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INLAND WATER TRANSPORT IN COMMUNIST CHINA 1950 - 58

CIA/RR 59-40
October 1959

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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FOREWORD

The purpose of this report is to present (1) an analysis of [redacted] inland water transport in Communist China and (2) estimates of the size, character, efficiency, and employment of inland water transport in China, with special reference to its ability to serve the transportation requirements of the Chinese Communist economy. [redacted]

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INLAND WATER TRANSPORT IN COMMUNIST CHINA*
1950-58

Summary and Conclusions

Communist China has an extensive inland waterway system that is capable of contributing much to the economy of the country. More than 114,000 kilometers (km) of waterways are navigable by junks, and about 40,000 km also are navigable by modern powered vessels. In 1955, 30,000 km of steamer routes and nearly twice this length of junk routes were in operation. Three rivers -- the Yangtze, the Sungari, and the Pearl -- carry nearly 60 percent of all modern inland water traffic.**

The capacity of the inland water fleet of Communist China is estimated to be between 4 million and 5 million gross register tons (GRT),*** but only about 10 percent of the capacity of the fleet is composed of modern powered vessels, the rest being composed of junks and other small craft. Although still of major importance, the primitive sector of the fleet is declining in relative performance. Primitive craft carried 84.6 percent of the volume transported in 1954, but their share had declined to about 70 percent in 1958, and this trend is expected to continue.

If 1952 is taken as the base year, the index of tons originated**** in Communist China in 1957 was 427 for inland water transport compared with 255 for all types of transport. Tons originated by modern transport on inland waterways increased from 4.5 million tons in 1950 to 56.7 million tons in 1958. For the same period, performance increased from 1.68 billion ton-kilometers (tkm) to 21.3 billion tkm.

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* The estimates and conclusions in this report represent the best judgment of this Office as of 15 August 1959.

** The terms modern and primitive (or native) are adopted for the purpose of this report to overcome the inconsistency of Chinese Communist terminology. The primitive fleet consists of junks and other wooden sailing vessels. It is not clear whether the Chinese regard motorized junks as belonging to the modern or the primitive fleet.

*** Gross register tonnage is a measure of the cubic capacity of the cargo space of a vessel expressed in tons at the rate of 1 long ton per 100 cubic feet.

**** Unless otherwise indicated, tonnages are given in metric tons throughout this report.

In spite of these achievements, inland water transport in Communist China has been a relatively inefficient operation. The average cost of transportation on the Yangtze River exceeds the average cost of rail transport, and because the Yangtze has many advantages lacking on other inland water routes, this condition may be presumed to be general. The high costs of operation are due to inefficient utilization of high-cost fuels and personnel and lack of adequate planning and coordination. The Chinese may be expected to be reasonably successful in their attempts to reduce the costs of operation.

Investment in water transport apparently has not lagged behind that in other sectors of the Chinese Communist economy. The largest part of investment thus far has been in construction of vessels. In the last 2 years, however, emphasis has shifted more to development and mechanization of ports. Additional investment in water conservancy also may be expected to benefit navigation. If performance of inland water transport is to continue at the present level or at an even higher level, however, the Chinese Communists must maintain a balanced program of investment at a corresponding level.

Although the total requirements of the Chinese Communists for transportation in 1959 are expected to be nearly double those in 1958, performance by all types of transport will not be sufficient to meet this demand. The inland waterway system has been almost constantly pressed to meet the demands placed on it, and in 1956 and again in 1958 inefficient operations and poor harbor facilities caused notable congestion on the waterways. Thus considerable doubt exists as to the ability of inland water transport to contribute its share to requirements for transportation in 1959.

I. Introduction

Inland water transport traditionally has held a position of preeminence in Chinese transportation. Only in recent times has rail transport replaced water transport as the principal hauler of goods, and only since the Communist regime have highways originated more tonnage than inland waterways. In terms of ton-kilometers, inland water transport still ranks second to rail transport, followed by coastal shipping and highway transport.

The inland waterway system which the Chinese Communists acquired in 1949 was in a bad state of disrepair. The ravages of war and the

inefficient and corrupt civil administration had reduced the system to a fraction of its former capacity. Much of the inland water fleet had been either sunk or removed from the country. Navigation lights and markers were nonexistent, channels and harbors were filled with silt, and most port facilities were inadequate.

The Chinese Communists decided to concentrate on railroad construction in the First Five Year Plan (1953-57), but inland waterways were not ignored. Rivers were dredged, vessels were salvaged, new vessels were constructed, and harbors were restored to usefulness. Extensive and elaborate schemes for water conservancy were undertaken, with the result that currents and depths of water began to be controlled and rivers remained in their channels. In view of the Chinese efforts and the small base from which they started, the increase in the volume of inland water transport in 1958 to more than six times the figure for 1952 is not surprising.

Although the performance of inland water transport in Communist China has almost regained the level it had reached before the Chinese civil war, the Chinese Communists still have a number of problems to solve. The inland waterway system has been pressed almost constantly to meet the demands placed on it and in 1956 and 1958 proved unable to meet the requirements of the economy. The evidence indicates that the "greater leap forward" anticipated in 1959 will require considerably more of inland water transport than the system will be able to produce.

II. Inland Waterway System*

A. General Pattern

The inland waterways of Communist China have a combined length of more than 320,000 km, of which at least 114,000 km were navigable in 1958.** 2/ More than one-third of the total navigable length can be

* See the map, inside back cover.

