 1953, rail traffic almost doubled, and in the latter year it equaled the previous 1945 peak. As a result of increases in rail traffic, the transport sector of the Chinese economy has been able to support the planned increases in the economic activity of the nation.

The present high level of rail performance has resulted from various factors. The railroads, now operating on a national scale, have developed an effective centralized administration. Although all aspects of rail operations are centered in Peiping (Pei-p'ing, Pei-ch'ing, Peking), this centralization is flexible. Reorganizations and modifications of the rail administration, reflecting the changing pattern of the Chinese Communist economy, have been numerous during the period of Communist control and have permitted intensive exploitation of the rail system.

High traffic levels have been attained through an intensive utilization of the existing facilities and equipment of the railroads. It is estimated that the Chinese Communists had an inventory of about 3,420 locomotives, 6,240 passenger cars, and 73,000 freight cars in 1954. This indicates that sizable additions to rolling stock inventories have been made. Previous estimates of low net annual additions to the freight car park are rendered suspect by rapid traffic increases, by reports of persons who have recently worked for the Chinese railroads, and by analysis of factory markings data. This matter of the relation of the car park to traffic is crucial, and is discussed at greater length elsewhere in this report.

* The estimates and conclusions contained in this report represent the best judgment of ORR as of 1 January 1956.
** Estimated operable route kilometrage as of the end of 1955.

The efficiency of the system is indicated by the attainment of an estimated 4-day turnaround time in 1953. This figure, which compares favorably with a 6.7-day turnaround time in the USSR for a somewhat longer average haul, is a significant indication of Chinese Communist ability to attain high levels of performance.

The pattern of rail development and operation established by the Chinese Communists shows that they are scheduling rail operations to meet the needs both of the military and of the basic economy. No evidence is available to suggest that either interest has been seriously hindered by a lack of rail transport. A net general transport shortage does not exist as yet, although rail transport is operating under stringent conditions, and, in spite of complete economic control and appreciable Soviet assistance, the rail situation is fast becoming critical. It would be dangerous, however, to presume that the current problems of rail transport were not foreseen by the Communists well before 1955. The performance of the Chinese Communist railroads thus far should give pause in estimating that they will be incapable of achieving the short-term and long-term goals of both the economic and the military sectors.

I. Introduction.

The most notable feature of the internal transport system of Communist China is the extent to which rail services currently predominate. Their rise from a minor to a major role is not necessarily a direct achievement of the Communist regime but is in line with a long trend for which favorable geographical factors and Japanese influence are also responsible. A few mountain barriers and other natural obstacles do impede rail construction to some extent, but on the whole they have proved less serious for railroads than for other carriers. Furthermore, the unique qualifications of the railroads as instruments of mass transport have helped assure their primacy.

In terms of metric tons* originated, as well as in ton-kilometers, the railroads' share of total traffic has risen progressively from

* Tonnages are given in metric tons throughout this report except where otherwise indicated.

approximately one-half the volume carried by all forms of transport in 1937 to 73 percent of total inland traffic in spite of a 240-percent increase in total overland traffic. Although water transport, which is second to rail transport, has had a relatively slow rehabilitation, rail traffic in terms of tons-originated has so increased that the total for Communist China in 1954 was approximately 33 percent above the pre-Communist record year of 1945. The estimated volume of internal traffic in China, by type of carrier, for selected years, 1937-54, and the 1955 Plan is shown in Table 1.*

In the period immediately before the Sino-Japanese War, inland water transport accounted for roughly one-half of total ton-kilometer performance in China. At present, however, because of the rapid wartime increase in rail capacity, the concurrent loss of inland water tonnage capacity, and the reorientation of domestic commerce to a north-south axis, inland water transport comprises less than 9 percent of total ton-kilometer performance and less than 10 percent (excluding coastwise traffic) of total tons-originated for Communist China.

Although the inland water system of Communist China is one of the most extensive in the world, a number of factors have served to impede its rehabilitation by the Communists. Before the Sino-Japanese War, the internal traffic of China was mainly east-west, moving to and from the major coastal ports, whereas the greater part of its present trade is north-south. The trade of Manchuria (Northeast Area**) is predominantly by rail to the rest of China (China proper) or to the USSR. The currently existing imbalance of river traffic has probably raised the cost of river transport. Also, seasonal navigability, floods, and low-water periods are major deterrents to the continuous supply of large-scale industry by water transport.

Although it is growing rapidly, motor transport in Communist China is still an insignificant carrier of freight and passengers. Probably the chief curb to the growth of motor transport is the condition of the road system, which, in spite of improvements, remains quite primitive. Motor transport consequently has functioned principally

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* Table 1 follows on p. 4.

50X1

Table 1

Estimated Volume of Internal Traffic in China, by Type of Carrier
Selected Years, 1937-54, and 1955 Plan

	Rail		Inland Water a/		Highway		
Year	Volume (Million Metric Tons)	Percent of Total	Volume (Million Metric Tons)	Percent of Total	Volume (Million Metric Tons)	Percent of Total	Total Volume (Million Metric Tons)
1937	56.9 b/	48.7	60.0 c/	51.3	0.05 d/		117.0
1942	126.6 e/		N.A.		0.3 f/		
1943	130.2 g/		N.A.		0.3 h/		
1944	122.2 i/		N.A.		0.4 j/		
1945	137.7 k/		N.A.		0.7 l/		
1950	99.2 m/	90.3	3.9 n/	3.5	6.8 o/	6.2	109.9
1951	110.5 p/	88.5	6.2 q/	5.0	8.2 r/	6.6	124.9
1952	131.0 s/	81.2	9.6 t/	6.0	20.7 u/	12.8	161.3
1953	157.0 v/	77.7	15.0 w/	7.4	30.0 x/	14.9	202.0
1954	183.0 y/	74.4	20.0 z/	8.1	42.9 aa/	17.4	245.9
1955 (Plan)	207.9 bb/	73.1	25.0 cc/	8.8	51.5 dd/	18.1	284.4

a. Excluding wooden sailing vessels and junks.
b. 1/ [redacted] Tonnage for Japanese-occupied North 50X1
China is estimated to have been 4 million tons.
c. This figure is an estimate, as firm data are not available. Before World War II the Yangtze River alone accounted for about 45 million tons of cargo per year, which is about 75 percent of total inland water traffic for China.

Table 1

Estimated Volume of Internal Traffic in China, by Type of Carrier
Selected Years, 1937-54, and 1955 Plan
(Continued)

d. 2/
e. 3/
f. 4/
g. 5/
h. 6/
i. 7/
j. 8/
k. 9/ Tonnage for Japanese-occupied North China is estimated to have been 43.9 million tons.
l. 10/
m. 11/
n. 12/
o. 13/
p. 14/
q. 15/
r. 16/
s. 17/
t. 18/
u. 19/
v. 20/
w. 21/
x. 22/
y. 23/
z. 24/
aa. [redacted] 50X1
bb. 26/
cc. 27/
dd. 28/

as an auxiliary service in handling traffic to and from rail heads and ports; the average length of haul is only 40 kilometers. 29/ A further important contribution is the servicing of outlying local areas which lack other means of transport. Trucking is of paramount importance in these roles.

II. Growth of Rail Transport.*

As a result of constant effort in all sectors of rail activity, the Chinese Communists have been able to increase the volume of rail traffic to an extent generally consistent with the needs of the economy. There were indications in 1954, however, that rail transport shortcomings might soon become acute for both the economic and the military sectors of China. At the moment the Chinese railroads are believed to be in such difficulties that short-term remedial measures will not suffice. Extensive investments must be made in existing railroad facilities and equipment in order to increase overall transport capacity commensurate with the projected growth of the economy. The First Five Year Plan (1953-57) of the People's Republic of China, published in August 1955, indicates that of total expenditures of 76.64 billion yuan, 55.8 percent, or 42.74 billion yuan, will be invested in basic construction. The investment for basic construction in Communist China, by economic sector, in the First Five Year Plan, 1953-57, is shown in Table 2.**

The capital investment of 5,670 million yuan allocated to rail transport represents about 13 percent of what appears to be new capital investment and 69 percent of the 8,210 million yuan reserved for investment in all forms of transport and communications. The allocation of basic construction investment funds to waterways and highways is not specifically noted in the Five Year Plan. It is estimated, however, that of the combined total of 2,078 million yuan assigned to the Ministry of Communications and to local communications, 900 million yuan have been allocated to highways, 800 million yuan to waterways, and 378 million yuan to posts and telecommunications on the local level. The railroads thus have been assigned a larger share of total capital investment than has any other single form of industrial activity. Such outlays tend to indicate the Chinese Communist intention to develop rail transport

* See the map, inside back cover.
** Table 2 follows on p. 7.

Table 2

Investment for Basic Construction in Communist China by Economic Sector, First Five Year Plan, 1953-57

Economic Sector	Investment (Million Yuan)	Percent of Total Basic Construction Investment	Percent of Total Rail Investment
Heavy industry	22,070	51.7	
Light industry	2,780	6.5	
Agriculture, forestry, and water conservancy	3,260	7.6	
Other	6,420	15.0	
Ministry of Communications	1,339	3.1	
Ministry of Posts and Telecommunications	361	0.8	
Civil aviation	101	0.3	
Local communications	739	1.7	
Railroads			
New lines	2,364	5.5	41.7
Improvement of existing lines	1,854	4.3	32.7
Increase in rolling stock park	1,219	2.9	21.5
Planning and design	233	0.6	4.1
Total railroads	5,670	13.3	100.0
Total	42,740	100.0	

at a rate likely to meet the increasing burden being placed on it by the increasing economic and military requirements of the country. Whether or not the Chinese Communists have the capital and material resources available to implement such an extensive program remains to be seen. Notwithstanding possible Chinese shortcomings, however, it is probable that should the USSR so desire, all current problems faced by the Chinese railroads could be overcome through the import of necessary material and equipment from the Soviet Bloc.

A. Tons-Originated Performance.

Since the Chinese Communists gained control over mainland China in 1949, all parts of the industrial sector of the economy, especially the railroads, have shown marked increases, both relative and absolute. In some instances the magnitude of the annual increases can be accounted for by the depressed level of performance of the economy in 1949. The large annual increase in tons-originated traffic is believed to have been caused by the ability of the Chinese Communists to obtain maximum efficiency from existing equipment and facilities and to expand existing facilities where the need for rail service is greatest.

Since 1949, when traffic was at a low of 48.2 million tons-originated because of the economic and political disorganization resulting from civil war, the Chinese Communists have announced annually sizable gains in tons-originated. Commodity analysis and other cross-checks indicate that the announced figures are reliable and are consistent with independent estimates within a small margin of error which might result from variations in the interpretation of statistical procedures. Chinese announcements of rail tons-originated are (1) historically consistent, both within China and in comparison with world rail experience*; (2) in close agreement with the current performance of basic sectors of the Chinese economy; and (3) internally consistent. After extensive analysis and evaluation (see Appendix A), therefore, the Chinese Communist claims have been generally accepted. It should be noted that statistical estimates of operational factors such as average length of haul, turnaround time, and freight car park are largely predicated upon announced tons-originated traffic. Thus the determination of levels of tons-originated is crucial.

* Although in some instances Chinese Communist statistics appear to be out of line with world rail experience, a proper evaluation of the methodology of these statistics indicates that they are reasonable.

In February 1953 it was announced that in 1952 the Chinese Communist railroads handled* 131 million tons of freight. 30/ On 26 January 1954 the New China News Agency (NCNA) in Peiping announced that "In 1953, the railroad loading plan was fulfilled by 108.3 percent, constituting an increase of 15.7 percent over 1952. The planned target of total delivery tonnage was fulfilled by 112.9 percent, or an increase of 20 /sic; that is, 19.9/ percent as compared with that in 1952." 31/ If tons-originated in 1953 are equated to the 19.9 percent increase of "total delivery tonnage," a figure is obtained for 1953 of 157 million tons-originated,** a net gain of 26 million tons. The Chinese Communist government announced on 12 April 1954 that "freight transport this year will be increased by 15 percent as compared with 1953." 32/ This increase yields a planned figure of 180.5 million tons. Subsequently the government announced, on 1 January 1955, that the 1954 "planned rail transport target for 1954 was fulfilled ahead of time. Up to 28 December, more than 12,000 cars were loaded in excess of the target for the year." 33/ The overfulfillment of approximately 76,000 carloads (4 days at 16,000 cars per day plus 12,000 cars), or 2.28 million tons (at 30 tons per carload), added to the 180.5 million tons planned yields a total for 1954 of approximately 183 million tons. Although no information is available to permit an independent check of the figure, it is believed to be in the proper magnitude. One announcement does report that the "overhaulage of freight trains was 20,000,000 tons." 34/ This would indicate that the total increase for 1954 over 1953, assuming the same number of trains, was more than 20 million tons.

An announcement on 1 March 1955 that rail freight tonnage would increase by 13.6 percent 35/ in 1955 indicates that the Chinese Communists planned to originate 207.9 million tons in 1955.

B. Ton-Kilometer Performance.

Railroad ton-kilometer performance for 1953 in Communist China was reported to be about 129 percent of the announced 59.5 billion ton-kilometers performed in 1952, 36/ or 76.6 billion ton-kilometers. In view of officially reported tons-originated figures and of available information concerning the average length of haul,

* "Tons-handled" should be interpreted in this connection to mean "tons-originated."

** Not including narrow-gauge traffic.

this ton-kilometer figure is considered to be consistent with known facts and is believed to be statistically accurate. The best criterion for comparing increases in ton-kilometer performance with increases in tons-originated performance of the Chinese Communist railroads is the average length of haul, which is obtained by dividing ton-kilometers by tons-originated. The average length of haul on Chinese railroads, as derived from official statistics of the Ministry of Railroads for the period of Communist control of the railroads, are shown as follows:

Year	Length of Haul (Kilometers)
1949	N.A.
1950	400 37/
1951	466 38/
1952	454 39/
1953	488*
1954	500 (estimated)

These figures are considered to be both reasonable and accurate in the light of previous experience in Manchuria and of current practices in the USSR. The indicated increases in the average length of haul under the Chinese Communists are in some measure attributable to the reorientation of internal Chinese traffic which followed the Communists' rise to power. Because of the curtailment of international ocean trade, internal rail traffic has been reoriented from an east-west to a north-south pattern. This has had the effect of increasing long-haul traffic density and thus the average length of haul.

Another factor tending to increase the average length of haul has been the powerful Chinese Communist effort to develop the economy of China proper at a relatively greater pace than that of Manchuria. There is clear evidence of this movement in the relatively greater allocation of resources to capital construction projects in China proper, such as the T'ai-yuan and Pao-t'ou steel complexes, the development of Hankow (Han-k'ou) industries, and extensive projects in Szechwan (Ssu-ch'uan) and Sinkiang (Hsin-chiang) Provinces, than to projects in Manchuria.

* 76.6 billion ton-kilometers for 1953 divided by 157 million tons-originated.

III. Factors Affecting the Growth of Rail Transport.

Increases in tons-originated and ton-kilometer performance, which indicate a pronounced annual growth in the economic contribution of the Chinese Communist railroads, are believed to be reasonable in view of the general increase in the economic activity of the country and of the improvement in the administrative and operating efficiency of the railroads during 1950-55.

A. Freight Traffic Demand.

The accompanying chart, Figure 1,* indicates graphically the increase in the gross national product (GNP) of the Chinese Communist economy and in the following six selected areas of economic activity in 1936-55: modern manufacturing, ferrous mining, electric power, cement, timber, and coal. Each of these basic industries, as well as the GNP, is a fairly representative measure of the economic activity of a country. The chart shows that in Communist China the increase in these economic indicators parallels the increase in tons-originated on the railroads during the same period. This correlation reflects the fact that the increased demand derived from the production of goods and services has both supported and made necessary the growth of rail transport during the period of Communist control.

The chart, in conjunction with an analysis of the correlation existing between rail tons-originated and each of the selected economic indicators (see Appendix A), is an attempt to evaluate more precisely the current performance of the Chinese Communist railroads. The results of this technique indicate that the rapid expansion of the Chinese economy, especially since 1949, has been paralleled by a similar rate of growth in rail transport. This in turn tends to substantiate estimates of tons-originated traffic based on Communist announcements. The close correlation between the growth rate of the selected economic indicators and that of rail traffic further confirms the belief that the Chinese Communists are not deliberately falsifying rail tonnage statistics or reporting tons-hauled as tons-originated.

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* Following p. 12.

The correlation between the economic indicators and rail traffic also tends to confirm information on the currently tight situation of Chinese Communist rail operations. Available estimates of the growth of the economy confirm the level of rail transport performance shown in this report. Figure 2* clearly demonstrates that any estimates of rail tons-originated appreciably below announced rail performance figures for the postwar period would be suspect in view of the considerable gains made in other basic industries and in GNP. To reject the rail tons-originated figures, therefore, would be to reject production estimates in the basic sectors of the Chinese Communist economy.

Substantiation of the officially reported high level of Chinese rail traffic is also possible through an analysis of (1) the commodity breakdown of traffic, (2) the regional distribution of traffic, and (3) announcements of operating statistics (see Appendix A).

B. Administration and Organization.

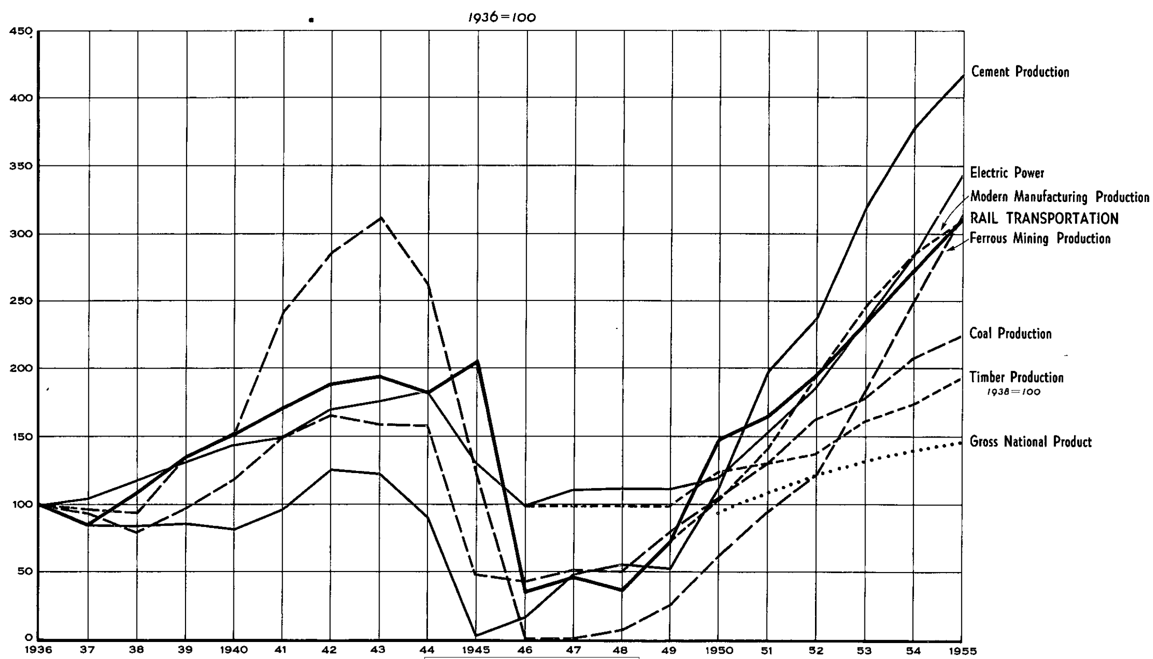
A second factor of major significance, which has contributed materially to the growth of rail performance in Communist China, has been the centralization of rail administration and organization on a national basis (see Appendix B). An appreciable advantage also results from the 5-year period of stable control by the Chinese Communists. Earlier groups which controlled Chinese railroads were continually hampered by unusual circumstances resulting from expanding or contracting borders and from military damage. From 1937 to 1945 the Japanese continually were faced with the problem of incorporating newly conquered regions into the framework of railroads under their control. In 1945-49 the Chinese Nationalists were faced with the opposite situation. Both groups were equally hampered by the effects of military action which continued throughout both periods. Since 1949, in contrast to the instability of rail transport operations and administration in China in 1937-49, the Communists have been able to develop their control and operations in an atmosphere of relative stability. This has permitted the training of needed personnel and the improvement of those already assigned positions of responsibility. Moreover, it

* Following p. 14.

