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THE OUTFLOW OF GOODS FROM NORTH CHINA VIA INLAND TRANSPORT ROUTES

Description

An analysis of production and movement of raw material exports from North China to Japan, Manchuria, and Korea during 1944 and a description of major railroad and port facilities in North China.

Washington, D. C.

10 February 1945

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INTRODUCTION

This paper presents (1) an analysis of the export of raw materials from North China to Japan, Manchuria and Korea during 1944, and (2) a general physical description of major railroad and port facilities in North China. No attempt is made to select and evaluate transportation targets, a task which can be performed more effectively in the field. However, an attempt is made to provide information basic to such a selection by (1) indicating the relative concentrations of movement of commodities over various sections of railroad and out of major ports, evaluating them in terms of their importance to particular segments of the Japanese economy and (2) describing the chief transportation facilities in the area which might constitute desirable targets[1].

Only those export commodities are considered which are thought to form a significant portion of current supply in the Japanese home islands or of Japan, Manchuria and Korea combined.

North China, for present purposes, is defined as the area between the lattitudes 34° and 41° and extending westward to the Huang Ho (Yellow River).

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1 Estimates of commodity movements have been based upon a study of ground intelligence regarding production, freight flow and shipping from North China ports. Photographic cover has been used when available, for the sections on railroad and port facilities and their accompanying maps.

I. Summary

Strategic Importance and Vulnerability of North China Exports

A. Relation of North China Exports to Japanese Supply Position

North China, it is estimated, exported to Japan, Manchuria and Korea during 1944 some 10,000,000 metric tons of raw materials. Roughly speaking, about 68% of this tonnage consisted of coal, 20% of iron ore and pig iron, and the remaining 12% of aluminous shale, salt, minor minerals and agricultural products. Although shipments to Japan from major North China ports have declined sharply (more than 50% below 1942 shipping estimates), it is believed that in 1944 they accounted for 60% of the total tonnage exported. Northbound traffic over the Pei-p'ing--Liao-ning Railroad into Manchuria was increased during 1944 to an average annual rate of 4,000,000 tons so that it accounted for the remaining 40% of North China exports. This freight released raw materials produced in eastern Manchuria and Korea for use in Japan, although a portion of it probably continued through Korea to Japan.

Several raw materials from North China have become increasingly important to Japan in view of their declining availability from southeast Asia and the Pacific Islands. Coal shipments from North China, which suffered a sharp curtailment in 1944, were nevertheless of greater importance as a result of the inaccessibility of coal from Indochina and the Indies. It is estimated that during 1944 they provided about 56% of imports available to meet the total coal deficit of Japan, Manchuria and Korea, although they formed only 7% of the combined coal supply of these three areas. Much of North China's export coal has a high grade coking quality

essential to the Japanese metallurgical industry. However, exports of this high grade coal from North China to Japan would have to be cut below 1,000,000 tons per year before production of pig iron at current estimated rates in Japan could be affected.

Difficulties in shipping iron ore from Malaya, the Philippines, Hainan and central China have forced increased production in North China and it is estimated that in 1944 this area exported iron ore and pig iron equivalent to about 19% of the ferrous content of iron ore available to Japan, Manchuria and Korea. It would be practically impossible to offset the loss of North China coal and iron by increased production elsewhere in the Inner Zone. However, the strategic use of both raw materials occurs deep in the industrial process and the widespread consumption of coal in electric power and miscellaneous industries would make possible the allocation of/curtailed supply to most essential industries. Nevertheless, any considerable shortage of coal would have an immediate effect on general industrial activity in Japan.

Increasing inaccessibility and the pending loss of Bintan Island in the Indies as the primary source of bauxite for the Japanese aluminum industry have urged exploitation of less economical but abundant aluminous shales in North China. It is estimated that in 1944 North China exported shale with an alumina content equal to 36 - 44% of current Japanese requirements for aircraft aluminum and other aliminum products. While there are large alternative shale and clay deposits in Manchuria and Korea with similar alumina contents, Japan's capital investment in the exploitation of North China deposits makes them now vital to the aluminum industry.

Interference with exports of shale, or possible alumina in 1945, should have an early effect upon aircraft production.

Other raw material exports from North China are of less strategic importance to the Japanese economy. Still significant for military use, however, are North China's exports to Japan of raw cotton, wool, and leather (or hides), which in 1944 formed an estimated 43%, 66% and 55% respectively of total supply in the Japanese home islands. Japan has drawn heavily on salt produced in North China's coastal fields; 1944 exports formed 30 - 40% of Japan's home supply. However, loss of North China exports could be countered by a sharp reduction in food uses of salt, while Inner Zone production of salt for industrial purposes should be capable of some expansion. Loss of phosphate rock from North China, exports of which formed 30% of Japan's home supply in 1944, would reduce Japan's food consumption only in the long run, for deficiencies of phosphate fertilizers in the soil are not believed to have a quick effect upon crop production. Curtailment of North China's export of vegetable seeds and oils, which may have represented 17% of Japan's home supply in 1944, could probably be met easily by increased production and export from Manchuria, and by reduced consumption in Japan if necessary.

Table 1 summarizes the estimated 1944 exports of raw materials from North China via major ports of shipment and railroads into Manchuria.

Table 1. Estimated 1944 Rail and Ship Movement of Commodities from North China to Japan, Manchuria and Korea. (in thousands of metric tons)

Commodity Category	From Ch'in-wang-tao	From Tientsin-T'ang-ku	From Ch'ing-tao	From Lien-yun-kang	Via Rail-road	Total
Coal**	1,400	800	1,300	800	2,550	6,850
Iron ore		400	-	150	1,050	1,600
Pig iron			100		350	450
Aluminous shale(e)			240		120	360
Salt	25	250	150 (a)	150	25	600
Other minerals		5 (b)		80 (d)	5 (c)	90
Agricultural products		50	35	25	-	110
Totals	1,425	1,505	1,825	1,205	4,100	10,060

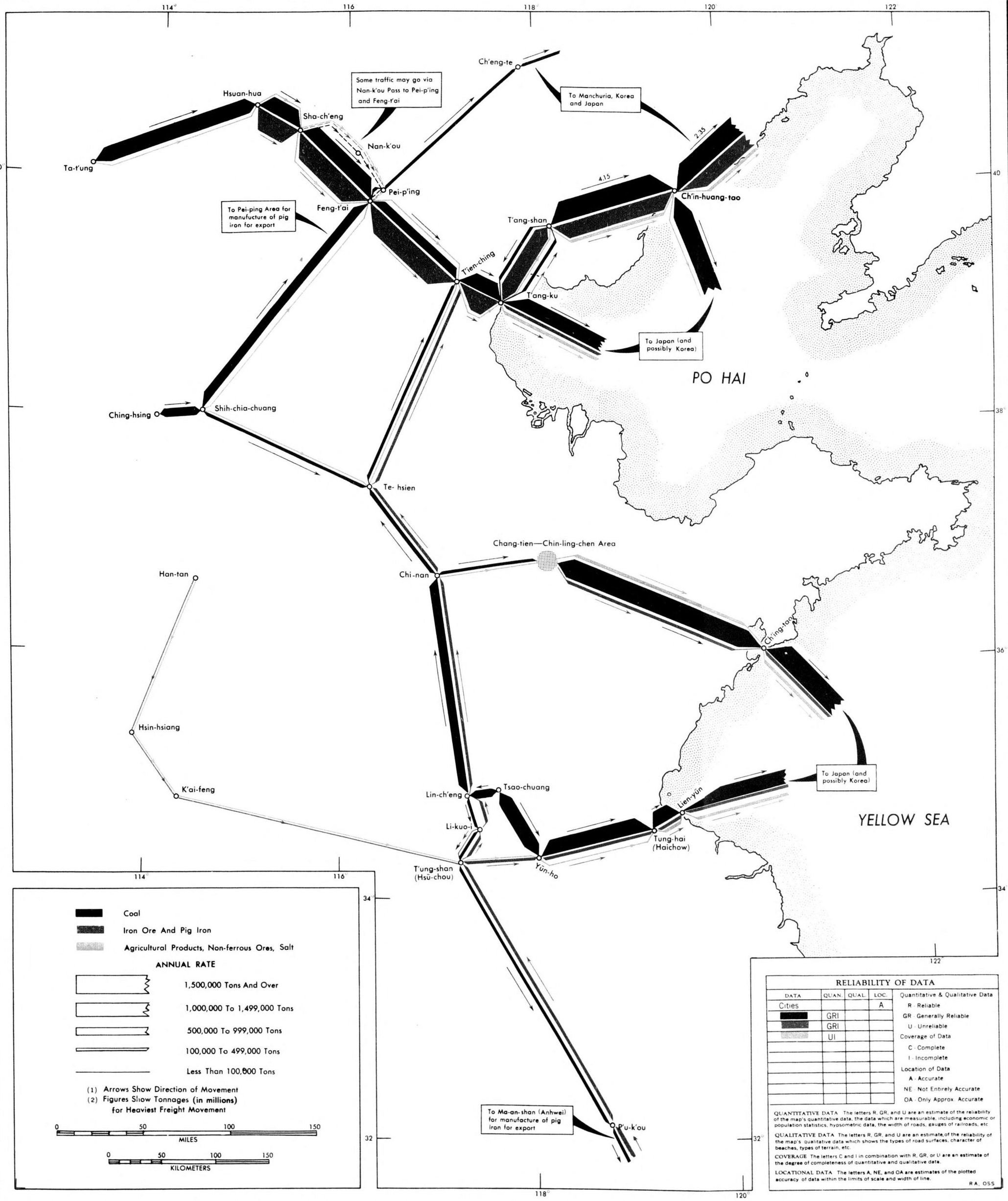
*All goes by Pei-p'ing--Liao-ning Railroad to and through Manchuria, except 200,000 tons of coal via Peking-Jehol RR.
**OSS Map No. 5478 (Export Freight Flow) shows coal shipments about 200,000 tons greater for each port than above figures, which do not include coal for bunkering.
(a) Includes 25,000 tons out of Chefoo.
(b) Manganese ore
(c) Aluminous shale, and 5,000 tons of lead concentrate.
(d) Phosphate rock
(e) Gross weight of shale

B. Concentration of Export Freight and Cargo Movement

The movement of export commodities out of North China is most highly concentrated along five different sections of railroad and out of the four major ports of the area. (See OSS Map No. 5478 and Table 2) Three of these sections of railroad which carry the heaviest freight load, are part of the Pei-p'ing--Liao-ning line along which is routed chiefly Ta-t'ung and K'ai-lan coal, Lung-yen iron ore and pig iron processed at Hsüan-hua and Pei-p'ing, and T'ang-shan aluminous shale. These commodities are shipped from Tientsin-T'ang-ku and Ch'in-huang-tao or railed through to Manchuria. The

EXPORT FREIGHT FLOW OF NORTH CHINA

WITH RELATED FREIGHT MOVEMENTS, 1944 ESTIMATE



RELIABILITY OF DATA

DATA	QUAN.	QUAL.	LOC.
Cities			A
	GR		
	GR		
	U		

Quantitative & Qualitative Data
R - Reliable
GR - Generally Reliable
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Coverage of Data
C - Complete
I - Incomplete
Location of Data
A - Accurate
NE - Not Entirely Accurate
OA - Only Approx. Accurate

QUANTITATIVE DATA. The letters R, GR, and U are an estimate of the reliability of the map's quantitative data, the data which are measurable, including economic or population statistics, hypsometric data, the width of roads, gauges of railroads, etc.

QUALITATIVE DATA. The letters R, GR, and U are an estimate of the reliability of the map's qualitative data which shows the types of road surfaces, character of beaches, types of terrain, etc.

COVERAGE. The letters C and I in combination with R, GR, or U are an estimate of the degree of completeness of quantitative and qualitative data.

LOCATIONAL DATA. The letters A, NE, and OA are estimates of the plotted accuracy of data within the limits of scale and width of line.

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fourth section of rail line is along the Chiao-Chi (Li-ch'eng-Ch'ing-tao) Railroad in Shantung, which carries chiefly Po-shan-Tzu-ch'uan coal and aluminous shale and Chin-ling-chen iron ore[1] to Ch'ing-tao for shipment. The last section is along the Lung-hai Railroad and carries the lightest freight load of the five to Lien-yun-kang for shipment. This freight consists chiefly of Chung-hsing coal, iron ore from Hung-shan (Hopeh) and Li-kuo-i, and phosphate rock from Hai-chow.

Estimated export freight flow over these five sections of railroad and of cargo shipments from the major ports during 1944 (See OSS Map No. 5478) are tabulated in Table 2, by various commodities in terms of their respective contribution to total supply or requirements[2] in Japan proper, or in Japan Manchuria and Korea combined.

The selection of transportation targets in North China (bridges, repair shops, marshalling yards, locomotive storing, port storage and loading facilities, shipping, etc.) may be made with reference to the effect on Japanese industry of intermittent or prolonged interference with traffic and shipping in localities indicated in Table 2.

---

1 This iron ore is smelted at Ch'ing-tao and shipped as pig iron

2 The term "supply" is used when Japanese plant operation is believed to be below capacity due to a shortage of raw materials. "Requirements" is used when available raw material supply exceeds current plant operation requirements.

Table 2 (continued)

Commodity	Export Freight or Cargo Tonnage		Share of Estimated 1944 Supply or Requirements (Japan, Manchuria & Korea)
4. Pei-p'ing to T'ang-ku (Hopeh) (including inflow at Tientsin from Ching-pu Railroad)			
Coal (high grade coking)	350,000		9% of requirements (J, M & K)
" (other)	800,000		
Sub-total	1,150,000		1% of supply (J,M & K) or 10% of deficit (Japan)
Iron ore	1,550,000		
Pig iron	295,000		
Sub-total	(1,135,000)	fe	19% of Supply (J,M &K)
Cotton	20,000		17% of Supply (Japan)
Wool	12,000		66% of Supply (Japan)
Hides and leather	7,000		52% of Supply (Japan)
Oil seeds & oils	12,000		6% of Supply (Japan)
Total	3,050,000		
5. Port of Tientsin-T'ang-ku (Hopeh)			
Coal	800,000		1% of supply (J,M & K) or 7% of deficit (Japan)
Iron ore	400,000	(54% fe)	4% of supply (J,M &K)
Manganese ore	5,000		2-5% of supply (J,M &K)
Salt	250,000		13-16% of supply (Japan)
Agricultural products	As A-4		As A-4
Total	1,509,000		
B. Chiao-chi Railroad			
1. Chin-ling-chen to Ch'ing-tao (Shantung)			
Coal	1,300,000	(a)	1% of supply (J,M & K) or 11% of deficit (Japan)
Iron ore	175,000	(55%fe)	2% of supply (J,M & K)
Aluminous shale	240,000		24-29% of requirement (J,M & K)
Cotton	20,000		17% of supply (Japan)
Hides and leather	3,000		14% of supply (Japan)
Oil seeds and oil	12,000		6% of supply (Japan)
Total	1,750,000		
2. Port of Ch'ing-tao (Shantung)			
Coal	As under B-1		As under B-1
Aluminous shale	"		"
Agricultural products	"		"
Pig iron	100,000		2% of supply (J,M & K)
Salt	125,000		6-8% of supply (Japan)
Total	1,800,000		

(a) An unknown portion of this coal, perhaps 800,000 tons, is high grade coking quality. This amount would be 38% of present requirements for such coal in the Japanese Islands.

Table 2 (continued)

Commodity	Export Freight or Cargo Tonnage	Share of Estimated 1944 Supply or Requirements (Japan, Manchuria & Korea)
C. Lung-hai Railroad		
1. Chao-tun to Hai-chow (Kiangsu)		
Coal (high grade coking)	800,000	38% of requirement (Japan)[2] or 1% of supply (J,M & K)[2] or 7% of deficit (Japan)[2]
Iron ore	150,000 (50%fe)	1% of supply (J,M & K)
Cotton	10,000	9% of supply (Japan)
Hides and leather	2,000	9% of supply (Japan)
Oil seeds and oil	11,000	5% of supply (Japan)
Total	973,000	
2. Port of Lien-yun-kang (Kiangsu)		
Coal	As under C-1	As under C-1
Iron ore	"	"
Agricultural products	"	"
Phosphate rock	80,000	30% of supply (Japan)
Salt	150,000	7-9% of supply (Japan)
Total	1,203,000	

Table 3 indicates the estimated 1944 export freight flow over various sections of all major North China railroads[1]. Since movements of iron ore and coal (for coke) to blast furnaces, and of coal to ports for ships bunker are directly related to export, they are included in tonnage estimates. OSS Map No. 5478 portrays this pattern of freight flow, as well as cargo shipping, in broad tonnage categories.

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1 Tonnage movements estimated for principal railroads lie within the range of one direction capacity estimates. See Table 15.

2 For all coal.

Table 3. Estimated 1944 Export Freight Movement in North China
(in thousand metric tons)

Section of Railroad	Coal	Iron Ore & Pig iron	Other Commodities*
Ta-t'ung-Hsuan-hua	1,000		20 (a)
Hsuan-hua-Nan-k'ou-Pei-p'ing) Hsuan-hua-Sha-cheng-Feng-t'ai)	1,000	1,865	20 (a)
Pei-p'ing-Jehol	200		
Pei-p'ing & Feng-t'ai-Tientsin	800	1,745	33 (a)
Tientsin-T'ang-ku	1,150	1,845	5 (a)
T'ang-ku-T'ang-shan	350	1,445	25 (b)
T'ang-shan-Ch'in-huang-tao	(4,150)**	1,420	150 (c)
	3,950		
Ch'in-huang-tao-Shan-hai-kwan, and north to Manchuria	2,350	1,420	150 (c)
T'ang-shan-T'ang-ku-South	300		
Ching-hsing-Shih-chia-chuang	650		
Shih-chia-chuang-Pei-p'ing	500		13 (a)
" -Te-hsien	150		18 (a)
Te-hsien-Tientsin	350	100	18 (a)
Li-ch'eng (Chi-nan)-Te-hsien	200	100	
Li-ch'eng-Chang-tien and Chin-ling-chen	300		35 (a)
Chang-tien & Chin-ling-chen to Ch'ing-tao	1,580	175	275 (d)
Lin-ch'eng-Li-ch'eng	500	100	
Tsao-chuang-Lin-ch'eng	700		
" -Chao-tun	1,000		
Lin-ch'eng-Li-kuo-i	200		
Li-kuo-i-Tung-shan	200	75	
Tung-shan-P'u-k'ou	200		
P'u-k'ou-Lin-ch'eng		100	
Han-tan-Tung-shan		75	23 (a)
Tung-shan-Chao-tun		150	23 (a)
Chao-tun-Hai-chou	1,000	150	23 (a)
Hai-chou-Lien-yun-kang	1,000	150	103 (e)

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* Estimated tonnages of agricultural products originating at various points are lumped and shown in one figure for an entire stretch of railroad.