** The Chinese Communists have not defined the term navigable. Judging from the type of craft used and the claims of navigability for various rivers and provinces, this figure (114,000) probably includes channels with a depth of 1 meter (m) or more. The figures in Table 1, column 2 (p. 4, below), probably include all channels of 1.5 m or more. A recent announcement claimed that 150,000 km of waterways were navigable at the end of 1958 and indicated that this amount was an increase of 10,000 km above the navigable length in 1957. [redacted] 50X1 50X1 This statement is out of line with all previous announcements and, if true, probably includes channels of less than 1 m in depth and those having only seasonal navigability. Another possibility is that the figure is only a revision of previous announcements and is based on new information resulting from hydrographic surveys. Until the matter is clarified by additional information, however, the figure of 150,000 km must be regarded with considerable skepticism.

used by steamers or other powered vessels. [redacted] 50X1
a total of about 30,000 km of waterways was served by inland steamers on regular routes in 1955, whereas routes served by junks were double this length. 3/ This figure compares with a total of 83,800 km of waterways served by steamers in the USSR.

With the exception of a few rivers in the northern and western regions, the rivers of Communist China do not freeze and are navigable throughout the year. There is considerable variation in water level, however, ranging from 12 to 38 feet in some areas, a factor which has a marked influence on navigation.

The inland waterway system of Communist China consists of three major river systems and numerous additional rivers and canals. The water routes are generally oriented in an east-west direction and are important lines of communication between coastal and interior areas. Table 1 indicates the growth of the inland waterway system in Communist China since 1950.

Table 1

Total Length of Navigable Inland Waterways in Communist China a/
1950-58

Kilometers

Year	Total Length of Navigable Inland Waterways	Length of Inland Waterways Navigable by Powered Vessels
1950	73,100	30,000
1951	N.A.	N.A.
1952	95,025	30,508
1953	95,025	30,508
1954	95,025	30,508
1955	99,938	31,685
1956	103,619	38,304
1957	104,700	39,500
1958	114,700 b/	40,500 c/

a. 4/
b. Based on an announced increase of 10,000 km in 1958. 5/
c. Estimated.

1. Yangtze River System

The Yangtze River and its tributaries in Communist China comprise more than 57,000 km of inland water routes important both for local traffic and for connecting the Szechwan Basin with the industrial regions and ports along the coast. Some of the more important of the tributaries are the Min, the Han, the Chia-ling, and the Yuan Rivers. More than 16,000 km of the Yangtze River System are navigable by modern powered vessels, and, in 1957, 13.4 million tons of cargo moved on the Yangtze by means of such vessels. This amount represents 33 percent of the total volume of cargo moved by modern powered vessels in Communist China in 1957. The main products in the traffic on the Yangtze River System are rice, other grains, and livestock moving downstream and ores, refined petroleum, and manufactured goods moving upstream. Coal and building materials move in both directions.

2. Pearl River System

The Hsi, Tung, Pei, and Kuei Rivers all enter the South China Sea by way of the Pearl (Chu) River estuary and together with their tributaries are commonly referred to as the Pearl River System. This system ranks second to the Yangtze River System in terms of navigable distance and contains more than 10,000 km of navigable waterways, 4,500 km of which are navigable by modern powered vessels. In 1953 the Pearl River System carried about 3.7 million tons, or 24 percent of the cargo moved on inland waterways by modern vessels. 6/ The vast majority of cargoes moving downstream on the Pearl include wood products, timber, wood oil, foodstuffs, livestock, and manganese. The cargoes moving upstream are mainly finished goods, machine parts, processed foods, chemicals, and fertilizers. Coal is shipped in both directions, but petroleum is shipped upriver, with the empty drums being returned to Canton.

3. Amur River System

The Amur River System ranks third after the Yangtze and Pearl River Systems in terms of importance and volume of cargo moved in Communist China. The Amur System includes the Argun, Ussuri, and Sungari Rivers, which are tributary to the Amur, and the Nonni River, which is tributary to the Sungari, as well as numerous rivers of lesser significance. Although the navigation season lasts only about 6 months because of freezing, this system is of special importance because of the route it provides between the Manchurian plain and the USSR. On the Amur River, traffic moves in Soviet vessels, and there is little or no Chinese transport. The Sungari and its tributaries carried about 1.5 million tons, or 5.7 percent of the traffic moved on inland waterways by modern vessels in 1955. Harbin and Chia-mu-ssu are rail

transshipment centers, and most commodities move in the direction of one of these ports. The major commodities moving are timber and agricultural products, including grain, hemp, soybeans, and others. Construction materials and coal are also important commodities.

4. Some Lesser Systems

The Yellow River ranks second to the Yangtze River among the rivers of Communist China in terms of total length. In terms of navigable distance, however, it ranks about fifth, after the Huai River, because of siltation and variations in water level. The Yellow River is important only for local transport because its navigable reaches are intermittent and it has no convenient outlet to the sea. According to announced plans, the water conservancy program projected for the Yellow River will render it navigable from its mouth to the San-men Dam, an increase of about 1,000 km, thus providing an all-water route from Peking to the interior.

The Huai River System ranks immediately after the Amur River System in terms of navigable distance. The extensive program for flood control and water conservancy in the Huai Basin will render more than 3,900 km of the river and its tributaries navigable to modern powered vessels by 1962 and will provide an important water route linking Shanghai and the lower Yangtze River ports with the rich agricultural region of the north China plain.

Many other rivers are of importance in Communist China, particularly in local transport. Among these are the Min (Fukien) and Liao Rivers, which provide access from the coast to the interior. The Hai River, although short, provides access by water to the sea for the industrial region around Peking. The Tumen and Yalu Rivers on the border of Korea are carriers of local trade and some international trade. The Ili and Chernyy Irtysh Rivers provide a similar connection between the USSR and Sinkiang Province.