50X1

Figure 1

PATTERN OF GROWTH OF SELECTED ECONOMIC SECTORS WITHIN CHINA, 1936-55



25413 5-56

50X1

is believed that 5 years have given the Chinese Communists sufficient time to develop a technical perspective which will enable them to cope with new problems more effectively.

C. Operational Characteristics.

The third factor of major importance which supports the high volume of tons-originated traffic on the Chinese Communist railroads is the increased efficiency which the Communists have obtained from equipment and facilities (in part through increased investment) and from the 620,000 employees.

1. Expansion of Facilities.

Since the end of 1949, when the Chinese Communists had only 21,700 km of operable rail lines, they have allocated a large part of the available resources to expanding the system and to strengthening existing facilities. In view of the 25,500 km of track operable at the end of 1954 40/ and of the additional 1,000 km of new lines to be constructed in 1955, 41/ it is obvious that considerable progress has been made. Such progress is also apparent in announcements about the completion and planning of projects designed to strengthen the system. For example, the entire length of the Peiping-Mukden (Shen-yang) line and the northern sections of the Peiping-Hankow line have been double tracked. 42/ Besides double-tracking programs, lines carrying heavy traffic have also received additional sidings and improved signal equipment. Increases in the length of sidings during 1954 were reported to total 280 km. 43/ Yard congestion is being partially eliminated by the proposed expansion and reconstruction of station facilities at such key points as Mukden, Tientsin (T'ien-ching), Ssu-p'ing, Chin-chou, and Feng-t'ai. 44/ Reports also indicate the strengthening of bridges and the inauguration of a new rail car ferry between Wu-ch'ang and Hankow during 1954. According to the 1954 rail plan reported by NCNA Peiping on 12 April 1954, " 50 percent of the funds invested by the state will be used to strengthen existing installations of the railways ... and add new wagons and locomotives." 45/ It is impossible, on the basis of available information, to interpret accurately the value of the "50 percent of the funds invested by the state." The statement does indicate, however, that appreciable attention is being given to the development of rail capacity.

2. Equipment Utilization.

The Chinese Communists have devoted particular attention to obtaining maximum utilization of available rolling stock by decreasing turnaround time and increasing tons loaded per car. The estimated freight car requirements in Communist China in 1952-54, based on an analysis of the relationship between traffic and available operational data, are shown in Table 3. (See Appendix C.)

Table 3

Estimated Freight Car Requirements in Communist China
1952-54

Year	Million Tons-Originated	Tons Loaded per Car	Daily Carloadings	Turnaround Time (Days)	Total Freight Car Requirements
1952	131	28.3	12,682	3.8	56,000
1953	157	29.3	14,673	4.0	65,000
1954	183	31.6	15,866	4.0	68,000

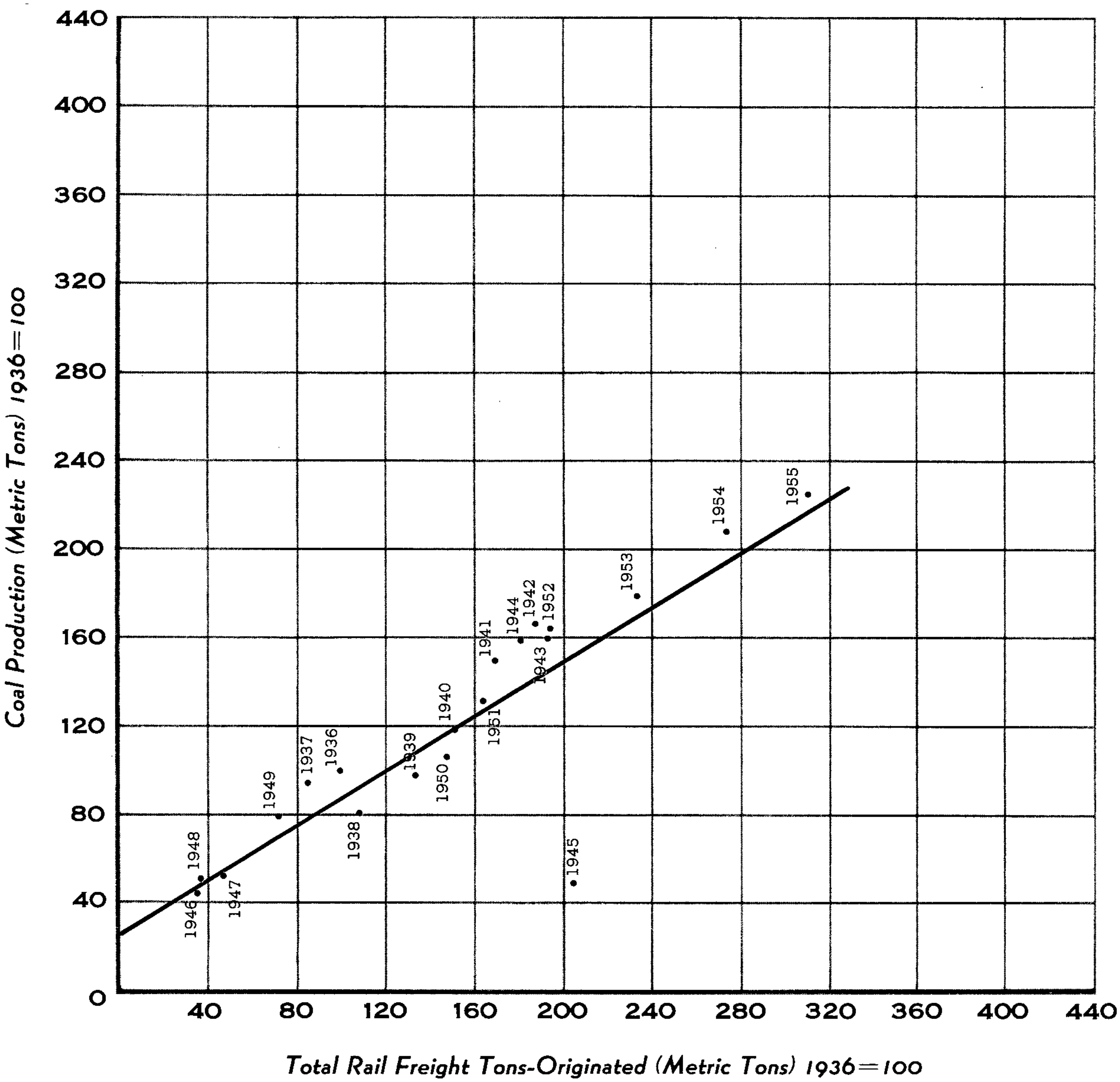
Each of the estimates allows for (a) a 4-percent factor to account for cars under repair and (b) a factor for cars in reserve, amounting to 10 percent in 1952, 6 percent in 1953, and 3 percent in 1954. The variance in the latter figures reflects the increasing traffic which, it is believed (although no firm evidence has been found), is being handled in relation to the size of the car park.

Total freight car requirements of the Chinese Communist railroads have been obtained through a mathematical evaluation of tons-originated announcements in terms of the average load per loaded car and turnaround time. It is estimated that 28.3 tons were loaded per car in 1952 and that this amount was increased by 1 ton in 1953, bringing the figure for that year to 29.3 tons per car. On 6 February 1955, Peiping announced that the average load per car for 1954 had been raised 2.3 tons over that for 1953. This would yield a 1954 figure of 31.6 tons per car. 46/ Although this figure may seem high, it is believed to approximate closely the actual average load

Figure 2 50X1

LINEAR REGRESSION OF COAL PRODUCTION TONNAGE ON TOTAL RAIL FREIGHT TONS-ORIGINATED FOR CHINA

1936-55



25414 4-56

50X1

per car. Chinese Communist success in this respect may be attributed to the existence of a large number of 40- and 50-ton cars as well as to the considerable volume of heavy loading freight which the railroads are currently moving. It is believed that an average load of 31.6 tons per car is not inconceivable under present operating conditions.

The function of turnaround time is equally vital to the procurement of maximum efficiency from the existing park of rolling stock (see Appendix D). The Chinese Communists annually have announced turnaround time figures which have ranged between 2.9 days and 3.09 days since 1952. Assuming that the Chinese Communist definition of turnaround time is the same as that in the US -- that is, the time required for a car to be loaded, move to its destination, be unloaded, and be placed ready for its next loading -- it would appear that the Chinese railroads are operating at an exceptionally high level of efficiency. Analysis of Chinese Communist statements indicates, however, that they in effect have perverted the meaning of the term by excluding the time cars are empty. It is believed, therefore, that the Chinese are actually referring to a loaded car turnover rate instead of to conventional turnaround time. It follows, then, that to obtain turnaround time figures consistent with a proper definition of the term, the announced Chinese figures must be increased by a factor which reflects the empty haul of a freight car. On this basis, the estimated turnaround time for 1950-54 is shown as follows:

Year	Days
1950	4.7
1951	4.1
1952	3.8
1953	4.0
1954	4.0

The factors of "tons per car" and "turnaround time" are seen to be of crucial importance when it is realized that their combined use serves to determine minimum freight car requirements for a given level of traffic. Although each of these figures indicates that the Chinese Communist railroads are operating at a slightly greater rate of efficiency than is the case in the USSR, this level of efficiency is credible in view of the differences between the two countries in the availability of rolling stock and in the average length of haul.

Available information on the total number of locomotives in operation indicates that approximately 3,420 were available at the end of 1954. (See Appendix C.)

The current high levels of traffic volume (tons-originated) on the Chinese railroads have resulted from major increases in the production of basic industries, which have created a proportional increase in the demand for rail transport. These high traffic level requirements have been met largely as a result of Chinese Communist achievements in organizing and marshaling their railroad system so as to obtain maximum efficiency.

IV. Current Problems and Trends.

Along with Chinese Communist announcements describing the considerable accomplishments of their railroads, there have been recurring statements about difficulties facing the system. More recent announcements tend to confirm the general belief that the rail situation in China is approaching a level of strain which, if not alleviated, might jeopardize the economic and defense plans of the Chinese Communist government.

The Minister of Railroads reported in October 1953 that there was "waste of transportation power." 47/ This statement indicates that, in spite of the heavy volume of traffic, Chinese railroads were capable of carrying additional tonnage if waste could be eliminated. The Minister stated that unwise planning had set the 1952 Plan too high and that, in order to fulfill it, freight had to be solicited. In 1953 the rail plan underestimated the amount of freight to be carried, and the unforeseen heavy traffic burden resulted in confusion in the transport system and in uneconomic utilization of rail resources. These problems, which are essentially marginal in nature, apparently were to be resolved by administrative measures. With the announcements of 1954 accomplishments and 1955 goals, however, more active attention is being given to discussion of the physical facilities which set absolute limits to rail transport capabilities.

A. Decreasing Rate of Growth of Rail Transport.

It is evident, in view of the year-to-year increases in freight tons-originated, that the Chinese Communists have been forced to give additional attention to increasing the capability of

available rail facilities as well as to expanding the scope of the rail network. Although the magnitude of annual increases in terms of tonnage increments has been increasing from year to year, the proportionate increase during recent years has become progressively smaller. The rate of growth of tons-originated has fallen from a 20-percent increase in 1953 over 1952 to a planned 13.6-percent increase in 1955 over 1954. Both Chinese Communist announcements on alleged traffic increases in tons-originated [redacted] 50X1
[redacted] indicate that the Chinese have reached a 50X1
definite turning point in their development of rail transport. Palliative measures to increase transport capability through a series of administrative reforms and workers' emulation campaigns are believed to have reached the point of diminishing returns. Further progress by the railroads can now be accomplished only through a program of additional capital investment, designed to increase both the capacity of routes and the availability of motive power and rolling stock.

B. Measures to Augment Rail Transport Capabilities.

1. Construction of New Lines.*

It appears from available information that the Chinese Communists are attempting to increase the capability of their railroads by extending the network as well as by improving existing lines. Extension of the rail system into hitherto undeveloped regions has been one of the prime targets of the Communist government. This program, designed to achieve increases in rail capability, in economic resources, and in political and military control over greater areas of the population, has varied somewhat in intensity from year to year. In 1950, the first full year of Chinese Communist control, new construction amounted to 523 km. 48/ This was raised to 771 km in 1951 49/ but fell to 482 km in 1952, 50/ probably as a result of commitments in Korea. The rail construction program has increased regularly since 1953, however, amounting to 589 km in that year, 51/ 831 km in 1954, 52/ and a planned addition of 1,000 km of new track in 1955, 53/ which would bring the total length of operable routes to about 26,500 km by the end of 1955. 54/

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* See the map, inside back cover.

The Chinese Communists have concentrated the major part of their effort to construct new lines in the western provinces of China. After the completion of the 505 km Chungking (Ch'ung-ch'ing) - Ch'eng-tu line in the Szechwan rice bowl, work began on the 700-km Ch'eng-tu - Pao-chi line, designed to link the Szechwan line with the main network of China. Some 313 km of this project were completed as of 12 December 1954 on the southern section, and work is in progress in the mountainous region of the northern sector immediately south of Pao-chi. 55/

Building westward, the Chinese Communists have moved the Lung'hai railhead from T'ien-shui to Lan-chou. Work began in 1953 on the 2,800-km section of track which is to extend westward from Lan-chou by way of Yumen and Urumchi (Ti-hua) to the Chinese border, where it is to connect with a line from Alma-Ata on the Turkestan-Siberian Railroad (Turk-Sib). 56/ Currently, the railhead is at Wu-wei, 250 km northwest of Lan-chou. 57/ It is believed that this line will receive high priority in the allocation of resources for new construction at least until 1957, at which time it is estimated that the railhead will be in Yumen and in a position to assist in the exploitation of oil resources located at this point. It is doubtful that the line will reach Urumchi before 1960 or the Soviet border before 1961. Available evidence, however, indicates that the USSR is presently engaged in the survey of rail routes from the Turk-Sib Railroad toward the Chinese frontier. 58/ Should the USSR begin construction in the near future and continue until joined with the Chinese effort, it is possible that the line will be completed for Sino-Soviet traffic in 1960.

A third major construction project, which was recently completed, is the Chinese Communist section of the Trans-Mongolian Railroad, 59/ a southeastern extension of the Trans-Siberian Railroad. This section, approximately 350 km in length, was completed from Chi-ning on the Peiping-Suiyuan line to the Sino-Mongolian border station of Erhlien on 11 December 1954. Rail laying on both sides of the border was completed on 8 February 1955. 60/ Announcements in the Chinese press indicate that the line will have broad-gauge track over its entire length, with transloading facilities provided at Chi-ning, 61/ and probably will be serviced by diesel locomotives. Chinese tolerance of Soviet broad-gauge track on Chinese territory is indicative of the Chinese Communist desire to obtain maximum efficiency out of existing facilities. The service provided by the USSR on this line will permit savings in Chinese rolling stock to be employed elsewhere within China.

2. Improvements in Existing Facilities.

In addition to the construction of new lines, the Chinese Communists devoted considerable attention during 1949-54 to the improvement of existing facilities through construction or restoration of double tracks, installation of communications equipment, and the like. According to an official announcement in November 1954, "the volume of rail traffic has become heavier day by day and has exceeded the capacity of the railway facilities." 62/ During 1954, numerous projects to increase line capacity were carried out, and in 1955 the size and number of such projects were to be greatly increased. In 1955, on 3 lines* alone, an aggregate of 240 km of double tracking was to be completed, 700 km were to be surveyed for double tracking, initial designing for 850 km of line was to be undertaken, uncompleted surveys on 619 km of line were to be finished, and technical designs for an additional 559 km of line were to be drawn up. 63/ In addition, several important yards and railroad stations were to be rebuilt or enlarged, automatic signaling installed, and sidings lengthened. Although there are inadequate data on the total magnitude of this effort, it is apparent that the Chinese Communists have embarked on a major program of rail construction. It is also significant, in view of the large commitments of capital resources necessary for this program, that 20 percent of total investments in railroads planned for 1955 were to have been devoted to the manufacture of rolling stock and motive power. 64/ It is impossible to translate this investment into the number of units to be built, although the magnitude of the investment does support the belief that freight car production is considerably higher than previously estimated.

C. Economic and Military Role of Rail Transport.

Since the present and future plans for the Chinese Communist rail system are conditioned by the dual necessity of supporting a growing economy and satisfying the needs of the military establishment, any evaluation of rail transport in China must be made in terms of these responsibilities. In the economic sector, the railroads are committed to handling rapidly increasing levels of traffic on lines fast becoming overburdened. Long-term needs of the growing economy require that the railroads expand into areas having exploitable resources. In the military sector, the railroads are committed

* Peiping-Suiyuan, Peiping-Hankow, and Shih-chia-chuang (Shih-men) - T'ai-yuan.

to supplying troops throughout China and along its borders, such as in Kwangsi (Kwang-hsi) and in North Korea. Long-term planning of the military must envisage a China under armed attack. This, in turn, requires a railroad pattern in depth, capable of rendering the army's logistics as invulnerable as possible.

The Chinese Communist Ministry of Railroads, in an apparent effort to reconcile the needs of the economic and the military sectors, initially concentrated on rehabilitation of the existing railroad network. This was immediately followed by an extensive program of construction of new lines having both economic and military significance. When completed, probably about 1961, the projected Lan-chou - Yumen - Urumchi - Alma-Ata line will aid materially in the exploitation of oil resources in Sinkiang. It will also provide the military with a highly strategic fourth link with the industrial USSR, its principal supplier of ordnance, and accordingly will reduce the vulnerability of rail connections between Communist China and the USSR. The recently completed Trans-Mongolian line provides a much more economical route than either the Man-chou-li - Harbin (Ha-erh-pin) or the Sui-fen-ho - Harbin connections for the overland movement of import-export traffic between the USSR and China proper. Located farthest inland, it is the least vulnerable of existing Sino-Soviet rail connections.

With the completion of the Chungking - Ch'eng-tu line and the initiation of construction at both Pao-chi and Ch'eng-tu designed to link this line with the main network, the Chinese Communists will soon be in a position to profit more fully from the resources of the Szechwan rice bowl. This western construction project also has considerable military significance. Once Chungking is linked with Pao-chi, there remain to be completed only the Chungking - Chan-i section to the south and the Lan-chou - Pao-t'ou section to the north, and China will have an inland artery stretching from the Trans-Siberian Railroad to Indochina. Since work is believed to have started on both of these sectors, this project may soon be completed.

In addition to announced rail construction projects, there is increasing evidence that military considerations are becoming more competitive in the demands made on available railroad resources and capital investment. On 7 July 1955 the Chinese Communists announced the completion of a rail line between Fort Bayard (Chan-chiang) on the South China coast and Litang (Li-hua) on the Hu-nan - Kwangsi line. 65/ No indication of Communist activity in this area had appeared in the press before completion of this line. It is expected that the line will serve primarily the military sector. A second railroad is reported under construction between Kuei-ch'i and the coastal ports of Amoy (Hsia-men) and Foochow (Fu-chou) opposite Formosa (Taiwan). 66/ As in the case of the Fort Bayard line, it is probable that this line is also being constructed to satisfy military requirements, particularly those in Fukien Province (Fu-chien).

D. Future Trends of Rail Transport in the Chinese Communist Economy.

In view of the growth pattern of the Chinese Communist railroads, the factors which have supported this growth, and the commitments under which the rail system is obliged to labor, it appears that the Chinese efforts to fulfill both short-term and long-term transport requirements for economic growth and military support should provide an excellent test of the strength and adequacy of the developing rail transport system. With the expansion of economic activity and the concurrent dependence of the economy on adequate transport services, the resources that will be required for the expansion of the railroads must in large measure be generated by the Chinese economy. Should the economy fail to produce the increasing coal, steel, and capital requirements for expansion of the railroads, then the growth of the over-all economy, and more particularly the growth of the modern industrial sector, will be impaired.

Such a failure seems unlikely in view of the present regime's power to allocate labor and capital resources in accordance with its determined pattern of national industrialization at any cost. In view of the close working relationship which has been developed between the USSR and the Chinese Communists in the planning, design, and procurement of material and technical aid, it seems equally unlikely that the USSR would fail to provide the Chinese with the resources required for rail expansion during the next several years if the Chinese economy should fail to generate the resources needed for rail expansion. Nonetheless, it cannot be denied that in spite of complete economic control by the government and appreciable Soviet assistance, the situation of the railroads is becoming critical. This would not be considered abnormal if other sectors of the economy were experiencing similar difficulties, but Communist China is believed to be stockpiling coal and steel, and cement is being exported.