** Represents previous estimate outdated by recent intelligence which suggests a 1944 export from Ch'in-huang-tao of only 1,400,000 tons, rather than 1,600,000 as shown on OSS Map No. 5478.

(a) Agricultural products

(b) Salt

(c) plus 120,000 tons of aluminous shale and 5,000 tons lead ore concentrate

(d) plus 240,000 tons of aluminous shale

(e) plus 80,000 tons of phosphate rock

II. Movement of Export Commodities from North China

A. Diversion from Ship to Rail Transport via Manchuria;

During the latter half of 1943 and 1944 shipping difficulties compelled the Japanese to increase the rail movement of goods out of North China to and through Manchuria in an attempt to compensate for greatly decreased shipments from coastal ports to Japan. It is probable that larger quantities of the two most important commodities thus affected, coal and iron ore, are being used to satisfy increased Manchurian and Korean requirements, while substitute quantities of coal and iron ore produced in eastern Manchuria and Korea, are now being exported to Japan, thus effecting a savings in both rolling stock and bottoms. However, considerable tonnages of North China exports may still be shipped to Japan from Korea after being railed through southern Manchuria, although information is not available to indicate the extent of this practice.

The major factor behind this transportation shift has been the increasingly tight position of Japanese shipping. So long as central Pacific operations require the movement of military supplies and so long as Japan continues her military position in and economic exploitation of southeast Asia, any damage to her shipping must be absorbed as much as possible in the increased use of land transportation on the continent.

A secondary but very important factor has been the submarine threat to shipping in the Yellow Sea. Submarine activity probably has not entered the Gulf of Chihli as the water there is too shallow. Nevertheless, bulk commodity shipping out of Ch'in-huang-tao and T'ang-ku to Japan & Korea

must pass out of the Gulf of Chihli into the Yellow Sea. Such shipping as continues to negotiate the Yellow Sea carries less cargo during a given time period due to the necessity for slow moving convoys, longer lay-overs in ports to avoid daylight departures, and the tendency of shipping to follow indirect coastal routes.

A third factor lying behind the diversion from ship to rail transport is Japan's increased dependence on coal and particularly iron ore from North China. Shipping shortages and air attacks have long since prevented any substantial export of Indochina coal and have greatly reduced the shipment of Malayan, Philippine and Yangtze valley iron ore to Japan proper. Consequently, Lung-yen iron ore, which has a higher ferrous content than that available in Manchuria, Korea or Japan, assumes a position of high priority, as does North China coal which represents the major supply of Japan's high grade coking coal.

There is very little intelligence on which to base estimates of the freight tonnages which actually are moving north on the Pei-p'ing-Liaoning Railroad via Shan-hai-kuan. The general argument outlined above suggests that the line is being used to the extent that available rolling stock will permit. That this is the case is supported by shipping observations which show a drastic curtailment in the cargo tonnages exported from North China ports.

A conservative estimate of one-way capacity on the Pei-p'ing-Liaoning line north of Ch'in-huang-tao is 4,320,000 tons per year.[1] However, numerous reports not yet verified

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1 See Part IV, Table 12.

by photographic cover, of double-tracking (perhaps signifying construction of numerous sidings and double bridges) may mean that its capacity has been considerably increased. Reports that "double-tracking" has been completed date as far back as July 1943. Since estimates of freight movement used in this study are based on observations of trains passing Shan-hai-kuan after that date, it is assumed that rail movement in late 1943 and 1944 was over a line of double-track capacity (or equivalent) and that it was and still is limited primarily by the availability of rolling stock.

The above mentioned train observations suggest that by December 1943 eight freight trains were moving north every day, each train having an average of 25 cars of about 40 tons freight capacity. The heavy net load of these trains, 1,000 tons each, may be accounted for by doubling locomotives and/or by a greatly reduced train speed. December traffic also included two north bound mixed passenger and general freight trains through Shan-hai-kuan each day. A Tientsin passenger train schedule for April 1944 shows five through trains to Manchuria per day, four of which are slow trains, and the fifth a fast passenger train. If, as is likely, these four slow trains carry mixed passenger and general freight cars, the April 1944 schedule indicates an addition of two such trains since December 1943. It is assumed that the four mixed trains include an average of eight freight cars of thirty tons capacity each.

It is believed that, to increase the north-bound movement of coal and iron, at least two additional all-freight trains per day (each 25 cars at 40 tons) or their

equivalent were added to the schedule in 1944[1]. This would give a total north-bound movement of 14 freight trains a day with capacities as follows:

		Combined Daily	Freight Capacity Annual
10	All-freight trains	10,000 tons	3,650,000 tons
4	Mixed freight & passenger trains	960 tons	350,400 tons
14	Freight trains	10,960 tons	4,000,400 tons

This count of freight trains would mean a 1944 rail movement of about 4,000,000 tons of coal, iron and general freight into and through Manchuria from North China.[2] A minor fraction of the tonnage may be accounted for by local freight. The following detailed freight movement by major commodities and raw material sources is suggested here. The total tonnages of coal and iron are consistent with the reported and projected count of train movements, and it is probable that pig iron is going north by rail. Some of the pig iron,

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1 A report of November 18, 1944, giving monthly statistics of railway freight tonnage in North China and Manchuria indicates a through freight flow at Shan-hai-kuan of about 9,000,000 tons in 1944. If the report has any reliability, it is very difficult to account for such a high figure. South-bound freight tonnage can hardly be more than a few hundred thousand tons annually, although the number of empty cars moving south should roughly equal those moving north. It may be that these statistics represent freight car capacities, rather than actual freight in transit. In that case, if it is assumed that freight capacity moving in each direction is roughly equal, this report shows that about 4,500,000 tons of freight moved north past Shan-hai-kuan during 1944.

2 It is believed that about 95% of through freight consists of coal, iron ore and pig iron -- commodities whose cubic weight would equal or exceed the rated cubic weight capacity of freight cars in use. North-bound freight cars on this line, therefore, are being used close to 100% of capacity.

coal or iron ore may be carried in the mixed freight trains and allowance for this has been made in the estimates below. The relative tonnages of coal from particular mines and other products by source is speculative and only suggested here.

Estimated Freight Movements on Pei-p'ing-Liaoning Railroad North to Manchuria - 1944

		Annually in Metric tons
Coal from:		
Ching-hsing	150,000	
K'ai-lan	2,000,000	
Ta-t'ung	200,000	2,350,000
Iron ore from:		
Lung-yen	960,000	
Ma-an-shan	100,000	1,060,000
Pig iron from:		
Hsuan-hua	155,000	
Shih-ching-shan	140,000	
T'ang-shan	62,000	357,000
T'ang-shan area aluminous shale and lead		125,000
Ch'ang-lu salt		25,000
TOTAL		3,917,000

Additional freight may be moving over the Pei-p'ing-Jehol Railroad into Manchuria. It is believed that this line was constructed primarily for military purposes and that its steep grade and sharp turns prevent its use for any large volume of freight. However, the line probably could handle two light freight trains a day, and it is assumed that Ta-t'ung coal was railed through Jehol at an annual rate of 200,000 tons in 1944.

B. Shipments from Major North China Ports.

Ground intelligence on shipments from Ch'in-huang-tao, T'ang-ku and Ch'ing-tao combined with the foregoing calculation of rail movements to Manchuria form the basis for 1944 estimates of exports from North China ports. It is concluded that shipments of all commodities from Ch'in-huang-tao, Tientsin-T'ang-ku, Ch'ing-tao and Lien-yun-kang during 1944 were about 6,000,000 tons. This represents a reduction of 54% below the annual rate of shipments estimated in late 1942 of 12,960,000 tons.[1]

The reduction in annual shipments by major categories of goods is shown as follows:

Commodity	1944 Estimate	1942-43 Estimate	Percentage Reduction
	(in thousand metric tons)		
Coal	4,300	9,250	54%
Iron ore and pig iron	650	2,010	68%
Salt & agricultural products	690	1,250	45%
Other minerals	325	450	28%
Total	5,965	12,960	54%

Allowance has been made in these estimates for some shipping by wooden vessels in addition to tonnages carried in larger steel ships.

1. Ch'in-huang-tao shipments

Shipments of coal from Ch'in-wang-tao in 1944 are estimated to have been about 1,400,000 tons. Some 25,000 tons of salt from the Ta-ching-ho field may also have been exported from this port. This total export is 73% less than the 1942 estimate of 5,100,000 tons out of Ch'in-huang-tao.

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1 Estimates made by FEA in 1942 and used by COA report on shipping in 1943.

Scattered reports of vessels calling at Ch'in-huang-tao indicate a great decrease in shipping at that port, but observations covering a consecutive period are not available. It is believed that all K'ai-lan coal that can be carried by rail is moving to and through Manchuria and that Ch'in-huang-tao shipments now consist of little else than the balance of K'ai-lan coal available for export. The volume of coal unloaded at Ch'in-huang-tao is clearly suggested by freight flow statistics for North China and Manchuria railroads covering the first nine months of 1944. The difference between through freight at Luan-hsien and Shan-hai-kuan (projected to annual figures) is exactly 1,400,000 tons, and can be explained only in terms of freight (probably K'ai-lan coal) unloaded at Ch'in-huang-tao. It is assumed that shipping was available to handle this amount of coal from Ch'in-huang-tao, although a portion of the tonnage may have been used for bunkering if coal from mines adjacent to the port was not sufficient for this purpose.

2. Tientsin-T'ang-ku shipments

Total shipments from Tientsin (T'ien-ching) and T'ang-ku to Japan are estimated to have been approximately 1,500,000 tons during 1944. This is a reduction of 60% below the 1942 estimate of 3,700,000 tons.

Coal exports are estimated at a 1944 rate of 800,000 tons, whereas they were reported close to an annual rate of 1,500,000 tons in mid-1943. Information that coal exports were down to a rate of 5-600,000 tons per year in 1944 are credited, but an allowance of 200,000 tons has been made for additional shipment by wooden vessel. The greater part of total coal exported probably is from the Ta-t'ung

mines, but as much as 1/4 of it may be brought from the Chung-hsing mines in Shantung.

Iron ore exports are reported to have fallen off sharply from an annual rate approaching 1,000,000 tons in mid-1943. However, it is believed that during 1944 such Lung-yen ore as could not be railed to Manchuria -- about 400,000 tons -- may have been shipped from Tientsin-T'ang-ku. Intelligence does not mention any shipments of pig iron from T'ang-ku.

Commodities are estimated to have been shipped from Tientsin-T'ang-ku to Japan during 1944 in the following amounts:

(in thousand metric tons)

Coal		
Chung-hsing mines	200	
Ta-t'ung mines	600	800
Iron ore - Lung-yen mines		400
Salt - Ch'ang-lu field		250
Manganese - P'ing-ku mine		5
Agricultural products		
Peanuts and/or oil	5	
Sesame seed and/or oil	2	
Cotton seed and/or oil	5	
Cotton (raw)	20	
Wool	12	
Hides and leather	7	51
		1,506 tons

3. Ch'ing-tao shipments

Shipments to Japan from Ch'ing-tao during 1944 may have been as high as 1,800,000 tons. This tonnage is only 24% below the annual rate of 2,350,000 tons estimated as being shipped in 1942-43. Ch'ing-tao exports would tend to suffer less than those from T'ang-ku and Ch'in-huang-tao, as large quantities of Shantung coal can be sent to Japan only by sea, in contrast to K'ai-lan and Ta-t'ung coal and Lung-yen ore,

which can be railed through Manchuria.

The above 1944 estimate is based largely on a report specifying the average number and size of vessels each month loading various commodities at particular wharves during the seven months preceding March 1944. All vessels cited, except for a number of junks carrying salt, were from 1,000 to 3,000 gross tons. Although not mentioned by the source, it is likely that small wooden vessels also are carrying coal and other goods from Ch'ing-tao to Japan.

Coal ships able to load 600,000 tons a year were said to be calling at wharf #5. However, the source also reports coal loaded from large stocks on wharf #3, but no vessels are specified. Therefore a shipment of 400,000 tons is allowed for wharf #3 and an additional 300,000 tons is allowed for possible wooden ship export.

The source reports loading of "bauxite" (aluminous shale) at the annual rate of 420,000 tons. This amount would have been abnormally high during 1944 in the light of supplies of bauxite still available to Japan from Binton Island and Malaya. However, previous estimates of 100,000 tons annually from Ch'ing-tao may have been low and a compromise figure of 240,000 tons of aluminous shale is adopted here.

Although the source does not mention any shipment of iron ore and pig iron, other reliable intelligence indicates that blast furnaces are operated at Ch'ing-tao. If estimated effective capacity operation has been attained, about 100,000 tons of pig iron were produced in 1944 for export to Japan. Estimates of various commodity shipments

from Ch'ing-tao to Japan during 1944 are as follows:

(in thousand metric tons)

Coal		
Chung-hsing mines	300	
Po-shan-Tzu-ch'uan mines	1,000	1,300
Pig iron - Ch'ing-tao		100
Salt		125
Aluminous shale - Po-shan area		240
Agricultural products		
Peanuts and/or oil	5	
Rapeseed and/or oil	1	
Sesame seed and/or oil	2	
Cotton seed and/or oil	4	
Cotton (raw)	20	
Hides and leather	3	35
		1,800 tons

4. Lien-yun-kang Shipments

Total shipments from Lien-yun-kang to Japan are estimated at a 1944 rate of about 1,200,000 tons. This figure is 30% below the 1942 estimate of 1,750,000 tons.

The figures for iron ore given below are based on arbitrary estimates of mine production. There is some information to support a lower coal shipment figure. However, 800,000 tons represent a considerable reduction in previous estimates and, in view of the good coking quality of Chung-hsing coal, it is thought to be reasonable.

Individual commodity shipments during 1944 from Lien-yun-kangto Japan are estimated as follows:

(in thousand metric tons)

Coal - Chung-hsing mines		800
Iron ore - Li-kuo-i mine		75
Hung-shan mine		75
Phosphate rock - Hai-chow		80
Salt - Huai-pei field		150
Agricultural products		
Peanuts and/or oil	5	
Rapeseed and/or oil	4	
Sesame seed and/or oil	1	
Cotton seed and/or oil	1	
Cotton (raw)	10	
Hides and leather	2	23
		1,203 tons

III. Production and Distribution of Export Raw Materials

A. Minerals and Metals

1. Coal

a. Total production, export and importance

It is estimated that in 1944 Japan, Korea and Manchuria imported about 6,850,000 tons of coal from North China. Approximately 36% of this amount was railed to and through Manchuria and the balance, 64%, was shipped from North China coastal ports to Japan. North China exports represented 7% of the total estimated 1944 coal supply of Japan, Manchuria and Korea, and over half of their total estimated 1944 coal deficit and imports. Most of the North China export coal is better suited for metallurgical coke than other coals produced in the Inner Zone, and contributes heavily to the coke oven requirements of Japan, Manchuria and Korea. The only other area in the Inner Zone with a surplus of high grade coking coal is Karafuto, exports of which are thought to range from 500,000 to 1,000,000 tons. Minimum requirements of high grade coking coal for present estimated rate of coke production[1] in the Japanese islands are about 2,100,000 tons (1,700,000 tons for metallurgical industry coke), so that exports of North China coal to Japan would have to be cut below 1,000,000 tons a year before production of pig iron in Japan could be affected. However, other consuming industries in Japan would suffer seriously from any curtailment of North China imports.

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1 - Assuming annual overall pig iron production of 6,000,000 tons, blast furnace output in Japanese islands of only 2,700,000 tons (35% of effective capacity), coke used for other industries at 800,000 tons, total coal requirements for coke in Japan are 6,300,000 tons. If the minimum mixing ratio of 1 part high-grade coking coal to two parts low grade coal is used, imports of the former should be 2,100,000 tons.

Manchuria has no coal for export unless North China coal is imported. Korean metallurgical coke must be made entirely with North China and/or Manchurian coking coal. If coal exports from North China to Korea and Manchuria were severed, it might be extremely difficult to supply blast furnace requirements in both Manchuria and Korea with the uncertain production of good coking coal in Manchuria.

