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CHINESE RIVER PORTS

The Importance of Water Transport in China

(Introduction)

China has 10,000 km of coastal shipping lines and over 100,000 km of inland waterways, most of which are navigable the year round. Along most of these rivers the population is dense and production abundant. (40, No. 3005, 1956, p. 7)

Inland waterways in China have a combined length of more than 320,000 km, of which 100,000 km are navigable, including about 30,000 km for steam vessels. The most important waterways beginning at the north are the Hei-lung-chiang (Amur) and Sung-hua-chiang (Sungari), the Hai-ho (Hai River), Huang-ho (Yellow River), Huai-ho (Huai River), Ch'ang-chiang (Yang-tzu), the Ta-yun-ho (Grand Canal), Tung-t'ing-hu (Tung-t'ing Lake), Po-yang-hu (Po-yang Lake), and the Yueh-chiang (Yueh River) system including Hsi-chiang (West River) and Chu-chiang (Pearl River). (30, No. 7, 1956, p. 29) The southwest has a lack of navigable rivers. (37)

Most of China's rivers have abundant water and deep channels and do not freeze the year round, except rivers in the northern regions and parts of the central regions. (30, No. 7, 1956, p. 29) Marked changes of depth in the rainy and dry seasons, however, do affect shipping. (6, p. 85) Such seasonal changes of level run from 12 to 38 ft at ports along the lower Ch'ang-chiang and are one reason why Chinese river ports seldom have permanent wharves, but use pontoon landings instead. Stone river embankments are cut with long flights of steps in order to reach moored vessels at low water. (22)

The combined length of major inland steamer routes in China is 15,000 km, on which operate 2,618 power-driven ships with a total tonnage of 1,017,243. Routes and ports are maintained by 90 service steamers /probably including dredges and salvage vessels/ totaling 19,849 tons. (2, pp. chi* 31, 32) A later Chinese source gives 30,000 km as the total length of inland steamer routes. (29)

The ratio of freight carried by the chief mechanical means of transportation in China is shown in the table below. It does not give the total picture, however, since it excludes transportation by junks, carts and coolies. (5, p. 73)

	1950 %	1952 %	1954 %	1955 %	1957 %	(plan)
Rail	93.2	86.5	84.0	81.4	80.5	
River*	3.9	5.2	7.1	8.6	10.3	
Marine*	2.0	7.3	7.3	8.1	7.1	
Highway**	0.9	1.0	1.6	1.9	2.1	

*Excluding freight carried by junks

**Excluding freight carried by carts and coolies

*Chi is a Chinese alphabetical section of the book.

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The volume of freight moved by inland waterways, excluding junk routes, should rise 321.5% under the first Five-year Plan and reach 36,864,000 t by 1957, or 15,292,000,000 t/km. Passenger traffic is planned to rise 93.8% and total 56,040,000 persons; the goal is 3,408,000,000 passenger/kilometers, a rise of 78.7%. The volume of freight carried almost trebled in the first 3 years of the first Five-year Plan, 1953-55. (5, p. 83)

The combined length of major inland junk routes in China is 60,000 km, double that of steamer and barge routes. (2, pp. chi 31, 32) According to incomplete statistics, China's junks numbered over 294,000 in 1954 with a combined capacity of over 3,100,000 t. In 1954 junks carried 85% of all local freight on inland waterways, or about 70% of that year's total freight turnover. (29)

In East China, comprising Shan-tung, Chiang-su, Che-chiang, Fu-chien and An-hui Provinces, all types of transportation routes total over 40,000 km, averaging 5.7 km per 100 sq km of land area. Waterways in this region average 2.8 km per 100 sq km, highways 2.3 km and railroads 0.6 km. These figures considerably exceed the average for each type of transportation in China as a whole. (6, pp. 4, 246) East China's inland waterways total 19,200 km even without including certain routes for which data is not available, and carry more freight than either railroads or highways. (6, pp. 246, 247)

Freight moved on China's rivers increased from 4,504,000 t in 1950 to 28,050,000 t in 1955. In 1954 some 20,476,000 t were moved, of which 8,634,000 or 42% moved on two rivers, the Ch'ang-chiang and Sung-hua-chiang. The freight turnover by inland waterway rose from 1,677,000,000 t/km in 1950 to 10,800,000,000 t/km in 1955. By 1954 it totaled 7,891,000,000 t/km, of which 5,505,000,000 t/km or 69% was handled on the same two river systems. (5, p. 84) In 1952 private steamers carried 31.2% of the total freight volume for powered vessels. In 1954 nationalized corporations carried 69% of the total freight by sea and river while joint state-private organizations handled 22.2% and private carriers 8.8%. By 1956 more than 130 private steamship lines had been reorganized into joint state-private corporations. (30, No. 7, 1956, p. 29)

Part I

RIVER SYSTEMS IN MANCHURIA AND NORTH CHINA

Northeast China (Manchuria) has six major river systems:

Hei-lung-chiang
Sung-hua-chiang
T'u-men-chiang
Ya-lu-chiang
Liao-ho
Ta-ling-ho

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Generally speaking, South Manchuria comprises the basis of the Liao-ho, Ya-lu-chiang and Ta-ling-ho, while North Manchuria includes those of the Hei-lung-chiang and Sung-hua-chiang, the Wu-su-li-ho (Ussuri River) and Nen-chiang (Nonni River). (23, pp. 4-5) Figs. 1 & 2

1. The Hei-lung-chiang is 4,500 km long (10, p. 282) and forms a long stretch of the Sino-Soviet border. It drains a large area with its principal southern tributaries the O-erh-ku-na-ho (Argun River), Sung-hua-chiang with Nen-chiang, and the Wu-su-li-ho, and eventually falls into the Okhotsk Sea, (7, p. 104) The Hei-lung-chiang is navigable for steamers from its mouth to Mo-ho (53 28N 122 17E), Hei-lung-chiang Prov., a distance of 3,000 km. This course is divided into three sections: 1. the upper reaches from Mo-ho to Hei-ho (50 16N 127 28E), Hei-lung-chiang Prov., plied in the summer by vessels drawing 1 m; 2. the middle section from Hei-ho to Fu-yuan (48 21N 134 18E), Hei-lung-chiang Prov., at the mouth of the Wu-su-li-ho, navigable for vessels of 2-m draft. 3. The lower reaches are on USSR territory. (10, p. 282) An official Chinese source of 1950 gives Mo-ho as the first upper transshipment point on the Hei-lung-chiang, and the distance from there to the last transshipment point Fu-yuan at the mouth of the Wu-su-li-ho as 2,381 km. This then is the navigable length for steam vessels in Chinese territory. (2, p. chi 32) The navigation season lasts only 5 months on the Hei-lung-chiang. (10, p. 282)

Fu-yuan (48 21N 134 18E), Hei-lung-chiang Prov., is at the confluence of the Hei-lung-chiang and Wu-su-li-ho. (10, p. 259)

Small steamers can operate up to Hu-lin (45 58N 133 38E), Chi-lin Prov., on the Wu-su-li-ho. Junks go up farther to Lake Hsing-k'ai or Khanka (Hanka). The navigation season lasts 5 to 6 months, but water traffic is not very active because the region is very sparsely settled. (10, p. 282) Hu-lin, (other names: Nu-t'ou, Ni-ma-k'ou or I-man*) derives its name from Hu-li-kai-chiang, an old Chinese name for the Wu-su-li-ho. It is a county seat with little industry. (7, p. 222)

T'ung-chiang (47 40N 132 30E), Hei-lung-chiang Prov., at the confluence of Hei-lung-chiang and Sung-hua-chiang, is an important junction of water traffic between China and the Soviet Union. (10, p. 290) (Fig. 3)

Fo-shan (48 38N 130 30E), and Wu-yun (49 17N 129 40E), Hei-lung-chiang Prov., are small ports below and above a narrow gorge between mountains close to both banks of the Hei-lung-chiang. (10, p. 259)

*Marked as an alternate name for Hu-lin on WAC 282, but not found in other available sources.