5. Grand Canal

The Grand Canal, more than 1,700 km in length, runs from Tientsin to Hangchow in Communist China. Although it is presently of little use for navigation, reconstruction of the canal is underway. Present plans call for straightening the canal and shortening its length to 1,500 km as well as for dredging to accommodate vessels of more than 2,000 GRT by the end of the Second Five Year Plan (1958-62). When completed, the canal will provide the only north-south inland waterway of any significance. It will join the Yellow, Huai, Yangtze, and other rivers into an interconnecting network and will provide water transport among virtually all the important

industrial and agricultural regions of North and Central China. Three major ports are to be constructed for handling coal, one of which will have a capacity of 20 million tons annually. 7/

B. Major Ports

With the exception of the Yangtze, most rivers of Communist China have fewer than two ports which handle sufficient goods to be designated major ports. By far the most important of the Yangtze ports and hence the most important inland water port in China is Shanghai, which is also the largest ocean port in the country. Hankow, Chungking, and Nanking are also major ports on the Yangtze and rank high among the inland water ports. On the Pearl River, Canton is of major importance, whereas Harbin and Chia-mu-ssu dominate transport on the Sungari River. The volume of cargo handled by Yangtze ports in 1958 ranged from more than 4 million tons handled by Chungking to 32 million tons handled by Shanghai. 8/ Other ports are minor when compared with these, although some, such as Ma-an-shan and Yu-ch'i-k'ou, are of considerable economic significance.

III. Organization

Central control over inland water transport in Communist China rests in the Sea and River General Navigation Bureau in Peking, which is subordinate to the Ministry of Communications. Operational control over planning and policies for inland water transport is exercised by regional or provincial bureaus, which are described below.

A. Yangtze Navigation Bureau (YNB)

The Yangtze Navigation Bureau (YNB) of Communist China has jurisdiction over the Yangtze River and its major tributaries. Before 1958, virtually all administrative and operational policies in this area were decided by the YNB, which had final and exclusive jurisdiction. The YNB was organized into three major branches, each having control over a different section of the river, and into offices which performed staff functions (finance, planning, engineering, and the like). The three branches were at Shanghai, Chungking, and Hankow. Each branch had five or more subordinate offices located in various inland water ports under its jurisdiction. Control over local intra-provincial shipping was the responsibility of the several provinces but was coordinated with the various branch offices concerned.

In 1958, following the general policy of decentralization of control, much of the organization described in the preceding paragraph was transferred to the control of the provinces. Many of the harbor offices and a large number of vessels formerly controlled by the YNB

were given to the provinces, as were some specialized functions such as waterway engineering. The full implications of this change have not yet become apparent. The YNB still exercises a great deal of control over all aspects of inland water transport and still coordinates all long-distance hauling, plans, and the like. The provinces, however, have some real responsibilities for administration, investment, and preliminary planning. The exact division of responsibilities and the devices for coordination apparently are not yet firmly established.

B. Provincial Navigation Bureaus

Control over shipping on the Pearl and Sungari Rivers in Communist China is exercised by the provincial navigation bureau concerned. Before 1957 the Pearl River Navigation Bureau had control over the Pearl River similar to that of the YNB over the Yangtze River. In March 1957 the Pearl River Navigation Bureau was abolished, and control over the Pearl was given to the Kwangtung and Kwangsi Provincial Navigation Bureaus. A similar move had already occurred in the northeast, where the Northeast Inland Water Navigation Bureau, which controlled traffic on the Amur and Sungari Rivers, had been abolished in 1955 in favor of the Heilungkiang Shipping Bureau, a provincial organization. Virtually all of the other rivers are under the control of the provinces through which they flow.

IV. Inland Water Fleet

The inland water fleet of Communist China consists of a multitude of craft with a great variety of types and sizes, ranging from new passenger-cargo vessels of 4,000 GRT to small sampans capable of carrying less than 1 ton. A statement of the total number and capacity of vessels by type is not possible from the evidence available, but some general observations can be made.

A. Modern

The modern inland water self-propelled fleet of Communist China is estimated to have totaled about 30 vessels and 80,000 GRT at the end of 1956, 9/ or approximately 110,000 deadweight tons (DWT).* The exact additions to the fleet since 1956 are unknown, but they have been substantial. The announced plans for construction of vessels in 1958 called for 381 vessels of both maritime and inland types totaling 96,000 DWT. 10/ Subsequent announcements indicate that more than

* Deadweight tonnage is a measure of the carrying capacity of a vessel in long tons -- that is, the difference between the vessel's displacement light and its displacement loaded.

100,000 DWT were constructed in 1958. A considerable part of this construction consisted of barges and tugboats for inland water use. Plans call for construction of refrigerated, petroleum, and ore barges, and all three types of vessels are believed to be under construction. The evidence indicates continued growth and modernization of the inland water fleet, with greater emphasis on barge tows and decreasing use of self-propelled vessels.

By 1957 the horsepower of the tugboat fleet had increased to more than six times the power available in 1952, as shown in Table 2.

Table 2

Estimated Horsepower of the Tugboat Fleet on Inland Waterways in Communist China a/
1952-57

Year	Index of Horsepower (1952 = 100)	Percentage Increase Above Preceding Year	Thousand Horsepower
1952	100		41.1
1953	141	41.0	58.0
1954	215	52.5	88.4
1955	358	66.5	147.2
1956	476	33.0	195.8
1957	640	34.5	263.4

a. [redacted] 50X1

[redacted] 50X1

The capacity of the barge fleet on the Yangtze River was estimated to be nearly 200,000 GRT in 1958 (about 282,000 DWT), 13/ and probably another 200,000 GRT of barges operate on the Pearl and Sungari Rivers. If modern vessels of all types and sizes are included, the total tonnage of the modern inland water fleet of Communist China is probably between 400,000 and 500,000 GRT and may be even larger.