Although it would be dangerous to assume that the current problems of rail transport were unforeseen by the Communists well in advance of 1955, all explanations of this apparent anomaly advanced to date must be considered tentative. Perhaps there is adequate slack in the over-all economy to overcome the shortage of rail transport. Perhaps increased Soviet aid will resolve the transport shortage. In any event, there is ample reason to believe that the Chinese Communists have bitten off an extremely ambitious mouthful. Their performance to date should give pause in estimating that they will be incapable of achieving the short-term and long-term goals of both the economic and military sectors. Also, future developments in the field of transportation, especially rail transport, should provide excellent criteria for judging the strength and adequacy of the Chinese economy.

APPENDIX A

TONS-ORIGINATED TRAFFIC

1. Commodity Distribution of Traffic.

The estimated tonnage of certain basic commodities originating on the railroads in Communist China in 1953-54 is shown in Table 4.

Table 4

Estimated Tonnage of Basic Commodities Originating on Railroads in Communist China 1953-54

Million Metric Tons

Commodity	1953	1954
Coal	52.0	61.0
Construction materials	30.0	32.6
Food crops	23.5	27.5
Timber	13.4	15.9
Ferrous metals	7.9	10.6
POL	1.0	1.1
Total	127.8	148.7

On the basis of total tons-originated estimates of 157 million tons in 1953 and 183 million tons in 1954, it is believed that the above estimates of 127.8 million tons and 148.7 million tons, for basic commodities only, support the position that the Chinese Communist announced figures of total rail traffic are reasonably accurate and are expressed in terms of tons-originated. The above commodity estimates, which represent approximately 80 percent of total tons-originated for each year, would be higher if it were possible to obtain more precise information on the amount of miscellaneous freight originated on the railroads. Unless the production estimates of the commodities noted above can be successfully challenged however, the Chinese Communist announcements of total tons-originated should be considered verified.

a. Coal.

The estimated production of coal in Communist China, by area, in 1953-54 is shown in Table 5. It is estimated at 69.0 million tons for 1953 and 80.0 million tons for 1954.

Table 5

Estimated Production of Coal in Communist China, by Area
1953-54

Million Metric Tons

Area	1953	1954
Northeast Area (Manchuria)	34.4	40.0
Inner Mongolia Autonomous Region	0.7	0.8
North China Area	20.7	24.0
East China Area	6.9	8.0
Central and South China Area	2.1	2.4
Southwest Area	2.8	3.2
Northwest Area	1.4	1.6
Total	69.0	80.0

Although no data are available, it is believed that if there were any imports of coal into Communist China in 1953 and 1954 the amounts were negligible.

The estimated amount of coal exported from Communist China, by destination, in 1953-54 is shown in Table 6.* The Northeast, North China, and East China Areas are the principal sources of coal exported.

* Table 6 follows on p. 25.

Table 6

Estimated Amount of Coal Exported from Communist China by Destination 1953-54

Thousand Metric Tons

Destination	1953	1954
USSR	500	1,000
Japan	147	47
North Korea	750	650
Pakistan	100	200
Hong Kong	7	N.A.
Total	1,504	1,897

The general pattern of coal production in Communist China closely parallels that prevailing before the Communist seizure of control. The pattern of coal distribution, however, and to some extent the pattern of coal consumption, have undergone considerable change. Before 1950 a considerable amount of the coal produced in North China moved by rail to the ports of Ch'in-huang-tao and T'ang-ku, where it was transferred to coastwise vessels and moved by water to Shanghai (Shang-hai). This water movement was interfered with in 1950, necessitating the movement by rail to Nanking (Nan-ching) and Shanghai of substantial volumes of coal originating in the North China and Northeast Areas, pending an increase in coal production in Central and South China. In the main, the present centers of coal-consuming industries are of long standing. They were developed and grew up in proximity to coal-mining areas and to coastal waters and the navigable rivers. These centers are served largely by local mines from which the transportation hauls are comparatively short. Where the movement beyond is by coastwise vessel the rail movement from originating mines to transshipment ports is also relatively short. In some instances, variations in the quality of coal produced in the several districts do result in crosshauling of coal from one district to industrial centers contiguous to another district. An example of this is the movement of high-quality coking coal from the Kailan (K'ai-lu, K'ai-lu-hsien) mines in Hopeh (Ho-pei) Province in North China to iron foundries and steel mills in Mukden and An-shan. Some coal is also coked at country ovens near the mine mouth and moved to distant points of consumption.

The Chinese Communists, in an attempt to alleviate some of the strain on the railroads imposed by heavy coal traffic, have encouraged a twofold program which envisages the increased exploitation of coal resources close to areas of consumption and the diversion of coal traffic to river vessels wherever possible. It is doubtful, however, whether such measures have as yet obtained results which offset significantly the combined effects of the geographical location of currently producing mines; the reorientation of export coal traffic from coastal ports to an overland rail haul to the USSR; the increased crosshaul of coal resulting from variations in the quality of coal produced in the different areas; and the increased total volume of coal produced, which rose from 69.0 million tons in 1953 to 80.0 million tons in 1954. 67/

Although there is little specific information available to make possible a detailed breakdown of coal traffic, the available information on current production and on pre-Communist coal traffic, together with various press releases by the Communists, does permit an estimate of approximate coal movements.

During 1936, 16.7 million tons, or three-fourths of the coal production of China proper, were carried by railroad, and only 4 million tons were transported by sea and by inland waterway. 68/ The ratio of coal tonnage hauled by rail to total rail freight traffic in 1931-34 in China proper was usually around 50 percent, occasionally even higher. 69/ Available information on the ratio of coal originated by railroads to the total production of coal in Manchuria in 1937-43 is shown in Table 7.* With increasing coal movements in Manchuria and shipments to the Northwest Area, plus greater fluidity existing between all areas as a result of the political and economic unification of Communist China, it would seem reasonable to assume that in 1953-54 the railroads were even more important in the coal-carrying trade than heretofore. For purposes of comparison, however, when the prewar ratios are applied to the current regional production estimates in Table 5,** the following results are obtained:

* Table 7 follows on p. 28.
** P. 24, above.

Area	Amount (Million Metric Tons) 1953	1954
Northeast Area (Manchuria)*	27.5	32.0
China proper	26.0	30.0
Total	53.5	62.0

Various statements appearing in the Chinese Communist press provide some indication as to the magnitude of coal movements on the railroads in China proper. The chief item of freight in 1949 in China proper was coal, which constituted 61 percent of the total volume of freight shipped. Later it was announced that by August 1950 the Chinese railroads had transported over 60 million tons of freight, over 50 percent of which was coal. 70/ For all of 1950 it was reported that coal constituted 58 percent of total rail freight. 71/ At a still later date it was reported that for 1954, one-third of total freight was coal. 72/ If the one-third factor is used to estimate coal traffic on the railroads, this would yield 52 million tons for 1953 and 61 million tons for 1954. These figures agree well with a 1951 figure for coal traffic of 38 million tons which was reported by a Communist rail official in 1955.

Additional confirmation of a current coal traffic figure in excess of 50 million tons is to be found in a Chinese Communist press release which notes that "in 1954, the average weight per carload was raised 1.3 tons over that for 1953. That gain is equivalent to the loading, on the average, of an additional 6,500 tons in each 24 hours." 73/ The context of this statement indicates that it applies to coal movement and not to total traffic. On the basis of a national average of 31.6 tons loaded per car, this yields a minimum annual total of 57,670,000 tons of coal for 1953.

In view of the ratios of coal traffic to total traffic existing in China proper and Manchuria in earlier years, however,

* Total production for Manchuria has been reduced by 20 percent to account for minehead and local consumption. The resultant ratio of 80 percent of total coal production moving on the railroads agrees well with that of the pre-Communist period, as shown in Table 7.

Table 7

Ratio of Coal Originated by Railroads to Total Production of Coal in Manchuria 1937-43

	(1)	(2)	(3)
Year	Total Production of Coal a/ (Thousand Metric Tons)	Coal Originated by Railroads b/ (Thousand Metric Tons)	Ratio of Coal Originated to Total Production (Percent)
1937	14,303		
1938	15,849	14,090	89
1939	17,623	16,510	94
1940	19,430	19,430	100
1941	21,909	23,470	107 c/
1942	22,428	25,340	113 c/
1943	24,783	25,680	104 c/

a. 74/
b. 75/
c. The percentage figures in column (3) show that in 1941-43, more coal was originated on the railroads than was actually produced. It is believed that these figures are high, because of the double haul of some portions of total coal production and the fact that during this period, freight arriving on the Manchurian railroads by way of the border station of Shan-hai-kuan (Lin-yu) increased 29 times. Although the bulk of this increase was undoubtedly coal from mines in North China, it is believed not to have appreciably exceeded 3.5 million tons for any given year.

plus the fact that the volume of coal originated on the railroads during recent years has probably increased, it is believed that the figures of 52 million tons for 1953 and 61 million tons for 1954 are reasonable and closely approximate the total volume of coal originated on the Chinese Communist railroads.

b. Construction Materials.

An estimate of the volume of construction materials -- that is, the earth, stone, sand, gravel, crushed stone, brick, and cement which is moved by various means of transportation in Communist China -- has proved particularly difficult because of the lack of any precise figures on the annual production of these materials. Independent estimates of total production and the relative amounts moved by the various means of transportation have been compiled on the basis of known construction activity in Communist China. The estimated volume of construction materials moved by various means of transportation in Communist China in 1953-54 is shown in Table 8.* This table indicates that approximately 45 million tons of construction materials were moved by the railroads in 1954 as opposed to 34 million tons in 1953. In view of the lack of information available on construction projects in China, as well as on the production of construction materials, the above estimates are considered to be highly tenuous and open to revision. It may be noted, however, that these estimates do not differ widely from estimates derived from pre-Communist rail records and recent statements appearing in the Chinese Communist press.

The 1943 records of the Manchurian railroads indicate that of a total of 84.6 million tons of freight originated, 12.69 million tons were "rocks," 2.12 million tons were limestone, and 1.64 million tons were cement. 76/ Although it is not known whether "rocks" includes sand and earth, the above rock, limestone, and cement, totaling 16.5 million tons, is known not to include bricks. The 5 to 1 ratio of total freight to construction materials in Manchuria indicated by these figures would therefore be a minimum figure, since it does not include all construction materials, and the intensity of construction activity in Communist China is believed to be greater today than it was in Manchuria in 1943.

With these considerations in mind, the Manchurian ratio of construction materials-originated to total tons-originated when applied to the figures of 157 million tons-originated for 1953 and 183 million tons-originated for 1954 would yield minimum figures of 31.4 million tons of construction materials moving by rail for 1953 and 36.6 million tons for 1954. These minimum figures tend to support the estimates in Table 8.**

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* Table 8 follows on p. 30.
** Text continued on p. 32.

Table 8

Estimated Volume a/* of Construction Materials Moved by Various Means of Transportation in Communist China 1953-54

Commodity	Means of Transportation b/	Percent of Annual Total	Amount (Thousand Metric Tons) 1953	1954
Earth	Coolie	95	475,000	665,000
	Rail	3	15,000	21,000
	Truck	2	10,000	14,000
	Marine	3	15,000	21,000
	Annual total c/		500,000	700,000
Stone d/	Coolie	50	2,500	3,000
	Rail	40	2,000	2,400
	Truck	40	2,000	2,400
	Marine	60	3,000	3,600
	Annual total c/		5,000	6,000
Sand, gravel, and crushed stone e/	Coolie	70	19,600	23,800
	Rail	50	14,000	17,000
	Truck	50	14,000	17,000
	Marine	50	14,000	17,000
	Annual total c/		28,000	34,000
Bricks	Coolie	50	1,300	1,500
	Rail	30	750	900
	Truck	50	1,300	1,500
	Marine	5	130	150
	Annual total c/		2,500	3,000

* Footnotes for Table 8 follow on p. 31.

Table 8

Estimated Volume a/ of Construction Materials Moved by Various Means of Transportation in Communist China 1953-54 (Continued)

Commodity	Means of Transportation b/	Percent of Annual Total	Amount (Thousand Metric Tons) 1953	1954
Cement	Coolie	5	150	240
	Rail	80	2,400	3,760
	Truck	40	1,200	1,880
	Marine	40	1,200	1,880
	Annual total c/		3,000	4,700
Totals by each means f/	Coolie		499,000	694,000
	Rail		34,000	45,000
	Truck		28,000 g/	37,000 g/
	Marine		33,000	44,000

a. There is considerable overlap in these figures, because in many cases some of the tonnage is moved by more than one means of transportation before reaching its final destination.
b. Coolies have been included as a means of transportation in this table since they continue to play a major role in the complete movement of construction materials as well as in loading and unloading of other means of transportation and in transshipment operations.
c. The underlined totals are the estimated amounts produced and transported annually (excluding duplications), except that the figure for earth does not include dredging or hydraulic means of transportation.
d. Including cut stone, rip-rap, and other large stone.
e. Crushed stone has been included here because in most cases its uses are similar to those of sand and gravel.
f. Totals are rounded.
g. This figure is presumed to include intraplant movement, which probably does not contribute to the national total truck tons-originated figure.

c. Agriculture.

Food crop production in 1953 and 1954 is estimated at 160 million tons for 1953 and 158 million tons for 1954. The food surplus and food deficit areas have been located by means of estimates based on the regional distribution of total food crop production and on the apportionment of net food availability among the different areas by population. On this basis it has been estimated that the interregional rail movement of food crops amounted to approximately 8 million tons in 1953 and 9 million tons in 1954. Since these figures do not account for any intraregional movement of food crops, they are believed to be quite low.

"Farm freight" in Manchuria in 1935-38 averaged 16 percent of total freight but fell to about 8 percent in 1939-43. 79/ In China proper under the Nationalists in 1936, 12 percent of total tons-originated consisted of agricultural products. 80/ In the first half of 1950 it was reported that 10.5 percent of total tons-originated consisted of agricultural products. 81/ Because of the increased exports of grain to the USSR, the increased urban population, and the almost complete domination of the wholesaling and distribution of food crops by the state, it is believed that rail transport of grain has risen appreciably under the Communists. It is doubtful that food crops moved on the railroad would constitute less than 15 percent of total tons-originated for 1953 and 1954. This would yield a 1953 figure for food crop movement of 23.5 million tons and a 1954 figure of 27.5 million tons.

d. Timber.

The estimated production of timber in Communist China is shown in Table 9.* It has been assumed that almost all of the timber transported by modern means is industrial wood or is timber destined for nonfuel uses, although some fuelwood does move by rail. 50X1

The breakdown of timber production by areas [redacted] gives production goals for 50X1
1951 in the various areas in percentages of the national total. 82/ Because timber production occurs over large areas and enters the transport network at numerous points, these regions will be considered as centers of production. The only standing timber reserves

* Table 9 follows on p. 33.

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Table 9

Estimated Production of Timber in Communist China
1953-54

Thousand Metric Tons

Area	1953	1954
Northeast Area (Manchuria)	9,000	11,600
Inner Mongolia Autonomous Region	1,000	1,200
Central and South China Area	2,100	2,600
Southwest Area	1,200	1,500
Northwest Area and Shansi Prcvince	700	800
Total	14,000	17,700

of any size are located in the northern and eastern parts of Manchuria, the northeastern part of the Inner Mongolia Autonomous Region, the Southwest Area, and the mountains in the Central and South China Area. Increases in construction and a general increase in the demand for wood to fulfill the needs of the expanding economy have meant considerable expansion in timber exploitation in all regions.

In Manchuria in 1939-43, timber averaged 9 percent of total tons-originated. 83/ In 1936, timber traffic on the Chinese railroads averaged less than 1 percent of total tons-originated. 84/ [redacted] in 1953, timber traffic on the Chinese Communist railroads totaled about 12 million tons. 85/ On the basis of statements made by Peiping, a figure was derived for timber of 13.4 million tons for 1953.* Since the total production of timber for 1953, including industrial timber and fuelwood, was 25.6 million tons, the 13.4-million-ton figure does not look unreasonable, especially since it would amount to only about

50X1

* Peiping announced that "by increasing the average loading of each car by 2.1 tons of timber, as compared with 1952, an annual aggregate saving of 35,350 cars was obtained." Letting x equal tons per car, or 29.3, and y equal cars, then the following would obtain: $(x - 2.1)(y + 35,350) - xy = 0$. Solving for y equals 457,867 cars, or 13.4 million tons, of timber originated on the railroads in 1953.

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8.5 percent of total tons-originated. A projection on this figure of the announced plan to increase 1953 timber shipments by 18.3 percent would yield a 1954 figure of 15.9 million tons.

e. Ferrous Metals.

The estimated production of ferrous metals and the percent moving by modern transport in Communist China in 1953-54 is shown in Table 10.

Table 10

Estimated Production of Ferrous Metals
and Percent Moving by Modern Transport in Communist China a/
1953-54

Ferrous Metals	Amount (Thousand Metric Tons) 1953	1954	Percent Moving by Modern Transport
Pig iron	2,230	3,030	38.8
Crude steel	1,760	2,200	N.A.
Finished steel	1,487	1,722	70.9
Iron ore	6,233	8,408	100
Total	11,710	15,360	

a. 86/

This table indicates that in 1953, 11.7 million tons of ferrous metals products and ore were produced and thereby became susceptible to movement by modern transport. In 1954 this amount was increased to about 15.4 million tons. Because of the nature of ferrous metals production and the large amount moving by water, considerable portions of the above amounts would not move by rail. Except for 150,000 tons of pig iron which are known to move downstream from Ma-an Shan to Shanghai by water, the remaining bulk of pig iron which moves by modern transport probably moves by rail. This would yield 715,000 tons in 1953 (2,230,000 times 38.8 percent minus 150,000) and, similarly, 1,026,000 tons in 1954. All crude steel is consumed locally in making finished steel in the form of rolled products or castings and in making semifinished steel. Of the total volume of 1,054,000 tons of finished steel which moved by modern transport in 1953 and of 1,221,000 tons similarly moved in 1954, 13 percent moved by water from Chungking and Ta-yeh, half of which probably was the object of a rail haul before reaching its ultimate destination. This would indicate that approximately 980,000 tons of finished steel moved by rail in 1953 and 1,136,000 tons in 1954.

All of the iron ore except that exported from Yu-lin is believed to have moved by rail. The totals of these estimates of ferrous metals movements by rail are as follows:

	Amount (Thousand Metric Tons)	
Product	1953	1954
Pig iron	715	1,026
Finished steel	980	1,136
Iron ore	6,233	8,408
Total	7,928	10,570

Although these figures are open to revision, it is believed that they closely approximate the volume of iron ore and finished products originating on the railroads. [redacted] in 1953 the railroads transported several million tons of iron and steel and their products. 87/

50X1
50X1

f. POL.

Production of crude oil in Communist China has been estimated at about 800,000 tons in 1954 and 630,000 tons in 1953. The total quantity of refined products consumed in China in 1954 is estimated at 1.4 million tons. 88/ It has been estimated that about 1 million tons of POL (all products) were imported by China in 1953. 89/ In view of the fact that the major portion of POL imports is moved by rail from the USSR through the border stations of Man-chou-li and Sui-fen-ho, it is estimated that approximately

1 million tons of POL were moved on the railroads out of a total tonnage available of 1.6 million tons. Allowing for a 10-percent increase in 1954, this would yield a figure of 1.1 million tons of POL products originated on the railroads.