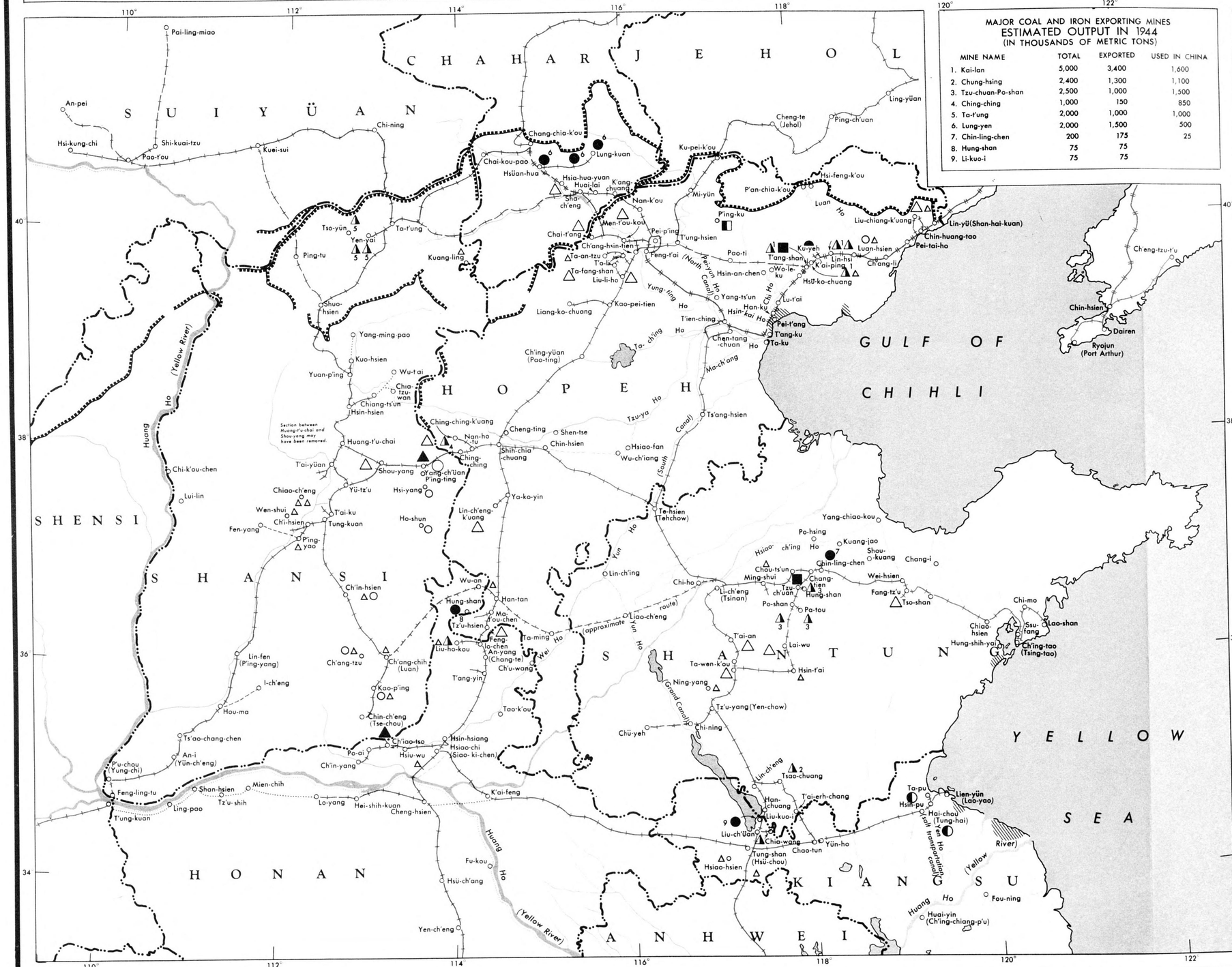
The mining of coal in North China has been affected both by scarcity of equipment and by difficulties of labor mobilization. However, a stringent rolling stock and shipping situation has been the governing limitation on Japan's use of North China coal. As a consequence, mine production has tended to decline in accordance with shipping possibilities, although the amount of coal mined for export still exceeds that which can be shipped.

The coal sent to Japan is drawn chiefly from five coal fields as shown in Table 4. These mines are indicated in the Mineral Resources Map accompanying this study. (see OSS Map No. 5423)

Table 4. Estimated 1944 Output North China Coal Mines Exporting Coal to Japan, Manchuria and Korea
(in thousand metric tons)

Mines	Province	Estimated 1944 Output	Sent to Japan Korea & Manchuria	Left for Use in China
K'ai-lan	Hopeh	5,000	3,400	1,600
Ching-hsing	"	1,000	150	850
Chung-hsing	Shantung	2,400	1,300	1,100
Po-shan-Tzu-chuan	"	2,500	1,000	1,500
Ta-t'ung	Shansi	2,000	1,000	1,000
Total		12,900	6,850	6,050

NORTH CHINA: MINERAL RESOURCES


CHAHARJEHOL
SUIYÜAN
HOPEH
SHENSI
SHANSI
HONAN
SHANTUNG
ANHWEI
KIANGSU
GULF OF CHIHLI
YELLOW SEA
Pai-ling-miao
An-pei
Hsi-kung-chi
Shi-kuai-tzu
Pao-t'ou
Kuei-sui
Chi-ning
Chang-chia-k'ou
Chai-kou-pao
Hsüan-hua
Lung-kuan
Ku-pei-k'ou
Cheng-te (Jehol)
Ping-ch'uan
Ling-yüan
Hsia-hua-yuan
Huai-lai
K'ang-chuang
Sha-ch'eng
Nan-k'ou
Mi-yün
P'an-chia-k'ou
Hsi-feng-k'ou
Luan Ho
Liu-chiang-k'uang
Lin-yü(Shan-hai-kuan)
Chin-huang-tao
Pei-tai-ho
P'ing-ku
Tso-yün
Yen-yai
Ta-t'ung
Ping-tu
Kuang-ling
Wen-t'ou-kou
Pei-p'ing
T'ung-hsien
Chai-t'ang
Ch'ang-hsin-tien
Ta-an-tzu
To-li
Ta-fang-shan
Liu-li-ho
Feng-t'ai
Pao-ti
T'ang-shan
Ku-yeh
Lin-hsi
K'ai-ping
Luan-hsien
Ch'ang-li
Wo-le-ku
Hsü-ko-chuang
Hsin-an-chen
Yung-ting Ho
(North China Canal)
Yang-ts'un
Chi Ho
Lu-t'ai
Han-ku
Hsin-kai Ho
Pei-t'ang
T'ang-ku
Ta-ku
Liang-ko-chuang
Kao-pei-tien
T'ien-ching
Chen-tang-chuan
Ho
Ch'eng-tzu-t'u
Chin-hsien
Dairen
Ryojun (Port Arthur)
Shua-t'hsien
Yang-ming-pao
Kuo-hsien
Yuan-p'ing
Wu-t'ai
Chia-tzu-wan
Chiang-ts'un
Hsin-hsien
Ch'ing-yüan (Pao-ting)
Ta-ch'ing
Ma-ch'ang
Ching-ching-k'uang
Huang-t'u-chai
Nan-ho-tu
Cheng-ting
Shen-tse
Chin-hsien
Shih-chia-chuang
Hsiao-fan
Wu-ch'iang
Tzu-ya Ho
(South Canal)
Ts'ang-hsien
Section between Huang-t'u-chai and Shou-yang may have been removed.
Chi-k'ou-chen
Lui-lin
T'ai-yüan
Shou-yang
Ch'ang-ch'üan
Ping-ting
Hsi-yang
Yü-tz'u
Chiao-ch'eng
Wen-shui
Chi-hsien
T'ai-ku
Tung-kuan
Fen-yang
Ping-yao
Ho-shun
Lin-ch'eng-k'uang
Ya-ko-yin
Te-hsien (Tehchow)
Yang-chiao-kou
Po-hsing
Kuang-jao
Shou-kuang
Chin-ling-chen
Chang-i
Hsiao-ch'ing Ho
Chou-ts'un
Ming-shui
Tou-ch'uan
Chang-hsien
Hung-shan
Wei-hsien
Fang-tz'u
Tso-shan
Chi-mo
Lao-shan
Ssu-tang
Ch'ing-tao (Tsing-tao)
Chiao-hsien
Hung-shih-yai
Li-ch'eng (Tsinan)
Po-shan
Pa-tou
T'ai-an
Lai-wu
Hsin-t'ai
Ta-wen-k'ou
Ning-yang
Tz'u-yang (Yen-chow)
Chi-ning
Chü-yeh
Grand Canal
Lun Ho
Lin-ch'ing
Chi-ho
Liao-ch'eng route (approximate)
Wu-an
Hung-shan
Han-tan
Mo-t'ou-chen
T'z'u-hsien
Feng-lo-chen
An-yang (Chang-te)
Ch'u-wang
Ta-ming
Wei Ho
T'ang-yin
Tao-k'ou
Liu-ho-kou
Ch'ang-tzu
Ch'ang-chih (Luan)
Kao-p'ing
Chin-ch'eng (Tse-chou)
Lin-fen (Ping-yang)
I-ch'eng
Hou-ma
Ts'ao-chang-chen
Hsin-hsiang
Hsiao-chi
Siao-ki-chen)
Ch'iao-tso
Hsiu-wu
Po-ai
Ch'in-yang
An-i (Yün-ch'eng)
Pu-chou (Yung-chi)
Feng-ling-tu
Shan-hsien
Mien-chih
Tz'u-shih
T'ung-kuan
Ling-pao
Lo-yang
Hei-shih-kuan
Cheng-hsien
K'ai-feng
Huang Ho
(Yellow River)
Fu-kou
Hsü-ch'ang
Yen-ch'eng
Huai-yin (Ch'ing-chiang-p'u)
Fou-ning
Yün-ho
Tung-shan (Hsü-chou)
Hsiao-hsien
Liu-ch'üan
Chia-wang
Chao-tun
Han-chuang
Liu-kuo-i
T'ai-erh-chang
Tsao-chuang
Lin-ch'eng
Ta-pu
Hsin-pu
Lien-yün (Lao-yao)
Hai-chou (Tung-hai)
Grand transportation canal
Yen Ho
Yellow River
Huang Ho
Huang Ho
Huang Ho

In addition to the above mines there are a large number of mines, some of considerable size, which probably do not send coal to Japan, either because their coals lack certain qualities demanded by the Japanese or because their location is less favorable for export. However, some of these mines are very important in the Japanese war economy in North China. Their locations are shown on the Map of Mineral Resources accompanying this study and their estimated output for 1944 in shown in Table 5. (see OSS Map 5423) Field intelligence may show that their output in some cases is exported to supplement or substitute for the exports indicated in Table 1.

Table 5. Estimated 1944 Output of Non-exporting Coal Mines of North China
(in thousand metric tons)

Mines	Province	Estimated 1944 Output	
Cheng-feng	Hopeh	400	
T'zu-hsien	"	200	
Liu-chiang	"	300	
Ch'ang-ch'eng	"	50	
Men-t'ou-kou	"	100	
Chai-t'ang	"	100	
Others	"	850	
Total			2,000
Chang-ch'iu	Shantung	170	
Hua-feng	"	170	
Hua-pao	"	150	
Fang-tzu	"	50	
Others	"	1,060	
Total			1,600
Chung-fu	Honan	1,000	
Liu-ho-kou	"	400	
Others	"	100	
Total			1,500
Liu-ch'uan	Kiangsu		300
Chi-ming-shan	Chahar	70	
Hua-feng	"	10	
Hua-yuan	"	15	
Hou-feng	"	55	
Others	"	270	
Total			400

Table 5 (continued)

Mine	Province	Estimated 1944 Output	
Yang-ch'uan	Shansi	500	
Shou-yang	"	300	
Hsi-shan	"	175	
Tai-yang	"	160	
Fu-chia-t'un	"	30	
Hsiao-i	"	30	
Other	"	805	
Total			2,000
Total, Non-exporting mines			7,700
Total, Exporting mines			12,900
Total, North China			20,600

b. K'ai-lan Coal mines

The largest and most important coal mines in North China are those of the former K'ai-lan Mining Administration located along the Pei-p'ing-Liaoning Railroad from T'ang-shan to Lin-hsi in eastern Hopeh. The mines produce a good quality coking coal which is mixed with lower grade coals in Manchuria and Japan to make a metallurgical coke for the iron and steel industry of the Inner Zone. The mining area is very favorably located to export coal via the ports of Ch'in-huang-tao and T'ang-ku and by rail to Manchuria, Korea and Japan. There are four important mines, each connected with the main line of the Pei-p'ing-Liaoning Railroad by spur lines. A fifth mine, Ma-chia-kou, was abandoned before 1936, and in spite of reported Japanese efforts to resume production, is not believed to be operating on any large scale.

Reports on total annual production at the K'ai-lan mines have ranged from 4 to 7 millions tons, and it is believed that output in 1942 may have approached the higher figure. However, known difficulties in the repair and

maintenance of mining equipment, a scarcity of lubricants, and physical limitations on rail and water shipping tend to substantiate a declining production rate. It is estimated that a 1944 output of about 5,000,000 tons was produced as follows:

Chao-ko-chuang mine	2,600,000 tons
Lin-hsi mine	1,000,000 tons
T'ang-chia-chuang mine	800,000 tons
T'ang-shan mine	600,000 tons
Total	5,000,000 tons

About 3,400,000 tons, or 68% of the total K'ai-lan output, were thought to have been exported in 1944. It is believed that all K'ai-lan export coal moves north over the Pei-p'ing-Liaoning Railroad; about 40% is sent to Ch'in-huang-tao for shipment to Japan and the remaining 60% continues by rail to Manchuria. Some of this 60% may be shipped through to Korea and Japan, but available intelligence does not indicate the extent to which this practice is followed.

The 1,600,000 tons of K'ai-lan coal left in China may be stockpiled to an extent at the mines, or distributed somewhat as follows: ship bunkering at Ch'in-huang-tao -- 200,000 tons[1]; railroads -- 300,000 tons; industrial use in T'ang-shan area -- 600,000 tons; T'ang-ku-Tientsin industrial use -- 300,000 tons.

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1 Recent intelligence suggests that only 1,400,000 tons were sent to Ch'in-huang-tao in 1944. If 200,000 tons of this were used for bunkering, exports would be 1,200,000 tons instead of 1,400,000 tons as estimated above. On the other hand, bunker coal might be secured from minor K'ai-lan mines near Liu-chiang-k'uang, in which case the entire 1,400,000 tons could be exported.

c. Ching-hsing coal mines

The Ching-hsing mines are located on a spur of the Cheng-t'ai (T'ai-yuan) Railroad between Shih-chia-chuang and the Hopeh-Shansi border. (The name Ching-ching is sometimes used for the mines.) Past production records and current intelligence indicate a 1944 output of 600,000 tons to 1,000,000 tons. The high coking quality of the coal and several reports argue that much of the produce is sent to Manchuria and Japan, but the present difficulty in shipping coal of similar quality from mines much nearer the coast makes it doubtful that Ching-hsing exports are large. It is assumed that not more than 150,000 tons were exported in 1944 and that this went to Manchuria, Korea or Japan via the Shih-Te Railroad to Te-hsien (Shantung), then north by the Tientsin-P'u-k'ou Railroad to Tientsin and finally north eastward via the Pei-p'ing-Liaoning Railroad. The Ching-hsing mines provide the most convenient source of good coking coal for the blast furnaces at Shih-ching-shan and Hsuan-hua. It is thought that as much as 500,000 tons annually may go north to these plants over the Pei-p'ing-Han-kou and the Pei-p'ing-Sui-yuan Railroads. Some of this coal probably is processed in the coke ovens at Shih-chia-chuang.

d. Chung-hsing coal mines

The Chung-hsing coal mines, located at or near Tsao-chuang in I-hsien, southern Shantung, constitute one of three mining areas most important to the Japanese in North China. This importance is due to the volume of good coking coal produced at the mines, and to their convenient location for export. The mines have direct rail connections

with the T'ientsin-P'u-k'ou Railroad at Lin-ch'eng and with the Lung-hai Railroad at Chao-tun.

Reports of recent production vary widely, but a reasonable compromise estimate of 2,400,000 tons in 1944 is accepted here. Output approached an annual rate of 2,000,000 tons in 1940-41 and subsequent Japanese efforts to increase production have been strenuous. High shipping priorities for this coal have probably made it possible to continue the 1940-41 rate of export, and it is assumed that about 1,300,000 tons, slightly more than half of the total production, is sent to Japan.

Reports that roughly 1,000,000 tons a year of Chung-hsing coal were moving in 1943-44 to Lien-yun-kang and 1,000,000 tons north on the Tientsin-P'u-k'ou Railroad lend strength to the following suggested allocation of shipments. It is probable that 800,000 tons, or 60% of Chung-hsing export coal, is railed to the nearest port, Lien-yun-kang, and shipped to Japan. (An additional 200,000 tons may go to Lien-yun-kang annually for ship bunkering.) Shipping schedules together with better port and railroad facilities to the north may make it desirable to send as much as 500,000 tons a year to Japan via Ch'ing-tao and T'ang-ku. This tonnage would go north over the Tientsin-P'u-k'ou Railroad to Li-ch'eng (Tsinan), where 300,000 tons is assumed to move eastward over the Chiao-chi Railroad to Ch'ing-tao and 200,000 tons may continue north to T'ang-ku. Since the Chung-hsing mines are the nearest known source of coking coal for blast furnaces at Ma-an-shan in Anhwei, it is estimated that about 200,000 tons a year go south over the Tientsin-P'u-k'ou Railroad to P'u-k'ou on the Yangtze

River to meet the requirements of these furnaces.

e. The Po-shan-Tzu-ch'üan coal mines

The Po-shan-Tzu-chuan coal field covers the two hsien (counties) of Po-shan and Tzu-chüan in central Shantung and is one of three fields most important to the Japanese in North China. It is second only to the K'ai-lan field in volume of production, of which a substantial portion is good coking coal, and it is conveniently located for export. A branch line linking Po-shan and Tzu-chüan connects with the Chiao-chi Railroad at Chang-tien.

Several reports indicate that the total 1944 production of the field was in the neighborhood of 2,500,000 tons. This output represents a considerable reduction below previous estimates, but approximates the production achieved in 1937 (miscellaneous smaller mines excluded). However, it is difficult to justify even this estimate, for it is not believed that shipment from Ch'ing-tao to Japan could have accounted for more than 1,000,000 tons. Only 180,000 tons can be allocated to coke production at Ch'ing-tao, while bunkering needs at that port can be met partly from near-by mines and may draw no more than 100,000 tons from the Po-shan-Tzu-chüan mines. It is not likely that power and railroad requirements in Shantung could have consumed the remaining 1,220,000 tons in 1944. In 1945, however, the operation of a large alumina plant near Chang-tien may require a considerable production of coal in the Po-shan-Tzu-chüan area, even though shipments of coal decline further.

f. The Ta-t'ung coal mines

The Ta-t'ung mines are located west of the city of

Ta-t'ung in northern Shansi, and have rail connections with the Pei-p'ing-Suiyuan Railroad. The product is a good bituminous coal noted for its high B.T.U. content, but for coking purposes it must be mixed with high grade coking coal.