B. Primitive

Estimates of the primitive inland water fleet of Communist China are very tenuous. The large number of junks in existence, however,

makes them significant enough to warrant an appraisal of their capacity. It seems likely that there are from 300,000 to 400,000 junks with a capacity of 2 million to 4 million DWT. 14/ Junks are estimated to carry between 60 and 80 percent of the total volume of goods moved on the inland waterways. 15/

V. Performance and Efficiency of Operations

A. Volume of Cargo Hauled

Although the performance of inland water transport in Communist China has not regained the position of preeminence which it occupied in the pre-Communist period, it has experienced a steady and pronounced growth. If 1952 is taken as the base year, tons originated by modern transport on the inland waterways of China increased at a faster rate than total tons originated by all forms of modern transport in the country, as indicated in Table 3. During

Table 3

Index of the Volume of Total Modern Transport and Modern Inland Water Transport in Communist China a/ 1952-58

1952=100

Year	Total Modern Transport	Modern Inland Water Transport
1952	100	100
1953	126	163
1954	159	218
1955	167	279
1956	221	376
1957	255	427
1958	437	603

a. Compiled from data in Table 4, p. 12, below.

1952-57 the performance of modern inland water transport increased at a faster rate than that of railroads or coastal shipping but at a slightly slower rate than that of highways.

The volume of tons originated which were carried by modern transport on inland waterways in Communist China increased from

4.5 million tons in 1950 to about 56.7 million tons in 1958. 16/ For the same period, performance in ton-kilometers increased from 1.68 billion tkm to about 21.3 billion tkm. 17/ The average length of haul by modern transport on the waterways of China was 376 km in 1958. These relationships are shown in Table 4.*

Although the volume of tons originated on inland waterways in Communist China may be expected to continue to increase in absolute terms, it is unlikely that inland water transport will increase significantly in comparison with other forms of transport. Continued growth will probably result in a slightly lower share of the total transport load for inland waterways because of the tremendous room for expansion of railroad and highway nets and facilities. Further development will result in more specialization in bulk movement by inland water transport, whereas general cargo with a higher value will move by land transport.

About 60 percent of total inland water traffic in Communist China occurs on three rivers, the Yangtze, the Sungari, and the Pearl. The Yangtze alone normally carries about one-third of all modern inland water tonnage, as shown in Table 5.** Comparable data for the Pearl and Sungari Rivers are not available. In 1953 the Pearl carried 3.7 million tons originated, or 24 percent of the total tons originated by modern inland water transport. The Sungari carried 1.5 million tons in 1955, or 5.7 percent of the total. The remaining 30 to 40 percent of tons originated by modern inland water transport move on numerous lesser rivers such as the Huai, the Min, and the Liao. Data for these rivers are virtually nonexistent.

Estimates of the total performance of inland water transport are somewhat more tenuous than those for modern inland water transport alone, because data for primitive transport are much less comprehensive and precise. The Chinese Communists announced a combined performance by coastal shipping and inland water transport of 210 million tons originated for 1958, an increase of 37 percent above performance in 1957. 18/ It seems likely that in 1958 primitive transport carried about 70 percent of all tons originated on the inland waterways of Communist China. Because the figure for modern inland water transport in 1958 is estimated to have been 56.7 million tons originated, primitive inland water transport is estimated to have moved about 133 million tons originated. A total of 190 million tons originated moved on the inland waterways of China in 1958 by modern vessels, tugboats and barges, junks, and possibly sampans and rafts as well. This figure is reasonable in view of the announced performance for 1957 as indicated in Table 6.***

* Table 4 follows on p. 12.
** Table 5 follows on p. 13.
*** Table 6 follows on p. 13.

Table 4

Performance of Total Modern Transport and Modern Inland Water Transport in Communist China a/
1950-58

	Total Modern Transport		Modern Inland Water Transport				
			Tons Originated		Ton-Kilometers		
Year	Tons Originated (Million Metric Tons)	Ton-Kilometers (Billion Metric Tons)	Million Metric Tons	Percent of Total Modern Transport	Billion Ton-Kilometers	Percent of Total Modern Transport	Average Length of Haul (Kilometers)
1950	112.3 b/	42.2 c/	4.50 d/	4.0	1.68 e/	4.0	373
1951	133.6 b/	57.7 c/	6.96 d/	5.2	2.66 e/	4.6	382
1952	168.0 b/	69.5 c/	9.41 d/	5.6	3.64 e/	5.2	387
1953	212.0 b/	89.6 c/	15.3 d/	7.2	5.63 e/	6.3	368
1954	266.5 b/	111.0 c/	20.5 d/	7.7	7.89 e/	7.1	385
1955	280.2 b/	119.4 c/	26.3 d/	9.4	10.4 e/	8.7	395
	278.2 f/	118.1 g/	26.1 f/	9.4	10.2 g/	8.6	391
1956	371.3 f/	145.4 g/	35.4 f/	9.5	12.9 g/	8.9	364
1957	428.6 f/	164.2 g/	40.2 f/	9.4	15.1 g/	9.2	376
1958	733.8 f/	230.0 g/	56.7 f/	7.7	21.3 g/	9.3	376

a. [redacted] 50X1

b. Including both physical tons and tariff tons. Tariff tons is a term used in Chinese Communist accounting. The exact meaning of the term is unknown, but there is very little difference between a tariff ton and a physical (metric) ton.

c. Including both physical ton-kilometers and tariff ton-kilometers. See footnote b, above.

d. Tariff tons. See footnote b, above.

e. Tariff ton-kilometers. See footnote b, above.

f. Physical tons.

g. Physical ton-kilometers.