2. Comparison of the Rates of Growth of Rail Transport and Other Sectors of the Economy.

The Communist regime has made noteworthy progress in restoring and developing the economy of China to a state of productivity surpassing the levels of activity under the Nationalists and the Japanese. Economic activity in 1931-52 was complicated by the series of political upheavals resulting from the Sino-Japanese war and the Civil War that followed. Economic trends in 1931-37 were relatively homogeneous for the area that is now Communist China. Economic development in Manchuria in 1937-45 proceeded rather rapidly, whereas development in China proper was scattered and spasmodic. Economic development in 1945-46 was relatively depressed in all of China, including Manchuria. In 1946-49 there was a period of increasing production in most areas, ending in a decline resulting from the disruption of the Civil War. Production in 1949-52 again increased, generally reaching in Manchuria the level attained under the Japanese in 1941-45. Since 1950 the modern industrial output for China as a whole has climbed by an average annual increase of about 26.8 percent; the index of industrial output in 1954 stood at 142 percent of 1952 production and at about 258 percent of 1950 production. 90/

Figure 1* demonstrates this fluctuating pattern of the economic development of Communist China during 1936-54, and in addition, indicates a rather pronounced degree of association among all of the selected economic indicators. For example, during the depressed 1945-49 period, all of the selected sectors of the economy, without exception, are at below-normal levels. In the majority of sectors, recovery starts as of 1949, with the exception of coal, railroads, and ferrous mining, which preceded general recovery by 1 year -- thus reflecting the known interdependency existing among basic sectors of the economy.

* Following p. 12, above.

The analytical process known as linear correlation may be used to observe and measure more precisely the relationship which occurs between the rates of growth in rail transport and in other sectors of the Chinese Communist economy. In such a procedure the indexes of the 2 related or associated series (that is, rail freight tons-originated and the selected indicators of Chinese economic activity) are plotted graphically, with 1 variable (transport) placed on the X axis and the other variable (economic indicator) on the Y axis. The result is known as a scatter diagram. The relationship resulting from plotting the associated variables is expressed as a line (regression line) which is in effect a computed average of the distribution of these variables about a fixed relationship.* The greater the degree of correlation between the variables, the closer will the plotted points tend to conform to the plotted line. Should all points fall exactly on the line, perfect correlation will be indicated. The results of this correlation analysis are presented

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* The relationship resulting from plotting the associated variables is expressed as a line known as a regression line. This line averages the distribution of the variable, or, in other words, it expresses mathematically the average relationship between the two variables. With an imperfect relationship or correlation, the variation will cause the plotted points to depart from the indicated line, thus creating a scatter about the line of regression. If there is a close association, the scatter will be confined to a narrow path which will lie along the line of regression. The less perfect the relationship between the two variables, the more widely will the plotted points scatter about the line of regression.

A line of regression could, of course, be fitted by visual inspection of any of the scatters, but a more accurate result is obtained in this report by solving the following generally accepted simultaneous equations used for this purpose and then plotting two or more base points from which to draw the regression line, as follows:

1. $\Sigma(y) = Na + \Sigma(x)b$

2. $\Sigma(xy) = \Sigma(x)a + \Sigma(x^2)b$

The values required for the solution of these equations may be derived from the data following each graph. Substituting the values graphically in Figures 2-8.* The basic data and formulas used in establishing the regression lines are shown in Tables 11-17.** Inspection of the graphs, particularly as concerns the slope of the regression lines and the position of plotted points relative to the line, indicates rather uniform characteristics prevailing.

With the exception of cement, ferrous mining, and modern manufacturing, the computed lines of regression lie on a plane indicating that the growth of rail tons-originated is at a rate somewhat greater than any one of the selected indicators of Chinese Communist economic activity. This characteristic is particularly

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presented for coal production, for example, the equation becomes:

1. $2{,}418 = 20a + 3{,}034b$
2. $434{,}690 = 3{,}034a + 570{,}216b$

Solving simultaneously:
$a = 27.252$
$b = 0.617$

From the first equation above:

$$y = a + bx$$

Substituting the obtained values for a and b, the required equation for plotting the lines of regression is:

$$y = 27.252 + 0.617x$$

A mathematical expression has now been secured for the relation between the two variables being studied, rail tons-originated and the selected economic indicator (coal production in this case). Any value may be substituted for either x or y for the purpose of selecting the base points. For example, if, in the above equation, values of 100 and 200 are assigned to x, then y will equal 89.0 and 150.7. These two sets of values are then plotted on the graph, and a line is drawn between them. The resulting line is known as the line of regression.

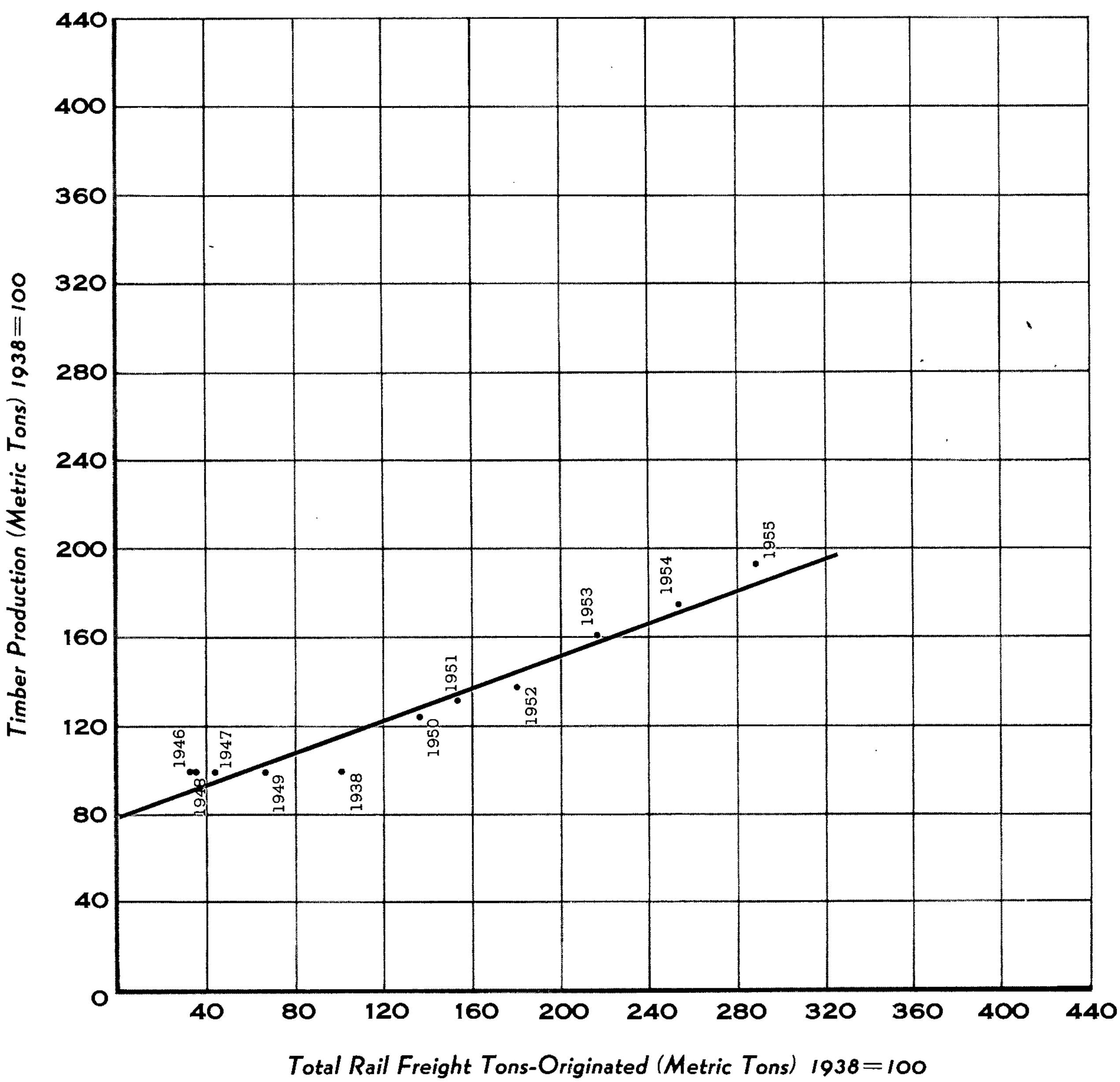
* Following p. 38.

** Tables 11-17 follow on pp. 39-45, below.

Figure 3 50X1

LINEAR REGRESSION OF TIMBER PRODUCTION TONNAGE ON TOTAL RAIL FREIGHT TONS-ORIGINATED FOR CHINA

1938-55



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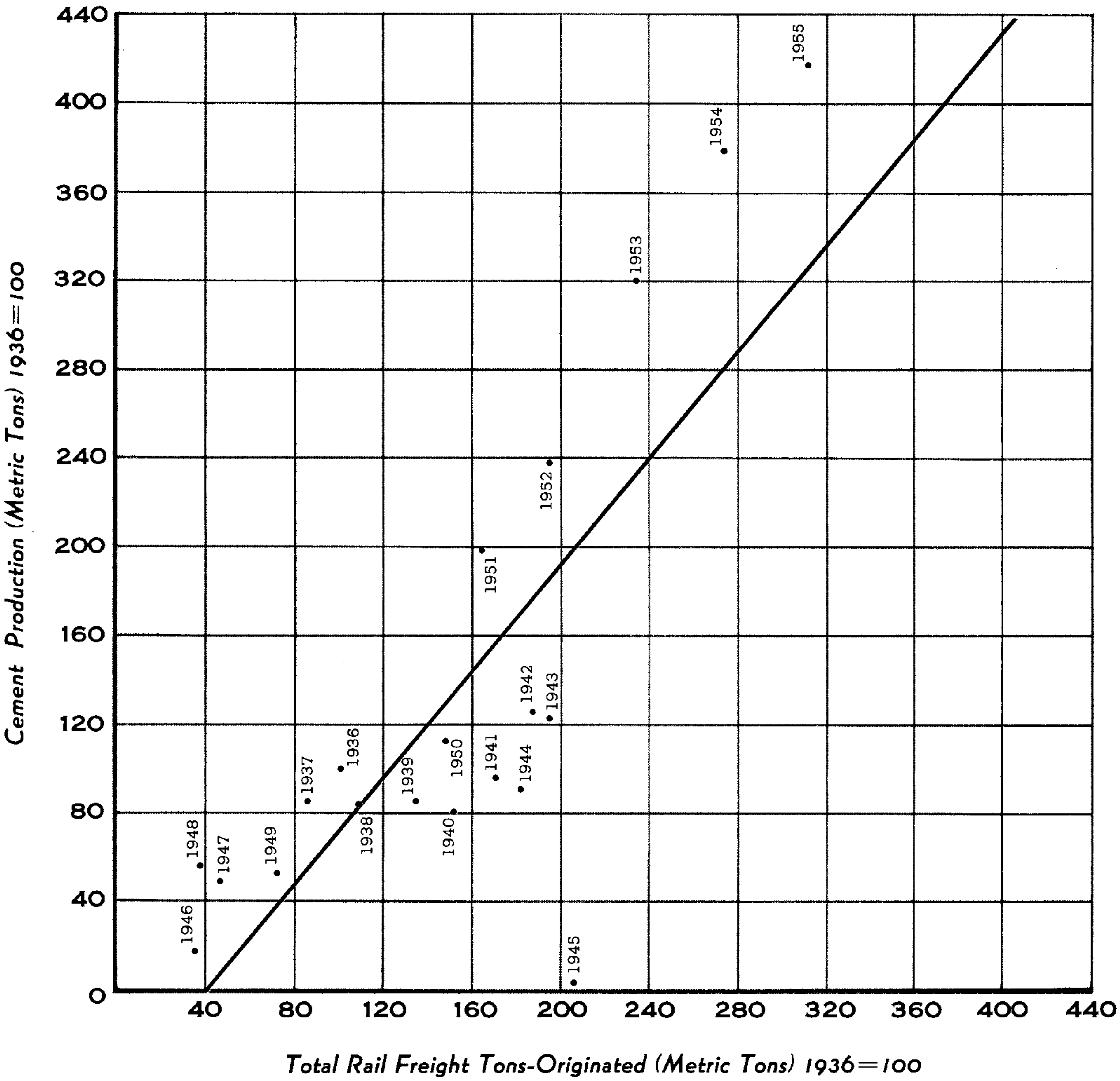
50X1

50X1

Figure 4

LINEAR REGRESSION OF CEMENT PRODUCTION TONNAGE ON TOTAL RAIL FREIGHT TONS-ORIGINATED FOR CHINA

1936-55



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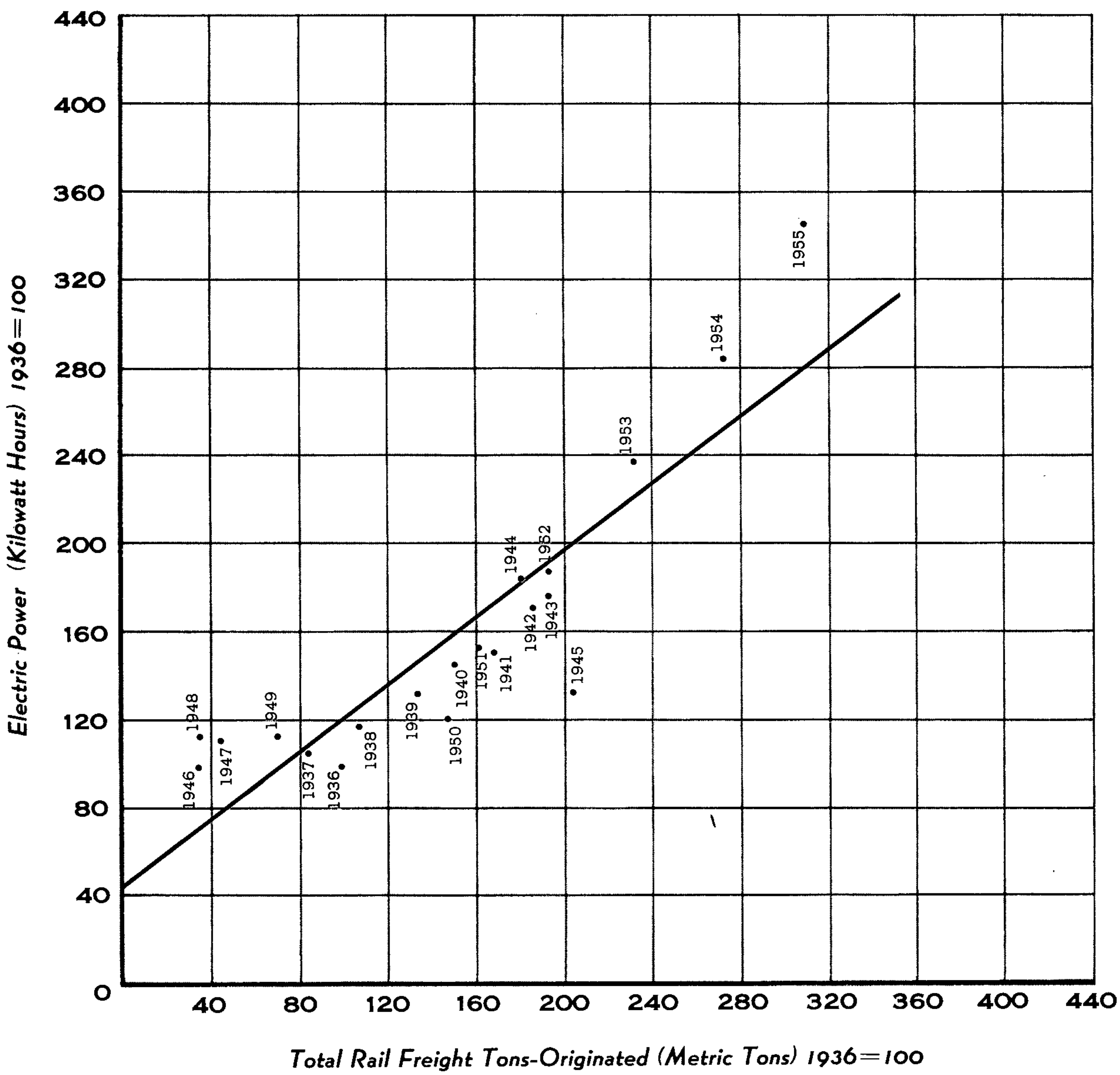
50X1

Figure 5

LINEAR REGRESSION OF ELECTRIC POWER ON TOTAL RAIL FREIGHT TONS-ORIGINATED FOR CHINA

1936-55



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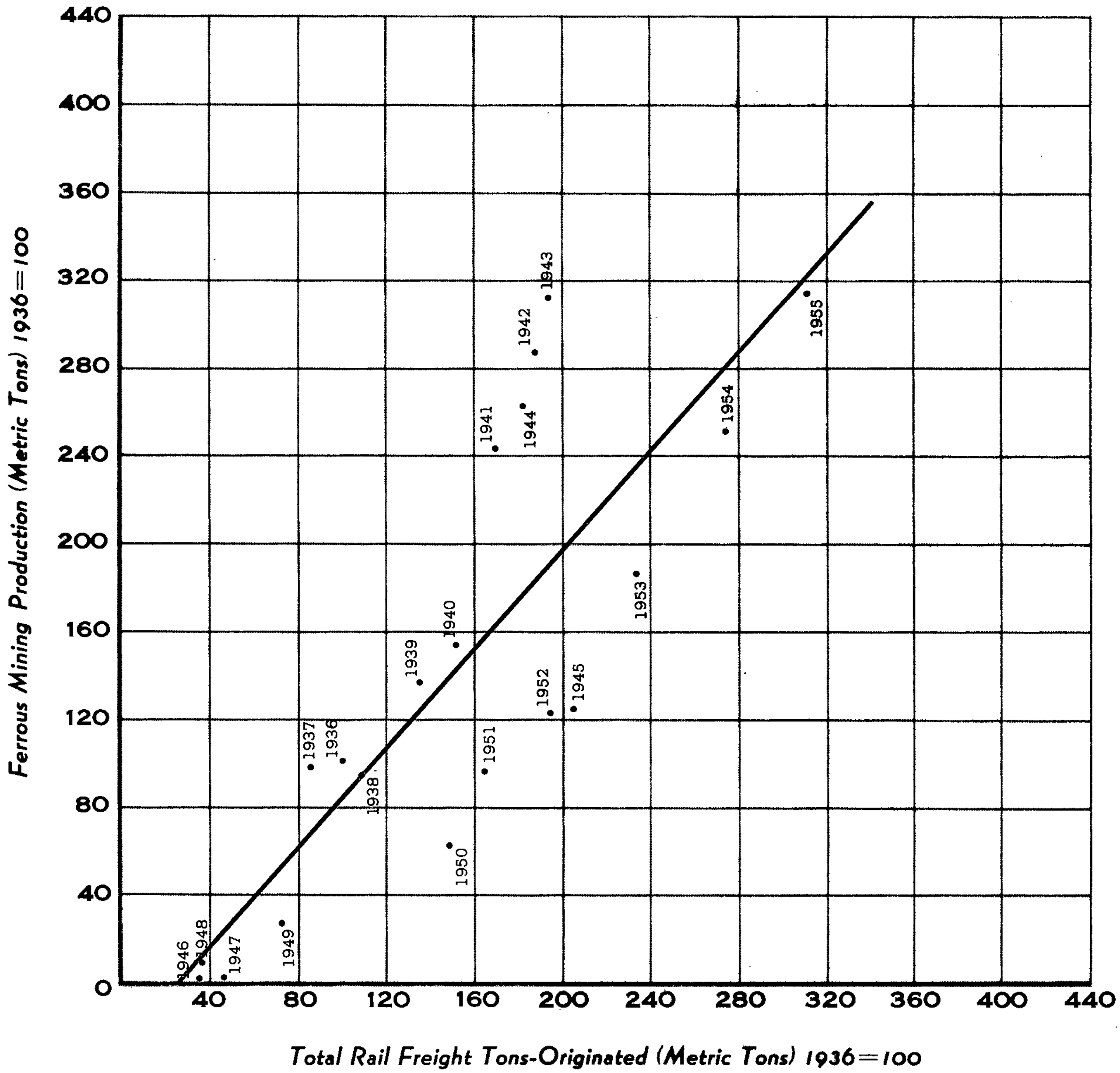
50X1