Intelligence is lacking on which to base a reliable estimate of current production. However, the generally accepted estimate of 2,000,000 tons a year seems possible for 1944 in view of (1) a 1936 production of 1,500,000 tons; (2) the reported operation of a coal liquification plant near Ta-t'ung; (3) increased requirements for electric power at Ta-t'ung and Hsia-hua-yuan (Chahar); (4) increased rail capacity from Sha-ch'eng to Feng-t'ai and (5) numerous reports of intensive Japanese exploitation at Ta-t'ung.

It is believed that rail capacity and shipping may have been able to handle Ta-t'ung coal exports of about 1,000,000 tons during 1944. This tonnage moves to Pei-p'ing via the Pei-p'ing-Suiyuan Railroad and/or to Feng-tai via the Sha-ch'eng-Men-t'ou-kou cutoff line. The new Pei-p'ing-Jehol Railroad may be able to carry as much as 200,000 tons of this coal annually to Manchuria. From Feng-tai the remaining 800,000 tons is railed over the Pei-p'ing-Liaoning Railroad to T'ang-ku where some 600,000 tons is assumed to have been shipped to Japan. The balance of 200,000 tons or more probably continued over the Pei-p'ing-Liaoning Railroad into Manchuria.

2. Iron Ore and Pig Iron

a. Total production, export and importance.

Production of pig iron and steel in the Inner Zone is severly limited by the availability of iron ore. Total

production of pig iron is now believed to be at an annual rate of 5-6,000,000 tons, over half of which takes place on the mainland. For purposes of this study, the ferrous content of iron ore used in all Japanese controlled blast furnaces is conservatively estimated at 6,500,000 tons annually.

Ore production in North China has been developed intensively, chiefly at the Lung-yen mines, in an attempt to meet the overall shortage. (See OSS Map No. 3423.) It is estimated that iron ore and pig iron shipments from North China in 1944 represented about 19% of the total annual Japanese ferrous content supply. Actual ore production in North China is greater than shipments and includes Shansi ore consumed locally (about 1% of total Japanese supply), as well as a possible excess of production over shipment at Lung-yen. Total production of iron ore in North China is believed to be at a current annual rate of at least 2,600,000 tons, which, in terms of ferrous content, represents 63% of the ore available to the Japanese from all Occupied China (exclusive of Hainan).

Reports indicate that the Japanese have made moderate progress in the construction of small blast furnaces in North China. Although the successful operation of these furnaces is questionable, it is assumed for purposes of estimate that they are being used to effective capacity. The total effective annual capacity of those furnaces believed to have been constructed in North China is estimated as 450,000 tons. At this rate, about 36% of the ore produced in North China for export is smelted and shipped as pig iron. Thus, a savings of 18% is effected in freight and cargo

tonnage.

Table 6 indicates estimated 1944 production of major North China iron mines and the export of their output as pig iron or iron ore.

Table 6. Production and Utilization of Iron Ore of Major North China Mines 1944 Estimate (in thousand metric tons)

Mine	Output	Smelted Locally	Exported as Ore	Exported as Pig
Lung-yen	2,000	640	1,360	340
Kuyeh	50	50	-	15
Chin-ling-chen	200	175	-	95
Hung-shan	75	-	75	-
Li-kuo-i	75	-	75	-
Ma-an-shan*	-	-	100*	-
	2,400	865	1,600	450

* Produced in the Yangtze River valley but assumed to be railed through North China.

b. Lung-yen iron mines

These mines are located in Chahar between Lung-kuan and Hsuan-hua on a spur line of the Pei-p'ing-Suiyuan Railroad. Exploitation of four or five mining areas is reported underway. Recent detailed information indicates a 1944 production rate of at least 3,000,000 tons[1]. The metallic

1 A 1943 "Report on the Lung-yen Iron Mines", prepared for the Commission of Reconstruction of the Refugee Chahar Provincial Government, provides the following details: Exports from Lungyen during the 18 months from April 1941 through September 1942 totaled 900,000 tons. The Pang-chia-p'u mining area was opened in the spring of 1942 and was producing 700 tons a day by December 1942. A great production increase during 1943 was made possible by the use of pneumatic drills, completion in December 1942 of an overhead cable at Pang-chia-p'u (5,000 tons daily capacity) and introduction of electric power from the Hsia-hua-yuan plant in January 1943. Output, presumably by mid-1943, had reached a daily figure of 2,500 tons at Pang-chia-p'u and 3,000 tons at Yen-tung-shan.
A daily production of 5,000 tons at Yen-tung-shan is made plausible by the fact that this mining area must have reached about 2,300 tons a day by September 1942 if the reported export is correct. If, as seems likely, output at Pang-chia-p'u continued to increase in 1943 up to the capacity of

content of this ore, 1,080,000 tons (average ferrous content 54%) represents about 17% of the total iron content of ore estimated as available to Japan from all areas in 1944.

More than 600,000 tons of Lung-yen ore may be used in blast furnaces at Hsuan-hua, Shih-ching-shan and T'ang-shan for the production of 350,000 tons of pig iron[2]. As there are no known steel furnaces and rolling mills in North China other than those in Shansi Province, all 350,000 tons of pig is believed exported to Japan. At present it is thought to be moving through Manchuria over the Pei-p'ing-Liaoning Railroad, since there are no reports of any pig iron shipments from Tientsin-T'ang-ku.

The balance of the Lung-yen iron ore, 1,400,000 tons, is exported to Japan, Manchuria, or Korea. This ore is thought to move over the Pei-p'ing-Suiyuan Railroad and/or via a possible new cut-off line from Sha-ch'eng to Shih-ching-shan[3] into the Pei-p'ing-Feng-t'ai area and on to Tientsin. It is believed that about 1,000,000 tons then move over the Pei-p'ing-Liaoning Railroad through Manchuria, while about 400,000 tons probably is still being shipped from T'ang-ku.

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1 (continued from preceding page) of the overhead cable, a total Lung-yen production of about 3,000,000 tons in 1944 is reasonable. This estimate makes no allowance for possible production at additional newly exploited mining areas.
Commercial intercepts of October 1944 reveal an annual production rate at Lungyen of 3,700,000 tons. Further confirmation of this is required but, even if correct, it is doubtful that shipments out of North China can be maintained at the same rate as production.

2 Assuming an effective capacity of 85% of maximum rated capacity of blast furnaces.

3 Evidence is still contradictory regarding the completion of the cut-off line from Sha-ch'eng to Shih-ching-shan. Since

Effective capacity operation of the blast furnaces at Hsuan-hua would require 290,000 tons of Lung-yen iron ore to produce 155,000 tons of pig iron[1] which would be railed via the Pei-p'ing-Liaoning Railroad through Manchuria.

If the blast furnaces at Shih-ching-shan (outside Pei-p'ing) are able to operate at effective capacity, 260,000 tons of Lung-yen ore are used there to produce 140,000 tons of pig iron[2] which then moves through Manchuria over the Pei-p'ing-Liaoning Railroad.

c. Kuyeh mines

Blast furnaces have been erected at T'ang-shan in northeast Hopeh to smelt iron ore from new mines near Kuyeh. It is reported that these mines are producing only small quantities of 30% ferrous content ore. Even if the Kuyeh mines can produce about 50,000 tons, approximately 87,000 tons of Lung-yen ore will have to be railed to T'ang-shan for an effective capacity furnace production of 62,000 tons of pig iron there[3]. This pig iron can then move through

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3(continued from preceding page) the capacity of the Pei-p'ing-Suiyuan Railroad in the Nan-k'ou Pass stretch is so low, it would seem that on the Sha-ch'eng cut-off hangs the whole issue of whether 3 million tons of freight a year (2 million tons of iron ore and pig and 1 million tons of coal) can be moved into the Pei-p'ing area. However, if photographic cover shows conclusively that such a cut-off does not exist, other possibilities for a heavy freight movement should be investigated. Through freight tonnages at Shan-hai-kuan and Lung-yen mine production reports both indicate a freight flow to the coast and on to Manchuria that can be explained only by an alternative to or a great improvement in the Nan-k'ou Pass bottleneck.

1 Assuming 15 blast furnaces of 20 tons capacity each and 2 furnaces of 100 tons each.
2 Assuming 10 blast furnaces of 20 tons capacity each and 1 furnace of 250 tons capacity
3 Assuming 10 blast furnaces of 20 tons capacity each.

Manchuria on the Pei-p'ing-Liaoning Railroad.

d. Chin-ling-chen iron mines

These mines are located in Shantung at Tieh-shan, some four miles north of the railroad from Li-ch'eng to Ch'ing-tao (Chiao-chi Railroad). They are the principal source of iron ore in Shantung Province and are said to have produced as much as 200,000 tons annually before the war (average ferrous content 55%). The only intelligence available indicates production at the rate of 180,000 tons per year in the fall of 1942. Announced Japanese intentions have been to smelt this ore in blast furnaces at Ching-tao and recent air photos show that two furnaces have been erected there. The estimated effective capacity of these furnaces is 96,000 tons per year[1], and capacity operation would require 175,000 tons of ore. It is assumed, therefore, that current annual production at Chin-ling-chen is about 200,000 tons. Cargo space from Ch'ing-tao would be very difficult to obtain for any ore produced in excess of furnace requirements.

e. Hung-shan iron mine

This mine is located in Wu-an-hsien in northern Honan and was newly opened by the Japanese in early 1944. Production of only 8,000 tons was anticipated for 1944, but it may have increased to an annual rate of 75,000 tons by the end of 1944. The ferrous content of the ore is not known. The mine is near spur lines which connect with the P'ing-Han Railroad and the ore can be railed north via Pei-p'ing and T'ang-ku to Manchuria, via Shih-chia-chuang and Li-ch'eng to Ch'ing-tao for shipment, or via K'ai-feng on the Lung-hai

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1 Assuming one blast furnace of 250 tons and one of 60 tons capacity.

Railroad to Lien-yun for shipment. As the latter route is most expedient, it is assumed in this study. However, if a projected railroad connecting Han-tan and Li-ch'eng is completed, the ore will probably be routed over this line and on to Ch'ing-tao for shipment.

f. Li-kuo-i iron mine

The Li-kuo-i iron mine is located near the town of the same name on the Tientsin-P'u-k'ou Railroad just inside the northern border of Kiangsu. This mine is being actively exploited by the Japanese. Information regarding the extent of exploitation is not available and the irregular deposits are not suited to large scale mining. However, a 1944 production of 75,000 tons (50% ferrous content) should be possible and is assumed. This ore is being railed south to Tung-shan and thence via the Lung-hai Railroad to Lien-yun-kang for shipment.

g. Ma-an-shan iron mines

Although these mines are located on the Yangtze River in Anhwei (outside the area of this study), there are reports that some of the ore produced is being sent north by rail from P'u-k'ou. Available photo cover fails to show any large rail movements of ore, but observation of ore shipments down the Yangtze do not account for all of the 1,500,000 tons believed produced in the Yangtze valley. For the time being, therefore, the reports of rail movement of iron ore are credited and it is assumed that a possible 100,000 tons of Ma-an-shan ore were railed to Manchuria from P'u-k'ou via Tientsin in 1944.

3. Aluminous Shales. The impending loss of bauxite from Bintan Island in the East Indies, on which the Japanese have depended for a major portion of their alumina requirements, has forced them to rely on aluminous clays and shales of a higher silica content located in the Inner Zone.

Commercial processes for the reduction of alumina from aluminous shales have been developed and there has been some production by these methods in both Germany and Japan. It is probable that the so-called Ancor (lime-sinter-soda-leach) process, for part of which equipment in cement plants is suitable, is being used by the Japanese to process aluminous shales.

The best quality aluminous shales exist in areas of bituminous coal deposits in North China, Korea, and Manchuria. Reports indicate that two well-known shale areas in North China are being actively exploited. The first is near T'ang-shan in the K'ai-lan coal mining area of eastern Hopeh and the second is in the Po-shan-Chang-tien coal mining area of central Shantung. Reliable intelligence regarding the scale of operations in these areas is lacking, but it is estimated that in 1944 the Japanese may have obtained 360,000 tons of shale from North China or from 36% to 44% of their current annual alumina requirements. [1] Some of this, of course, may have represented stockpiling. Numerous reports indicate that aluminous shale is being processed by a large new plant at Chang-tien and by the Chee Hsin Cement plant at T'ang-shan. If the reports are correct, it is likely that in both places equipment for the complete Ancor process has been installed, and that the alumina produced is shipped to aluminum plants in Japan, Manchuria, or Korea. The intermediate sinter (aluminous

1 An alumina content of 50% (effective extraction-40%) is used in computing the contribution of North China shales, although portions of these deposits register an alumina content ranging as high as 71%. Current estimates of Japanese annual alumina requirements range from 330,000 tons to 400,000 tons.

shale and lime stone), which a cement plant could produce, is 2.4 times heavier than the original shale and would hardly be shipped. However, it is not certain that the Chang-tien plant has started operation or that the Chee Hsin cement plant began the reduction of alumina before late 1944. Therefore, the bulk of aluminous shale mined in Shantung and Hopeh in 1944 probably was shipped as shale. If, in 1945, this shale can be reduced to alumina in Ancor process plants in North China, the weight to be shipped would be only 40% of that of the shale mined.

About one-third (120,000 tons) of the aluminous shale shipped out of North China in 1944 is thought to have been dug from the T'ang-shan area deposits in Hopeh. This shale probably is exported via the Pei-p'ing-Liao-ning Railroad to or through Manchuria. The Po-shan-Chang-tien deposits are estimated to have yielded 240,000 tons of shale in 1944, all of which would move over the Chiao-Chi railroad to Ch'ing-tao and then by ship to Korea or Japan. Shipment of shale from Ch'ing-tao at an annual rate of over 400,000 tons has been reported but, until it is substantiated, this high figure is not accepted.

4. Manganese Ore. The Japanese have developed a manganese ore deposit near P'ing-ku-hsien in northern Hopeh, with an estimated output of 5,000 tons of ore per year. This quantity constitutes only a minor fraction, 2-5%, of estimated annual Japanese supply. As Japanese stocks are large, the North China manganese production is of little consequence.

During the summer and fall this ore could be sent in small boats down the Peh-t'ang River and so to T'ang-ku for export to Japan. However, during the dry season, winter and spring, a cart- or truck-haul of 40 to 50 miles would be

required before the ore could reach the head of navigation at or near Hsia-ts'ang-chen.

5. Lead. The Japanese have recently been exploiting a lead deposit close to Chao-ke-chuang in the K'ai-lan mining area. The reports of production vary widely from what seems the most reasonable estimate of 5,000 metric tons of concentrated ore per year. Assuming that the ore concentrate contains 75% recoverable Pb, the above tonnage represents about 7% of Japanese estimated new supply in 1944. The lead probably goes to Dairen over the Pei-p'ing-Liao-ning Railroad.

6. Phosphate Rock. Japan's supply of phosphate rock, used chiefly as fertilizer, has been drastically reduced as a result of her loss of Nauru and other Mandated Islands and her difficulty in shipping that produced in Indochina. North China export is thought to be about 80,000 tons, or 30% of Japan's estimated current annual supply of 260,000 tons. Since deficiencies of phosphate fertilizers are not believed to have a quick effect upon crop production, it is not likely that shipping priorities would be given to increased production in North China.

There are only two known worked deposits of phosphate rock in North China area. One of these is at Mien-p'ing-shan, a few miles due south of the city of Tung-hai (Haichow) in Northern Kiangsu. Unexploited before Japanese occupation, the deposit has been worked by the Japanese since 1939. The deposit is reported to be of good grade and is presumably used for fertilizers. In 1943 the Japanese started the development of a second deposit near Hsin-pu, north of Tung-hai City. Annual production at both mines is estimated at 80,000 metric tons of ore, with a phosphorous content of 34%. The ore is taken over the Lung-Hai railroad

from Tung-hai to Lien-yun-kang for export to Japan.

7. Salt. Since 1939 North China has been one of the chief sources of supply for salt consumed in the Japanese Islands. Current reduced annual salt consumption for food and industrial uses in Japan is estimated at between 1,600,000 tons and 2,000,000 tons. Manchuria and the Japanese Islands can supply 70% of the maximum requirements and North China salt fields could easily have provided the remaining 30%, or 600,000 tons, in 1944. The necessity for shipping economy probably dictated that this amount and no more was exported from North China.

The major salt fields in North China are all located along the sea coast where the Chinese obtain their salt through the solar evaporation of sea-water. Practically no rail transport is required in the export of salt, for salt from those fields not located near large ports can be carried by coastal junks to the port of shipment. Table 7 below shows estimates of salt exports from major fields in 1944.

Table 7

Estimated 1944 Salt Exports to Japan from Major Fields in North China

Salt Field	Location	Estimated export (in metric tons)	Port of shipment	Share of current maximum consumption in Japan
Ta-ching-ho[a]	Hopeh-southwest edge of Luan River delta	25,000	Ch'in-huang-tao	1%
Ch'ang-lu	Hopeh-between T'ang-ku and Lu-tai	275,000[b]	T'ang-ku	14%
Ch'ing-tao	Shantung - South of Ch'ing-tao	125,000	Ch'ing-tao	6%
Yeu-tai	Shantung - near Yen-tai and Che-Foo	25,000	Ch'ing-tao	1%
Huai-pei	Kiangsu - South of Lieu-yun-Kang	150,000	Lieu-yun-Kang	8%
Total		600,000		30%

a Recently developed by Japanese.
b Some 25,000 tons of this may have been sent via the Pei-p'ing-Liaoning Railroad through Manchuria.