Table 5

Tons Originated by Modern Inland Water Transport
on the Yangtze River in Communist China a/
1952-58

Year	Tons Originated (Million Metric Tons)	Percent of Total Modern Inland Water Transport
1952	3.9	41
1953	5.3	35
1954	7.1	35
1955	8.5	33
1956	10.3	29
1957	13.4	33
1958	18.9	33

a. 19/

Table 6

Performance of Inland Water Transport
in Communist China a/
1957

	Total Performance	Modern Inland Water Transport		Primitive Inland Water Transport	
		Performance	Percent of Total	Performance	Percent of Total
Million tons originated	138.6	40.2	29.0	98.4	71.0
Billion ton-kilometers	21.8	15.1	69.3	6.7	30.7
Average length of haul (kilometers)	157.3	375.6		68.1	

a. 20/

The requirements for primitive inland water transport in Communist China are local in nature, the average length of haul for such transport being only 68.1 km compared with 375.6 km for modern transport. Although 71 percent of the total tons originated in China are carried by primitive transport, only 31 percent of the ton-kilometers are so carried.

Modern inland water transport, therefore, is used primarily for long-distance hauling, and primitive transport is used for local transportation. Although the role of the junk is still important, its share of transport performance is declining. Table 7 indicates

Table 7

Tons Originated by Modern Inland Water Transport and by Primitive Inland Water Transport in Communist China a/ 1954 and 1957

		Modern		Primitive	
Year	Total Tons Originated (Million Metric Tons)	Tons Originated (Million Metric Tons)	Percent of Total	Tons Originated (Million Metric Tons)	Percent of Total
1954	133.5	20.5	15.4	113.0	84.6
1957	138.6	40.2	29.0	98.4	71.0

a. 21/

that the share of the primitive sector in the total volume of inland water transport declined from 85 percent in 1954 to 71 percent in 1957, and the volume of junk traffic decreased in absolute terms by 14.6 million tons originated. In 1958 the percentage of the total inland water traffic handled by junks remained near the 1957 level, but the absolute figure for tons originated by the primitive sector reached an all-time high of 133 million tons originated as a result of the "leap forward" program. As the modern fleet is expanded, the junk eventually will be confined to the smaller waterways and the simplest tasks.

B. Composition of Cargo

As would be expected, bulk cargoes not requiring fast transit make up the greater part of inland water traffic in Communist China. The five major commodities moved on the waterways of China, in terms of volume, are agricultural products, mineral construction materials, coal, ferrous metals, and timber. The most important commodities are agricultural products and mineral construction materials, which together comprise from 45 to 50 percent of the total volume of goods moved by inland water transport (see Tables 8 and 9*).

Table 8

Composition of Cargo Carried by Total Inland Water Transport in Communist China
1956

	Tons Originated		Ton-Kilometers	
Commodity	Million Metric Tons a/	Percent of Total b/	Billion Metric Tons a/	Percent of Total b/
Grain	35.6	26.0	8.1	37.6
Mineral construction materials	33.8	24.7	2.0	9.5
Coal	12.3	9.0	2.1	9.6
Timber	5.3	3.9	1.1	5.0
Salt	5.3	3.9	1.0	4.4
Ores and ferrous metals	2.3	1.7	1.0	4.7
Cotton	1.4	1.0	0.5	2.1
Petroleum	0.9	0.7	0.4	1.8
Other	39.8	29.1	5.4	25.3
Total	136.7	100.0	21.6	100.0

a. Estimated.
b. 22/

* Table 9 follows on p. 16.

Table 9

Estimated Composition of Cargo Carried by Modern Inland Water Transport in Communist China
1956 and 1958

Commodity	1956 Tons Originated (Million Metric Tons)	1956 Percent of Total	1958 Tons Originated (Million Metric Tons)	1958 Percent of Total
Agricultural products	10.3	29	17	30
Of which:				
Grain	N.A.	N.A.	16.7	29.5
Cotton	N.A.	N.A.	0.3	0.5
Coal	7.1	20	11	19
Mineral construction materials	6.3	18	8	14
Ores and ferrous metals	1.8	5	6	11
Of which:				
Steel	N.A.	N.A.	1.5	3
Timber	0.4	1	1.7	3
Petroleum products	0.4	3	3	5
Other	8.6	24	10	18
Total	35.4	100	56.7	100

1. Agricultural Products

Agricultural products rank high in the inland water transport of Communist China. The largest single movement consists of grain and other products being moved from the Szechwan Basin by way of the Yangtze River to the consumer regions along the coast. Ranking second in importance to the movement of Szechwan grain is the general movement of agricultural goods from production areas to consuming areas -- for example, the movement of grain and other foodstuffs from the rural areas of Kwantung down the Hsi River to Canton. In 1956, grain and cotton accounted for 27.0 percent of the total tons originated by inland water transport and for 39.7 percent of the ton-kilometers. 23/ In 1958, agricultural products may have accounted for as much as 30 percent of tons originated by modern inland water transport.

2. Mineral Construction Materials

Mineral construction materials, consisting largely of sand, stone, brick, cement, and dirt, consistently rank first or second in any ranking by volume of goods moved by inland water transport in Communist China. Many of the items in this category are produced or consumed on or very near the rivers -- sand, for example, is dredged from a river and consumed by construction of dams or irrigation works on the river or nearby. The movement therefore is largely local and utilizes to a large extent the capacities of primitive vessels. Although mineral construction materials comprised 24.7 percent of the volume of total inland water transport in 1956, they accounted for only 9.5 percent of the ton-kilometer performance. 24/ In 1958, mineral construction materials again accounted for 25 percent of the volume of total inland water transport but probably for only about 14 percent of the volume of the modern sector.