50X1

Figure 6

LINEAR REGRESSION OF FERROUS MINING PRODUCTION TONNAGE ON TOTAL RAIL FREIGHT TONS-ORIGINATED FOR CHINA

1936-55



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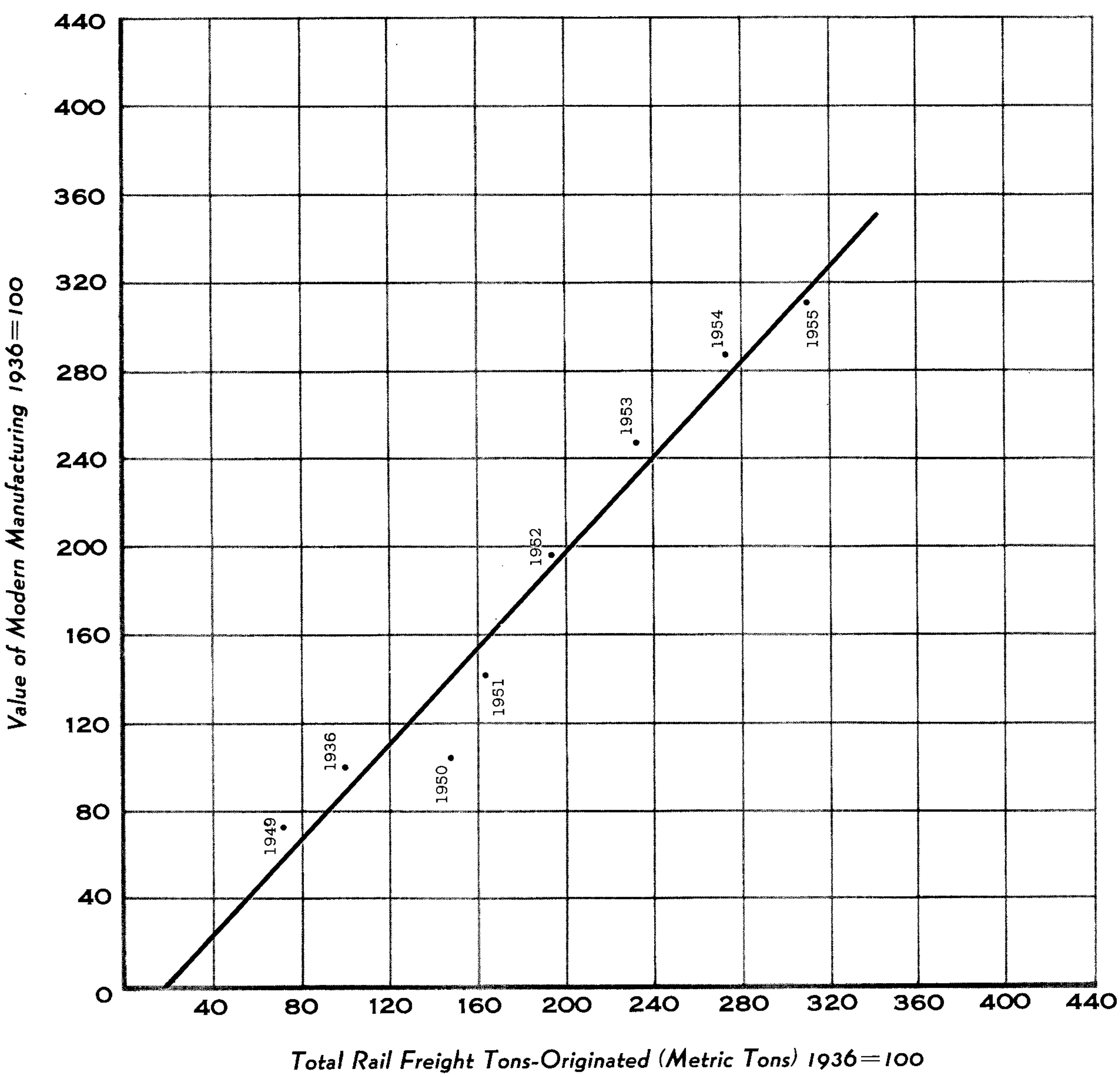
50X1

Figure 7

LINEAR REGRESSION OF MODERN MANUFACTURING PRODUCTION ON TOTAL RAIL FREIGHT TONS-ORIGINATED FOR CHINA

1936 and 1949-55



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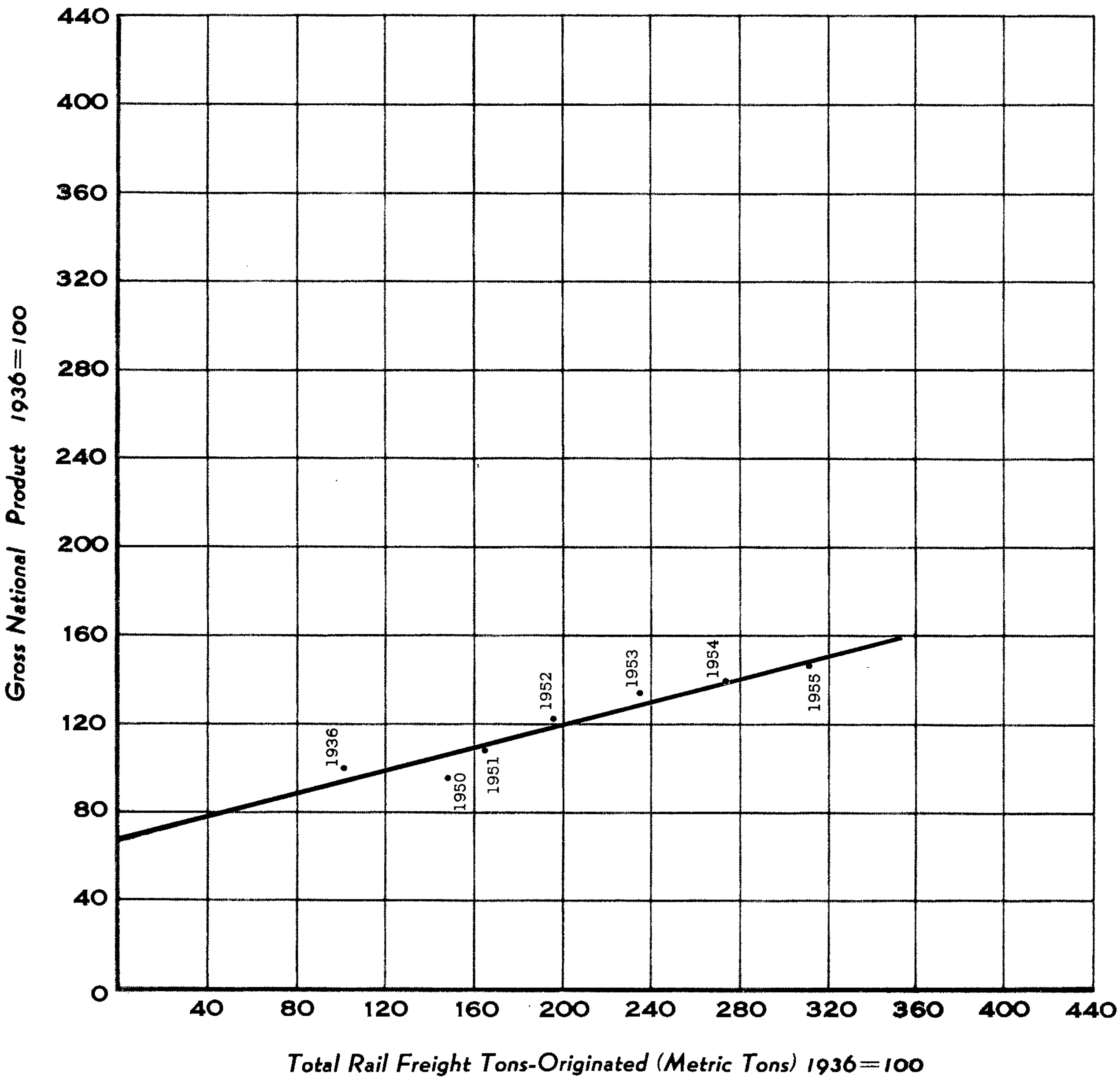
50X1

Figure 8 50X1

LINEAR REGRESSION OF GROSS NATIONAL PRODUCT ON TOTAL RAIL FREIGHT TONS-ORIGINATED FOR CHINA

1936 and 1950-55



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50X1

Table 11

Linear Regression of Coal Production Tonnage
on Total Rail Freight Tons-Originated for China
1936-55

Year	X	Y	XY	X^2
1936	100	100	10,000	10,000
1937	85	94	7,990	7,225
1938	108	81	8,748	11,664
1939	135	98	13,230	18,225
1940	151	119	17,969	22,801
1941	170	150	25,500	28,900
1942	188	166	31,208	35,344
1943	194	160	31,040	37,636
1944	182	159	28,938	33,124
1945	205	49	10,045	42,025
1946	35	44	1,540	1,225
1947	46	52	2,392	2,116
1948	37	51	1,887	1,369
1949	72	80	5,760	5,184
1950	148	106	15,688	21,904
1951	164	132	21,648	26,896
1952	195	164	31,980	38,025
1953	234	179	41,886	54,756
1954	274	209	57,266	75,076
1955	311	225	69,975	96,721
Total	3,034	2,418	434,690	570,216

$y = 27.252 + 0.617x$

Table 12

Linear Regression of Timber Production Tonnage on Total Rail Freight Tons-Originated for China 1938-55

Year	X	Y	XY	X^2
1938	100	100	10,000	10,000
1946	32	100	3,200	1,024
1947	43	100	4,300	1,849
1948	34	100	3,400	1,156
1949	66	100	6,600	4,356
1950	136	125	17,000	18,496
1951	152	131	19,912	23,104
1952	180	138	24,840	32,400
1953	216	162	34,992	46,656
1954	252	175	44,100	63,504
1955	287	194	55,678	82,369
Total	1,498	1,425	224,022	284,914

$y = 79.116 + 0.370x$

Table 13

Linear Regression of Cement Production Tonnage on Total Rail Freight Tons-Originated for China
1936-55

Year	X	Y	XY	X^2
1936	100	100	10,000	10,000
1937	85	85	7,225	7,225
1938	108	84	9,072	11,664
1939	135	86	11,610	18,225
1940	151	82	12,382	22,801
1941	170	96	16,320	28,900
1942	188	126	23,688	35,344
1943	194	123	23,862	37,636
1944	182	91	16,562	33,124
1945	205	3	615	42,025
1946	35	17	595	1,225
1947	46	49	2,254	2,116
1948	37	56	2,072	1,369
1949	72	53	3,816	5,184
1950	148	112	16,576	21,904
1951	164	199	32,636	26,896
1952	195	238	46,410	38,025
1953	234	321	75,114	54,756
1954	274	380	104,120	75,076
1955	311	418	129,998	96,721
Total	3,034	2,719	544,927	570,216

$y = -46.786 + 1.205x$

Table 14

Linear Regression of Electric Power
on Total Rail Freight Tons-Originated for China
1936-55

Year	X	Y	XY	X^2
1936	100	100	10,000	10,000
1937	85	105	8,925	7,225
1938	108	118	12,744	11,664
1939	135	132	17,820	18,225
1940	151	145	21,895	22,801
1941	170	150	25,500	28,900
1942	188	171	32,148	35,344
1943	194	176	34,144	37,636
1944	182	184	33,488	33,124
1945	205	132	27,060	42,025
1946	35	100	3,500	1,225
1947	46	111	5,106	2,116
1948	37	113	4,181	1,369
1949	72	113	8,136	5,184
1950	148	121	17,908	21,904
1951	164	153	25,092	26,896
1952	195	187	36,465	38,025
1953	234	237	55,458	54,756
1954	274	284	77,816	75,076
1955	311	345	107,295	96,721
Total	3,034	3,177	564,681	570,216

$y = 44.714 + 0.752x$

Table 15

Linear Regression of Ferrous Mining Production Tonnage on Total Rail Freight Tons-Originated for China 1936-55

Year	X	Y	XY	X^2
1936	100	100	10,000	10,000
1937	85	97	8,245	7,225
1938	108	94	10,152	11,664
1939	135	136	18,360	18,225
1940	151	153	23,103	22,801
1941	170	242	41,140	28,900
1942	188	287	53,956	35,344
1943	194	312	60,528	37,636
1944	182	262	47,684	33,124
1945	205	124	25,420	42,025
1946	35	1	35	1,225
1947	46	1	46	2,116
1948	37	8	296	1,369
1949	72	26	1,872	5,184
1950	148	62	9,176	21,904
1951	164	95	15,580	26,896
1952	195	122	23,790	38,025
1953	234	186	43,524	54,756
1954	274	251	68,774	75,076
1955	311	315	97,965	96,721
Total	3,034	2,874	559,646	570,216

$y = -26.902 + 1.125x$

Table 16

Linear Regression of Modern Manufacturing Production on Total Rail Freight Tons-Originated for China 1936-55

Year	X	Y	XY	X^2
1936	100	100	10,000	10,000
1949	72	73	5,256	5,184
1950	148	104	15,392	21,904
1951	164	141	23,124	26,896
1952	195	196	38,220	38,025
1953	234	247	57,798	54,756
1954	274	286	78,364	75,076
1955	311	312	97,032	96,721
Total	1,498	1,459	325,186	328,562

$y = - 20.173 + 1.082x$

Table 17

Linear Regression of Gross National Product on Total Rail Freight Tons-Originated for China 1936-55

Year	X	Y	XY	X^2
1936	100	100	10,000	10,000
1950	148	95	14,060	21,904
1951	164	109	17,876	26,896
1952	195	123	23,985	38,025
1953	234	133	31,122	54,756
1954	274	140	38,360	75,076
1955	311	146	45,406	96,721
Total	1,426	846	180,809	323,378

$y = 68.403 + 0.257x$

pronounced in the case of GNP. As will be noted, the plotted points of GNP indicate almost perfect correlation with freight tons-originated, while the nearly horizontal position of the regression line indicates that Rail Freight Tons-Originated is growing at a much greater rate than GNP. While world rail experience testifies to the fact that in the initial stages of economic development, rail transport service tends to increase at a rate somewhat greater than does over-all production, it does not support rail advances of the magnitude indicated in the GNP regression line. Actually, the pronounced growth of rail traffic in relation to GNP results from conditions peculiar to China, where about 75 percent of GNP is derived from the agricultural sector, which is incapable of any significant growth. Hence, the predominant characteristic of the regression lines is that Rail Freight Tons-Originated is growing at a somewhat greater rate than other sectors of the economy, confirming the existence of what is generally adjudged to be a normal situation in a developing country such as Communist China.

The most significant characteristic apparent in the graphs is that the plotted points in all cases tend to cluster rather closely about the path of the regression lines, thereby confirming correlation. Correlation in most instances is not perfect; however, the points do not scatter widely about the line of regression. In addition, the plotted points for 1953-55 on all graphs, with the exception of Ferrous Mining, lie on or above the regression line. This indicates a slight deviation from the average relationship established by the regression line between rail transport and the other variable. Since the points for 1953-55 are consistently above the line, this indicates that the deviation is in favor of the y axis: that is, that production is tending to develop at a slightly faster pace than would be expected on the basis of the relationship established by the regression line. Various factors could cause this; however, it is believed to be a reflection of the tight situation of current Chinese Communist rail operations.

The fact that rather close linear correlation exists between Rail Freight Tons-Originated and the selected variables is additional support for the position that the Chinese Communists are in fact reporting rail traffic gains in terms of tons-originated. The 1936 figures are known to be in terms of tons-originated, and any Chinese Communist change of reporting from tons-originated to tons-hauled would result in a much lower coefficient of correlation than is shown in Figures 2-8.

Because on the one hand there is close association among all of these variables, as shown in Figure 1,* and because on the other hand the graphed regression lines indicate close correlation between freight tons-originated and each separate sector of basic economic activity, it becomes evident that, in view of the rapid expansion of production in Communist China, the absolute level of tons-originated rail traffic must be at least as high as has been estimated herein. Contemporary organization of economic activity will not support an autonomous increase in total over-all production without a comparable increase in transport performance. Hence, to reject current estimated levels of rail performance implies that an adequate basis must be provided for first rejecting the indicated growth pattern of the other economic sectors used in the present correlation analysis.

3. Regional Distribution of Traffic.

Few specific data are available on the volume of traffic moved in the various regions of Communist China. One notable exception is in the area of the Harbin Railroad Control Bureau, which receives considerable attention in the press. One statement dealing with the traffic position of this Bureau partially corroborates the national figure of tons-originated for 1953. On 14 December 1953, Peiping reported the fulfillment of the Harbin Bureau's 1953 goal by 5 December, with a statement that the workers were planning to load an additional 84,000 freight cars by the end of the year. 91/ This would indicate that the Harbin Bureau would load 3,360 cars daily. Converting this to annual carloading and multiplying by 30.4 tons per car (announced as average tons loaded per car in 1953 in the Harbin Bureau 92/) would yield a 1953 tons-originated total of 37,282,560 tons, which is approximately 24 percent of the total tonnage of 157 million tons-originated in Communist China. This percentage is entirely consistent with the position of central Manchuria in the Chinese economy and lends support to the national estimate of 157 million tons.

A more recent report supports the 1953 performance of the Harbin Railroad Control Bureau. This report states that because of improved loading in the Bureau during the first half of 1954, the average carload had been increased to 31 tons and that "This figure represents a planned increase averaging 0.6 ton per car over that in 1953. This was equivalent to a saving of 14,600 cars." 93/

* Following p. 12, above.

Expressing the statement in an algebraic formula where x equals tons per car (31 tons), y equals cars, and xy equals tons-originated, the following is obtained:

$$(x - 0.6)\ (y + 14{,}600) - xy = 0$$
$$xy + 14{,}600x - 0.6y - 8{,}760 - xy = 0$$

Solving for y on the basis that x equals 31 tons yields:

$$0.6y = 452{,}600 - 8{,}760$$
$$0.6y = 443{,}840$$

$y = 739{,}733$ cars loaded in the first half of 1954.

At 31 tons per car, this would equal about 22,932,000 tons-originated during the period. If this same level of activity was maintained throughout the remainder of 1954, tons-originated by the Harbin Bureau would have been about 45,864,000, or about 25 percent of total tons-originated in Communist China. The Communist plan to increase tons-originated by 15 percent to 180 million tons in 1954 would presumably require that the Harbin Railroad Control Bureau account for approximately 25 percent of the total. Hence, if the 1953 figure of national tons-originated was in fact 157 million tons, to attain 180 million tons in 1954 (a net increase of 23 million tons), the Harbin Bureau, in order to maintain its relative position, would have to increase tons-originated by about 8.0 million tons. The fact that such increases are apparently being met attests to both the validity and the consistency of Chinese Communist transportation reporting.

The 1954 tons-originated figure for the Harbin Railroad Control Bureau represents a 23-percent increase over 1953, compared with the 15-percent national increase. This is to be expected, however, since a more efficient utilization of the car park is possible in Manchuria, permitting a larger tonnage increase than could be obtained in China proper.

A recent Japanese publication 94/ provides a regional distribution of traffic on the basis of estimated locomotive assignments in Communist China. According to this source, the regional distribution of freight as of the end of 1952 was as follows:

Area	Amount	
	Billion Ton-Kilometers	Million Tons-Originated
Northeast Area (Manchuria)	41.5	80 to 85
North China Area	21.3	50 to 55
Central and South China Area	8.5	10 to 15
Total	71.3	140 to 155

The Chinese Communist press has announced that 54 percent of total freight traffic originates in Manchuria, and on the basis of the 1953 tons-originated figure of 157 million tons, this tabulation would agree. Since the above is for 1952 and not 1953, however, the agreement is not close enough to permit full acceptance of this regional breakdown, which is developed on the basis of locomotive allocation. The text of the Japanese report allocates 31 percent of total freight locomotives to the Harbin Railroad Control Bureau. Since the Bureau originated about 24 percent of the total volume of freight, however, there would appear to be an additional point of minor disagreement.

4. Official Announcements of Operating Statistics.

At various times the Chinese Communist press, in an attempt to propagandize Communist successes in railroad transport has released figures which, probably unintentionally have disclosed considerable information. For instance, the present estimate of performance by Chinese Communist railroads in 1953 is based on the following official information released from Peiping on 26 January 1954: "In 1953, the railroad loading plan was fulfilled by 108.3 percent, constituting an increase of 15.7 percent over 1952. The planned target of total delivery tonnage was fulfilled by 112.9 percent, or an increase of 20 /sic; that is, 19.9/ percent as compared with that in 1952." 95/ If tons-originated in 1953 are equated to the 19.9 percent increase of "total delivery tonnage," this would yield a figure for 1953 of 157 million tons of freight originated,* which is a sizable increase for a rail system judged by some to have been operating under a strain in 1952. This figure results from a literal interpretation

* Does not include narrow-gauge traffic.

of the Peiping announcement. There is additional information which supports a like interpretation which, in effect, results from an analysis of (a) the above statement that rail loading increased by 15.7 percent over 1952, and (b) a statement made in the same article that "the net loading capacity of freight wagons was raised by one ton on average as compared with that in 1952, thereby saving a value equal to 580,000 revenue wagons* in the whole year."