Ai-hun or Sa-ha-liang (49 59N 127 28E), Hei-lung-chiang Prov., is a small port 40 km below Hei-ho on the southern bank of the Hei-lung-chiang, and has a population of about 40,000. (10, p. 291) Lumber is floated here from the Hsiao (Lesser) Hsing-an Mts. to be shipped to other regions. (10, p. 268)

Hei-ho, Hei-ho-t'un or Ta-hei-ho, opposite the Soviet city of Blagoveshchensk (7, p. 26), is expanding rapidly as a transshipment center for Sino-Soviet trade. (10, p. 291) New wharves have been built since 1949. (30, p. 31) A Chinese railroad runs up from Pei-an, and the Soviet port across the river is connected with the Trans-Siberian Railroad by a branch line. (1, Map 26) Chief exports are soy beans, oil, oil cake, peanuts, and pig iron. (10, p. 278) Lumber from the Hsiao (Lesser) Hsing-an Mts., which have one fourth of the forests in Northeast China, is sent to Hei-ho for shipment. (10, p. 268) Imports are mostly cotton fabrics and consumer goods. (10, pp. 277-278) (Fig. 4)

According to a 1948 source, Hei-ho has a small ship-repair yard. (13, p. 229) and recently became the administrative center of Ai-hun County. (10, p. 291)

The O-erh-ku-na-ho, tributary to the Hei-lung-chiang, is the only river navigable for steamers in Inner Mongolia Autonomous Region. (7, p. 28)

2. The Sung-hua-chiang is particularly important, because it traverses the North Manchurian Plain, a region densely populated, economically developed, and crossed by trunk railroads. (13, p. 155) It carries the second highest volume of freight of all Chinese rivers. (5, p. 84) The navigation season lasts only about 6 months, since the river is usually frozen over from the beginning of November to the middle of April, offering a good sledge track in the winter. (10, p. 282)

The Sung-hua-chiang is 1,870 km long (7, p. 105), 565 km from the source to Chi-lin (43 51N 126 33E), Chi-lin Prov., 640 km from Chi-lin to Ha-erh-pin or Harbin (45 45N 126 39E), Chi-lin Prov., (30, p. 31), and 696 km from Ha-erh-pin to its mouth. (2, p. chi 32) Another source gives the total length of the river as over 2,000 km, some 700 km of which are through lowlands between Chi-lin and Ha-erh-pin. Here the river, with sandy, gravel or clay banks and bottom, frequently changes its thalweg (12, p. 230), most markedly at the highest water level during the summer, which is the rainy season here. At this time the river, ordinarily a few hundred meters wide, floods to a width of many kilometers. The difference between highwater and the normal water level varies from 4 to 6 m; current velocity is from 0.6 to 1.2 m/sec. The river is mostly shallow; shoals and the above-mentioned changes in the thalweg complicate navigation. (12, p. 231)

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The Sung-hua-chiang is navigable for steamers from its mouth to Chi-lin, almost 1,300 km, and junks travel 250 km above that point. (13, p. 156) Another source gives the navigable length as 1,400 km (10, p. 282) During the entire navigation season in wet years, and for three quarters thereof in dry years, the Sung-hua-chiang is navigable above the mouth of the Nen-chiang to Chi-lin for steamers drawing 4 and even 5 feet. (25, p. 384) Another source states that at high and medium water steamers drawing up to 60 cm go up to Chi-lin, the terminus of regular navigation. (12, p. 231) In years of exceptionally low water only steamers drawing 2 1/2 ft can operate for a short period. (25, p. 384)

The most important navigable tributaries of the Sung-hua-chiang are the Nen-chiang, navigable for steamers up to Ch'i-ch'i-ha-erh (47 22N 123 57E) and the Hu-lan-ho (13, p. 156), navigable up to Hu-lan (45 59N 126 36E), both in Hei-lung-chiang Province. (13, p. 156; 25, p. 384)

Shipping routes of the entire Sung-hua-chiang system total over 2,900 km, of which 1,800 km are navigable for steamers. This is over 60% of all inland waterways in Northeast China, excluding the border rivers Hei-lung-chiang, Wu-su-li-ho and O-erh-ku-na-ho. (13, p. 156)

All steam shipping on the Sung-hua-chiang has been nationalized. (30, p. 31)

In the summer the Sung-hua-chiang and Nen-chiang are the main transportation arteries in the North Manchurian plain. Small steamers ply the Sung-hua-chiang between Chi-lin and T'ao-lai-chao* (44 51N 125 54E), Chi-lin Province. Navigation is complicated from that port down to Fu-yu (45 11N 124 49E) in Chi-lin Province because the I-t'ung-ho and Yin-ma-ho join the river here, silt up its bed and cause frequent changes in its channel. This section has no vital importance for shipping. (10, p. 282)

After its confluence with the Nen-chiang below Fu-yu, the Sung-hua-chiang is a large river (10, p. 282) over 1,000 m wide with depths varying from 6 to 12 m. (10, p. 259) The section below Ha-erh-pin is navigable for vessels of 300-t displacement and river traffic is lively here. (10, p. 282) According to another source, this stretch is navigable for vessels of 500-t displacement. (16, p. 228) The Sung-hua-chiang fleet owned by the North Manchuria River Transportation Bureau in 1942 operated 113 steamers, 130 lighters and 67 sailing junks ranging from 700 to 1,000 tons. Steamers on North Manchurian rivers are driven by paddle wheels at the sides of stern and are fueled with Ho-kang coal or local wood. (24, p. 29)

Shoals at I-lan or San-hsing (46 19N 129 34E), Chi-lin Prov., complicate navigation between Ha-erh-pin and the river's mouth. At highwater, ships of 2,000 to 3,000-t displacement may sail the Sung-hua-chiang between Chia-mu-ssu (46 50N 130 21E), Hei-lung-chiang Prov., and the sea. (30, p. 31)

*See footnote on the port of Sung-hua-chiang, p. 13.

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T'ung-chiang, see above under Hei-lung-chiang.

Fu-chin (47 16N 132 01E), Hei-lung-chiang Prov., lies NE of Chia-mu-ssu on the south bank of the Sung-hua-chiang and has recently become a shipping center for agricultural products from the lower region on that river, to which there is a growing influx of settlers. (10, p. 290) (Fig. 5) New wharves were built at Fu-chin since 1949. (30, p. 31)

Chia-mu-ssu on the south bank of the Sung-hua-chiang, 451 km below Ha-erh-pin, is the largest city on its lower reaches (13, p. 224) and the largest grain port on the entire river (15, p. 589); it used to have 20 large grain firms (25, p. 385). It is an important transshipment center because five railroad lines converge here (7, p. 220; 41, 14 Aug 56, quoted source), from Sui-hua on the W, Mu-tan-chiang (44 35N 129 36E), Hei-lung-chiang Prov., on the S, from Fu-chin on the NE (41, 14 Aug 56), and the short lines to large coal mines at Ho-kang (Hao-li) (47 05N 130 20E), and Shuang-yai-shan (46 37N 131 36E), all in Hei-lung-chiang Province (7, p. 220; 16, p. 228). The latter line runs 50 miles east from Chia-mu-ssu to the Shuang-ya-shan coal mines, which have been rapidly developed since the end of World War II, but were known as Chien-shan until 1954. (16, p. 228)

Part of Chia-mu-ssu's significance is due to the port across the river, Lien-chiang-k'ou (46 52N 130 18E), Hei-lung-chiang Prov., whence coal from the Ho-kang Mines is shipped to fuel Ha-erh-pin and the entire Sung-hua-chiang fleet. (13, pp. 223-224) New wharves were built at both Chia-mu-ssu and Lien-chiang-k'ou since 1949. (30, p. 31)

Before the Japanese occupation, Chia-mu-ssu shipped 130,000 tons a year, chiefly soy beans. (13, p. 224) Its chief trade is grain (15), which, together with other agricultural and native products, is transshipped here by rail to large cities in the south and for export. Coal and industrial products brought by rail are also transshipped here to river craft for distribution to the rural regions along the Sung-hua-chiang, according to a quoted source. (41, 14 Aug 56)

Besides being the largest grain port on the entire river, Chia-mu-ssu is also the chief industrial center on the lower Sung-hua-chiang, with two flour mills, four oil mills, a brickyard, tannery, sawmills and an electric power plant. Its population grew from 20,000 in 1931 to 120,000 in 1945. (13, p. 224) A 1953 source gives the population as 160,000 (10, p. 290), whereas a 1955 source gives it as 90,000. (7, p. 30)

Although on the bank of the Sung-hua-chiang, the city is free from floods. Even the great flood in 1932 did not touch it, while I-lan 80 km upriver was inundated. (39)

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The Chia-mu-ssu Joint Railway and Shipping Administration was organized in 1956 under a joint order by the Ministry of Railways and the Ministry of Communications, which had sent a deputation to investigate serious delays and damage to freight transshipped here. The railway appointed several of its higher officials at the Chia-mu-ssu Station to the new agency, other organizations did likewise, and the various grain and food interests were represented. Rules were set up on handling cargo, a joint agency was put on duty at the wharves to supervise transshipment. These measures raised efficiency; in June, for instance, unloading and reloading time of railroad cars was reduced 23.6% and that of steamers 14.8%. (41, 14 Aug 56)