3. Coal

Coal is a commodity which traditionally is suited to transportation by water. Many of the major coal-producing areas in Communist China are located on navigable waterways, and in some instances rail lines have been constructed to move coal to a water route. A number of ports have been constructed specifically for handling coal (for example, Yu-ch'i-k'ou on the Yangtze River), and several ports are planned for construction on the Grand Canal. In 1956, coal accounted for 9.0 percent of the tons originated by total inland water transport and for 9.6 percent of the ton-kilometer performance. 25/ Coal probably accounted for about 19 percent of the tons originated by modern inland water transport in 1958.

4. Ferrous Metals

Ferrous metals, both raw materials and semifinished goods, are moved to a large extent by inland water transport in Communist China. Large iron and steel centers are located along the Yangtze River at Chungking, Wu-han, Ma-an-shan, and Shanghai, and the bulk of the ferrous materials moved by inland water transport probably is consumed by these centers. Ores and ferrous metals accounted for 2.3 million tons originated, or 1.7 percent of the total tons originated by inland water transport in 1956, but as much as 6 million tons originated, or about 11 percent of the tons originated by modern inland water transport in 1958.

5. Timber

Timber is an important commodity in the traffic on most of the inland waterways of Communist China. The most common form of movement is in rafts of raw logs which are towed or allowed to drift downstream from logging areas to sawmills and the consuming regions. This movement is important on the Amur, Sungari, Ussuri, and Yangtze Rivers and their tributaries as well as on numerous lesser rivers. Timber accounted for about 3 percent of tons originated by modern transport on the inland waterways of China in 1958.

6. Other Commodities

Among other commodities which are of importance in Communist China are salt, refined petroleum products, fertilizer, and various handicraft products. These commodities, although important enough to list, generally are less significant in terms of shipping capacity used than the commodities listed in 1 through 5, above. Salt and petroleum, however, are becoming increasingly important and, as production expands, may become major commodities in inland water transport (see Table 9*).

C. Efficiency of Operations

The chief advantage of water transport is the economy of moving bulk goods for relatively long distances. In this respect the Yangtze River is ideally situated, with large amounts of bulk cargoes (grain, ores, and the like) originating in its basin and with the longest average length of haul of any river in Communist China. In spite of these advantages, the average cost of transportation along the Yangtze, as is indicated in Table 10,** is higher than that of rail transport in the Yangtze area. 26/ Inland water transport has been developed to a

* P. 16, above.
** Table 10 follows on p. 19.

Table 10

Comparative Costs of Shipping by Rail Transport and by Inland Water Transport from Szechwan to Shanghai in Communist China a/ 1957

Direction and Commodity	Route	Costs (Yuan per Metric Ton) Rail	Inland Water
Downriver			
Rice	Ch'eng-tu to Shanghai	38.31	59.43
Rice	Chungking to Shanghai	46.12	77.46
Upriver			
Steel	Shanghai to Chungking	41.40	61.23
General cargo	Shanghai to Chungking	127.18	130.15
General cargo	Shanghai to Ch'eng-tu	105.52	171.76
Chemical fertilizer	Shanghai to Chungking	48.20	73.98
Chemical fertilizer	Shanghai to Ch'eng-tu	40.04	94.64

a. 27/

much greater extent in the Yangtze area than in any other, and navigation is possible on a year-round basis, so it may be assumed that operations in the Yangtze area are more efficient than elsewhere in China. Because the Yangtze is so important in the inland waterway system of China and because data for other river systems are lacking, this section is concerned with the efficiency of operations along the Yangtze. It is believed, however, that the conclusions based on operations on the Yangtze are generally applicable to the entire inland waterway system in China.

On the waterways of the USSR the average unit cost of inland water transport in 1956 was 18.2 percent less than the average unit cost of rail transport. 28/ In Communist China the average unit cost

of inland water transport along the Yangtze River in 1957 was expected to be 30.4 percent higher than the average unit cost of rail transport. This situation prevailed in spite of repeated reduction of rates along the river and attempts by the Chinese Communists to reduce operating costs wherever possible. The high costs appear to be due to four major factors -- (1) the high cost and inefficient use of fuel; (2) poor utilization of personnel; (3) underutilization of capacity; and (4) lack of coordination, planning, and control of shipping operations. In Table 11 some comparative data on the components of the costs of rail and inland water shipment are given.

Table 11

Comparative Unit Costs of Shipping by Rail Transport and by Inland Water Transport on the Yangtze River in Communist China a/
1956

	Unit Costs (Yuan per Thousand Combined Ton-Kilometers b/)	
	Rail	Inland Water
Wages	2.19	3.11
Fuel and electricity	0.92	2.27
Supplies	0.73	0.74
Repairs	0.64	1.51
Depreciation	2.74	2.20
Other	0.45	1.14
Total	7.67	10.97

a. 29/
b. Combined ton-kilometers (or total traffic kilometers) equal freight ton-kilometers plus passenger kilometers. Freight ton-kilometers and passenger kilometers are combined on an equal basis.

The first factor mentioned, the high cost of fuel consumed in the operation of vessels along the Yangtze River, has two causes: the performance of about 40 percent of the shipping by vessels which burn diesel fuel (and POL products are expensive in Communist China) 30/ and the inefficient use of high-cost coal. In 1957, expenditures for fuel amounted to 21.3 percent of the total cost of inland water transport. 31/

As increased industrialization in China makes possible lower costs for POL and coal and as new vessels having more modern and efficient powerplants are added to the fleet, this cost factor should be reduced substantially.