As concerns the increase in rail loading, it was announced in another article** that in 1952 the average number of tons loaded per loaded car was 28.3. On this basis, dividing 131 million tons-originated in 1952 by 28.3 tons per car would yield 4,628,975 cars loaded during 1952, or 12,682 cars loaded daily (4,628,975 divided by 365). Assuming that the increase of 15.7 percent in the rail loading plan in 1953 refers to daily carloadings, then 1953 total daily carloadings would be 115.7 percent of 12,682, or 14,673 cars loaded daily. Consequently, 14,673 cars loaded daily converted to an annual basis and multiplied by 29.3 tons (28.3 plus 1 ton improvement for 1953) yields 156,920,398 tons-originated in 1953. This agrees closely with the postulated 1953 tons-originated figure of 157,069,000, which is based on a 19.9-percent increase in 1953 traffic over 1952.

In reference to the above statement about 580,000 revenue wagons saved by increasing the average net load by 1 ton, it can be shown that tons-originated was in the order of 157 million tons. Expressing the statement in an algebraic formula where x equals tons per car, y equals revenue cars, and xy equals tons-originated, the following is obtained:

$$(x - 1)(y + 580{,}000) - xy = 0$$
$$xy + 580{,}000x - y - 580{,}000 - xy = 0$$

Solving for y on the basis that x = 29.3 tons would yield:

$$y = (580{,}000 \times 29.3) - 580{,}000$$
$$y = 16{,}994{,}000 - 580{,}000$$
$$y = 16{,}414{,}000 \text{ revenue-car-days}$$

* From analysis and interpretation of various press reports it has been determined that a revenue wagon, or car, is equal to a loaded car-day.
** See Appendix E.

Converting this to revenue cars per day (16,414,000 divided by 365) yields 44,970 revenue cars in daily operation, which includes both cars originating on a particular day and loaded cars in transit on that day. To use the data to obtain tons-originated on the number of freight car days per day, the revenue cars in daily operation must be divided by a loaded car turnover rate. Dividing the announced turnaround factor of 3.09 days (see Appendix D, where this shown to be loaded car turnover rate) into the calculated 44,970 revenue car days per day yields a daily carloading figure of 14,553 cars. If, then, 14,553 cars are loaded daily to 29.3 tons per car, a total of 155,637,058 tons of revenue freight would have been originated in 1953. This again compares well with the Communist announcement of 157 million tons-originated in 1953.

APPENDIX B

ADMINISTRATION AND ORGANIZATION

The history of the administration and organization of Chinese Communist rail transport is characterized by an increasing degree of centralization, reform, and ideological orientation. Since 1949, rail centralization has continually increased and has now reached heretofore unknown dimensions. During the same period the structure of the Ministry of Railroads has undergone frequent changes, necessitated on the one hand by the ever-increasing size of the physical plant and on the other hand by the increased responsibilities of rail transport within the enlarging scope of the Chinese economy. Also, the Chinese concept of Communist economic control requirements has penetrated quite significantly into the organizational structure of the railroads with the establishment of political and security organizations which have considerable power and autonomy.

1. Centralization.

As presently constituted, all aspects of control, direction, and responsibility of the rail system and its 620,000 employees 96/ are centralized in the hands of the Minister of Railroads, Teng Tai-yuan, who is also a member of the Central Committee of the Communist Party. Assisting the Minister and directly responsible to him are seven Vice-Ministers. 97/

The Ministry has, like most Chinese Communist economic ministries, a simple line and staff organizational structure. The central administration is broken down into a number of functional bureaus, which perform the typical staff functions of planning and the like (see Figure 9*). The line organizations are made up of 14 regional control bureaus. Each of these has subordinate departments or sections corresponding to the staff functional bureaus at the ministerial level but responsible directly to the regional control bureaus. 98/ The effect of such an organization is to make each regional control bureau responsible for the management and the economic and operational activity of the territory assigned to it. Regional control bureaus report directly to the Ministry

* Following p. 54.

of Railroads. The regional control bureau is thus a completely independent administrative unit and is the basic management unit of rail transport. 99/ This organizational structure is typical of rail organizations, especially in Communist countries.

2. Changes in Administrative Structure.

During the period of Communist control of the Chinese railroads there have been numerous reorganizations and modifications of the rail administration. As the functions and areas of responsibility of various central bureaus and regional bureaus increased, new bureaus were created to facilitate over-all administration of the lines. In 1949 the Ministry of Railroads was originally formed with a total of 15 functional bureaus and regional bureaus. Since then the number of functional bureaus and regional bureaus has doubled. Some of these changes, such as the creation of the Chungking Railroad Control Bureau, reflect an increase in operational trackage. 100/

Characteristic of the trend toward centralization was the replacement of the somewhat autonomous Northeast Railroad Bureau with regional bureaus at Harbin, Tsitsihar, Kirin, and Chin-chou in May 1952. 101/ The new regional bureaus were made directly responsible to the Ministry. It is believed that this major reorganization in Manchuria foreshadowed a change in status of the Sino-Soviet-operated Chinese Ch'ang-ch'un Railroad, which reverted to complete Chinese control in January 1953. 102/ A further reason for the reorganization in Manchuria was doubtless to de-emphasize the importance of this area relative to China proper. A similar development took place in 1952 in other economic sectors in Manchuria.

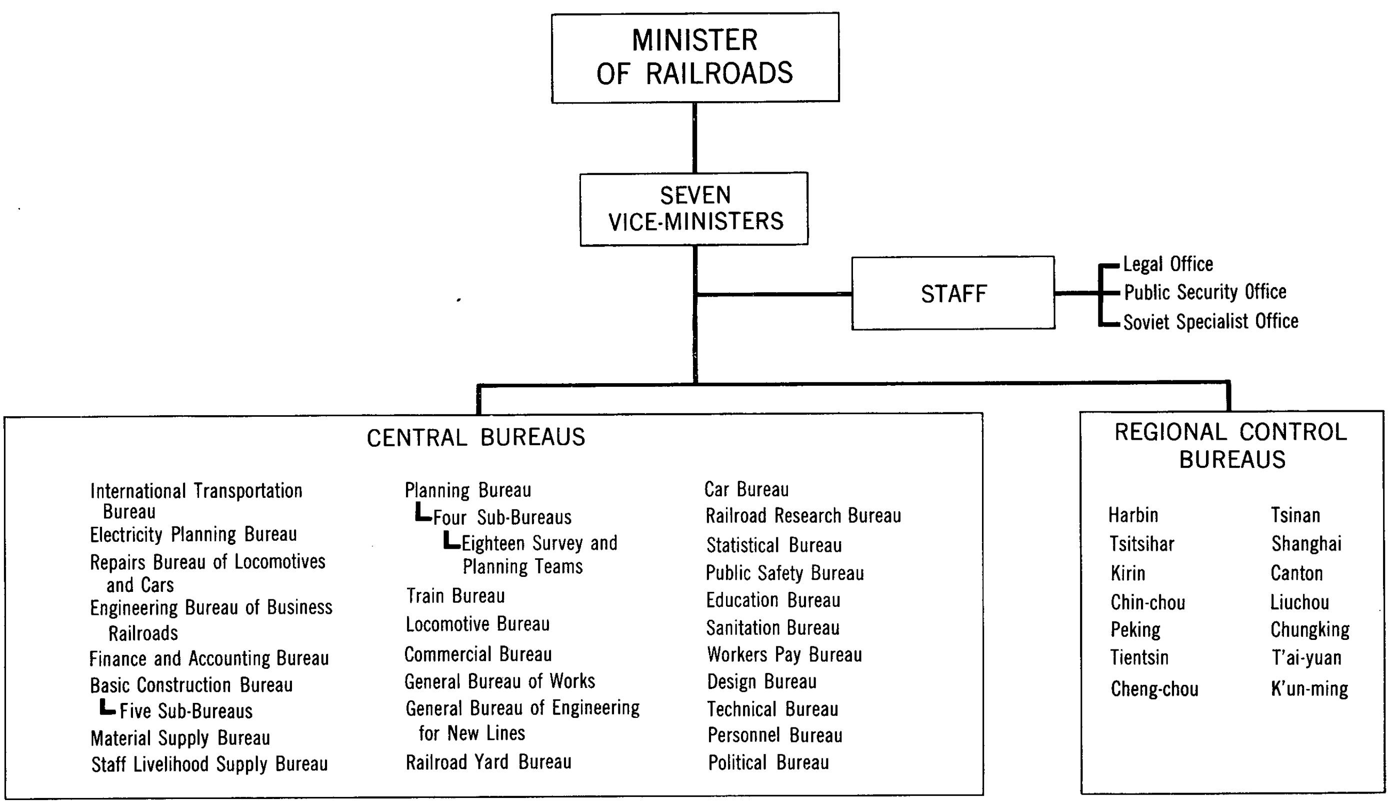
The centralization of Soviet influence was first noted when the Soviet Specialist Office was established on the ministerial level in January 1952. 103/

In view of the continued trend toward centralization and the ever-expanding pattern of the rail network, it is believed that administrative reforms will be made periodically to maintain a close control over the system. Although it is difficult to foresee exact changes, it is possible that in the future the 14 regional bureaus will be grouped into 3 or 4 large geographic units under the Ministry of Railroads in order to increase control over the various bureaus and to centralize their operations.

Figure [redacted]9 50X1

COMMUNIST CHINA

ORGANIZATION OF THE MINISTRY OF RAILROADS, 1954



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3. Communization of Chinese Railroads.

All key positions in the Ministry of Railroads seem to be held by Communist Party members. 104/ [redacted]. 50X1
[redacted] an important economic function of the Communist Party is to serve as a propaganda device to stimulate greater production and efficiency. There is no indication that Party responsibilities are in conflict with the functional necessities of the railroads, although ideological considerations may limit the freedom of action and the scope of responsibility of the operating heads of the several bureaus. 50X1

The Chinese Communist experiment should benefit immeasurably from Soviet experience. Policies and programs can be compared with Soviet results obtained from like action in similar situations. As long as the present cooperative relationship obtains between Communist China and the USSR, the administration of the Chinese railroads is aided in that its approach to current problems can be founded on the practical working experience of the USSR.

4. Structural Organization of the Ministry of Railroads.

[redacted] 50X1
the 14 regional bureaus are set up along the following lines: 50X1

Executive Office of a Regional Bureau

General Affairs Bureau
Civil Engineering Bureau
Bureau of Engineers
Bureau of Finance
Bureau of Personnel
Bureau of Supplies (has depots at various points)
Bureau of Public Security
Bureau of Health
Bureau of Education (supervises schools for both employees and dependents)

* Following p. 54, above.

Bureau of Statistics
Bureau of Capital Construction
Bureau of Electricity
Bureau of Workshop
Bureau of Inspection and Supervision
Bureau of Shipment
Planning Bureau
Bureau of Rolling Stock
Central Supplies Office (supervises cooperative stores and subbranches)

The Civil Engineering Bureau, the Bureau of Engineers, the Bureau of Rolling Stock, and the Bureau of Shipment are subdivided into units of area control. Each subbureau has about 200 km of rail trackage under its control. Other subbureaus, referred to as shipping administrations, are located at major stations.

Military transport is handled by a Military Council, not by the Railroad Administration, and men conscripted from the railroad by the military authorities are under a separate Military Administration. In the Tsinan Railroad Control Bureau there were 30 people in the Military Representative's office. 106/

It should be noted that, in the case of the Tsinan Railroad Control Bureau, at least 17 of the 22 subbureau chiefs are Communist Party members. 107/ Assuming that this proportion is typical, the administrative chain of command exercised by the Ministry of Railroads is apparently seconded by a system of Party control. Because the Minister himself is a prominent member of the Party organization, Party control and administration on all levels are effectively centralized.

APPENDIX C

FREIGHT CAR AND LOCOMOTIVE PARK

In October 1949 the Chinese Communist Ministry of Railroads reported that there were in China 30,000 freight cars in use and an additional 9,600 out of service. 108/ It was planned that in 1950 the operable park was to be increased to 39,500 cars. On 8 March 1950, however, it was officially reported that as a result of a nationwide inventory an additional 10,278 freight cars had been "found," of which 3,088 were in immediately usable condition. 109/ Although these statements indicate a total freight car park of 49,878 in 1950, the figure is not in itself sufficiently firm to be taken as a base from which to calculate the current park. Estimates of the present park are, therefore, based on analyses of requirements, production, war losses, attrition, imports, [redacted] and a projection of the Manchurian car park. 50X1

[redacted] 50X1

Three methodologies have been developed in an attempt to arrive at an accurate measure of the car park. The first method, primarily a deductive approach, takes as its point of departure the performance figures annually announced by the Chinese Communists. The second method, an inductive approach, is essentially historical and takes as its point of departure the known freight car park in 1945, qualified by estimated additions and subtractions through 1952. [redacted] 50X1 50X1

1. Estimate of Freight Car Requirements.

In Appendix A it was noted that it was possible to obtain daily carloadings for 1952, 1953, and 1954 -- 12,682, 14,673, and 15,866* carloadings, respectively. Daily carloadings multiplied by turnaround time (see Appendix D) yield a minimum required car

* (183 million tons ÷ 365) ÷ 31.6 = 15,866.

park for 1952, 1953, and 1954 of 48,192,* 58,692,** and 63,464*** cars, respectively. These figures represent the minimum number of cars which the Chinese would need for the volume of traffic originated during corresponding years. They do not account for that part of the total park which would be out of operation because of repairs, and they do not allow for any reserve park which might exist.

It has been estimated on the basis of world rail experience that about 4 percent of the total freight car park is out of operation at any one time because of overhauls and repairs. This figure is applied to the Chinese Communist freight car park, although it may be high in view of the fact that the US reduced the bad-order figure to 2.7 percent in 1943 when cars were badly needed. 110/

Chinese Communist rail literature has occasionally made reference to the existence of reserve cars. [redacted] 50X1 50X1 50X1 In November 1951 the Chinese press published a rather detailed breakdown of "Cars in Operation" and "Cars Not in Operation." This article 112/ defines "Cars in Operation" as all cars transporting freight except the following eight categories of "Cars Not in Operation":

a. Cars reserved for the use of the Ministry of Railroads
b. Cars serving as temporary substitutes for carrying passengers, mail, baggage, and the like
c. Cars leased to various economic units of the railroads operating on a budget basis and engaged in the construction or restoration of rail tracks
d. Bureau work cars engaged in the work of the railroad bureau
e. Storage cars and occupied cars
f. Special assignment cars such as cabooses, rescue and relief cars, kitchen cars, and the like

* 12,682 x 3.8 = 48,192.
** 14,673 x 4.0 = 58,692.
*** 15,866 x 4.0 = 63,464.

g. Cars requisitioned by the military for use under its control
h. Cars under inspection and repair (estimated at 4 percent of the total park)

If the figure of 10 percent is used for the reserve park in 1952 and an additional 4-percent factor is used to cover that part of the total park under repair, the total park for that year would be about 56,037 freight cars.* In 1953, however, with the increase in freight traffic, it is probable that some elements of the reserve park were utilized in commercial service to supplement the working park. Assuming this to be true, the reserve factor could be reduced during the course of 1953 to 6 percent from the previous year's 10 percent. Allowing for a reserve factor of 6 percent and an additional 4 percent to account for cars under repair yields a 1953 park figure of 65,213 freight cars.**

The 1954 minimum car requirements figure of 63,464 adjusted by only 3 percent to reflect an even greater reduction of reserves and a 4-percent factor to account for cars under repair yields a 1954 park figure of 68,241 freight cars.***

2. Estimate of the 1952 Freight Car Park Based on the Known 1945 Freight Car Park.

The derivation of the estimated 1952 freight car park in Communist China from the known 1945 freight car park in China proper and Manchuria is shown in Table 18.****

a. Freight Car Park for 1945.

According to official Chinese Nationalist statistics, there were 25,848 freight cars in China proper in 1945. No attempt is made to account for any freight cars which may have been in the hands of the Communists during this period. Japanese records show 41,984 freight cars in Manchuria in 1945. Totaling these figures yields a minimum freight car park for 1945 of 67,832 units. The reported freight car park in China proper and Manchuria in 1934-45 is shown in Table 19.*****

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* (12,682 x 3.8) ÷ (100% - 10% - 4%) = 56,037.
** (14,673 x 4) ÷ (100% - 6% - 4%) = 65,213.
*** (15,866 x 4) ÷ (100% - 3% - 4%) = 68,241.
**** Table 18 follows on p. 60.
***** Table 19 follows on p. 61.

Table 18

Derivation of the 1952 Freight Car Park in Communist China from the 1945 Park in China Proper and Manchuria

		Units
1945 Freight Car Park		67,832
Minus:		
Retirements	9,496	
War losses		
Civil War	2,500 to 5,000	
Korean War	500 to 1,250	
Soviet reparations	6,298	
Total losses		18,794 to 22,044
Plus:		
Production 1947-52	9,565	
Imports	3,945	
Total additions		13,510
1952 Freight Car Park		
(Minimum loss plus additions)		62,548
(Maximum loss plus additions)		59,298
Mean		60,923

Table 19

Reported Freight Car Park in China Proper and Manchuria
1934-45

Units

Year	Northeast Area (Manchuria) a/	North China Area b/	Nationalist China Proper c/	Total
1934	15,179			
1935	18,229		15,482 d/	
1936	20,021			
1937	21,974		15,000 e/	
1938	23,657	11,154	12,000 e/	46,811
1939	26,987	15,082	10,000 e/	52,069
1940	30,056	16,010	6,045	52,111
1941	32,353	17,152	6,379	55,884
1942	35,781	17,321	4,493	57,595
1943	39,309	18,414	4,261	61,984
1944	41,826	18,709	2,307	62,842
1945	41,984		25,848 f/	67,832 g/

a. 113/
b. Japanese-controlled area. 114/
c. 115/
d. 116/
e. Estimated.
f. Does not include totals of Hainan and Taiwan. Includes 18,532 in the North China Area.
g. 117/ The increase of 4,990 cars in 1945 over 1944 is believed to represent largely the units surrendered to the Nationalists by the Japanese-controlled Central China Railroad Company (estimated at 3,000 units) and the South China Railroad Company (estimated at 1,000 units). 118/

b. Losses since 1945.

(1) Retirement.

From the 67,832 freight cars available in Communist China in 1945, there have been losses because the retirement of worn-out cars, seizures by the USSR, and destruction resulting from the Civil War and the Korean War. Although figures are not available for the current rate of retirement of rolling stock in China, records of Japanese rail operations in North China during 1937-45 indicate that retirements for that 8-year period were about 1 percent per year. 119/

The foregoing table indicates that more than 30 percent of the freight cars in operation in Manchuria and China proper in 1945 were less than 8 years old. By comparison, in 1951, 31 percent of the freight cars in the US were less than 10 years old. It is probable that the Chinese Communists have a slightly higher retirement rate than the 1-percent rate of the North China railroads in 1937-45. Given the newness of the Chinese freight car park and the need for cars in Communist China, however, it is doubtful whether the retirement rate has risen above 2 percent per year.*

Using a straight-line retirement rate of 2 percent per year on the 1945 total of 67,832 cars for 1946-52 would indicate that 9,496 freight cars were retired. This method of calculation produces a conservative bias in the total park for 1953, since the rate is applied to some freight cars that were lost to the Chinese Communists through other causes.

(2) Reparations to the USSR.

In his report to the President of the United States in July 1946, Edwin W. Pauley estimated that the USSR had removed some 27,000 freight cars from occupied territory. 121/ No basis for this estimate was given and no independent evidence has been found to support it. [redacted] 50X1

50X1

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* In the US during World War II the retirement rate rose from 0.86 percent per year in 1942 to 2.48 percent per year in 1944. 120/

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50X1

Manchurian freight cars have been observed in the USSR by both German and Japanese prisoners of war since 1945. In 1945, when the Chinese Nationalists were pushing north, the USSR may have been vitally interested in preventing freight cars in Manchuria, as well as other industrial resources, from falling into Nationalist hands. For example, the USSR dismantled numerous plants and sent them to Soviet territory or to border points removed from the immediate danger of capture by the Nationalists. When the Chinese Communists began to launch successful offensives, much of this equipment was returned to Manchuria. The same policy may have held true for rail equipment.