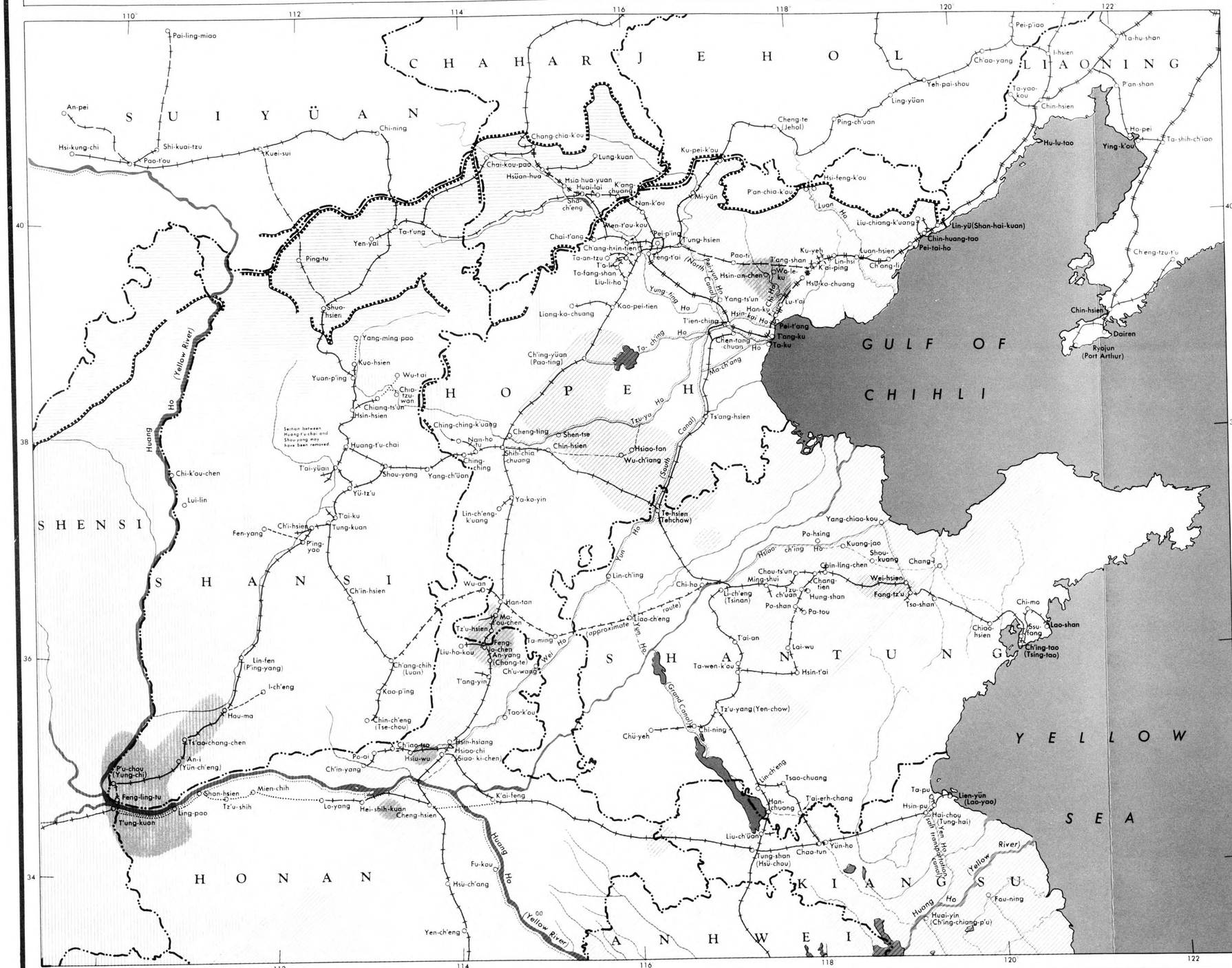
B. Agricultural Products.

1. Grains. North China is in the Winter Wheat-Kaoliang and Winter Wheat-Millet agricultural areas. Rice is only a minor crop in this region. (See OSS Map 5422) Prior to 1937 under normal conditions North China was not quite self-sufficient in grains and imported some rice and wheat flour. On account of climatic and political conditions North China's crops have been markedly below normal in recent years and the Japanese controlled market tops only a small part of the agricultural produce of the area. The Japanese have a more convenient source of wheat and other grains in Manchuria and a more abundant source of rice in Central China. It is not likely that they transport any appreciable amounts of grain out of North China, although, they do take large quantities of grain, especially wheat, to meet their military, civilian, and puppet needs in North China.

2. Oilseeds and Oils. The Japanese may be meeting a portion of their needs for vegetable fats and oils with imports from North China. The oils derived from peanuts, cottonseed, sesame, and rapeseed are valuable for food and industrial purposes and the seed cakes are useful as fertilizer. Cotton, peanuts, and sesame are grown all over North China, while rapeseed is largely confined to the southern portion of the area. (See OSS Map No. 5422)

The current normal annual consumption of vegetable oils for both food and industrial uses in Japan proper is estimated roughly at about 210,000 tons. It is believed that 35,000 tons, on 17% of this supply, could be secured from North China without difficulty. Little is known about Japanese home supply or about actual shipments from North China, but the above estimate is accepted as a possible 1944 export. The ~~loss of~~ some 30,000 tons of copra oil

NORTH CHINA: AGRICULTURAL AREAS



AGRICULTURAL AREAS

- Spring Wheat
- Winter Wheat-Millet
- Winter Wheat-Kaoliang
- Intensive Cotton Cultivation
- Intensive Peanut Cultivation
- Intensive Tobacco Cultivation

FROM: *Land Utilization in China*, by J. Lossing Buck, 1937.

(Agricultural areas are not shown north of the Great Wall, except in Shensi Province.)

RAILROADS

	Standard Gauge	Narrow Gauge
Double track		
Double track under construction		
Single track		
Single track under construction		
Destroyed		

- Navigable section of waterway
- Waterway under construction
- Provincial boundary
- Great Wall

0 50 100 150 MILES

0 50 100 150 KILOMETERS

RELIABILITY OF DATA

DATA	QUAN.	QUAL.	LOC.
RAILROADS	GR–I	GR–I	NE
NAVIGABLE WATERWAYS		GR–I	NE

Quantitative & Qualitative Data
R Reliable
GR Generally Reliable
U Unreliable
Coverage of Data
C Complete
I Incomplete
Location of Data
A Accurate
NE Not Entirely Accurate
OA Only Approx. Accurate

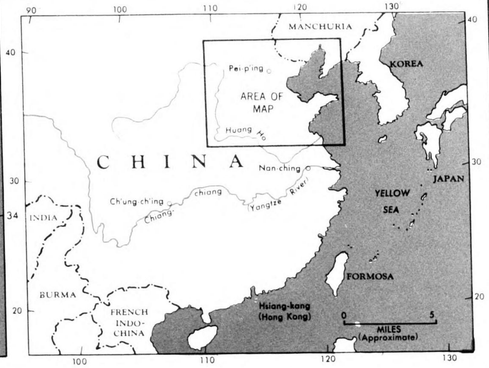
QUANTITATIVE DATA. The letters R, GR, and U are an estimate of the reliability of the map's quantitative data, the data which are measurable, including economic or population statistics, hypsometric data, the width of roads, gauges of railroads, etc.

QUALITATIVE DATA. The letters R, GR, and U are an estimate of the reliability of the map's qualitative data which shows the types of road surfaces, character of beaches, types of terrain, etc.

COVERAGE. The letters C and I in combination with R, GR, or U are an estimate of the degree of completeness of (un-)tabulative and qualitative data.

LOCATIONAL DATA. The letters A, NE, and OA are estimates of the plotted accuracy of data within the limits of scale and width of line.

R & A, OSS



NO. 5422–R & A, OSS
19 JANUARY 1945

LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

from the Philippines makes a vegetable oil export of this volume from North China all the more likely during 1945.

Part or all of the oilseeds and nuts could be pressed in North China before export, but since the residue may also be shipped for fertilizer, no allowance is made for weight variations. Allocation of shipments by commodity and ports is suggested in Table 8.

Table 8

Estimated Shipments of Oilseeds and Oil from North China to Japan, 1944
(in metric tons)

Commodity	From T'ang-ku	From Ch'ing-tao	From Lien-yun-kang	Total
Cottonseed	5,000	4,000	1,000	10,000
Peanuts	5,000	5,000	5,000	15,000
Rape-seed		1,000	4,000	5,000
Sesame	2,000	2,000	1,000	5,000
Totals	12,000	12,000	11,000	35,000
Share of Japan's home supply	6%	6%	5%	17%

3. Cotton. The Japanese have made strenuous efforts to maintain cotton production all over North China, but have not succeeded. The Chinese farmers have tended to decrease their planting of cotton because of their great need for food, especially when subject to the exactions of two contending armies, and because of their reluctance to accept low prices offered by the Japanese in terms of a steadily depreciating currency. It is probable that there has been a sharp decrease in cotton production in North China, as compared with pre-war output, and it is certain that the Japanese get only a portion of the cotton grown in North China.

However, cut off from major pre-war sources of raw cotton, the United States, British India, and Brazil, Japan is now almost completely dependent on Occupied China. Her present annual supply is estimated at 165,000 metric tons. North and Central China each provide about 75,000 tons of this, and it is probable that of the cotton acquired by the

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Japanese in each area, roughly one-third (25,000 tons) is milled in China for Japanese and puppet use. This leaves 115,000 tons of raw cotton available for use in the Japanese islands, of which North China may export 50,000 tons, or 43% of Japan's home supply.

Although cotton is widely grown over the whole North China area south of Pei-p'ing, the regions of more intensive cultivation are (1) the Central Hopeh region, (2) the Eastern Hopeh region, (3) the Northern Honan area: (a) around An-yang, (b) around Hsiu-wu, and (c) around Kung-hsien and (4) the Southwest Shansi area which extends across the Huang-ho into Northwestern Honan. (See OSS Map 5422)

Export cotton secured primarily from these regions may be shipped as follows: 20,000 tons or 17% of Japan's home supply from the port of T'ang-ku; 20,000 tons, or 17% of Japan's home supply from Ch'ing-tao; and 10,000 tons, or 8% of Japan's home supply, from Lien-yun-kang.

The T'ang-ku cotton would move out over three alternative routes: (a) north out of Hopeh over the Pei-ping-Han-kow Railroad to Feng-tai and then south over the Pei-ping-Liaoning Railroad to T'ang-ku; (b) east out of Central Hopeh on the Shih-Te Railroad to Te-hsien, Shantung, then north over the Tientsin-Pu-k'ou Railroad to Tientsin and finally south over the Pei-p'ing-Liaoning Railroad to T'ang-ku; (c) from Eastern Hopeh, southeast over the Pei-p'ing-Liaoning Railroad to T'ang-ku.

The Ch'ing-tao cotton would also move over three routes: (a) west from Central Hopeh over the Shih-Te Railroad to Te-hsien, then south over the Tientsin-P'u-k'ou Railroad to Li-ch'eng, Shantung, and finally east over the Chiao-Chi Railroad from Li-ch'eng to Ch'ing-tao; (b) from Western Shantung north over the Tientsin-P'u-k'ou Railroad to Li-ch'eng and then as above to Ch'ing-tao; and (c) from Shantung east of Li-ch'eng over the Chiao-Chi Railroad to Ch'ing-tao.

4. Wool and Hides. Two other agricultural products, wool and hides, which are of very considerable importance to Japan originate largely outside the occupied North China area but pass through it en route to ports.

The wool originates in Meng-chiang (Inner Mongolia) or beyond, from which it is transported over the

Pei-p'ing-Sui-yuan Railroad to Feng-t'ai and thence via the Pei-p'ing-Liaoning railroad to T'ang-ku and by ship to Japan. The wool export is estimated roughly at 12,000 metric tons a year, which is two-thirds of Japan's estimated annual supply.

Most of the hides also originate in the Meng-chiang area and are transported via the same route for export. However, a possible 40 percent of the hides may originate within North China to be shipped from the ports of Ch'ing-tao and Lien-yun-kang.

The total annual export of hides from North China is estimated roughly at 12,000 tons, or about 55% of the new supply thought to be available to Japan proper in 1944. The following allocation of export hides and/or leather by ports of shipment is suggested:

Port	Estimated export	Share of Japan's home supply
From T'ang-ku --	7,000 tons	32%
From Ch'ing-tao --	3,000 tons	14%
From Lien-yun-kang --	2,000 tons	9%
Total	12,000 tons	55%

IV. RAILROADS AND RAILROAD FACILITICS IN NORTH CHINA

A. Pattern of Railroads

The railroads of North China are arranged somewhat like a ladder, with three roughly parallel east-west trunk lines, intersecting three roughly parallel north-south trunk lines. These trunk lines are supplemented by branch and spur lines tapping mineral deposits, and by loop and cut-off lines connecting trunk railroads and providing alternate routes between main lines. The total railroad mileage in North China is in excess of 5,000 miles. OSS Map No. 5389 shows existing and projected lines. Recent information, however, indicates the number of major changes in the lines as shown on the map.[1]

(a) Double tracking of Pei-p'ing-Liaoning line. This line is single-track from Kai-p'ing to Ku-yeh, and from T'ang-shan south at least halfway to Tientsin.

(b) Men-t'ou-kou - Sha-ch'eng cut-off. Recent aerial photographs show a line turning northwest from Shih-ching-shan on the branch from Pei-p'ing to Men-t'ou-kou, and following the east bank of the Yung-ting-ho. For the six miles covered, this line appears in operation. Previous information had given the route of this cut-off as shown on the map and had indicated that it was in operation. Recent reports state that the line is not operating all the way between Pei-p'ing and the Pei-p'ing-Suiyuan line, and in the absence of complete air coverage, it is not possible to state conclusively whether or not the entire line exists.

(c) The pattern of lines around Pei-p'ing is somewhat different. There is no line from Ch'ang-hsien-tien to Shih-ching-shan; the Pei-p'ing-Han-kow line enters Pei-p'ing via Feng-t'ai, from which point one branch runs north to the Pei-p'ing northwest yards and another branch runs east and north to the East Station.

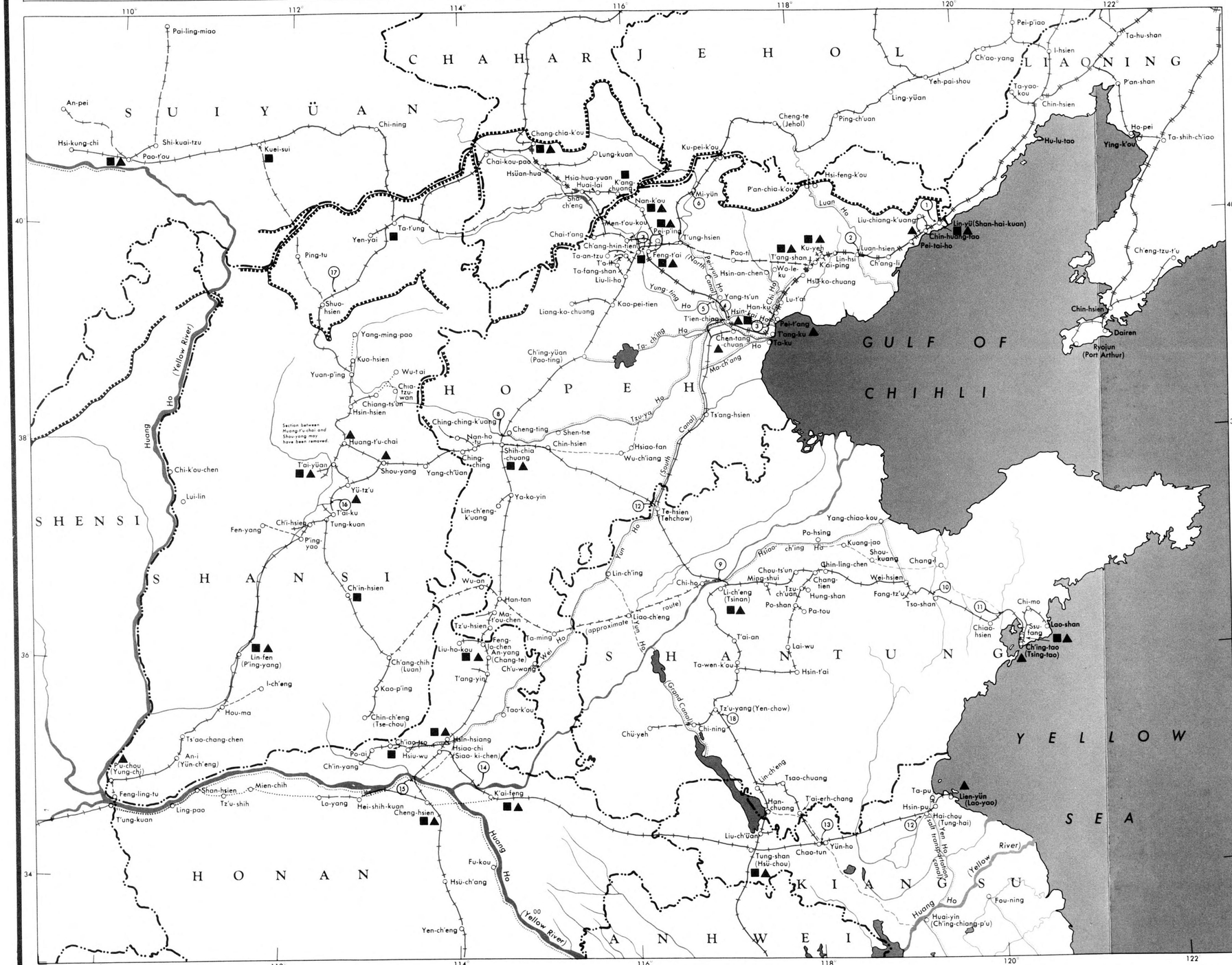
(d) The line from Kalgan (Chang-chia-k'ou) to Tolun is under construction.

(e) The Ta-t'ung-P'u-chou line is standard gauge from Ta-t'ung to T'ai-yuan, and narrow gauge from P'u-chou to Yu-tz'u. Between T'ai-yuan and Yu-tz'u there are two parallel lines--one standard and one narrow gauge. P'u-chou is the present southern terminus, but reports indicate that the section to Feng-ling-tu is being rebuilt. The line from T'ai-ku continues NNE to Yu-tz'u instead of northwest. The branch line running southeast from Tung-kuan terminates at Lu-an (Ch'ang-chih).