I-lan or San-hsing at the mouth of the Mu-tan-chiang on the Sung-hua-chiang is an old grain shipping center and the commercial and transportation link between the Sung-hua-chiang region and the densely populated Mu-tan-chiang basin. (7, p. 220; 15) It is one of the best equipped ports on the Sung-hua-chiang and handles all freight coming down the Mu-tan-chiang by junk from Ning-ku-t'a or Ning-an (44 23N 129 26E), Chi-lin Province. Before the Japanese occupied I-lan, it was a more active port than Chia-mu-ssu, but has lost out to the latter since railroads were built. (13, p. 225) (Fig. 9) A 1948 source gives the population of I-lan as over 30,000 (13, p. 225); a 1953 source sets it "close to 20,000" (10, p. 290)

The port of Mu-tan-chiang (44 35N 129 36E), Hei-lung-chiang Prov., is where the railroad from Ha-erh-pin to Vladivostok crosses the Mu-tan-chiang. During the occupation the Japanese built the T'u-men/Chia-mu-ssu Railroad through this city, which then became a military center with several Japanese war industries. The city's population rose from 35,000 in 1931 to 179,000 by 1940 and 214,000 by the beginning of 1945. The city was seriously damaged by military action in the summer of 1945. (13, p. 215, 216) Much of its growth in the last 25 years is due to expanding freight turnover and transfer to rail of timber and agricultural products floated down the river from Ning-an (44 23N 129 26E) in Hei-lung-chiang Province. (7, pp. 194-195)

Ning-an or Ning-ku-t'a is on the left bank of the middle Mu-tan-chiang 29 km south of the crossing of the railroad which runs east from Ha-erh-pin. It is an ancient city with over 40,000 population. (13, p. 215)

The Hu-lan-ho, a northern tributary of the Sung-hua-chiang, is navigable only for shallow-draft steamers as far as the city of Hu-lan (45 59N 126 36E), Hei-lung-chiang Prov., a distance of approximately 10 miles. (25, p. 384)

Hu-lan is the trade center of the Hu-lan-ho basin, through which agricultural products are shipped south to Ha-erh-pin and north to Hai-lun (47 27N 126 56E), Hei-lung-chiang Prov., the granary of northern Manchuria. Situated where the Ha-erh-pin/Pei-an Railroad crosses the Hu-lan-ho, Hu-lan has great possibilities for future development. (10, p. 289)

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Ha-erh-pin (45 45N 126 39E), Chi-lin Prov., lies on the south bank of the Sung-hua-chiang (10, p. 289), 696 km from its mouth. (2, p. chi 32). During low water in November and December the river at Ha-erh-pin discharges barely 1/10 its annual average and only 1/25 the average highwater discharge in August. The table appended shows the relation between river levels and precipitation at Ha-erh-pin. (7, pp. 106, 107) (Fig. 10)

The main channel of the Sung-hua-chiang, originally ran far from the city's wharves, but was corrected by the construction of a dike on the opposite shore and a dredged channel along the wharves. (25, p. 384) In 1939 a huge levee was built to protect the city against floods. (21) These regulatory works were completed in 1942. (24, p. 24) (Fig. 11)

Ha-erh-pin is the largest of the 31 ports on the Sung-hua-chiang (13, p. 156) and also the most important transshipment center in the Manchurian plain, with five railroads converging at its waterfront. (7, p. 215; 1, Map 50). These railroads run north to Pei-an, Hei-lung-chiang Prov., northwest to Man-chou-li, Inner Mongolia Autonomous Region, southwest to Ch'ang-ch'un, Chi-lin Prov., south to La-fa, Chi-lin Prov., and southeast to Sui-fen-ho, Hei-lung-chiang Province. (1, Map 50) Ha-erh-pin has the best equipped railroad junction in North Manchuria, with vast warehouses and auxiliary installations. (13, pp. 197, 198) (Fig. 12)

The largest shipping installation at Ha-erh-pin is Export Port, also called Bridge Section or Eight Railway Section*, due to its location at the railroad bridge across the Sung-hua-chiang. This shipping section lies between the Chinese section of Fu-chia-tien on the east and Tao-li (Landing) on the west. (13, p. 198; 21, p. 30)

Export Port has 1,420 m of mooring frontage, 15 berths, 11 storage installations of 2,200-t total capacity, 1 timber wharf and 2 wharves for coal and firewood. Railroad sidings to all wharves facilitate the transshipment of grain from river to rail and the handling of raw materials for local industries and their products. Most of the city's oil mills, six large flour mills, a brewery and many small enterprises are located in Export Port. (13, p. 198)

Neighboring Fu-chia-tien is so densely settled that railroad sidings could hardly be laid here (13, p. 201), but its waterfront is lined with wharves (21, p. 30), including one for passengers. (13, p. 198)

San-k'o-shu, much smaller than Export Port, is a third shipping section of the city. (13, p. 198) New wharves were built at Ha-erh-pin since 1949. (30, p. 31) Tao-li Section is commercial rather than industrial, with large stores, offices and banks, one oil mill and four flour mills. (13, p. 198)

*All Japanese map shows Fou-t'ou-ch'u in Chinese characters.

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The Zaton (Russ. for "back-water", "Cove") on the opposite bank serves as a wintering harbor for vessels. Here are the steamship administration and ship repair yards. (13, p. 202) (Figs. 13, 14, 15, 16, 17, 18)

Ha-erh-pin has shipbuilding and repair yards, and the largest railroad works of the Chinese Ch'ang-ch'un Railroad (13, p. 200), which occupy a large block on the western outskirts of Tao-li. (13, p. 201) A shipyard founded by the Chinese Eastern Railway, but neglected after the flood of 1932, built 10 fast steamers immediately after its reconstruction in 1942 by the North Manchuria River Transportation Bureau. This government bureau also operated repair shops employing 800 to 1,200 workers in the early months of the year when vessels are laid up. (24, p. 29)

Some 15 small foundries and machine shops are connected with the above enterprises. One of the city's electric power plants originally belonged to the above railroad works. (13, p. 200)

Ha-erh-pin's trade extends far beyond the boundaries of Manchuria into Mongolia, Siberia and Europe. (10, p. 289) Main exports are soy beans, oil cake and bean oil; wheat, flour and other grains rank second. (13, p. 197) In 1931 over 1,100,000 t of freight, including 50% to 60% grain, were shipped to Ha-erh-pin chiefly to be transshipped by rail. Between 200,000 and 300,000 t of coal came here from the Ho-kang or Hao-li-kang Mines, north of Chia-mu-ssu, and large stocks of firewood from down river. Some 80% to 90% of all freight moved on the Sung-hua-chiang was shipped through Ha-erh-pin. (13, p. 198)

In 1953 the city's population was recorded as 800,000 (10, p. 289), in 1956 as 1,200,000. (16, p. 228)

Chao-yuan or Chao-chou (45 30N 125 08E), Hei-lung-chiang Prov., is a grain landing on the river and county seat, 120 miles from Ha-erh-pin. It handles its grain trade through Fu-yu. (25, p. 384)

San-ch'a-k'ou* (appr. 45N 125E), on the border of Chi-lin and Hei-lung-chiang Provinces, is at the mouth of the Nen-chiang into the Sung-hua-chiang (1, Map 25), 20 miles NW of Fu-yu. (10, p. 259; 25, p. 384)

The Nen-chiang flows into the middle Sung-hua-chiang from the north. (7, p. 205) Its channel is 470 m wide, and after it enters the plain at Ch'i-ch'i-ha-erh, it has low banks, a sand and gravel bottom (12, p. 248) and branches into numerous arms between islands. (12, p. 246) It usually freezes by 27 November. It is navigable up to Nen-chiang or Nen-ch'eng (49 11N 125 13E), Hei-lung-chiang Province. (7, p. 205) At Ch'i-ch'i-ha-erh (47 22N 123 57E), Hei-lung-chiang Prov., shallow-draft sailing junks of 100-t capacity can operate. (12, p. 248) According to a 1953 source, small steamers also go up to Ch'i-ch'i-ha-erh (10, p. 289), and below that city the river is even navigable for the large steamers of the Sung-hua-chiang. (7, p. 205)

*Means "tri-furcation".

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Ta-lai (42 30N 124 18E), Hei-lung-chiang Prov., is 185 miles from Ha-erh-pin on the Nen-chiang, the commercial and administrative center of the district. It carries on grain trade principally through Fu-yu (25, p. 384), with which it is connected by the Ch'ang-ch'un/Pai-ch'eng Railroad (1, Map 25).