The inefficient utilization of personnel is another factor in the high costs of shipping in Communist China. In 1957 the YNB had employed about 56,000 persons. 32/ Approximately 20,500 persons were engaged in the operation of vessels, 15,000 were longshoremen, and 20,500 were employed in managerial and other activities. Only 63 percent of the labor force of the YNB, therefore, actually were engaged in transportation activities. The 20,500 workers actually engaged in the operation of vessels produced a total of 373,000 tkm per worker in 1956. 33/ This output indicates a very inefficient allocation of resources between managerial and operational personnel. The productivity of operational personnel on the inland waterways in 1956 was 11 percent lower than on the railroads. 34/ China traditionally has consumed unnecessary labor in inland water transport. Where other countries use barge tows, in which the barges are unmanned and the tugboat crew handles the entire tow, in China each barge has one or more men. This unnecessary waste of manpower involves about 20 percent of the personnel engaged in the operation of vessels. The average wage for inland water workers is about 26 percent higher than that for rail workers, 35/ thus indicating the cost of inefficient use of personnel compared with other forms of transportation.

The last two factors mentioned above, the underutilization of capacity and the lack of coordination, obviously contribute to higher costs of inland water transport. In 1957, vessels along the Yangtze River on the average spent nearly 50 percent of their time in port, whereas barges spent nearly 60 percent of their time in port. 36/ The Chinese Communists estimate that as much as 54 percent of the time in port is unproductive time: that is, waiting for loading and unloading, for tugboats, for cargo, and so on. 37/ Faulty scheduling of cargo, delays in transshipment, and inadequate harbor facilities have resulted in an underutilization of vessel capacity, accompanied by an overtaxing of harbor facilities.

The congestion on the waterways in 1956 and 1958 was largely the result of inadequate port facilities and of inefficiency in the operation of the inland waterway system. In spite of the difficulties encountered, there was no evidence of an acute shortage of vessels. Such shortage of vessels as existed was due to the fact that large numbers of barges and other vessels were being held in port for periods of more than 2 weeks while waiting for loading and unloading. Lack of coordination of combined rail-water shipments probably contributed as much as any other cause to the troubles encountered in 1958.

The Chinese Communist press has exhibited considerable concern over improving the efficiency of shipping operations. Articles having to do with improved techniques of vessel and port operation and cargo handling are frequently found in Chinese technical journals, and concern over operational policies is apparent even at the ministerial level. Improvements, however, are being made. In the past several years, rates, turnaround time, and costs have been reduced significantly. It is believed that this trend will continue and that within a reasonable time the Chinese inland waterway system will achieve a greater efficiency than it has at present.

VI. Investment

Programs for the development of inland water transport in Communist China have shown considerable variation in emphasis, usually in response to pressures of requirements. Details of investment during the Second Five Year Plan have not yet been announced, nor have the plans for 1958 or 1959 been revealed in any detail. Even the Chinese Communist First Five Year Plan (1953-57) lacked quantitative investment statistics. For this reason, the following section on investment deals only with the rate and direction of investment, not with amounts invested in absolute terms.

Investment in capital construction for transportation other than railroads in 1956 was 690 million yuan.* 38/ This figure includes inland water transport, ocean shipping, highways, and civil air transport. It is not possible to deduce from this information the exact amount of investment in inland water transport, because separate data for each of the sectors are not available. Other evidence, however, indicates that the rate of investment in inland water transport has been considerable and is increasing. If 1953 is taken as the base year, the index of investment in capital construction in inland water transport stood at 272 in 1958, as indicated in Table 12.** It should be noted that in the first 3 years of the First Five Year Plan period actual investment was from 6 to 13 percent less than the amount programed. 39/

The allocation of investment funds in inland water transport for the period 1950-56 was as follows: shipbuilding, 66.91 percent; harbor development, 11.77 percent; navigation routes, 1.93 percent; navigation signals, 3.35 percent; dockyard construction, 2.7 percent, and other expenses, including housing, health, and education, 13.34 percent. 40/

* About US $280 million on the basis of the rate of 2.46 yuan to US $1. This rate of exchange is based on the yuan-sterling rate for telegraphic transfers, which is arbitrarily established and bears no relationship to domestic price levels.

** Table 12 follows on p. 23.

Table 12

Index of Planned Investment in Capital Construction for Inland Water Transport in Communist China a/ 1953-58

1953 = 100

Year	Index
1953	100
1954	174
1955	235
1956	N.A.
1957	260
1958	272

a. 41/

The extreme emphasis on shipbuilding rather than harbor development resulted in a greater fleet capacity than the various harbors could accommodate and undoubtedly contributed to the congestion which, although chronic, became severe in 1956 and 1958. The Chinese Communists apparently recognized this fact, for the 1957 plan reduced the amount allocated to shipbuilding to 55.53 percent and increased the investment in harbor development to 21.83 percent. 42/ Although percentage figures for 1958 and 1959 are not available, the extensive harbor development observed indicates that increasing amounts have been allocated for this purpose.

The problem of how much the Chinese Communists are actually investing in inland water transport is further complicated by the investment of considerable sums in water conservancy projects, which contribute substantially to the improvement of navigation. When completed, the San-men Dam will render the Yellow River navigable from its mouth to the dam. The development schemes in the Huai River Basin have already contributed greatly to the navigability of that river. Plans for regulating the Yangtze River should, if carried out, render the river much more useful as a transportation artery. The improvement of navigation by these programs is generally a secondary function subordinate to the major considerations of flood control, irrigation, and electric power. A tremendous amount of money and labor have gone into construction for water conservancy in the past few years, and it is not possible to determine what part of these inputs should be regarded as investment in transportation.