(f) The Han-tan - Wu-an branch of the Pei-p'ing-Hankow line reportedly turns south southwest at Wu-an and runs for about ten miles to a mine. There is no evidence of the extension of this branch from Wu-an to Lu-an, or eastward from Han-tan. (Footnote continued on next page)

NORTH CHINA: RAILROADS AND NAVIGABLE WATERWAYS

Data as of 1 October 1944



RAILROADS

Standard Gauge

- Double track
- Double track under construction
- Single track
- Single track under construction
- Destroyed

Narrow Gauge

- Single track
- Single track under construction
- Destroyed

- Railroad repair and workshop
- Classification or marshalling yard
- (2) Railroad bridge (numbers refer to text)

NAVIGABLE WATERWAYS

- Navigable section of waterway
- Waterway under construction

- Provincial boundary
- Great Wall

0 50 100 150 MILES

0 50 100 150 KILOMETERS

RELIABILITY OF DATA

DATA	QUAN	QUAL	LOC
RAILROADS	GR I	GR I	NE
RAILROAD SHOPS AND YARDS		GR I	NE
NAVIGABLE WATERWAYS		GR I	NE
BRIDGES		GR I	NE

Quantitative & Qualitative Data
R Reliable
GR Generally Reliable
U Unreliable
Coverage of Data
C Complete
I Incomplete
Location of Data
A Accurate
NE Not Entirely Accurate
OA Only Approx Accurate

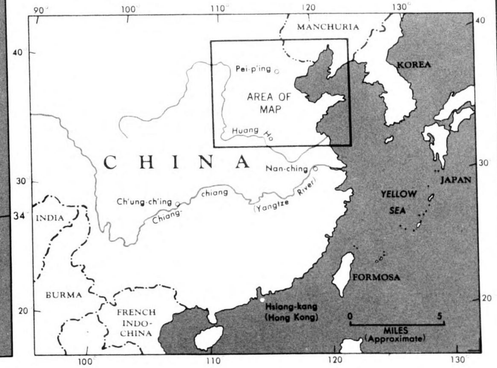
QUANTITATIVE DATA. The letters R, GR, and U are an estimate of the reliability of the map's quantitative data, the data which are measurable, including economic or population statistics, hypsometric data, the width of roads, gauges of railroads, etc.

QUALITATIVE DATA. The letters R, GR, and U are an estimate of the reliability of the map's qualitative data which shows the types of road surfaces, character of beaches, types of terrain, etc.

COVERAGE. The letters C and I in combination with R, GR, or U are an estimate of the degree of completeness of quantitative and qualitative data.

LOCATIONAL DATA. The letters A, NE, and OA are estimates of the plotted accuracy of data within the limits of scale and width of line.

R A, OSS



NO. 5389-R & A, OSS
19 JANUARY 1945

LITHOGRAPHED IN THE REPRODUCTION BRANCH, OSS

The railroads of north China fall into three categories:

(1) East-west trunk lines. These railroads are of primary importance as outlets for materials moving from the interior to the coastal area.

(2) North-south trunk lines. These railroads connect North China with Chahar, Jehol, and Manchuria to the north and with Central China to the south. They also provide connections between east-west lines, offering alternative routes between interior areas and ports.

(3) Stategic links which serve as connections, either main or alternate, between trunk lines.

Group (1) includes the following lines:

(a) Pei-p'ing-Liaoning Railroad (also called Pei-p'ing-Shan-hai-kuan, Pei-p'ing-Mukden and Peining).

(b) Tsinan (Li-ch'eng)-Ch'ing-tao Railroad (also called Chiao-Chi and Shantung Railroad).

(c) Lunghai Railroad.

(d) Shih-Te Railroad (also called Shih-men - Te-hsien, Shih-men -Te-chow, and Shih-chia-chuang-Te-hsien).

(e) Cheng-Tai Railroad (also called Cheng-ting - T'ai-yuan and Shih-chia-chuang - T'ai-yuan)

(f) Pei-p'ing-Suiyuan Railroad (also called Ping-sui, and King-pao).

(Footnote continued from preceding page):

(g) The Lung hai line has been rebuilt from K'ai-feng to Lo-yang.
(h) The branch line east of Ch'ing-tao on the Shantung peninsula has been abandoned.
(i) The Pei-p'ing-Suiyuan line has not been extended to Pai-ling-miao.

Group (2) includes the following lines:

(a) Tientsin-Pukow (T'ien-ching-Pu-k'ou) Railroad (also called Tsin-pu).

(b) Pei-p'ing-Han-k'ou Railroad (also called Ping-Han).

(c) Ta-t'ung - P'u-chou Railroad (also called Tung-pu)

(d) Pei-p'ing-Jehol Railroad (also called Pei-p'ing - Ku-pei-k'ou).

(e) Kalgan (Chang-chia-k'ou)- Jehol line, under construction.

B. Administration

The over-all supervision of rail lines in North China is in the hands of the North China Development Company, headed by Japanese (former South Manchurian Railway officials) with both Japanese and puppet Chinese personnel. Under this company is the North China Transport Company; and under this, in actual control of the operation and construction of railroads, is the North China Railway Company. To assist in the management of railroads, the Japanese have set up divisional control offices at Pei-p'ing, Li-ch'eng, Kalgan, Tientsin, T'ai-yuan, K'ai-feng, and Hsü-chou.

C. Track and Right-of-way

1. Under Chinese Operation. During the two years just preceding the Japanese invasion, the Chinese engaged in an extensive program of railroad rehabilitation. Due to political unrest, lack of funds, and inadequate centralized control, many lines were in a serious state of disrepair, with overaged ties and clogged ballast, battered rail ends, and worn fishplates. Bridges were often too weak to support heavy traffic. More than a million ties were replaced, signalling on the main lines was modernized, many bridges were strengthened or replaced by heavier structures, and new rolling stock was purchased. Many new lines were planned, but

the Japanese invasion put an end to the railroad rehabilitation and expansion program.

2. Under Japanese Control. When the Japanese seized the North China lines, many of them were in bad condition, some as the result of the circumstances outlined above, and others as the result of destruction by retreating Chinese. To facilitate their exploitation of North China resources and speed the flow of commodities and troops between the interior and the coast and between North China and Manchuria, the Japanese repaired these lines, built new strategic links, converted some lines from narrow to standard gauge, and built or extended feeder lines to tap resources. Service is being maintained with a fair degree of efficiency, but shortage of rails and equipment, sabotage, and Allied bombing continue to hamper operations and interrupt schedules.

a. Track and Gauge. Most of the railroad mileage of North China is single track. The chief lengths of double track are on the Pei-p'ing-Liaoning line between Pei-p'ing and T'ang-ku, and between Ku-yeh and Shan-hai-kwan. North China railroads are, for the most part, standard gauge (4'8½"). The only main line known to be narrow gauge at the present time is the Ta-t'ung - P'u-chou line from T'ai-yuan to P'u-chou and its branch from Tung-kuan to Lu-an.

b. Ballast. Details of ballasting on new lines are not available, but most Chinese-built railroads were ballasted with broken stone or gravel. The Tientsin-Pukow line is said to have kiln-made ballast on some sections, and the Lunghai line to have limestone between Hsu-chou and Lien-yun. Japanese-built lines are reported to be well-ballasted.

c. Ties. The Japanese have probably replaced most Chinese-laid ties. These were of Japanese or Australian

hardwood, with many of the recently laid ties of softwood from the Pacific Coast of the United States. Available information indicates that ties replaced by the Japanese are usually 8' x 9" x 6" of Japanese hardwood. Some steel ties and others of concrete are reported on the Shantung line.

d. Rails. Shortage of new rails has led to replacement from various sources, with lack of standardization as as the result. Most main lines seem to be equipped with 75 to 85 pound rails, although the Cheng-tai and Chiao-Chi lines are reported to have 60 pound rails. Lines reported to be heavy-rail throughout are the Pei-p'ing-Suiyuan, Pei-p'ing-Shan-hai-kuan, Lunghai, and Pinghan. The common rail connection is a four-hold fishplate.

e. Grades. With the exception of the Tientsin-Pukow and Li-ch'eng-Ch'ing-tao lines, both of which have maximum grades of 0.7%, ruling grades on railway lines in North China are in general about 1.0%. The steepest grades are on the lines which run northward from Pei-p'ing, the Pei-p'ing-Jehol and Pei-p'ing-Suiyuan Railroads. The latter line runs up to Ching-lung-chiao and switches back on ascending grades while entering the long Pataling tunnel. Maximum grade is 3.7%. The necessity for dividing trains into sections which were handled as separate trains on the switchback severely limited capacity of the line and prevented maximum use of rolling stock by holding up cars at the stations in the Nan-k'ou Pass. The Japanese are reported to have reduced grades at this point, (probably not increasing the efficiency of the switching operations more than 25%, due to the nature of the terrain which would prevent extensive improvements), and to have built a cut-off line from Sha-ch'eng, on the western side of the Pass,

southeastward to Shih-ching-shan on the Pei-p'ing-Men-t'ou-kou line, thus avoiding the steep grades at Ching-lung-chiao. The Pei-p'ing-Jehol line has grades up to 3.5%, a fact which so limits its capacity that it is of little value as an alternate route.

D. Rolling Stock

The Japanese captured some rolling stock from the Chinese, but most rolling stock in current use has been brought from Manchuria and Japan or manufactured or assembled in China since the invasion. The shortage of rolling stock, previously reported on main North China lines, appears to have been relieved at least temporarily, as extensive air coverage of these lines now suggests an over-all ratio of one locomotive to nineteen cars. According to another estimate there may be approximately 1,100 locomotives and 16,500 cars (1 to 15 ratio) now in use by the Japanese in North China.

At the beginning of 1937, the narrow gauge Tung-pu line had thirty-seven locomotives of 24½ tons, six locomotives of 20 tons, thirty-eight passenger cars, and about 500 freight cars, most of which were of 15-ton or 20-ton capacity. In February 1945, only 20 locomotives were still operating.

E. Railroad Workshops

Japanese sources in 1940 stated that as neither Japan nor Manchuria was in a position to meet all demands for rolling stock, the railroad workshops of North China must move toward self-sufficiency. Accordingly the North China Railway Car Manufacturing Company was organized for the purpose of promoting the manufacture of railway cars for North China lines, and was given control of the facilities of the shops at Ssu-fang and Shan-hai-kuan. Extensive improvements were made in the facilities of all major shops taken over from the

Chinese so the total capacity is now almost certainly larger than was the case under Chinese operation. Intelligence is lacking on the extent of this enlargement and modernization so that only a tentative estimate of capacity can be made. The most important shops, at T'ang-shan, Ch'ing-tao, Chang-hsin-tien, Shih-Chia-Chuang, and Nank'ou, are believed to have a combined capacity of around 800 major repairs per year. Reports of new locomotive construction at several of these shops cannot be confirmed, but must be given some credence in view of the facilities known to be available. Production of new locomotives is still centered in Manchuria. Major railroad workshops in North China are listed in Table 9.

Table 9. MAJOR RAILROAD WORKSHOPS IN NORTH CHINA - 1944

Location	Railway line	Annual capacity - major repairs	Remarks
T'ang-shan	Pei-p'ing-Liaoning	300	Manufactures parts and assembles locomotives. Construction of new locomotives also reported.
Ssu-fang	Li-ch'eng-Ch'ing-tao	200	Excellently situated for large-scale assembly operations since parts can easily be shipped in to Ch'ing-tao from Japan. Manufactures railroad cars and signal equipment.
Ch'ang-hsin-tien	Pei-p'ing-Han-kou	100-200	Acquired almost intact by Japanese and expanded. New locomotive construction reported.
Shih-chia-chuang	At junction of Pei-p'ing-Han-kou with lines to T'ai-yuan and To-hsien.	80-90	

Table 9 (Continued)

Location	Railway line	Annual capacity-major repairs	Remarks
Nan-k'ou	Pei-p'ing-Suiyuan	75 (on basis on pre-war capacity)	Reports of new locomotive construction
T'ai-yuan	Ta-t'ung-P'u-chou	Normal requirements of this and Cheng-Tai lines	Originally built as an arsenal but converted by Japanese to railroad use-Reports indicate possibility of new construction.
Shan-hai-kuan	Pei-p'ing-Liaoning		Manufactures freight cars and RR equipment-turntables, signals, switches, etc. Important as bridge works.
Mobile repair shop	Pei-p'ing-Han-k'ou and Lunghai		7 RR cars equipped with power plant and machinery capable of doing general repair work operate on southern section of Pei-ping-Hankow line and Lunghai line, with home station on a siding from the Lunghai at Shih-Li-P'u about 2 miles west of Chenghsien.

In addition to these shops with the locomotive sheds and roundhouses in their immediate vicinity, there are a large number of minor repair installations along the rail lines of North China. These vary considerably in importance,

but many of them, such as the shops at Hsu-chou, Tientsin, Kalgan, Li-ch'eng, Pao-t'ou, and Ta-t'ung, are probably used for substantial locomotive repairs. Facilities for minor repairs are located at P'u-chou, Lin-fen, Cheng-hsien, Te-hsien, K'ai-feng, Hsin-hsiang, and An-yang.

F. Marshalling-Yards

The main railroad yards are shown in the Table 10 below:

Table 10. CHIEF RAILROAD MARSHALLING YARDS IN NORTH CHINA

1944

Yards	Dimensions	Turntable (where known)	Other facilities
Tientsin			
E yards			
E section	2850' x 25 tracks	60', 85'	Freight car siding 900' x 9 tracks
W section	1100' x 18 tracks		8 track passenger siding
N station area	4000' x 17 tracks	85'	16 stall roundhouse
Pei-p'ing			
Pei-p'ing-Han-kou yards	1900' x 7 tracks		Roundhouse 170' x 50'
Pei-p'ing-Suiyuan yards	3600' x 1200'		
Pei-p'ing-Mukden yards	2680' x 9 tracks		
Feng-t'ai	3400' x 15 tracks		Storage yards 6200' x 24 tracks
Te-hsien	4300' x 15 tracks	65'	5 stall roundhouse
Li-ch'eng			
E yard	2700' x 8 tracks		
Main yard	3800' x 25 tracks	80'	25 stall roundhouse
Hsu-chou			
Tientsin-Pukow yards	3400' x 15 tracks	75', 60'	
Tientsin-Pukow-S yards	3800' x 22 tracks		
Lunghai yards	3600' x 8 tracks		
T'ai-ku	2100' x 9 tracks		
Ch'ing-tao			
Passenger yards	1575' x 6 tracks		
Freight yards	1000' x 10 tracks	60'	
Ssu-fang shops	2600' x 7 tracks		

Table 10 does not include sidings to docks, warehouses, repair shops, or station platforms and buildings.

G. Bridges:

Information on the rating of bridges in China is vague. It is known that a large number of locomotives in use have been transferred from Manchuria, and from this it can be assumed that the bridges have at least a Copper's E-35 rating.

The yellow river bridge presents a special case. The original bridge was destroyed by the Chinese in 1938 and was reconstructed by the Japanese during the spring of 1944. The reconstruction was hurried and of a temporary nature and is not able to take the weight of full trains. It is believed that most of the cars crossing on this bridge are uncoupled at each end of the bridge and move across in small groups by diesel-powered truck locomotives.

In planning the bridges on the Tung-pu line, a freight train E-25 (axial pressure 12.5 tons) was used as a basis for weight. Bridge construction was considered inferior, but the Japanese may have rectified such deficiences.

Spans and other steel work for the railway bridges of North China and Manchuria were fabricated at the Shanhaikuan Bridgework, the only shops in North China equipped to manufacture bridge structures.

Strategically located bridges are listed in Table 11.

Table 11. STRATEGIC RAILROAD BRIDGES IN NORTH CHINA - 1944

Bridge no.[a]	Across	Location	Discription
1.	Ta-shih Ho	Just SE of Shan-hai-kuan on Pei-p'ing-Liaoning line	1250', 12 spans of 100' each, one span of 50', double-tracked
2.	Luan Ho		
	a. Old Luan river bridge	Just E of Luan-hsien station	2174' long, 5-200' spans, 10-100' spans, 2 spans, app. 100'
	b. New Luan river bridge	About 150' N of old bridge	App. 2175' long. Single track, but wide enough for double track. Of steel without superstructure; stone and concrete piers.
3.	Peh-tang Ho	Just west of Han-ku	App. 545', 2 truss spans of 198', 1 trust span of 89', 1 girder span of 50'.

Between Pei-t'ang and Lu-t'ai there are 8 other bridges, ranging in length from app. 98' to 400'. It is reported

(Table 11 continued from preceding page)

Bridge no.	Across	Location	Description
		that the Japanese have built another the single track through truss steel Pei-t'ang.	bridge paralleling 400' bridge at
4.	Hsin K'ai Ho	Just N of Tientsin N station	420' long. Main bridge is 250' with 4 steel truss spans set on tall masonry piers and abutments, 2 on W bank, 2 in water, 2 on E bank. 2 half arch steel trestle approach spans 85' long lead onto bridge; deck is 25' wide; double-tracked
5.	Pei-yun Ho	14 miles NNW of Tientsin, near Yang-tsun	7 truss spans of app. 210' each. Concrete piers. Double-tracked
6.	Pei -yun Ho	SW of Mi-Yun	Probably of wood. App. 350', single track.
7.	Yung-ting Ho	Just N of Chang-hsin-tien	App. 1900' long, double-track
8.	Tsu-ya Ho	1.5 miles S of Chen-ting	1300' deck type, app. 15 spans
9.	Old Bed of Yellow river	4.4 miles NW of Li-ch'eng	About 4000' long. 9 Warren truss steel spans 295' with masonry or concrete abutments and 8 piers; 2-410' Warren steel truss; central span 540' modified cantilever with 90' superstructure at each end but no under structure below deck.
10.	Wei river	At Tso-shan	1 truss span app. 474'; 6 girder spans 97'; 3 girder spans 49'
11.	Ta-Ku Ho	39.1 miles W of Ch'ing-tao	623.3' long, 6 spans of 103.9' each, through plate girder type
12.	Hai-chou Ho	Just W of Tunghai	600' long, 6-100' steel spans
13.	Grand Canal	Just W of Yun-ho	500' long, 5-100' steel spans
14.	Old bed of Yellow river	5 miles NNW of K'ai-feng	Formerly 2200' long team span bridge. All but 140' have been filled in, forming an almost continuous embankment.