In all probability the estimate of 15 percent given above would amply cover all freight cars actually removed from the railroads of Manchuria by Soviet action and subsequently seen in the USSR. Based on the 41,984 freight cars in Manchuria in 1945, it is estimated that a total of 6,298 freight cars may have been lost in this way.

(3) Civil War.

No information is available on the number of freight cars lost in the Chinese Civil War. Few major battles were fought in concentrated industrial areas where large numbers of freight cars would have been exposed to heavy damage. Most losses resulting from military action must have been confined to individual trains or cars on isolated sidings. In any case, possession, not destruction, would have been the aim of both sides. Furthermore, freight cars can stand a great deal of punishment before they become irreparable. It is therefore estimated that not more than 2,500 to 5,000 freight cars of the total available in 1945 were permanently lost during the Chinese Civil War.

(4) Korean War.

There is considerable evidence to indicate that Chinese Communist freight cars operate on the North Korean rail system; however, they appear to have operated into and out of Korea rather than as an integral part of the North Korean system. The extent to which freight cars from Communist China have been exposed to bombings in Korea would depend, therefore, on the quantity of freight moving into North Korea and on the number of freight cars needed to handle this traffic.

It is estimated that the Chinese Communist and North Korean freight requirements during hostilities were 4,018 short tons per day and that, of this amount, only 2,520 short tons moved into Korea by rail. 123/ Assuming that this freight was loaded on an average of only 20 short tons per car [redacted] the total requirements at any one time in North Korea for freight cars from Communist China would have been 703 cars. The estimated requirements for Chinese Communist freight cars in North Korea, by rail line, in 1952 are shown in Table 20.*

After the level of Chinese Communist involvement in Korea has been determined, the freight car losses can be estimated on the basis of World War II experience. During World War II, up to 1944 the French National Railroad's losses of freight cars from military action and from foreign levies totaled 310,000 cars out of a total pre-war park of 478,500 cars. 124/ This represents a loss of 64.8 percent.

An Italian publication reports that in 1939, Italy had 150,637 freight cars, and that by 1945 the number had been reduced by 60 percent, to 60,637 cars. 125/

Both French and Italian experience indicates that something over 50 percent of the total number of freight cars hit were returned to service in a year's time. The freight cars in North Korea were exposed to more or less constant attack during a period of 2-1/2 years. Although it is true that these freight cars were subjected to the highest concentrated bombing effort in history, it is equally true that the North Korean park was not subjected to the depredations of an enemy retreating under desperate circumstances as was the case in France and Italy. In addition, operation of the Korean railroads was largely confined to hours of darkness, with the cars concealed during the day to limit the effect of bombings as much as possible. Hence it is believed that the European 60-percent-loss factor is applicable to the Korean experience, since conditions in Europe and in North Korea would have a tendency to equate themselves.

* Table 20 follows on p. 65.

Table 20

Estimated Requirements for Chinese Communist Freight Cars in North Korea by Rail Line
1952

Rail Line	Distance (Miles)	Daily Tonnage South-Bound (Short Tons)	Daily Car Requirements (20 Short Tons per Car)	Turnaround Time a/ (Days)	Total Car Requirements (Units)
Sinuiju to Sinanju	92	900	45	3	135
Sup'ung-dong to Chongju	77	420	21	3	63
Manp'ojin to Kaech'on	186	950	48	7	336
Namyang to Wonsan	406	250	13	13	169
Total		2,520	127		703

a. Turnaround time is the time required for a car to move from the Manchurian border to its Korean destination, spend 1 night in Korea for unloading purposes, and return to the Manchurian border.

On this basis, 703 Chinese Communist freight cars in North Korea would, during the course of 1 year, represent 256,595 days of car exposure. In France, cars were damaged or destroyed at an average rate of 850 cars per day -- that is, 0.18 percent of the cars exposed were destroyed or damaged each day. Applying this rate to North Korea would indicate that 462 cars were destroyed (256,595 x 0.0018), or about 500 cars per year. Because the European rate is based on the assumption that all losses were sustained in a 1-year period -- an assumption known to be untrue -- the above figure of 500 cars would tend to be biased upwards. On the other hand, the cars lost in North Korea would be replaced from stocks in Communist China. Hence the Chinese involvement during the period of 1 year was probably greater than the computed 703-freight-car figure would indicate. To account for this, it will be assumed that the 500-car loss represents annual losses and that, for the 2-1/2 year period, total losses could have been as high as 1,250 freight cars. Although the resulting range of 500 to 1,250 cars destroyed is open to considerable refinement, the magnitude of the estimate of cars destroyed will probably remain in the order of the expressed range.

50X1

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(2) Imports.

It is known that UNRRA shipped 3,445 freight cars to China after 1945. [redacted] 50X1

50X1

Under trade agreements between Communist China and the Satellites, rail freight cars could be included under the general categories of Machinery and Equipment. In the 1952 and 1953 trade agreements between China and the Satellites, rolling stock was included in the list of Polish exports, but no quantity was given.

In summary, the following imports of freight cars into Communist China are estimated for 1945-52:

Origin	Units
UNRRA	3,445
USSR	600 to 2,000
Satellites	100 to 200
Total	4,145 to 5,645

The estimate of imports from the USSR may be low, as it would be easy for Soviet freight cars to move into Communist China overland and to operate on the railroads for some time without being seen by foreign observers.

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[redacted] 50X1

The freight car park in Manchuria, by type of car, in 1945 is shown in Table 22.*

From this table it appears that approximately 82.7 percent of the freight car park in Manchuria in 1945 was composed of boxcars and open-top cars. Applying this percentage to the 58,952 minimum-estimate figure yields a minimum total car park estimate of 71,284 for the end of 1954.

The 71,284 estimate is weak. It probably continues to contain a significant downward bias, however, since the suspected bias in the 58,952 figure which results from the more frequent appearance of "better condition" cars is not eliminated in this exercise, but rather, is proportionally augmented.

Neither the 80,000-car figure nor the 71,000-car figure arrived at above represents an attempt to estimate the freight car park. These figures are set forward here merely to show to in what order of magnitude the 58,952-car figure might be biased downward. The obvious conclusion to draw from the above is that at the end of 1954 the Chinese Communists probably possessed not less than 71,000 freight cars and that the actual figure might be as high as 80,000 freight cars.

4. Official Announcements of the Freight Car and Locomotive Park.

[redacted] 50X1

The Chinese Communists in their Five Year Plan made the following statement: "In the period of the First Five Year Plan ... [we will] increase the number of large-model locomotives by 550;

* Table 22 follows on p. 73.

Table 22

Freight Car Park in Manchuria, by Type of Car a/
1945

Type of Car	Number	Percentage Distribution
Boxcars		
Closed boxcars	8,876	
Livestock cars	93	
Ventilation	92	
Subtotal	9,061	21.9
Refrigerator cars	465	
Subtotal	465	1.1
Open-top cars	24,280	
Mud transportation cars	908	
Subtotal	25,188	60.8
Flat cars	2,564	
Subtotal	2,564	6.2
Limestone and mineral cars	2,049	
Subtotal	2,049	4.9
Tank cars	435	
Subtotal	435	1.0
Others (general cars, crop cars, ballast cars, and so on)	1,673	
Subtotal	1,673	4.0
Total	41,435	99.9

a. 132/

repair and restore to use 136 locomotives. By 1957 the total number of locomotives will have been increased 16.6 percent as compared with 1952. Increase the number of freight cars by 33,720; repair and restore to use 805 cars. By 1957, the total number of freight cars will have been increased 51.6 percent. Increase the number of passenger cars by 1,437; repair 145 cars; adapt 1,704 easily converted [freight] cars for passenger use; by 1957 the total number of passenger cars will have been increased 58.7 percent over 1952." 133/

It was subsequently announced, in September 1955, that during the first 3 years of the Plan (1953-55), 284 locomotives, 18,800 freight cars, and 1,390 coaches would have been added to the rolling stock inventories. 134/

On the basis of these official announcements, the estimated park of locomotives and rolling stock in Communist China for selected years, 1952-57, is shown in Table 23.*

If it can be assumed that production of rolling stock during 1955 was at the rate of approximately 110 locomotives, 287 passenger cars, and 6,744 freight cars, then the end-of-1954 park of the 3 categories would be in the order of 3,420** locomotives, 6,240*** passenger cars, and 73,087**** freight cars. 50X1

* Table 23 follows on p. 75.
** 3,497 - 110 + 33 = 3,420
*** 6,420 - 287 + 107 = 6,240
**** 78,524 - 6,744 + 1,307 = 73,087

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Table 23

Estimated Park of Locomotives and Rolling Stock in Communist China
Selected Years, 1952-57

Units

Category	End-of-1952 Park	Five Year Plan 1953-57 Production	Less Retirement	End-of-1955 Park	End-of-1957 Park
Locomotives	3,313 a/	550	100 b/	3,497 c/	3,697 d/
Passenger cars	5,351 e/	1,437	321 f/	6,420 g/	7,957 h/
Freight cars	65,349 i/	33,720	3,921 j/	78,524 k/	90,830 l/

a. 550 ÷ 16.6% = 3,313.
b. Retirements straight line at 1 percent per year for 1953-55.
c. 3,313 + 284 - 100 = 3,497.
d. 3,313 + 550 - 166 = 3,697.
e. 1,437 + 1,704 ÷ 58.7 = 5,351.
f. Retirements straight line at 2 percent per year for 1953-55.
g. 5,351 + 1,390 - 321 = 6,420.
h. 5,351 + 1,437 + 1,704 - 535 = 7,957.
i. 33,720 ÷ 51.6% = 65,349.
j. Retirements straight line at 2 percent per year for 1953-55.
k. 65,349 + 18,800 - 3,921 - 1,704 = 78,524.
l. 65,349 + 33,720 - 1,704 - 6,535 = 90,830.

APPENDIX D

FREIGHT CAR TURNAROUND TIME

Turnaround time, as a measure of rail efficiency, is defined in the US as the average time which elapses between one loading of a freight car and its next loading. The figure serves essentially as a coefficient of rolling stock utilization and is a major measure of over-all operating efficiency in a given rail system when considered in conjunction with changes in average length of haul.

Official Chinese Communist announcements concerning freight car turnaround time for recent years, the estimated conventional turnaround time in Communist China, and a comparison with turnaround time in Manchuria and in the USSR in 1939-54 are shown in Table 24.*

A comparison of Chinese Communist statements concerning "turnaround time" since 1949 with similar statistics for China proper and Manchuria for earlier periods and with current experience in the USSR and East Germany, when related to average length of haul, would indicate that current Chinese efficiency is remarkably high. Current Soviet turnaround time is generally greater than that in Communist China, because of the longer average length of Soviet commodity haul, which in 1953 was 752 km, compared with 488 km in China. 135/ The shorter Chinese turnaround time reflects the fact that the Chinese economy is operating at a more primitive level than that of the USSR. For example, less-than-carload-lot traffic and consumer goods traffic, which tend to increase turnaround time, are less important in China than in the USSR. Moreover, the volume of coal, mineral, and timber traffic, which constitutes the bulk of Chinese traffic, moves over considerably shorter distances in China than in the USSR. This results from the greater degree of coincidence between raw material and processing sites in China than in the USSR.

Although this tends to substantiate a shorter turnaround time in Communist China and thereby confirms the magnitude of the announced Chinese figures, there is information available which suggests that the announced figures are distorted, possibly as a result of misinterpretation. Heretofore, translations of Chinese Communist

* Table 24 follows on p. 78.

Table 24

Freight Car Turnaround Time in China, Manchuria, and the USSR
1939-54

Days

Year	Official Announcements in China a/	Estimated Conventional Turnaround Time in Communist China b/	Northeast Area (Manchuria)	USSR c/
1939	N.A.	N.A.	N.A.	7.25
1940	N.A.	N.A.	N.A.	7.37
1941	N.A.	N.A.	N.A.	6.92
1942	N.A.	N.A.	N.A.	13.80
1943	N.A.	N.A.	N.A.	12.60
1944	N.A.	N.A.	N.A.	N.A.
1945	N.A.	N.A.	N.A.	10.92
1946	N.A.	N.A.	14.45 d/	10.07
1947	7.89 e/	N.A.	N.A.	9.61
1948	5.70	N.A.	5.60 f/	8.68
1949	3.00	N.A.	4.90 g/	8.28
1950	3.68	4.7	3.20 h/	7.65
1951	3.22	4.1	3.24 i/	7.26
1952	2.90	3.8	N.A.	7.04
1953	3.09 j/	4.0	N.A.	6.67 k/
1954	3.04 l/	4.0	N.A.	N.A.

a. These figures are considered to be "loaded car turnaround time" and represent a misnomer on the part of the Chinese Communists.
b. These figures are considered to be representative of turnaround time as defined in the US.
c. 136/ For all years except 1953.
d. 137/
e. 138/
f. 139/
g. 140/
h. 141/
i. 142/
j. 143/
k. 144/
l. 145/

material have assumed that the Chinese were using turnaround time in the same sense as in this country.

[redacted] the determination of a precise measure of turnaround time is tantamount not only to evaluating the operating standards and capability of the Chinese railroad system, but also to establishing a definitive estimate of freight car park based on daily carloadings. The problem can be approached from two different avenues, by attempting to determine the significance of published figures listed in Table 24 and by reconstituting turnaround time on the basis of available information concerning its component parts. Since both methods offer equally valid investigative possibilities, each is fully developed so that complete exposition can be accorded this highly controversial factor. Lastly, the Chinese Communist methods for determining turnaround time are analyzed. 50X1 50X1

1. Significance of Official Statements Concerning Turnaround Time.

a. Methods of Computing Turnaround Time.

Since 1950, considerable attention has been given in Chinese Communist publications to the interpretation of turnaround time. These articles 146/ are essentially concerned with establishing a correct method of computing the lowest possible turnaround time. But turnaround time, by definition, is a definite figure. Although there is more than one way of deriving the figure, all valid methods will produce the same result if the definition is not varied. The fact that the various formulas suggested in Chinese publications yield varying results is an indication of the possibility that the Chinese interpretation of turnaround time is at variance with that of the West.

Essentially all formulas described in the Chinese Communist articles resolve into two distinct approaches to the subject, a simple formula called the car-count formula and a very involved formula called the time-count formula. In all instances the articles are concerned only with the computation of turnaround time within regional bureaus.

(1) Car-Count Formula.

In all of the Chinese Communist articles the car-count formula is as follows:

$$\frac{\text{Cars in Operation}}{\text{Cars Loaded Plus Loaded Cars Handled}} = \text{Turnaround Time}$$

The result is not turnaround time in the accepted sense. Cars in Operation is considered by the Chinese to consist of all loaded cars present in the particular regional bureau at 1800 hours of the day, and is obtained by a physical count. This is divided by all the cars loaded in the bureau during the past 24 hours, plus all loaded cars received from adjacent bureaus during the same period of time. The result of ignoring empty cars present and of adding loaded cars received to those originated is to inflate the denominator, thereby producing a turnaround time far less than it ought to be. This method, which rejects the conventional consideration of empty car movements, will not produce turnaround time as the term is understood in most other areas of the world.

Most of these Chinese Communist articles state explicitly that the car-count formula is designed to obtain the same result as the time-count formula. Because experience has shown that such is not always the case, the above series of articles was written to determine what modifications are necessary in the time-count formula to bring it into agreement with the car-count formula.

(2) Time-Count Formula.

The time-count formula for computing turnaround time in Communist China is concerned with the summation of the length of time required by a car at station stops, travel time, and time spent en route excluding travel time. Although it is similar to the methodology employed elsewhere in this Appendix to arrive at a turnaround time of about 4.47 days, there are major differences.

The first term, Station Stopping Time, is the time spent in initial and final stations for loading and unloading operations. The Chinese Communists arrive at this as follows:

$$\frac{\text{Cars Loaded + Cars Unloaded}}{\text{Cars Loaded + Loaded Cars Handled}} = \text{Average Stopping Time per Car}$$

Travel Time is the time actually spent en route, exclusive of Station Stopping Time at points between origin and destination. The Chinese Communists arrive at this as follows:

$$\frac{\text{Average Turnaround Distance of Loaded Cars} + \text{Average Turnaround Distance of Empty Cars}}{\text{Traveling Speed}}$$

The third and final term, which is the time spent en route exclusive of travel time, is arrived at as follows:

$$\frac{\text{Average Turnaround Distance of Freight Cars}}{\text{Average Distance Between Classification Yards}} \times \text{Average Switching Time of Freight Cars}$$

The Average Switching Time of Freight Cars is obtained by averaging the time required to switch cars in a given station. Not all empty cars switched are included in the compilation of this figure; however, on the other hand, all loaded cars passing the station are definitely included in this average. Unfortunately, the criterion for determining when an empty car is to be considered switched is not made clear in the articles.

Summing up the results of these three separate factors will produce turnaround time, according to the Chinese Communists. In spite of the confusion existing in the two dissimilar methods, it is evident that neither will yield a valid turnaround time, since neither gives due weight to the movement of empty cars. The car-count formula deals exclusively with loaded cars. The time-count formula considers some aspects of switching of empty cars and seems to give some consideration to empty car travel time. At most, however, only part of the empty cars are considered.

It has not been definitely established whether either of these formulas is used by the Chinese Communist Ministry of Railroads to arrive at a national turnaround time or whether the national figure is merely an average of turnaround figures reported by the separate railroad control bureaus. No matter which method is used, however, the announced national figure of 3.09 days for 1953 would not be turnaround time as the term is understood in the US.

b. Announced Turnaround Time Figures.

Considerable light has recently been thrown on this problem by statements published in the Chinese Communist press. From the statement that "net loading capacity of freight wagons was raised by one ton on the average as compared with that in 1952, thereby saving a value equal to 580,000 revenue wagons in the whole year," 147/ it has been possible to obtain an interpretation of Chinese figures which suggests strongly that the Chinese are actually referring to a loaded car turnover time, rather than to the conventional turnaround time. As such, the loaded car turnover time would exclude empty car movement and would thereby yield a figure considerably lower than a corresponding figure for turnaround time. The basis for this interpretation is as follows:

Where x equals average load in tons per car for 1953 and y equals total revenue cars, the following is obtained:

$$(x - 1)(y + 580{,}000) - xy = 0$$
$$xy + 580{,}000x - y - 580{,}000 - xy = 0$$

Solving for y on the basis that x equals 29.3 tons,

$$y = (580{,}000 \times 29.3) - 580{,}000$$
$$y = 16{,}994{,}000 - 580{,}000$$
$$y = 16{,}414{,}000 \text{ revenue-car-days per year}$$
$$16{,}414{,}000 \div 365 = 44{,}970 \text{ revenue-car-days per day}$$

But 44,970 includes both cars originating on a particular day and loaded cars in transit on that day, and, therefore, when it is sought to use the data to obtain tons-originated or the number of freight cars loaded per day, the figure for revenue-car-days per day must be divided by a loaded car turnover rate. Using the announced turnaround factor of 3.09 days for 1953 and dividing it into the calculated 44,970 revenue-car-days per day yields a daily carloading figure of 14,553 cars. This compares well with the estimated 14,680 cars loaded daily obtained by dividing total tons-originated in 1953 (157 million tons) by 29.3 tons per car to obtain annual cars loaded and then converting this figure to daily carloadings. The agreement between these two figures is well within the margin of rounding error in the statistics used and strongly suggests that the 3.09 days turnaround time announced by the Chinese Communists is in fact loaded car turnover time and not conventional turnaround time. If 3.09 days were actual turnaround time, then the total number of loaded cars in daily operation divided by 3.09 would not yield a daily carloading figure. Hence it follows that either the 3.09-day figure should be accepted as loaded car turnover time, a perfectly valid measure of operating efficiency, or that the tons-originated figures for Communist China must be rejected as being too high.

It has been suggested that "580,000 revenue cars saved" should be interpreted as "580,000 operational cars saved" and as such would include both loaded and empty car savings. An interpretation ignoring the word "revenue" implies that the 3.09-day divisor is in effect turnaround time and not loaded car turnover time as viewed above. Such an interpretation is doubtful. First, if the total revenue-car-days per year (16,414,000) is multiplied by the average tonnage loaded per car (29.3 tons), a summation of total revenue-ton-days in a year will result. This equals 480,930,200 revenue-ton-days. Total revenue-ton-days when divided by tons-originated should yield a loaded car turnover time and not turnaround time, since only carloadings and loaded car movements are considered. In the present case this would be 3.06 days, which agrees well with the so-called turnaround time announced by the Chinese Communists as 3.09 days.