Ch'i-ch'i-ha-erh or Lung-chiang*, capital of Hei-lung-chiang Prov. (10, p. 289), lies 4 km east of the Nen-chiang (13, p. 204) on the left bank of the Hu-lu-t'ou, an arm of the Nen-chiang. It is the chief railroad and highway junction in northwestern Manchuria and water transportation played its part in the city's development. (12, pp. 246-248)

Ch'i-ch'i-ha-erh has long been the largest commercial center for agricultural products in the western part of the Sung-hua-chiang basin and was also a center for cattle driven down from Mongolian regions, such as the Barga area. (13, p. 204) The city has an area of about 67 sq km, only part of which is built up. (12, p. 246) Its population was 150,000 in 1945 (13, p. 204), but a 1955 source gives 120,000. (7, p. 30) (Fig. 19)

Nen-chiang, formerly Mo-erh-ken or Mergen, is a county seat in Hei-lung-chiang Province and the head of navigation for junks above Ch'i-ch'i-ha-erh. (7, p. 205; 10, p. 289)

Fu-yu, Po-tung or Po-tu-na, Hei-lung-chiang Prov., is a river port on the Sung-hua-chiang only 20 miles above the mouth of the Nen-chiang and 175 miles from Ha-erh-pin. (25, p. 384) Agricultural products from this region converge here for shipment (10, 290), also goods for distribution at this large commercial center, which is at the junction of overland routes to Ch'ang-ch'un (25, p. 384) and on the Ch'ang-ch'un/Pai-ch'eng Railroad (1, Map 25). The city has 50,000 population. (10, p. 290)

Sung-hua-chiang** or Lao-shao-kou (44 43N 125 51E), Chi-lin Prov., is a transshipment point on the Sung-hua-chiang and the railroad between Ha-erh-pin and Ch'ang-ch'un. Freight arriving by junks and steamers is transferred here to rail. (25, p. 384) (Fig. 20)

*The Gazetteer of Chinese Place Names, Wash., D.C., 1944, p. 20, also WAC 283 and Geografiya Novogo Kitaya, Moskva, 1953, p. 289, give Lung-chiang as an alternate name for Ch'i-ch'i-ha-erh. The Provincial Atlas of the Chinese People's Republic, Shang-hai, 1953, Map 26, however, gives Lung-chiang as the alternate name of Fu-la-erh-chi, where the railroad from Ha-erh-pin to Man-chou-li crosses the Nen-chiang.

**Marked on the Provincial Atlas of the Chinese People's Republic, Shanghai, 1953, Map 25, on the Chinese Ch'ang-ch'un Railroad, a short distance south of the Sung-hua-chiang River. T'ao-lai-chao is on the same Railroad, about 10 miles north of the river. (See p. 13) Only T'ao-lai-chao is marked on WAC 283.

Chi-lin, Kirin or Yung-chi, capital of Chi-lin Province, is on the left bank of the Sung-hua-chiang at the point where it enters the plain from the uplands of East Manchuria. Chi-lin is the head of steam navigation on the Sung-hua-chiang (10, 289; 13, p. 214) and the junction of the Shen-yang/Chi-lin and T'u-men/Ch'ang-ch'un Railroads. (10, p. 290) It ships timber from the upper Sung-hua-chiang to southern woodless regions in Manchuria. There is a large junk and boat-building industry at Chi-lin. (13, p. 214) The population of the city is about 230,000. (10, p. 290) Some 20 miles SE of Chi-lin is the Hsiao-feng-man Hydroelectric Power Plant, second largest in Manchuria. (10, p. 290) (Fig. 21)

Above Chi-lin the river is navigable only for rafts and small junks. (13, p. 214)

Hua-tien (42 56N 126 42E), Chi-lin Prov., became a center for large lumber enterprises under the Japanese occupation and for cellulose as raw material for explosives. (10, p. 268)

3. The T'u-men-chiang, called Shih-i-shui in its upper course, arises on the eastern slopes of the Ch'ang-pai-shan (10, p. 259) and Pai-t'ou-shan (7, pp. 177-178) and flows NE along the Chinese border with Korea. (10, p. 259) Short tributaries join it from the north. (7, p. 104) It makes a large bend SE from the border, passes W of Hun-ch'un (42 52N 130 21E) and falls into the Japanese Sea. (10, p. 259) This large river is 521 km long, but narrow gorges and rapids leave only 100 km on its lower reaches navigable for steamers (7, pp. 177-178), while junks sail far up. (7, p. 28) Below Kenyong (co-ordinates unknown) the river is 200 to 400 m wide, 2 to 3.5 m deep, and is used here for rafting timber. (7, pp. 177-178) The river freezes at the beginning of December. (7, p. 106)

Hun-ch'un, Chi-lin Prov., is on the Hung-ch'i-ho near its confluence with the T'u-men-chiang. (1, Map 25) It is one of five points handling China's trade with the USSR across the Manchurian and Korean borders (10, p. 277-278), and has an active balance exporting soy beans, oil and oil cake, peanuts, coal, pig iron, while importing cotton fabrics and consumer goods. (10, p. 278)

During the Japanese occupation Hun-ch'un was a fortified area to protect T'u-men (42 58N 129 49E), and Yen-chi (42 53N 129 31E) in Chi-lin Province (13, p. 216), railroad junctions at the NW corner of Korea (1, Map 25). A 1953 source gives the city's population as 20,000. (10, p. 290)

T'u-men on the north bank of the T'u-men-chiang is the terminus of the Ch'ang-ch'un/T'u-men Railroad. The Korean town of Hoi-ning, an important transportation center between China and Korea, is on the opposite bank. (10, p. 290)

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Yen-chi or Chu-tzu-chieh has trade with Korea in soy beans, oil and oil cake, peanuts, coal, pig iron as main exports, cotton fabrics and consumer goods as main imports. (10, pp. 277, 278) During the Japanese occupation large companies were founded here to dress lumber and make cellulose as raw material for explosives. (10, p. 268)

4. The Ya-lu-chiang rises on the southern slopes of the Ch'ang-pai-shan (Mts.) (10, p. 259) or Pai-t'ou-shan (Mts.) (7, p. 195) and is divided from the T'u-men-chiang by a mountain range. (10, p. 259) It is 813 km long (7, pp. 105, 178), flows southwest along the border between China and Korea, receives the Hun-chiang, and falls into the Yellow Sea at Ta-tung-kou (39 52N 124 08E), Liao-ning Province (10, p. 259). The Ya-lu-chiang is swift; numerous shoals pile up at its mouth. (10, pp. 282, 259) At An-tung (40 08N 124 24E), Liao-ning Prov., the river is usually frozen from December to March. December 7th and March 16th are given as mean dates for the beginning and end of this period. (13, p. 38)

The Ya-lu-chiang is navigable for steamers up to An-tung, a distance of only 24 km. Up to Lin-chiang (41 44N 126 55E), Liao-ning Prov., a distance of 258 km, it is navigable for junks and small cutters, and almost its entire course is used for rafting timber. Navigation has been improved through the large reservoir and dam built for the Shui-feng Hydroelectric Power Plant, 80 km above An-tung. (7, p. 178)

An-tung is open for shipping from the beginning of May to the end of October. Seagoing vessels drawing up to 3 m enter the port during high tide. (10, p. 290)

Served by railroads from Shen-yang, Fu-shun, Pen-ch'i (7, p. 195) and Korea (16, p. 220), An-tung is a lively trade and transportation center. (7, p. 195) Grain is shipped here down the Ya-lu-chiang, also timber from the East Manchurian uplands for the city's sawmills and match factories. (7, pp. 195-196) This port is the largest lumber shipping center for the Ya-lu-chiang and Hun-chiang basins. (10, p. 268) The Shui-feng Hydroelectric Power Plant provides An-tung with power for its expanding industry (7, p. 196), which includes flour and soybean mills, besides its old silk (pongee) industry. (16, p. 220) An-tung is one of the largest oil mill centers in Northeast China (10, p. 277) and its most important port for export of peanuts and peanut oil, next to Ta-lien. (10, p. 264) The city has a population of 310,000. (7, p. 30) (Figs. 22, 23)

The Japanese established shipbuilding and repair yards at An-tung, mostly for small wooden ships. (13, p. 132)

Ch'ang-tien-ho-k'ou (40 25N 124 48E), Liao-ning Prov., has a daily service by passenger-cargo vessel to An-tung. (41, 19 Mar 56, a quoted source)

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Lin-chiang (41 44N 126 55E), Liao-ning Prov., is an important metallurgical center on the Ya-lu-chiang (7, p. 196) and the terminus of a branch from the Mei-ho-k'ou/Chi-an Railroad at Ya-yuan (41 44N 126 12E), Liao-ning Prov. (10, p. 280)

5. The Liao-ho, over 1,300 km long (12, p. 201) or 1,200 miles according to another source (38) falls into the Liao-tung Gulf at Ying-k'ou (40 40N 122 17E), Liao-ning Province. It pushes its estuary seaward, so that Ying-k'ou is now over 16 km from the sea. (10, p. 260)

The water level and width of the ship channel change with the seasons; deeps frequently become shoals from one year to the next. Mean depths of the ship channel in the lower and middle reaches are 1.3 m in the dry, and 3.5 m in the rainy season. (12, pp. 201, 202, 203)

The navigation season lasts 7.5 to 8 months on the lower reaches of the Liao-ho. Ice pans usually first appear toward the end of November and continue for 8 to 12 days before the river freezes over in the first part of December. The ice attains maximum thickness of 70 to 90 cm in January; the river is usually free from ice by the middle of April. (12, p. 203)

Above Shuang-yuan (43 30N 123 29E), Liao-ning Prov., the Liao-ho is fordable. Below that city it becomes quite broad after receiving two large tributaries from the left, the Hsin-ho and Tung-liao-ho.