(Table 11 continued from preceding page)

Bridge no.[a]	Across	Location	Description
15.	Yellow river		96 spans averaging 95' in length; original bridge destroyed; bridge reconstructed on concrete filled screw piles
16.	Hsiao Ho	15 miles N of Tung-kwan	1200' long, 18-37' spans, 40-13' spans. (Line on which this bridge was located, is now abandoned)
17.	Shang-kang Ho	35 miles N of Ning-wu	750' long, beam-type, app. 20 spans (from photo cover). Chinese sources describe this bridge as a app. 1330' long, with 40-37' spans, steel I-beams.
18.	Shih-li river	2 miles NE of Ta-t'ung	2600' long, single track. 18 steel truss spans. on concrete piers

a Bridge numbers correspond with circled numbers on OSS Map No. 5389, with the exception of No. 18.

H. Capacity

As there is inadequate intelligence on the amount of double tracking, number of sidings, locomotive tractive effort, and bridge loadings, figures on capacity of lines in China can be only rough estimates. Present estimates are based on the amount of traffic under Chinese administration in 1936, estimated traffic under the Japanese in 1944, train counts from aerial photos of sections of the lines, known number of sidings and yard facilities, and concentrations of rolling stock at termini and stations along the lines.

The Pei-p'ing Liaoning line is probably the best-built line in China. Freight cars used are generally of 40-ton capacity; locomotives are chiefly heavy Mikados from the Manchuria lines. Capacity of the Pei-p'ing-Suiyuan line is limited by the switchback at Nan-k'ou Pass; trains must be divided into sections of four or five cars each and handled as separate trains. If the reported cut-off from Sha-ch'eng to Shih-ching-shan is actually in existence,

capacity would be greater. Trains in Central China, on the Tientsin-Pukow and Li-ch'eng Ch'ing-tao lines, usually have fewer cars than those on the Pei-p'ing Liaoning line, and use many freight cars of 20-ton capacity.

Table 12 indicates estimated 1944 capacities of principal North China lines under satisfactory conditions of operation (adequate rolling stock, freedom from bombing and sabotage, etc.)

Table 12. ESTIMATED CAPACITIES OF PRINCIPAL NORTH CHINA RAILROADS - 1944

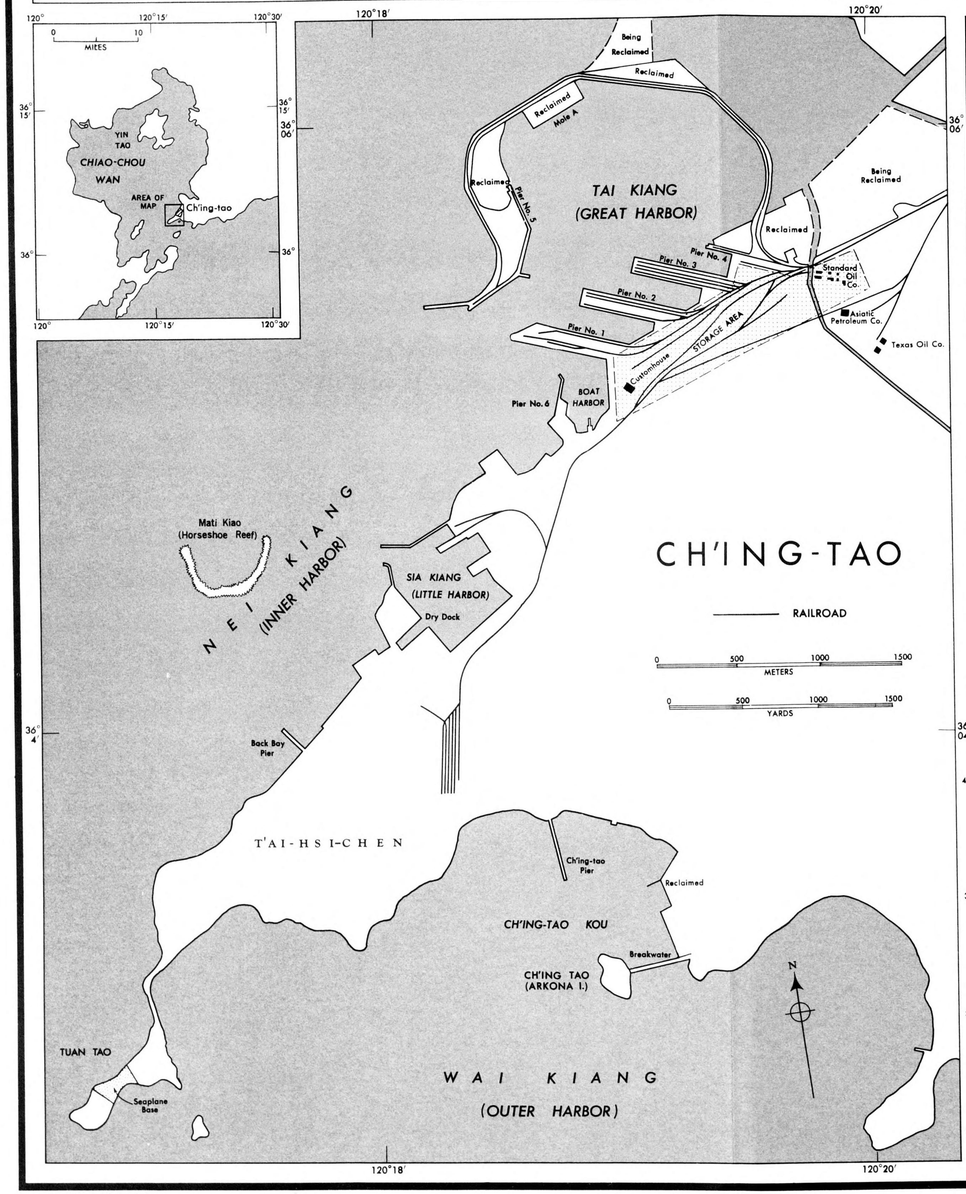
(tonnage figures represent maximum net load)

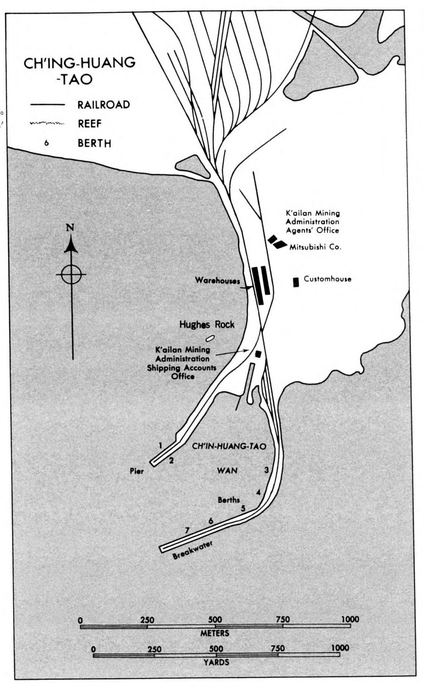
Railroad	Maximum 1-way capacity daily (in metric tons) Approximately	Maximum 1-way capacity annual (in metric tons) Approximately	Train equivalent
Pei-p'ing-Liaoning			
Pei-p'ing-T'ang-ku	25,000	9,000,000	30 trains per day one way, 875 tons per train.
T'ang-ku-T'ang-shan	10,500	3,780,000	12 trains per day one way, 875 tons per train.
T'ang-shan-Ch'in-huang-tao	25,000	9,000,000	30 trains per day one way, 875 tons per train.
Ch'in-huang-tao-Mukden	12,000	4,320,000	14 trains per day one way, 875 tons per train.
Pei-p'ing-Tehol	1,200	432,000	2 trains per day one way, 5-600 tons per train.
Pei-p'ing-Suiyuan			
Via Nan-k'ou Pass	3,750	1,350,000	6 trains per day one way, 600-650 tons per train.
or via Sha-ch'eng-Shih-ching-shan cut-off	5,600	2,000,000	8 trains per day one way, 700 tons per train
Total	9,350	3,350,000.	

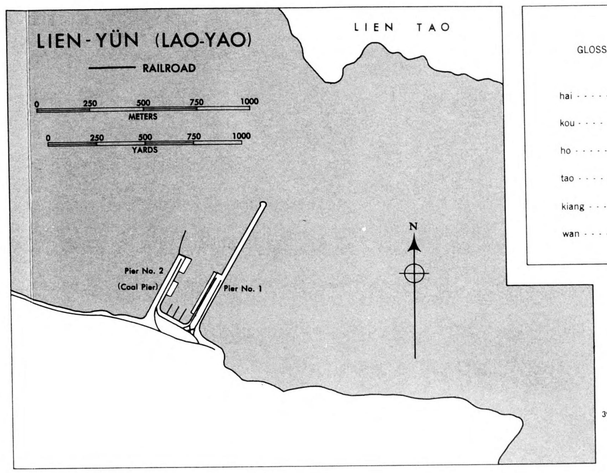
(Table 12 continued from preceding page)

Railroad	Maximum 1-way capacity (in metric tons) Approximately daily	annual	Train equivalent
Li-ch'eng-Ch'ing-tao	7,500	2,700,000	10 trains per day one way, 750 tons per train.
Tientsin-P'uk'ou	8,400	3,000,000	12 trains per day one way, 700 tons per train.
Lunghai	7,000	2,500,000	10 trains per day one way, 700 tons per train.

NORTH CHINA PORTS: HARBOR PLANS AND INSTALLATIONS







GLOSSARY

hai . . . . . sea
kou . . . . . harbor
ho . . . . . river
tao . . . . . island
kiang . . . . harbor
wan . . . . . bay

RELIABILITY OF DATA

DATA	QUAN.	QUAL.	LOC.
Ch'ing-tao			NE
Ch'in-huang-tao			NE
Lien-yün			NE
T'ien-ching			NE
Tang-ku & Taku			NE

Quantitative & Qualitative Data
R - Reliable
GR - Generally Reliable
U - Unreliable
Coverage of Data
C - Complete
I - Incomplete
Location of Data
A - Accurate
NE - Not Entirely Accurate
OA - Only Approx. Accurate

QUANTITATIVE DATA. The letters R, GR, and U are an estimate of the reliability of the map's quantitative data, the data which are measurable, including economic or population statistics, hypsometric data, the width of roads, gauges of railroads, etc.

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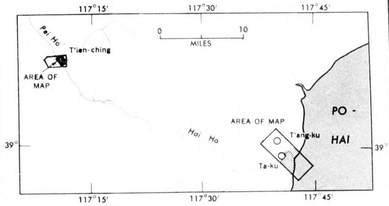
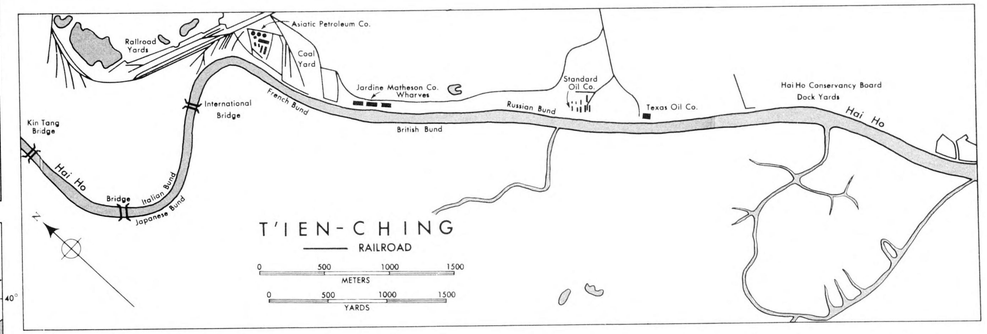
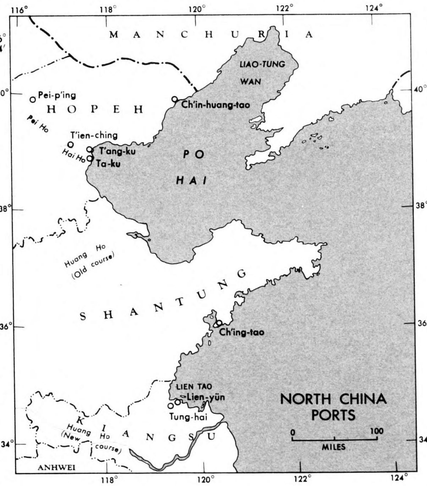
COVERAGE. The letters C and I in combination with R, GR, or U are an estimate of the degree of completeness of quantitative and qualitative data.

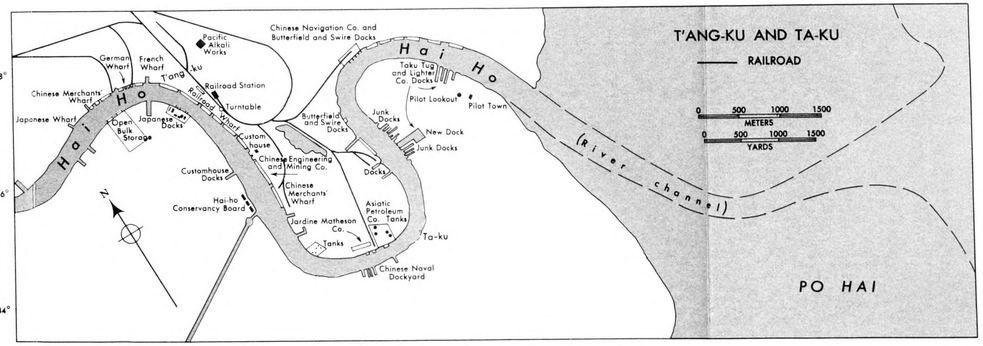
LOCATIONAL DATA. The letters A, NE, and OA are estimates of the plotted accuracy of data within the limits of scale and width of line.

R & A. OSS









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There is a moderate range in tides in the Ch'in-huang-tao area, the spring rise being 5½ feet.

The extent to which ice interferes with navigation in Ch'in-huang-tao road and vicinity is controlled by the temperature, state of the sea, duration, direction, and velocity of winds. The area around the breakwater and piers is non-navigable when the temperature falls below 5°F. In January and February, if the sea is calm for a week, ice from 6 to 8 inches thick forms and extends for a mile off shore. Northeast winds may bring considerable drift ice from the head of Liaotung-wan; easterly and southeasterly winds blow ice shoreward and pack it to a density seriously interfering with navigation. A powerful Kailan Mining Administration tugboat is used as an ice-breaker.

3. Port Facilities. All vessels load and discharge along the inner side of the breakwater or along both sides of the pier. Railroads serve these landing facilities. The pier, built of wood decking and piles, is approximately 1,150 feet long and 90 feet wide. The breakwater, approximately 2,550 feet in length and 120 feet wide has reinforced concrete decking and piles with steel rod bracing between. It provides a total of 2,000 feet berthage. A total of 7 berths (see Table 13) is available for vessels up to 600 feet, including 3 pier berths for ships of 10,000 tons.

Table 13

Ship Berths at Ch'in-huang-tao

Berth	Location	Dimensions	Depth Alongside
No. 1	N.W. side of outer end of pier	Length 400 feet	21 feet of water to a line 200 feet away from pier in N.W. direction and parallel to the pier
No. 2	S.E. side of outer end of pier	Length 400 feet	21 feet
No. 3	Beginning with No. 3 at shore end of breakwater berths located in a line extending to outer N.W. side of breakwater.	Berths from 300 to 420 feet in length	22 feet
No. 4			26 feet
No. 5			28 feet
No. 6			28 feet
No. 7			28 feet

A jetty 225 feet along extends in a south-southwestward direction from the western side of the marine railway at the head of the harbor. Boats can land at its eastern side at all stages of the tide.

Coal is loaded into railway cars by coolie labor, transported by train to the pier, and loaded into steamers manually. Three railway spurs, standard guage, run the length of the pier and breakwater. Sufficient sidings, which provide for a continuous supply of full cars, and unlimited coolie labor enable constant coaling.

Ample wharf lights make possible all-night operations. One 10-ton crane and 3 5-ton cranes on railway trucks have been reported. Two electrified locomotives, 20 to 30 steam locomotives, and 300 to 400 coal and freight cars were available in 1941. The control tower located in the south section of the railyards possesses a radio receiver and independent telephone and telegraph connections with T'ien-ching, as well as the telephone exchange for the area. This installation is vital to the operation of the

port because all rail traffic is controlled from here.

4. Storage Facilities. Storage space is available for 40,000 tons of cargo in 2 brick buildings with galvanized iron roofs about ½ mile from the harbor area. Coal stockpiles are located about ½ mile from the piers on either side of the railway yard.

5. Facilities for Repair and Servicing. Repair facilities in Ch'in-huang-tao are limited. At the head of the harbor is a marine railway about 120 feet by 30 feet which leads into a boat basin 325 feet long. There are 3 tracks spaced 10 feet apart, single rollers, and wood frames. The railway has probably been much improved in recent years. The Kailan Mining administration also maintains a few small machine shops.