Second, when ton-kilometers for 1953 (76.6 billion) are divided by revenue-ton-days (481 million), the result should yield daily kilometers per revenue-ton, which in this case would be 159.2 km. Since the average length of loaded haul is 488 km, and a ton of revenue freight moves 159.2 km per day, the total time required for movement through the loaded car cycle would be 3.07 days. This figure agrees so closely with the announced turnaround time of 3.09 days that the weight of available evidence supports the acceptance of the latter as loaded car turnover time and not as turnaround time.

It is interesting to note that in a more recently published article the Chinese Communists stated that by reducing turnaround time in 1954 they saved an equivalent of 480,000 car-days, and that with this number of cars about 5 million tons more of goods could be loaded. 148/ Dividing the 5 million tons by the 480,000 cars yields an average carloading of 10.4 tons per car, which is far too low to be reasonable. By multiplying this 10.4 figure by the loaded car turnover time of 3.04 days for 1954, however, an average carloading of 31.6 tons per car is obtained. Conversely, if total turnaround time is considered to be as high as 7.5 days, then the loaded car turnover time would be 75 percent of 7.5, or approximately 5.6 days. This would yield an average loading per car of 58.2 tons (10.4 x 5.6 days), which is far too high to be considered reasonable.

With the fact established that Chinese Communist announcements of turnaround time are probably referring to loaded car turnover time, the problem then becomes one of determining a methodology whereby the Chinese figure can be inflated to account for the empty movement of cars and thereby approximate turnaround time as properly defined. Since there is a rather well-defined ratio existing between the loaded haul distance (loaded car kilometrage) and the empty haul distance (empty car kilometrage), it is reasonable to expect that this relationship will tend to approximate the relationship of loaded car turnover time to empty car turnover time. It should be noted, however, that the correlation between the distance relationship on the one hand and the time relationship on the other will not be perfect. In effect, the functions involved in empty car turnover kilometrage should be performed at a faster rate of speed per kilometer than is the case for loaded cars, since (1) approximately 10 percent of the cars unloaded in a station are reloaded at the same station, (2) complicated routings involving numerous classifications en route will not obtain in the case of empty cars, and (3) the greater part of the time a car spends at points of origin and/or destination in loading and unloading will normally be considered as loaded car time. This latter point results essentially from the terminal time requirements devoted to loading and unloading operations when the car is actually considered as a loaded car from the beginning of the loading operation to completion of the unloading operation.

The actual relationship existing between loaded car haul (kilometrage) and empty car haul (kilometrage) is believed to be about 3 to 1; that is, 25 percent of total car movement in the complete turnaround cycle, including both empty and loaded movement, is accounted for by the empty move. Applying this relationship to the announced turnaround figure of 3.09 yields a figure of 4.12 days for 1953. In view of the above discussion on the relationship between turnaround time and distance, it is felt that the 4.12-day figure would be expressed more accurately if it were rounded downward to 4 days. Because there is such a minor difference between loaded car turnover time for 1953 and for 1954, it is considered prudent to accept the 4-day figure for 1954 as well as for 1953, since both are estimates and as such will contain some margin of error. The same methodology was used to obtain true turnaround time estimates for 1950-52.

It should be noted that a 4-day turnaround time indicates a speed of movement through the total turnaround cycle of 6.77 km per hour (650 km over 96 hours), which compares with a similar speed of movement in the USSR of 6.4 km per hour in 1953 (1,020 km divided by 160 hours). 149/ That Communist China is apparently making a slightly better showing than the USSR is to be expected, since a greater percentage of Chinese traffic consists of bulk freight, and the car park and transport net are operating under a slightly greater strain than is the case in the USSR.

2. Estimate of Turnaround Time Based on Time Required to Perform Its Separate Component Factors.

a. Loading and Unloading Operations.

Under the heading of "General Information About the Transportation of Freight," which appears in the Railway Timetables for All China, 1 December 1950, 150/ there appears the following statement: "Demurrage. Four hours is the time allowed the owner of cargo for loading and for unloading cars." That this is general practice is confirmed [redacted] 50X1
[redacted] in 1946-47 the USSR began to introduce in 50X1
Manchuria Soviet regulations providing for round-the-clock work at large stations for both acceptance and release of freight and the reduction of loading and unloading operations from 6 to 4 hours. 151/

Analysis of Chinese rail statistics for the fiscal year 1 July 1935 to 30 June 1936 indicates that an allocation of 4 hours for loading and/or unloading operations is consistent with Chinese Nationalist experience. During this period, statistics show that 50X1
the average time spent for the combined loading and unloading operation was 3.5 hours, and, if demurrage is included, the figure becomes 4.2 hours. 152/ [redacted] the 50X1
reasonableness of a 4-hour loading and/or unloading period. For example, as early as 1947 a prisoner of war reported that his unit was unloading and reloading freight cars at the Sui-fen-ho station in 4 hours. 153/ The most recent information available on this subject is [redacted] the Tsinan - 50X1
P'u-k'ou line, [redacted] loading and unloading time for freight 50X1
cars is allotted according to the type of freight, with fines for delays levied on either the shipper or the labor union. [redacted] 50X1
[redacted] "the increase in the speed of loading was a result of teamwork on the part of the crews." 154/ A Russian emigre

who worked at the Dairen Mechanical Works until March 1952 reported that a loading time limit of 6 hours was rigidly enforced. 155/ This higher figure probably results from the fact that much of the material moved from the plants was carried on flat cars and was bulky freight, requiring a longer time to load than the usual type of freight.

Although little new freight handling equipment is known to have been added to the rail system, numerous accounts refer to the organization of stevedore crews and their availability. The Ministry of Railroads, in apparent recognition of the importance of freight handlers in terms of car utilization, has accorded preferential treatment to workers of this category. 156/

The Chinese Communist press contains many citations relating to the expeditious handling of freight cargo. The majority of the cases cited would indicate an abnormally short time involved in the unloading of cars. For instance, in Tientsin it was reported in 1950 that the time required for unloading a car of grain had been reduced from 3 hours to only 40 minutes. 157/ [redacted] 50X1
some form of mechanized loading has been installed at certain coal mines, such as the Chiao-tso mines, where loading time per car has been reduced from 4 hours 10 minutes per car to 5 minutes per car, 158/ and the P'ing-hsiang mine, where loading time has been reduced from 11 man-hours per car to 1-2/3 man-hours per car. 159/ Photographs of the Fushin coal mine show the loading of side-dump gondola cars with a power shovel. If this practice is general at the major mines of Communist China, the over-all effect would be to yield a national average of less than 4 hours for this operation. For purposes of further investigation, however, it will be considered that 4 hours is the time required to load or unload a freight car in China.

b. Terminal Delay Time.

If terminal delay time is defined as that period when a given freight car is in a loading or unloading yard, but not in the shipper's or consignee's hands, and while it is under the jurisdiction of the railroad and retains its identity as a car rather than as a part of a train, then total terminal delay time in one turnaround period would be the sum of the time a car spends in (1) yard classification, (2) moving from classification yard to loading point, (3) returning from loading point to classification yard, (4) classification in originating yard, (5) classification in destination terminal, (6) moving from classification yard to unloading point, (7) returning from unloading point to classification yard, and (8) final classification before moving as an empty car in a train.

The Chinese Communists, in published articles on the subject, apparently use the term "stopping time" in referring to terminal delay time. Analysis of these data yields an estimate of average stopping time for all freight cars in 1953 of 15 hours. Because less than 10 percent of all freight cars were reported to be unloaded and reloaded at the same point in 1950, 160/ however, it is believed prudent to allow double the stopping time, or an average of 30 hours, in computing the portion of turnaround time absorbed by station stopping time.

If station stopping time is considered to include all aspects of terminal delay time as enumerated above, it would average 3.75 hours per operation. This figure is reasonable in that for any one of these operations, 3.75 hours is adequate time to perform the move. If these operations are considered from the point of view of engine and crew availability, however, a somewhat longer period of time would be consumed in terminal delay time. Specifically, this means that while any of the eight separate operations could be performed in a relatively short time, yard operations are such that, under heavy traffic conditions, each yard engine and crew would specialize in the performance of a specific and limited duty. This would have the effect of obtaining maximum efficiency from each crew. That the assignment of jobs to specific crews is current Chinese Communist practice has been confirmed by a locomotive engineer who reported on switch engine assignments in the Harbin area in 1951. 161/

Given job assignments of crews, it would be logical to assume that each of these separate parts of terminal time would be performed during the tour of duty of one crew with the following operation being performed by the succeeding crew. This would then require 8 hours for each operation, or a total of 64 hours for the total of 8 moves. Because the loading and unloading time each require 4 hours at a maximum, both loading and unloading time would be included in this period of 64 hours. Hence the maximum time allocated to terminal delay would equal 64 hours less 8 hours, or 56 hours.

A terminal delay period of 56 hours could be reduced substantially, especially in the case of coal, grain, and timber traffic, where loading and unloading facilities would be available for the handling of such traffic in entire trains. Because there is a considerable amount of such traffic, the estimated terminal delay time of 56 hours should be considered as fixing an upper limit to the maximum effort.

c. Travel Time.

The third element in the compilation of turnaround time is the time consumed in moving a car (either loaded or empty) in a train -- that is, that part of total turnaround time when the car loses its separate identity and becomes part of the train -- and also time spent in reclassification at stations en route. This would include delay en route.

The Chinese Communists have given considerable publicity to crews performing fast over-the-road runs. It is believed, however, that average runs at a rate of more than 50 km per hour are more the exception than the rule. Available evidence indicates that the average travel time between originating and terminating terminals, which by definition includes over-the-road time as well as time lost in intermediate terminals and junctions, is about 15 km per hour.

A discussion of turnaround time for short hauls published for Chinese Communist rail workers states that in the case of hauls involving less than 30 km, the average turnaround time of cars is 48 hours, but the time during which they are actually moving is only 1.5 to 2 hours, which is barely 4 percent of the turnaround time. 162/ This would yield an average speed of movement between terminals (excluding intermediate stops) of about 15 to 20 km per hour. It should be noted that this statement would allocate 46 hours to terminal delay time, which is fairly close to that estimated above.

[redacted] it is believed that a maximum estimate of 12 km per hour for the speed of movement of cars between originating terminals and final destination is reasonable for 1950 and 1951. In view of the fact that the Minister of Railroads has reported an annual increase of average freight train speeds for 1951 and 1952 over the preceding years, 163/ however, it is believed that the true rate of travel may have been as high as 15 km per hour during 1953. This increased speed of trains is confirmed by a Chinese railroad engineer, who states that increased operating speeds have resulted from reinforcement of roadbeds and replacement of rails.

Assuming an average travel time of 15 km per hour, a total time requirement of 43.0 hours would result from the movement of a car over the total turnaround distance of 650 km (488 km loaded haul and 162 km empty car haul).

The time requirements computed above for the 3 distinct aspects of turnaround time yield about 107.0 hours in 1 turnaround cycle (8 hours loading and unloading plus 56 hours terminal delay time plus 43 hours travel time). Converted to days, this would equal 4.46 days, which agrees well with the estimated turnaround time of 4.0 days based on a loaded car turnover time of 3.09 days in 1953.

It should be recognized that the methodology used above to arrive at the 4.46-day figure contains numerous factors and assumptions which are open to discussion. The exercise is included in this report, however, to point out the difficulties involved in an inductive reconstruction of turnaround time and to provide, as far as possible, an approximation of the magnitude of this figure. The major difficulty involved in this exercise results from the lack of precise knowledge concerning the percentage of total turnaround time allocated to the separate parts of turnaround movement. For instance, as opposed to the allocation of 40.5 percent of total time to travel time in the above exercise, it has been reported elsewhere that 30.5 percent of time was spent in transit in 1952. Assuming that the 3.04-day figure for 1954 is actually turnaround time and includes both empty and loaded movement, then, on the basis of 30.5 percent of time in transit, a total of 22.2 hours would be required for movement of a car through the entire turnaround cycle of 650 km. This would yield an average speed of 29.3 km per hour. On the other hand, if the 3.04 figure is considered as loaded car turnover time, then the same number of hours would be required for a loaded car movement of 488 km. This would yield an average speed of 22.0 km per hour, which appears to be more reasonable than the 29.3-km figure. In the USSR, comparable train speed -- that is, including stops, but not division stops -- is estimated to be 20.1 km per hour. If division stops are included, it is believed that travel speed would be reduced to about 15 km per hour. Hence it can be shown by various approaches to this problem that, in spite of the lack of precision in definitions and terminology, a reasonable estimate of turnaround time can be obtained, and that for 1953 and 1954 this figure was about 4 days.

APPENDIX E

TONS PER FREIGHT CAR

Calculations made on the basis of the traffic statistics reported by the Chinese Communists would, if accepted at face value, give an average loading per freight car of 27.5 tons for 1952 and 28.5 tons for 1953, rather than the 28.3- and 29.3-tons figures which have been accepted on the basis of consistency with available information. Because these figures are crucial, reasons supporting the 28.3- and 29.3-ton figures, as opposed to the 27.5- and 28.5-ton figures, are given in detail.

A mathematical analysis of Chinese Communist statements would indicate that 28.5 tons were loaded per car in 1953. The Communists stated that tons-originated in 1953 were 119.9 percent of 1952 and that the rail loading plan for 1953 was 115.7 percent of 1952. This would indicate that tons per car increased by 3.63 percent. Since it is officially stated that the average carloading "increased by one ton," this would imply (if 1 ton equals 3.63 percent of 1 load) that the load per car in 1952 was 27.5 tons per car and, therefore, that in 1953 it was 28.5 tons.

On the other hand, in August 1952 it was officially announced that "during April of this year /1952/, the average carload of the National Railways weighed 28.8 tons. This was increased to 30.1 tons in July." 164/ In view of the fact that, during the early part of 1952, freight transport quotas were not met, thereby forcing greater activity during the latter half of the year, it would seem logical that tonnage loadings per car would have increased, or at least remained high, rather than declined after July. Applying the statement about increasing the average load per car by 1 ton in 1953 would yield approximately 29.8 tons per car for 1953. In view of the August 1952 announcement regarding 28.8-ton and 30.1-ton averages in 1952, therefore, the derived figure of 27.5 tons per car seems somewhat low. There is, however, a possible explanation of the discrepancy.

The 1-ton increase mentioned for 1953 is very unlikely to have been exactly that, but is almost certainly a rounded figure. Under this assumption it is interesting to note the fluctuations appearing in the tons-per-car figure for 1952 when the 1-ton figure is varied slightly, as follows:

A net load increase of 0.9 ton would yield a load of 24.8 tons.
A net load increase of 1.0 ton would yield a load of 27.5 tons.
A net load increase of 1.1 tons would yield a load of 30.3 tons.

Whereas the figure of 24.8 tons is obviously far too low and that of 27.5 tons seems a little low in relation to directly quoted loading figures, the figure of 28.3 tons requires only that the true weight increase between 1952 and 1953 be 1.03 tons, and certainly this would have been spoken of by the newspaper as an increase of 1 ton. Incidentally, to show the likelihood of such an occurrence, the same article rounds a 19.9-percent increase in tons-originated to 20 percent when discussing the matter. The 28.3-ton figure for 1952 has therefore been retained on the basis of consistency with available information, and allowance for the 1-ton increase in 1953 would yield 29.3 tons for that year.

In 1954 the average weight per carload was raised 1.3 tons per car over that for 1953, according to an article of 18 February 1955 in a Peiping newspaper. 165/ The gain, according to the same article, "is equivalent to the loading on the average of an additional 6,500 tons in 24 hours." The context of the article immediately preceding these figures is such that, rather than referring to the national average, it is possible that the figures refer to the average increase in loading coal cars. If the 1.3-ton increase is accepted as referring to coal traffic, this would indicate that coal traffic is in the order of 56 million tons, which agrees with an earlier Chinese Communist statement that approximately one-third of the freight originated on the Chinese railroads is coal. An earlier press release of 6 February 1955 states that the average load per car in 1954 was 2.3 tons greater than the average for 1953. 166/ This would indicate a 1954 average loading per loaded car of 31.6 tons. Although it is difficult to evaluate this figure with the information available, it would appear that within the context of Chinese announcements, the 2.3-ton gain for 1954 is the more likely figure.

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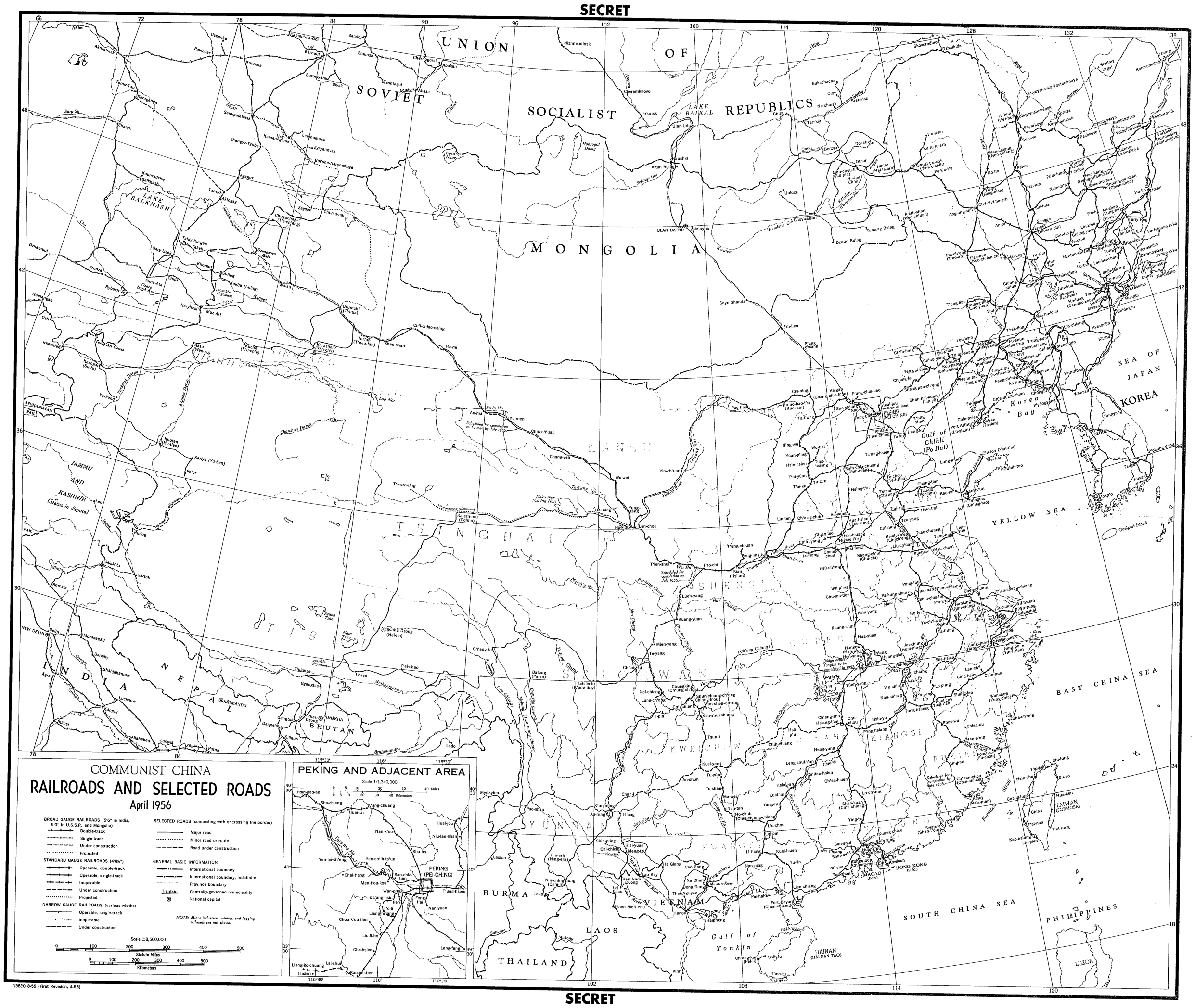

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