The average width of the river between Liao-yuan and T'ieh-ling (42 18N 123 49E), Liao-ning Prov., is 180 to 250 m, but 350 to 400 m in places. It flows between steep loess banks here and has a silt bottom with depths of 1.5 to 2.0 m at low water. Current velocity is 0.3 to 0.5 m/sec at T'ieh-ling. Near Chu-liu-ho (42 03N 122 55E) and below T'ien-chuang-t'ai (40 49N 122 06E), Liao-ning Prov., the river flows between low banks protected almost everywhere by dikes 3.5 to 4.0 m high. Maximum width on the lower reaches is 2.5 km at high tide, observed at Ho-pei Station (40 41N 122 12E) minimum width 450 m, observed above Ying-k'ou. The river's average width is 800 to 900 m. (12, pp. 200, 201, 203)

Navigation on the Liao-ho is complicated by many shoals in its winding course and by a large sandbar at its mouth. Depths average 1.5 to 2.0 m at T'ien-chuang-t'ai and 4.5 to 5.0 m at Ying-k'ou at low tide. Mean ebb tide depth is 1.3 m. Shoals in the shallow Liao-tung Gulf also complicate the approach from the sea. Tides reach 40 km upstream from the estuary, with most of the shoals emerging at low tide, forming groups of islands in places. (12, pp. 200-204)

Ying-k'ou, formerly Niu-chuang, lies in the estuary of the Liao-ho, on its left bank. (10, p. 288) Two thirds to three fourths of the incoming freight comes from Chinese ports, although foreign imports have risen in the last few years. Ying-k'ou has developed into a distributing center for Chinese products in Manchuria. (12, p. 205) Its main exports are soy beans, bean oil, wine, and other agricultural products. (10, p. 288)

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Vessels drawing 7 m go 32 km up the Liao-ho (13, p. 181) on the tide, but the marked difference between high and low tide complicates loading and unloading at Ying-k'ou Port considerably. (12, p. 204) During -- high water -- the tide may rise 4 to 5 m and depths then are 12 to 13 m at Ying-k'ou. (12, p. 203) Mean ebb tide depth is 1.3 m. (12, p. 202) (see p. 16)

The entire waterfront forms a wharf at the typical river port of Ying-k'ou. (26, p. 216) Concrete embankments 5 to 6 m high line the river here and serve as mooring berths for small vessels during high tide. (12, p. 203) The most detailed information available states that the wharves of the (former) South Manchurian Railway (including West Wharf) have a combined length of 3,600 ft, a freight handling capacity of 30,000 t, and can simultaneously berth 4 steamers of 2,000 to 3,000 t displacement. Tung-ying-k'ou Hai-kuan (East Ying-k'ou Custom House Wharf) and Hsi-ying-k'ou Hai-kuan (West Ying-k'ou Custom House Wharf) are also mentioned. (26, p. 216)

The Japanese had a small shipbuilding yard at Ying-k'ou (12, p. 207), chiefly for small wooden ships. (13, p. 132) (Figs. 24, 25, 26, 27, 28, 29)

Ying-k'ou has two railroad connections. A branch of the Shen-yang/Fel-ching Railroad at Kou-pang-tzu (41 22N 121 46E), Liao-ning Prov., terminates at Ho-pei on the right bank of the Liao-ho opposite Ying-k'ou. (27; 12, p. 206; 10, p. 288) A branch of the Ch'ang-ch'un/Ta-lien Railroad at Ta-shih-ch'iao (40 38N 122 30E), Liao-ning Prov., terminates at Ying-k'ou East Station on the left bank of the Liao-ho at the eastern end of the new city. (26, p. 211; 12, p. 206; 10, p. 288) There is daily ferry service between the two railroad stations, maintained by steamers plying between Tung-ying-k'ou Custom House Wharf and the wharf at Ho-pei Station. (26, p. 211) (Fig. 30)

The city's main street runs along the river and is rather well built. It is in the new section, which has mostly 2-story brick buildings in the western style. (12, p. 207)

Some 8,000 river junks with a combined tonnage of 221,600 called at Ying-k'ou in 1930 (13, p. 181), but its river traffic has fallen due to complicated navigation up the Liao-ho. (7, p. 218)

If the long-planned Sung-Liao Canal is built, agricultural products from the entire Sung-hua-chiang basin can flow into Ying-k'ou. This, and dredging the channel from the sea to 6-m depth, would make the port an important terminus of Northeast China's waterway system. (10, p. 288)

A 1953 source gives Ying-k'ou a population of 190,000 as recorded in 1945 (14); a 1955 source gives 154,705 as recorded in 1946 (17, p. 300); a third source gives 150,000 population in 1953. (10, p. 288)

San-ch'a-ho (co-ordinates unknown) Liao-ning Prov., is at the confluence of the Liao-ho, T'ai-tzu-ho and Hun-ho. It is the head of navigation for small steamers which do not draw more than 3 m. (10, p. 281) A regular steamer service is maintained to this point which is 110 km from the mouth of the Liao-ho. (13, p. 157)

Numerous junks sail the Liao-ho up to 500 or 600 km from its mouth. (12, p. 204) Grain is the chief freight downriver, consumer goods upriver. (10, p. 281)

The T'ai-tzu-ho joins the Hun-ho at San-ch'a-k'ou (co-ordinates unknown)* and later empties into the main stream of the Liao-ho. Another source shows Hsiao-peh-ho (41 22N 122 50E), Liao-ning Prov., at the confluence of T'ai-tzu-ho and Hun-ho. (1, Map 24) The T'ai-tzu-ho is navigable for about 170 miles; it is 1,200 ft wide at its widest and 350 ft at its narrowest point. The river is frozen over from the end of October to the beginning of March. (26, p. 238)

Liao-yang (41 17N 123 11E) in Liao-ning Prov., is on the east bank of the T'ai-tzu-ho (26, p. 236) and junks run freely between here and Ying-k'ou in depths ranging from 4 to 10 ft. The wharf is at Huang-chia-ling-tzu (co-ordinates unknown), east of the walled town of Liao-yang. At highwater small junks can sail 5 miles above the wharf, while smaller boats go up to Pen-ch'i-hu (41 20N 123 45E) and Wei-ning-ch'eng (41 22N 123 48E), both in Liao-ning Prov., to bring down coal, charcoal and firewood. (26, p. 238)

The Liao-yang region has long been known for the production of beans, kao-liang, bean cake, and distilled liquors. These products used to be transported by water to Ying-k'ou, but now go chiefly by rail to Ta-lien and Ying-k'ou.

The city of Liao-yang, with Pei-kuan and Hai-kuan outside its walls, has a population of 35,000. (26, p. 237)

T'ieh-ling on the Liao-ho is on the Ch'ang-ch'un/Ta-lien Railroad and has its landing at Ma-feng-k'ou (co-ordinates unknown) on a bend of the Liao-ho, about 2.5 miles west of the railroad station. (1, Map 24; 26, p. 246) Freight is carted between the station and wharf. (26, p. 246)

Ma-feng-k'ou is about 160 miles overland or 300 miles by water from Ying-k'ou, the whole distance being navigable for junks. Commodities from the interior used to be shipped by water to Ying-k'ou, making T'ieh-ling a flourishing city, but the railway and a new wharf at T'ung-chiang-k'ou (42 38N 123 43E), Liao-ning Prov., has undercut its former prosperity. Recently water traffic to T'ung-chiang-k'ou is on the wane and the Ma-feng-k'ou route is again used for beans and grain because Ying-k'ou can be reached from T'ieh-ling in 4 or 5 days at highwater. (26, p. 246)

*San-ch'a-ho and San-ch'a-k'ou possibly refer to the same place.