B. The Hai Ho River Ports of T'ien-ching (Tientsin) and T'ang-ku

1. T'ien-ching.

a. Location. T'ien-ching is located in Hopeh Province at the junction of the Pei Ho (river), the Hai Ho, and the Grand Canal, about 36 miles by river from the Po Hai (sea). Two subsidiary outports near the Po Hai, T'ang-ku and Ta-ku, also serve T'ien-ching. (See OSS Map No. 5404)

b. Port Conditions. The Pei Ho is navigable for shallow draft and flat bottom boats from Tungchow, near Pei-p'ing, to T'ien-ching, where, after its junction with several streams, it flows to the Po Hai as the Hai Ho. At T'ien-ching the Hai Ho is about 300 feet wide. Throughout 1936, except for short intervals between January and March, vessels 315 feet long and drawing 13 feet were able to reach T'ien-ching. However, the Japanese vessel, the Nitiman Maru drawing 16 feet, successfully negotiated the passage in 1940. With few exceptions vessels are aground in T'ien-ching harbor at half tide. Elaborate conservancy schemes, including cuttings across the meanders of the Hai Ho as well as dredging, enable small oceangoing vessels to reach T'ien-ching. Skilled pilotage is needed and any interruption in dredging operations quickly renders the passage hazardous. The bank of the Hai Ho is sloping and often swampy. The maximum speed of the river at ebb tide is 3 to 4 knots. Because of the difficulty of the passage up to T'ien-ching some of the functions of that port have been relegated to the ports of T'ang-ku and Ta-ku downriver, a short distance from the mouth of the Hai Ho. Lighter service between T'ien-ching and these ports is maintained by means of 300 - 400 - ton steel lighters. This service, however, is reported to meet with many delays. In the winter ice breakers must be employed to keep the river open.

c. Port Facilities. The Hai Ho affords 7.1 miles of quay space throughout the center of the city. Three bunds, the former British Bund (4,600 feet in length), the former French Bund (2,000 feet in length), and the Japanese Bund (3,500 feet long), provide 38 berths alongside. The large amount of quay space in T'ien-ching facilitates the transshipment of goods between rail and river. Vessels up to 300 feet in length and of 12 foot draft can be accommodated. On the left bank of the river (going downstream), several concrete jetties about 125 feet apart will accommodate 300-foot vessels. There are at least 8 wharves belonging to private companies distributed along the river, of which the Jardine Matheson Wharves are probably the largest. These measure 3,600 feet in length and include 11 warehouses averaging 310 by 125 feet, a coal yard. They are serviced by one railroad spur. The Asiatic Petroleum Company wharves measure 1,700 feet in length. These wharves are active for supply and storage but the Japanese have dismantled the oil tanks. Of the Standard Vacuum Oil Company's oil-storage facilities only 2 large and 3 small tanks remain. The former Texas Oil Company's 2 large tanks (64,000 barrel capacity each), and 3 small tanks are still active in the storage and supply of oil along the river front.

d. Facilities for Servicing and Repair. The Hai Ho Conservany Board Dock Yards are located on the left bank of the river in the southeastern part of the city. Repairs not requiring drydocking are undertaken.

Facilities for stocking at least 100,000 tons of coal were maintained. This coal is loaded aboard ship by ships' gear and coolie labor. The rate of loading is at least 40 tons an hour. It is possible that loading facilities have been improved by the Japanese.

2. Ta-ku Roadstead and Ta-ku Bar. The control of the T'ien-ching harbor authorities extends from the ex-Austrian bridge in that city downstream to positions 3 miles eastward of the 12-foot curve of Ta-ku Bar near the entrance to the Hai Ho. Vessels too large to cross the bar and proceed up river 8 miles to T'ang-ku or 38 miles to T'ien-Ching, must anchor in Ta-ku Roadstead outside of Ta-ku Bar, and, in consequence, the area of Ta-ku Bar is a decisive factor in limiting the character of river traffic on the Hai Ho.

Ta-ku Bar consists of extensive mud flats that dry at low water, fronting the coast for a distance of 3 miles on either side of the Hai Ho entrance. The natural depths of Ta-ku Bar are subject to quick change, with silting being particularly heavy during the rainy season. A channel is maintained (1½ miles long) by dredging. In 1938 a minimum depth on the center line of 15 feet at average high water and 8 feet at low water was secured by dredging.

In Ta-ku Roadstead a depth of 24 feet over good holding ground is available in a position about 9 miles east-southeastward of the Hai Ho entrance.

3. T'ang-ku.

a Location. T'ang-ku is located about 30 miles down the Hai Ho from T'ien-ching and about 8 miles upstream from the Ta-ku Bar entrance channel. This city and the nearby small town of Ta-ku, located between T'ang-ku and the mouth of the Hai Ho, serve as a port and point of transshipment for the city of T'ien-ching. Lighterage service is maintained between this port and T'ien-ching.

b. Port Conditions. T'ang-ku can be entered by larger vessels than can go upriver to T'ien-ching. The maximum rate of ingoing tidal current at T'ang-ku is about 3 knots, and the maximum rate of the outgoing current is about 4 knots.

c. Port Facilities. Except for short sections there are wharves and other harbor works along the river front from T'ang-ku to the entrance of the Hai Ho. These have always been under the control of the Chinese Maritime Customs in T'ien-ching, and under the supervision of the T'ien-ching harbor master. The river frontage of the principal wharves is shown in Table 14.

Table 14

Wharves at T'ang-ku[a]

Names of wharves	Lengths (feet)	Depths alongside (feet)
Ta-ku Tug and Lighter Co.	600	8 (HW)
Naval Dockyard-Bund	650	15-18 foot vessels accommodated
Butterfield and Swire's Wharf	1,050	
Ch'i Shun Cement Co.	400	
Gardene Matheson & Co. Ltd.	1,000	
Asiatic Petroleum Co.	700	
China Merchants' Lower Wharf	1,200	
Kailan Mining Administration's Wharf	850	10(L.W.S.)
Railway Wharves	3,000	
Japanese Wharf	500	
French Wharf	500	
China Merchants Upper Wharf	1,400	

a Improvements in the harbor of Tangku to an unascertained degree have been made recently.

d. Facilities for Servicing and Repair. Repairs of all ordinary types are undertaken in T'ang-ku. Diving gear is available and tugs fitted with special pumps undertake salvage work within a radius of 300 miles.

Large stocks of coal are maintained at all times in this port.

Oil storage facilities are better developed here than in T'ien-ching. However, no modern fueling facilities are known to be located on the lower Hai Ho.

Light and power connections are available at some of the berths in T'ang-ku.

C. Ch'ing-tao (Tsingtao)

1. Location. Ch'ing-tao lies on the southern side of Shantung Peninsula at the entrance to Chiao-chou-wan (bay) on the Huang Hai (Yellow Sea). It has the best harbor and most extensive port facilities in North China. (See OSS Map No. 5404) Excellent rail connections with the interior serve the port.

The Ch'ing-tao Area Special Base Force of the China Seas Fleet, which has several divisions of gunboats for coastal patrol, is based at the port. Ch'ing-tao is also a refueling base for submarines, aircraft carriers, and smaller patrol vessels. It is probably used as a base for patrol vessels having missions similar to our Sea Frontier Commands.

2. Port Conditions. Ch'ing-tao harbor consists of two parts, Nei Kiang (the inner harbor) and Wai Kiang (the outer harbor), which lies immediately within the entrance of Kiachow-wan. Depths of the entrance range from 10 to 30 fathoms.

The inner harbor (Nei Kiang) lies immediately westward of the outer harbor and extends northeastward. It is divided into four sections:

a. Tai Kiang (the Great Harbor or Commercial Harbor) to the north is enclosed by a semicircular breakwater on the northern side; the southern side is protected by No. 1 Pier. Tai Kiang has an area of about one square mile and the outer portion has been dredged to a depth of 30 feet. Large ships berth here.

b. The Boat Harbor (Dock Harbor), directly south of the Tai Kiang, has an area of about 30 acres and is partly enclosed by No. 1 Pier to the north and the new Pier No. 6 to the south. A portion has been dredged to a depth of

14 feet and it is used as an anchorage for ships owned by the local government.

c. Sai Kiang (Little Harbor) south of Tai Kiang is an area enclosed by breakwaters with an entrance 310 feet wide between them. Small craft anchor in depths of 14 feet maintained by dredging.

d. The remaining offshore area comprises the fourth section. In general, breakwaters and natural features afford shelter from prevailing winds. During severe winter months, Kiaochow-wan is partially frozen over, but the ice is rarely so thick that large vessels are obstructed.

The depth of the water at lowest tide is 32 feet, at mean low tide 34 feet. At high tide, the water depth reaches 47 feet, the mean high tide being 43 feet. The range of the spring tides is 12½ feet and the mean tide range 9 feet.

3. Port Facilities. The principal commercial wharves are located in Tai Kiang. With the exception of wooden pier No. 3, all piers are of stone, faced with concrete piling to serve as fenders. Fifteen miles of railroad siding and 3 miles of narrow gauge siding connect all the piers with the main Shantung Railroad. One hundred and ten trolleys and 500 carts of various sizes also serve these piers.

In addition to the piers of Tai Kiang (summarized in Table 15) the following landing facilities are also available:

a. In Sai Kiang are minor wharves for small steamers and sailing craft, including 2 piers 335 feet and 270 feet long on the NE side of the basin. One of the piers in the northeastern side of the harbor is served by the railway system.

Table 15

Piers in Tai Kiang-Ch'ing-tao

Name	Dimensions	Low water depths alongside	Berthing	Storage	Railroads	Use	Equipment
Pier No. 1	1,780' x 465'	23' to 25'	4000' quay space for large vessels. 7 vessels of 2,000' tons.	Open storage shale and coal. 5 warehouses 170' x 125'. Storage shed 270' x 30' Building - 105' x 85'	2 spurs branching into 4 sidings	Military cargo. Coal bunkering	7 water hydrants 6 telephone connections for ships
Pier No. 2	1,570' x 315'	24' to 26'	3,500' quay space 46,000 to 7,000 ton vessels on S. side and W. end 3,000 to 10,000 ton vessels on N. side.	Loose storage on N. side of pier. 2 warehouses 300' x 135' 1 warehouse 410' x 135'	3 spurs	Regular coastal passenger and freight runs.	9 water hydrants 6 telephones.
Pier No. 3	1,350' x 210'	27'	3,400' quay space at pier and along shore	Loose storage-coal and charcoal.	4 spurs	Coal and charcoal bunkering	2 water hydrants.
Pier No. 4	510' x 85'	25'	510' quay space for large vessels.		1 spur	Loading and unloading oil, coal, salt and ore.	6 water hydrants. 100 - ton crane. Reported pipe-line to to adjacent oil storage facilities.

Table 15 (continued)

Name	Dimensions	Low water depths alongside	Berthing	Storage	Railroads	Use	Equipment
Mole A.	Mole: 1,050' x 420' Pier: 115'		Accessable only to small boats.	Loose storage several small buildings	railroad facilities		
Pier No. 5 (off mole)	Mole: 3,400' x 750' Pier: 270' x 25' Breakwater extending from S. end of mole: 550'	27'	2,900' quay space for large vessels 8 vessels of 6,000 tons.	Open storage: S. half of mole - coal N. half - loose storage 20 buildings from 210' x 20 to 40' x 20'.	numerous spurs	Military cargo coal bunkering	150-ton electric crane. 3 floating cranes. 35(steam). 32 and 5 ton cranes.
Pier No. 6 (new)	Mole: 2,400' x av. 525' Pier: 270' Pier: 105' Breakwater extending SW from end of mole: 1,530'		2,950' quay space for smaller vessels.	Loose storage. Salt in open drums. 4 buildings av. 70' x 20' 12 buildings av. 65' x 20' Many small buildings	Served by railroad	Coal salt	Inner portion of mole on S. occupied by repair facilities.

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b. On the west side of Taisichen penisula, there is the Back Bay pier 530 feet by 10 feet for small boats.

c. Directly south of the city and inside of Ch'ing-tao, (Arkona Island) is the concrete and granite Ch'ing-tao pier 1,130 feet by 10 feet, with a triangular head 170 feet by 85 feet. It has a depth of 7 feet alongside and is used only by small boats.

The harbor craft formerly consisted of seven tug boats, the largest being 280 tons, two 200-ton lighters, five 100-ton lighters, two 50-ton fuel barges, and two water barges of 50 and 150 tons respectively.

Oil storage facilities were located in the northern section of Ch'ing-tao, about 7,000 feet from the water front, and had the following pre-war capacities:

a. Cal-Tex Company- 4 gasoline tanks, total capacity 20,470 imperial barrels; 5 kerosene tanks, total capacity 30,140 imperial barrels; one lubricating oil storage tank; one dockline for refined oil, 8 inches in diameter and 1,375 feet long.

b. Standard-Vacuum Oil Company-2 gasoline tanks, total capacity 2,340 tons; 3 kerosene tanks, total capacity 7,500 tons.

c. Mitsubishi- 3 diesel fuel-oil tanks, total capacity 1,100 tons; 3 filling tanks, total capacity 400 tons; 2 gasoline tanks, total capacity 6,000 tons; one kerosene tank, total capacity 5,000 tons.

All tanks are connected with No. 3 Pier or No. 4 Pier, probably No. 4, by 2 pipes 6 and 8 inches in diameter. The delivery rate of gas and kerosene is estimated to be 60,000 and 100,000 gallons per hour.

In the storage area behind the piers there are 43 warehouses ranging from 350 feet by 105 feet to 125 feet by 65 feet, 25 warehouses ranging from 115 feet by 40 feet to 60 feet by 30 feet,

many small miscellaneous buildings and large quantities of loose stones and coal stockpiles. This area is served by numerous railroad spurs.

On the Asiatic Petroleum Company property are 10 warehouses ranging from 160 feet by 75 feet to 50 feet by 50 feet.; on the Standard Vacuum Oil Company 4 warehouses ranging from 195 feet x 90 feet to 95 feet by 40 feet, 15 storage buildings averaging 50 feet by 20 feet, and loose stones; on the Texas Oil Company are 5 warehouses ranging from 155 feet by 35 feet to 60 feet by 30 feet.

The Japanese were reported in 1942 to be blasting into solid granite to build raid-proof oil storage tanks on the northwest corner of the peninsula, south of the channel and entrance to the drydocks.

5. Facilities for Repair and Servicing. Ch'ing-tao dockyard is located on the SW side of Tai Kiang next to the naval base. The meager berthing arrangements consist of one small wooden wharf 160 feet by 15 feet with a T-head 105 feet by 20 feet suitable for one or two vessels up to 200 feet in length. Small vessels are also berthed by anchoring bow and stern adjacent to the shipyard. There is one stone drydock built of native granite which will take vessels up to 6,000 gross tons and 474 feet in length.

In addition to this drydock there are three marine railways which will take vessels of 400, 100, and 50 tons respectively.

No. 1 slipway -- 450 feet long and 26 feet wide, has a slip carriage of 120 feet by 20 feet, which will handle ships of 400 tons gross.

No. 2 slipway -- 70 feet long and 18 feet wide, which will handle vessels of 100 tons.

A graving dock is also reported about 550 feet long, which can handle ships of 2,500 tons.

D. Lien-yun-kang (Lao-yao or Hsü-kou)

1. Location and Importance. Lien-yun is situated at the eastern terminus of the east-west Lung-Hai Railway in Kiangsu Province, 20 miles by rail from the important inland city of Tung-hai (Hai-chou) on the Huang Hai (Yellow Sea). (See OSS Map No. 5404) It is reported that the Japanese plan to convert Lieu-yun into a naval harbor and that 50,000 laborers were sent there in 1944 to effect this development.

2. Port Conditions. The port of Lien-yun is protected by the island of Lien Tao which lies about one mile off shore and gives the harbor complete protection from typhoons on the Huang Hai. Some large vessels anchor outside the harbor off the southeastern extremity of this island although depths increase only gradually and at distances of 3½ miles are only 26 to 28 feet.

The basin of the artificial harbor of Lien-yun has been constructed in the channel between the mainland and the southeastern shore of Lien Tao, and measures over 3,200 feet in length and over 800 feet in width. It has been dredged throughout to depths of at least 10 to 17 feet below lowest low water but silting remains a serious problem. The range of the tide in the vicinity of Lieu-yun is about 14 feet. Tidal currents are strong and variable, particularly across the approach channel. The entrance channel was originally dredged to a width of 256 feet and a depth at low water of 12 to 18 feet. It passes close to the southeastern shore of Lien Tao. Only this entrance to the harbor is used and merchant ships must wait for the tide before entering or leaving the harbor. Tugs are maintained and vessels are ordinarily turned before berthing.

3. Port Facilities. Two large piers constitute the only

important berthage of Lao-yao. Pier Number 1 (east pier) 1,475 feet long and 197 feet wide, is served by 2 railroad spurs. Berthage is available only on the inner side where an offset extension exists about 15 feet from the pier with 10-17 feet of water available alongside. This extension parallels the pier and is about 1,150 feet long and 25 feet wide. Access from this extension to the pier is furnished by 16 passageways. General cargo is handled as well as bulk cargo. Recent aerial coverage shows a coal stockpile covering the outer one-third of the pier. Near the shore end are several small buildings but the large warehouse formerly used for storage has been destroyed along with 3 electric cranes. The outer end of the pier is joined to a breakwater that extends out 1,800 feet and shelters the harbor from the east.

Pier Number 2 (west pier) served by 2 railroad spurs, is also 1,475 feet long and 197 feet wide, with 10-17 feet of water alongside but the offset extension on its inner side is not continuous. Instead berthage is offered at two seperate wharves: the southernmost, connected to the pier by 4 passageways, is 415 feet long and 25 feet wide and additions are being made to this quayage; the outer wharf is 340 feet by 20 feet with 5 passageways. The pier has a modern coal-handling plant equipped with a mechanical car dumper, belt conveyors and a traveling ship-loader that can load 400 tons per hour. A breakwater 300 feet long has been added to the end of this pier. West of the basin, about 4,300 feet from pier No. 2, is a structure that may be the beginning of a third large pier. Aerial coverage shows grading and filling-in activity along the shore.

Small craft are accommodated at 3 small piers extending into the basin between the main piers. Their lengths are 210 feet, 155 feet, and 105 feet. Depths alongside are not known.

The estimated loading capacity of the port is 4,800 metric tons per day of bulk cargo.

Open storage space is available on Piers Nos. 1 and 2. A coal storage area extending 1,640 feet westward from the base of Pier No. 2 has a capacity of 160,000 tons. There is a warehouse 140 feet by 85 feet and 8 probable storage buildings ranging from 125 feet by 50 feet to 40 feet by 20 feet located along the shore between the two main piers.