VII. Plans and Prospects

Plans for the development of inland water transport in the Second Five Year Plan (1958-62) in Communist China have not been announced. Numerous programs now in progress under the direction of both the central authority and the provincial governments point, however, to continuous and increasing development and utilization of inland water transport. One of the more significant programs is the dredging of the Grand Canal to accommodate vessels of more than 2,000 GRT. When completed, this waterway will add greatly to the potential of the entire inland waterway system. A second significant program is the improvement of river channels in Szechwan Province, particularly the Chia-ling River. The general purpose of this development is to allow the transportation of petroleum from Szechwan to refineries at Nanking and Shanghai by an all-water route. This activity, however, also should increase the flow of agricultural commodities by inland water transport. Programs in harbor development and construction are widespread and should add greatly to port capacity. The port of Chungking is receiving extensive renovation and expansion of facilities. 43/ A new harbor is being constructed at Ma-an-shan, and the newly constructed port of Yu-ch'i-k'ou is to be enlarged. 44/ Most of the bottlenecks in inland water transport have been inadequate ports. A program of port development such as the Chinese Communists seem to have undertaken could add to the capacity of the inland waterway system by as much as 50 percent.

Extensive construction of canals such as has been announced in the provinces of Kiangsu and Anhwei will increase the ability of the inland waterway system to function as local transport. As programs of water conservancy result in deeper and more stable channels and a more constant flow of water, the ability of the inland waterway system to make substantial contributions to both the national and the local economies will be greatly enhanced.

Continued expansion in terms of performance can also be expected. Although the central government indicated that the requirements of the economy for transportation in 1959 would be double those of 1958, it is estimated that modern inland water transport will carry only about 63 million tons originated in 1959.

APPENDIX A

METHODOLOGY

1. General

It is extremely doubtful if the Chinese Communists have precise and accurate figures for such items as the length of various rivers; the number of primitive or native craft; or the total amount of construction materials, such as sand and gravel, moved by native craft. Nevertheless, the Chinese are in a better position to estimate these and similar items than anyone else. For this reason, official Chinese government announcements have been used as source material wherever possible. Where official data were not available or were contradictory or inconsistent, Chinese and Soviet technical journals have been used.

50X1

2. Performance

Data on performance of the modern sector of inland water transport in Communist China before 1957 are based largely on official Chinese announcements and are considered to be reliable. 45/ Data for 1957 are taken from an official Soviet source. 46/

Figures on total performance of both the primitive and the modern sectors are available only for 1954 and 1957, and data for 1956 which are used in Table 8* are estimated from these 2 years. Estimates of performance of the primitive sector are also available only for 1954 and 1957. For this reason, no series of reliable estimates can be made for the total performance of the inland water fleet. Performance of inland water transport for 1958 is estimated on the basis of an announced performance of 210 million tons originated by all water transport. 47/ It is believed that the performance of inland water transport increased at a greater rate than did that of coastal shipping. Therefore, the performance of inland water transport for 1958 is estimated to have increased 41 percent above the level of 1957 to a figure of 56.7 million tons originated. This figure is consistent with the known performance of both the primitive and the modern sectors of the inland water fleet in 1957 and allows for a 30-percent increase in the coastal sector while conforming to the announced overall increase of 37 percent above total performance in 1957.

* P. 15, above.

Data on performance of water transport on the various river systems are much more scanty than on total performance in Communist China and are much less reliable. Table 5,* which gives the performance of inland water transport on the Yangtze River, is based primarily on two sources. According to the periodical Shui-yun (River Transport), transport performance on the Yangtze in 1957 totaled 13.4 million tons originated. 48/ Another periodical, Ti-li Chih-shih (Geographic Knowledge) indicated that performance in 1953 was 5.3 million tons originated. Because the figure for 1953 represents an increase of 35.8 percent above performance in 1952, the tonnage moved in 1952 was 3.9 million tons originated. 49/ In 1954 an increase in performance of one-third above performance for the preceding year was announced, giving a total of 7.1 million tons originated. 50/ The volume moved in 1955 was given as an index of 218.66, with 1952 as 100. 51/ Performance in 1955 therefore was 8.5 million tons originated. Performance in 1956 increased above performance in 1955 by 21 percent, giving a total of 10.3 million tons originated. Performance in 1958 is estimated by assuming that performance on the Yangtze River continued at the same level in relation to the total performance of inland water transport -- that is, about one-third of the total tons originated on inland waterways, or 18.9 million tons originated.

3. Commodities

Estimates of the composition of cargo moved by modern inland water transport in Communist China in 1958 represent modifications of Table 8,** which gives this information for all inland water transport in 1956. In view of the tremendous emphasis placed on the movements of iron and steel and related products in 1958, it seems reasonable to assume that the increased movement of ferrous metals would have occurred in the modern sector and that goods of lower priority (construction materials and some grain) were forced to utilize the primitive sector. In reality the over-all composition of inland water traffic changed only slightly, as is indicated by the announcement that four major commodities -- grain, cotton, coal, and steel -- accounted for 40 percent of the total volume of inland water traffic in 1958. 52/ This figure is very close to the 1956 total for these same commodities as shown in Table 8. A considerable change, however, occurred in the traffic carried by the modern sector. Table 9*** gives estimates of the composition of modern inland water traffic, by commodity category, for 1956 and 1958. This estimate is based on the assumption that coal, ferrous materials, and grain would represent a

* P. 13, above.
** P. 15, above.
*** P. 16, above.

greater percentage of performance by the modern sector than of total performance. The most significant change is in the relative increase of ferrous metals and the decline of construction materials.

This change is reasonable in view of the general trend of the economy in 1958. It is obvious from government announcements that the shipments of materials related to production of iron and steel increased greatly on all types of transport, and the priority given to these goods would indicate that they tend to displace such items as sand, gravel, cement, and other construction materials from modern inland water transport.

Table 9* shows the estimate of the composition of modern inland water traffic in 1958 based on the known composition of the total inland water traffic in 1956 (with its marked similarity to 1958) and the probable demands of the "leap forward" program on inland water transport.

* P. 16, above.

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