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T'ung-chiang is on the east bank of the Liao-ho, about 30 miles NW of T'ieh-ling and 24 miles W of K'ai-yuan (42 32N 124 01E), Liao-ning Province. It has 5,000 population, and was one of the leading ports on the upper Liao-ho as the shipping point for almost all grain from Neng-an (co-ordinates unknown), Shuang-yuan (43 30N 123 29E) and Pai-mien-ch'eng (43 11N 124 00E), all in Liao-ning Prov., on the upper reaches. It once outranked T'ieh-ling, but has gradually declined to an annual turnover of only 1,000,000 bushels. (26, p. 247)

At highwater small steamers go up to T'ung-chiang-k'ou, about 570 km from the mouth of the Liao-ho. (13, p. 157)

San-chiang-k'ou (Mouth of Three Rivers) (43 23N 123 42E), Liao-ning Prov., is at the confluence of the Hsiao-ch'ing-ho, Tung-liao-ho and Hsi-liao-ho, which flows through Cheng-chia-t'un. It is on the west bank, about 5 miles SE of the railroad station at Ta-min-t'un (41 50N 122 58E), Liao-ning Prov., which is on the east bank.

Once one of the leading commercial centers of Manchuria and Mongolia, connected with Cheng-chia-t'un on the upper, T'ieh-ling on the middle and Ying-k'ou on the lower course of the river, it had a large junk trade in the spring and summer. Its principal business now is shipping agricultural products from the villages on the Liao-ho, including beans, green peas, river fish and kao-liang, of which 250,000 bushels are shipped annually. (26, p. 256)

Shuang-yuan, Cheng-chia-t'un or Liao-yuan is the head of navigation for junks, 828 km from Ying-k'ou. (7, p. 207)

6. The Ta-ling-ho, with the city of Ta-ling-ho (40 56N 121 44E), Liao-ning Prov., near its mouth (1, Map 24) has junk traffic up to Ch'ao-yang (41 33N 120 25E), Liao-ning Province. This city started expanding rapidly after the Chin-chou/Ku-pei-k'ou Railroad was built, and is a trade center in the eastern part of former Je-ho Province. It has a population of 30,000. (10, p. 291) Oil shale occurs in the vicinity. (10, p. 273) The Ta-ling-ho is frozen 3 months of the year at Ch'ao-yang. (10, p. 262)
7. The Hai-ho, formed by five rivers converging near T'ien-chin (39 08N 117 12E), Ho-pei Prov., flows through this city, then southeast, and falls into the sea below Ta-ku (10, p. 50), where masses of silt, brought down especially by the Yung-ting tributary, have formed the Ta-ku Bar, a serious obstacle to navigation. (20, p. 142) The five tributaries of the Hai-ho are the Grand Canal North, starting from Mi-yun (40 22N 116 49E), Ho-pei Prov., at the confluence of the Pai-ho and Ch'ao-ho (10, p. 45) and flowing to T'ien-chin down the channel of the Pai-ho (10, p. 50); the Yung-ting-ho, protected by dikes because its channel at Lu-kou-ch'iao or Wan-p'ing (39 51N 116 13E), Ho-pei Prov., is higher than the surrounding country; the Ta-ch'ing-ho or Shan-hsin-ho, flowing through Hsi-tien Lake and Tung-tien Lake; the Tzu-ya-ho or Hsin-hsi-ho; and the Grand Canal South, flowing from Lin-ch'ing (36 51N 115 41E), Shan-tung Prov., at the confluence of Wei-ho and Hui-t'ung-ho. (10, p. 45; 19)

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The winding Hai-ho, also called Pai-ho, is 500 m wide in places and up to 10 m deep at high tide. (11, p. 6) It is navigable up to T'ien-chin for vessels of 5-m draft and a capacity of 3,500 tons (11, p. 7) According to a Soviet source of the same year, vessels of 4.8-m draft and 2,000-t displacement can enter T'ien-chin. (10, p. 77)

Thin ice covers the river in December and January. But small icebreakers keep the channel open for traffic throughout the winter. (11, p. 7) Another source of the same year states that the river is usually covered with ice for three months, but closed to water traffic for only two months, owing to the use of icebreakers. (10, p. 69)

The Hai-ho has to be dredged continually from T'ien-chin to its mouth to prevent it from silting up rapidly. The ship channel at T'ien-chin was straightened and dredged to greater depths, banks were reinforced and dikes built. (11, p. 7) But despite these improvements, steamers move upriver slowly, sometimes running aground on shoals. With the many bends in the channel reducing speed, it takes them from four to twelve hours to sail from the mouth of the Hai-ho to T'ien-chin.

Steamers too large to enter the river formerly anchored at the roadstead 40 to 50 km from the mouth and transferred their cargo to junks, barges and shallow-draft steamers going up to T'ien-chin. (11, p. 8)

T'ien-chin lies 39 km from the sea on the Hai-ho, according to a 1953 source (10, p. 77); another source of the same year gives the distance as 45 km. (11, p. 28) It is North China's largest city, with a population of 1,800,000. (10, p. 77) In 1951 a Soviet source gave its population as 1,922,000. (9)

The Pei-ching/Shen-yang Railroad connects this city with the port of T'ang-ku, the industrial center of Shen-yang, the K'ai-luan Mines, T'ang-shan, Shan-hai-kuan and Hu-lu-tao. (11, pp. 31, 32) The T'ien-chin/P'u-k'ou Railroad links it to East and Central China. (11, p. 32)

T'ien-chin is North China's largest commercial port (10, p. 77) and the most convenient outlet to the sea for Northwest China and Inner Mongolia. (11, p. 28) Its chief exports are agricultural products from North China, with peanuts and egg powder as chief staples, and wool and medical herbs from the northwestern provinces. It is also a supply center for these regions, with cotton, machinery, industrial raw materials, fuel, and sugar as principal imports. T'ien-chin has the third highest freight turnover of all Chinese ports, after Shang-hai and Ta-lien. (10, p. 77)

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A 1953 source states that the port can berth dozens of vessels of 4.8-m draft, 2,000-t displacement and 3,500-t capacity at wharves lining both river banks through the city. (10, p. 77; 11, pp.7,17) Between Chin-kang-ch'iao and the former Belgian Concession, a distance of two nautical miles, the Hai-ho can berth about 10 steamers of 2,000 t, at a river width of 99 m and depths varying from 4.9 to 6.4 m. (3, p. 67)

River depths in T'ien-chin (3, p. 67)

Chin-kang-ch'iao (bridge)	20 ft
Jih-pen-ch'iao (Japanese Bridge)	23 "
Former French Concession	20 "
Former British Concession	17-18 "
First Special District	18 "

The port area in the city has large storage facilities, including vast fenced sheds, where freight is stored on wooden racks.

Four large bridges span the Hai-ho. But a large portion of the traffic between the right bank and the industrial district on the left bank is handled by about 100 boat ferries, all within city limits. (11, p. 17)

The port of T'ien-chin has two disadvantages. First, it freezes over in the winter for about two months during which Ch'in-huang-tao (39 55N 119 37E), Ho-pei Prov., handles the export trade for T'ien-chin. Second, the Hai-ho silts up heavily, which compels many seagoing vessels to stand off Ta-ku to load and unload by lighters. (10, p. 78) (Figs. 31, 32, 33, 34, 35, 36)

River depths between T'ien-chin and Ta-ku are (3, p. 68):

Ni-ku	20.0 ft
Ko-ku	23.0 "
Hsin-ho	25.0 "
T'ang-ku	30.0 "
T'ang-ku to Ta-ku	30.0 "
Ta-ku	77.5 "

T'ang-ku (39 01N 117 40E), Ho-pei Prov., is on the north bank of the Hai-ho near its mouth and serves as an outer port for T'ien-chin. Its streets are lined with warehouses. (10, p. 78; 35, No. 1, 1954, pp. 11, 13) (Figs. 37, 38)

The shipbuilding and repair yard at T'ang-ku (42, No. 40, 1957, p.3) built a test tug propelled by water jet after the latest Soviet designs. It is 12 m long with a 3-m beam, and draws only 40 cm, which will enable it to sail most of China's small rivers at any time of year. (40, No. 2819, 1956, p. 2) (Fig. 43)

The new Branch Shop No. 17 of the Hai-ho Construction Bureau Repair Shop has restored its shipyard and started repairing ships. (40, No. 39, 1949, p. 1)

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Ta-ku (38 59N 117 41E), Ho-pei Prov., is on the south bank of the Hai-ho near its mouth and serves as a second outer port to T'ien-chin. A large portion of all seagoing vessels stand at Ta-ku to load and unload by means of lighters. (10, p. 78)

T'ang-ku Hsin-kang (new Port) is east of T'ang-ku on the Po-hai Gulf at approx. (39 00N 117 45E). (1, Map 21) Construction was started by the Japanese and completed by the present regime (10, p. 78); the port was officially opened in October 1952. (16, p. 107) The plan called for two breakwaters, a harbor, ship lock, docks, repair yards and railroad stations. One breakwater running from the north, the other from the south, were to stand 1 m above water level in the river. The ship lock, with 5-m minimum and 8-m maximum depths leads from the western part of the port to the Hai-ho and passes steamers of 2,000 to 3,000-t displacement bound for T'ien-chin. (10, p. 78) According to a 1956 source, ships of 3,500-t capacity now go directly to T'ien-chin. (42, No. 44, 1956, p. 2) (Fig. 39)

The two completed breakwaters have a combined length of over 19 miles and protect a deep-water area of about seven square miles from river sediment. (16, p. 107) Built of granite blocks each weighing many tons, they are broad enough for a jeep to drive along the top. A 9-mile channel had to be dredged to make it possible for 10,000-t ships to use the new port at T'ang-ku. (35, No. 1, 1954, pp. 12, 13) (Fig. 40)

Four square kilometers of land were reclaimed from the sea and wharves, large warehouses and auxiliary buildings erected. (42, No. 44, 1956, p. 2) Wharf No. 1 can simultaneously berth four 10,000-t ships (35, No. 1, 1954, p. 11) of 30,000-t displacement (10, p. 78) plus five 3,000-t vessels. Cranes transfer their cargo to trains. Wharf No. 2 has automatic coal loaders. (35, No. 1, 1954, pp. 11, 13) (Figs. 41, 42)

T'ang-ku handles 40% of all imports and 60% of all exports from China. (35, No. 1, 1954, pp. 11-13)

The five tributaries of the Hai-ho or Hai-ho/Pei-t'ang-ho System are all navigable for junks and carry a considerable volume of freight. (10, p. 69)

The Yung-ting-ho is the most important tributary. Junks carry agricultural products and handicraft wares, such as brooms, brushes, mats and sacks, downstream to T'ien-chin. (11, p. 8) Being a large river, it used to cause disastrous floods, but is now controlled (11, p. 8) by the Kuan-T'ing dam and reservoir at the entrance to the narrow gorge in the Hsi-shan (West Mts.). (28)

Work on a canal from the Yung-ting-ho to Pei-ching was begun 1 January 1956 to supply more water for Pei-ching and its industry, for transportation and to irrigate more land. This canal will be 25 km long and run from the lock at San-chia-tien (39 58N 116 05E), Ho-pei Prov., directly to the city moat at

Pei-ching. A tunnel nearly 700 m long will be dug to lead the canal through the Mo-shih Mts. The canal will use the moat around the south and east sides of Pei-ching, and the T'ung-hui-ho (28) or T'ung-hui Canal, which links Pei-ching to the north terminus of the Grand Canal at T'ung-chou. (10, p. 50) Pei-ching will thus become a port with an outlet to the sea. (28) (Fig. 44)

The Tzu-ya-ho is formed by the confluence of the Fu-yang-ho and the Hu-t'o-ho at Hsien (38 12N 116 07E) Ho-pei Province, and flows into the Hai-ho at T'ien-chin. (1, Map 21; 10, p. 45) It is an important water route for regional products. (11, p. 8)

The Wei-ho serves as part of the Grand Canal, the chief waterway from the agricultural regions of western Shan-tung to the industrial center of T'ien-chin. Formerly only ships under 100-t capacity could sail this river even during high water in the summer and fall, while shipping almost ceased during low water in the spring and early summer. (6, p. 97)

The new Victory Canal has raised the water level in the Wei-ho and made it navigable from Hsin-hsiang (35 19N 113 52E), Ho-nan Prov., to T'ien-chin, a distance of 900 km. The canal carries water from the Huang-ho at the Pei-ching/Han-k'ou Railroad bridge, parallel to the roadbed northward to the Wei-ho at Hsin-hsiang. (6, p. 97)

8. The Huang-ho is about 4,800 km long (31, a quoted source) or 4,635 km if measured up the Hsin-huang-ho (New Yellow River). It drains an area of 771,500 sq km and has a maximum discharge of 25,000 cu m/sec at flood time in the lower reaches. (6, pp. 90, 91) It falls into the Po-hai-wan (Gulf) east of Li-chin or Li-chiang (37 29N 118 16E), Shan-tung Province. (1, Map 33; 31)

The two obstacles to shipping on the Huang-ho are innumerable rapids and too low a volume of water in the middle and lower reaches. From November to May or June the water level is particularly low and the average monthly discharge then is only 3% to 5% of the annual discharge. (33)

In its upper reaches the Huang-ho is torrential and unsuitable for navigation, except for timber rafts from Kuei-te (36 03N 101 28E), Ch'ing-hai Prov., to Lan-chou (36 03N 103 41E), Kan-su Province. At Lan-chou the river widens and the volume of water increases; the stretch between Lan-chou and Chung-wei (35 47N 111 49E), Shan-hsi Prov., has five gorges only about 150 m wide. The section below Ching-yuan (36 37N 104 32E), Kan-su Prov., to Pao-t'ou (40 36N 110 03E), Inner Mongolia Autonomous Region, is navigable for junks, and the river is ice-free here for about 8 months a year. From Chung-wei to Ho-k'ou-chen (40 13N 111 12E) near T'o-k'o-t'o (40 15N 111 12E) in western Inner Mongolia, the river is wide and the flow normal, except for the narrow rapids at Ch'ing-tung-hsia (co-ordinates unknown) and near Shih-tsui-shan (Shih-tsui-tzu) (39 10N 106 45E), Kan-su Province.

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Below Ho-k'ou-chen (Ho-k'ou) the Huang-ho enters the loess region and drops rapidly -- about 18 m at the Hu-k'ou Waterfalls (36 09N 110 20E), Shen-hsi Province. Below Yu-men-k'ou (35 39N 110 29E), Shan-hsi Prov., the river flows through the San-men-hsia Gorges (34 54N 111 12E), Ho-nan Province. (31)

Below Meng-ching (34 52N 112 39E), Ho-nan Prov., the river enters the North China Plain where it receives no tributaries for 700 km or one sixth of its entire course. Here dikes and sedimentation through the centuries have raised the channel above the surrounding plain. (6, p. 90; 31)

Though navigable for shallow vessels, the lower Huang-ho is used for river transportation only in certain sections. This region is sparsely settled because of the constant threat of flood, especially below Chi-nan (36 41N 117 00E), Shan-tung Province. Only in the last 50 km of its delta is the river not confined by dikes. Accretion here is rapid; from 1947 to 1952 the mouth of the Huang-ho moved 25 km into the sea. (6, pp. 90, 91)

Pao-t'ou (40 36N 110 03E), Inner Mongolia Autonomous Region, a city with some 60,000 population (10, p. 309), stands where the Pei-ching/Pao-t'ou and Pao-t'ou/Lan-chou Railroads (10, p. 309; 4; 35, No. 8, 1956, pp. 5-9) and the highways to Yu-lin (38 17N 109 45E), Shen-hsi Prov., and into Kan-su Province (8) meet the Huang-ho. The port is at Nan-hai-tzu (40 33N 110 06E), Inner Mongolia Autonomous Region, on the north bank of the Huang-ho, 2 km SE of the new city of Pao-t'ou. (18; 10, p. 309; 1, Map 22) Over 500 junks use this river port and the first tug has been launched here a short time ago. (42, No. 171, 1955, p. 2) (Fig.45)

The Pao-t'ou stretch is the best for shipping on the entire Huang-ho. Skin rafts of 12-t to 15-t capacity carry goods between Lan-chou and Pao-t'ou, making about two trips a year. Junks make two trips a year between Pao-t'ou and Yin-ch'uan (32 28 106 19E), Kan-su Prov., traveling 18 to 30 km per day upstream (31) with products from the eastern provinces, transshipped at Pao-t'ou. (10, p. 309) They make 60 to 90 km per day downstream with leather goods and herbs from Chung-wei and Yin-ch'uan, and with salt from Teng-k'ou-shih (39 48N 106 36E) or Ting-k'ou-chen, Kan-su Province. (31)

Shipping on the stretch between Shen-hsi and Shan-hsi Provinces has to operate in two sectors, separated by the waterfall at Hu-k'ou. (31)

Ho-ching (35 37N 110 43E), Shen-hsi Prov., is a port at the confluence of Huang-ho and Fen-ho. Junks sail down the Huang-ho from Ho-ching to Cheng-chou (34 45N 113 40E), Ho-nan Prov., but cannot negotiate San-men-hsia Rapids going upstream. (10, p. 249; 40, No. 3071, 1956, p. 2)

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Since the channel of the Fen-ho has been improved, shipping has been extended from Ho-ching to Hsin-chiang (35 38N 111 13E) Shan-hsi Prov., and will reach farther up the Fen-ho to Hsiang-fen* (co-ordinates unknown). The navigable section will then be about 170 km long and become the first long waterway in Shan-hsi Province for shipping out the foodstuffs and cotton grown in the region. Wharves will be built at a number of points and river boats provided. (40, No. 3071, 1956, p. 2)

T'ung-kuan (T'ung-ch'uan (35 00N 109 07E), Shen-hsi Prov., is an important transportation center at the point where the Lung Hai Railroad meets the Huang-ho as it turns eastward. (10, pp.251,252) Junks go up the Wei-ho from T'ung-kuan to Hsing-p'ing (34 17N 108 25E), Shen-hsi Province. (10, p. 249; 1, Map 27)

A 1955 source states that between Yu-men (or Yu-men-k'ou), Shan-hsi Prov., and Lo-k'ou (36 44N 116 58E), Shan-tung Prov., junks can travel 20 km per day upstream and 70 to 100 km a day downstream. In Shan-tung Prov. the river averages 3 m deep. (31) According to a 1953 source, junks can sail the section between Cheng-chou (34 45N 113 40E), Ho-nan Prov., and Lo-k'ou, but navigation is complicated here. (10, p. 69) Steam navigation will be opened on this stretch up to Cheng-chou early in the Five-year Plan. (36)

Lo-k'ou is on the south bank of the Huang-ho and the river port for Chi-nan (36 40N 117 00E), Shan-tung Prov. (10, p. 79), which is 7 km (6, p. 271) south of the Huang-ho at the junction of the Ch'ing-tao/Chi-nan and T'ien-chin/P'u-k'ou Railroads, a city with a population of 590,000. (10, p. 79)

A passenger and freight steamer, built in about 5 months by the Shan-tung Province Water Transport Control Bureau, was launched at Lo-k'ou on 12 November 1955. Drawing 1.3 m, 29 m long and 5.4 m wide, this vessel is designed to ply the Huang-ho; it is the first ship of this type to be launched on this river, according to a quoted source. (32)

The lower course of the Huang-ho has many sand bars preventing vessels from going directly out to sea. Therefore, the clear Hsiao-ch'ing-ho flowing east of Chi-nan is used as an outlet to the sea. (10, p. 69; 31) This river is sufficiently deep for junk traffic directly from Chi-nan. Motor vessels ply its lower reaches. (6, p. 271)

At Yang-chiao-k'ou (37 16N 118 53E), Shan-tung Prov., at the mouth of the Hsiao-ch'ing-ho on the Po-hai Gulf, freight is transferred from river junks to seagoing vessels. (10, p. 69)

*The Provincial Atlas of the Chinese People's Republic, Shang-hai, 1953, Map 27, lists Lin-fen or P'ing-yang (36 05N 111 32E), Shan-hsi Prov., on the Fen-ho above Hsin-chiang.

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A Soviet project to utilize the waterpower and improve transportation on the Huang-ho calls for construction of 46 locks, and two very large reservoirs, at San-men-hsia (111 12N 34 54E) and Liu-chia-hsia (co-ordinates unknown). After these are built, the Huang-ho will be divided into four navigational zones:

- (1) from the estuary to T'ao-hua-hsia (co-ordinates unknown) near the county seat of Ch'eng-kao or Ssu-shui (34 51N 113 12E) in Ho-nan Province (1, Map 36: 31) a distance of 703 km;
- (2) from the Ch'ing-shui-ho (31) or Ch'ing-chien-ho (1, Map 27) south of Ho-k'ou-chen to Yin-ch'uan, a distance of 843 km;
- (3) San-men-hsia Reservoir itself
- (4) Liu-chia-hsia Reservoir.

The 46 locks will regulate the middle and lower reaches of the Huang-ho and allow vessels of 500-t capacity to sail from the mouth all the way up to Lan-chou. (31) (Fig. 46)

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42. Druzhba, Pei-ching

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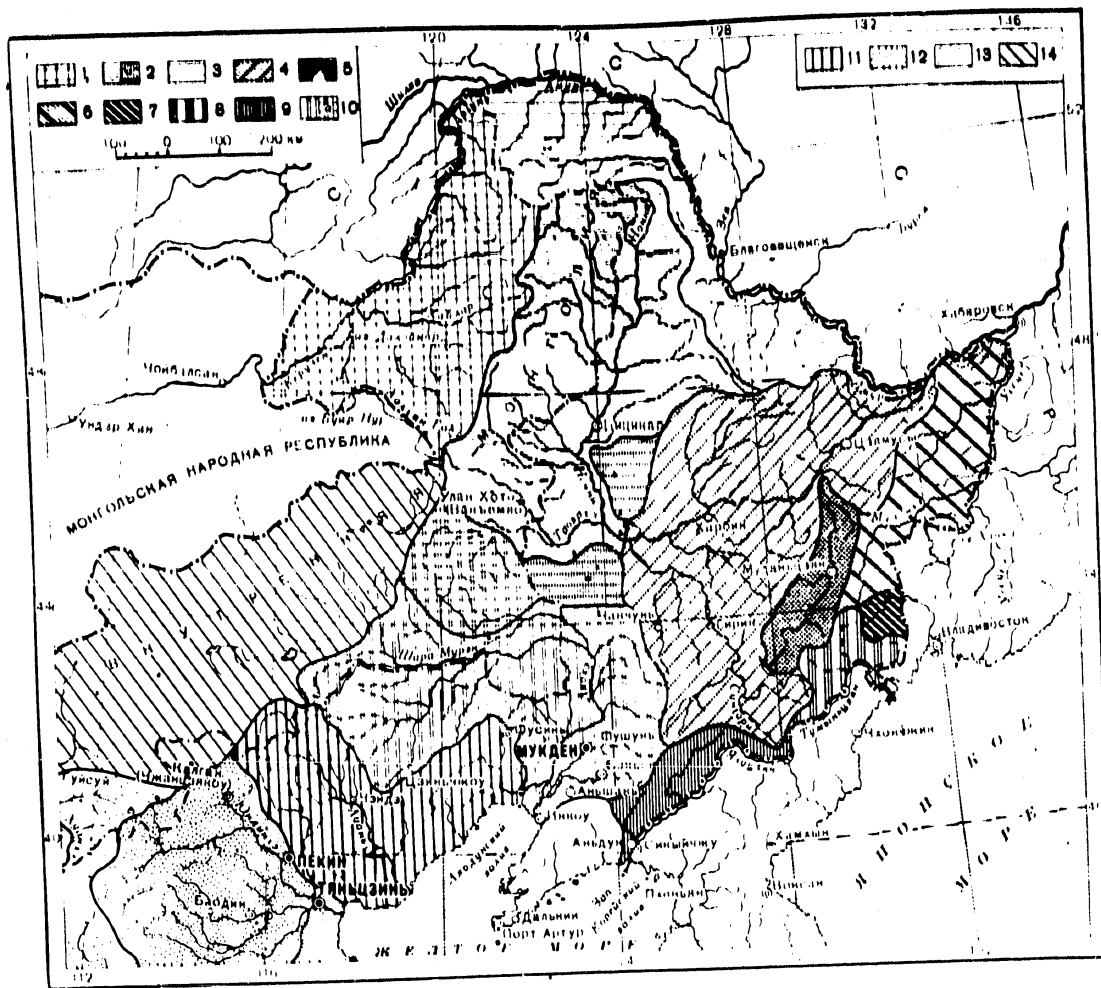


Fig. 1 - Main River Systems in Manchuria and North China

- | | | | |
|-------------------|----------------|----------------------------------|-------------------------------|
| 1. O-erh-ku-na-ho | 2. Nen-chiang | 3. Hei-lung-chiang | 4. Sung-hua-chiang |
| 5. Mu-tan-chiang | 6. Wu-su-li-ho | 7. Sui-feng-ho | 8. T'u-men-chiang |
| 9. Ya-lü-chiang | 10. Liao-ho | 11. Ta-ling-ho, and Pai-ho | 12. Rivers in Ho-pei Province |
| | 13. Huang-ho | 14. Water courses in Gobi Desert | |

Source: M: Severo-Vostochnyy Kitay, E.M. Murzayev, Moskva, 1955, btw. pp. 104 & 105

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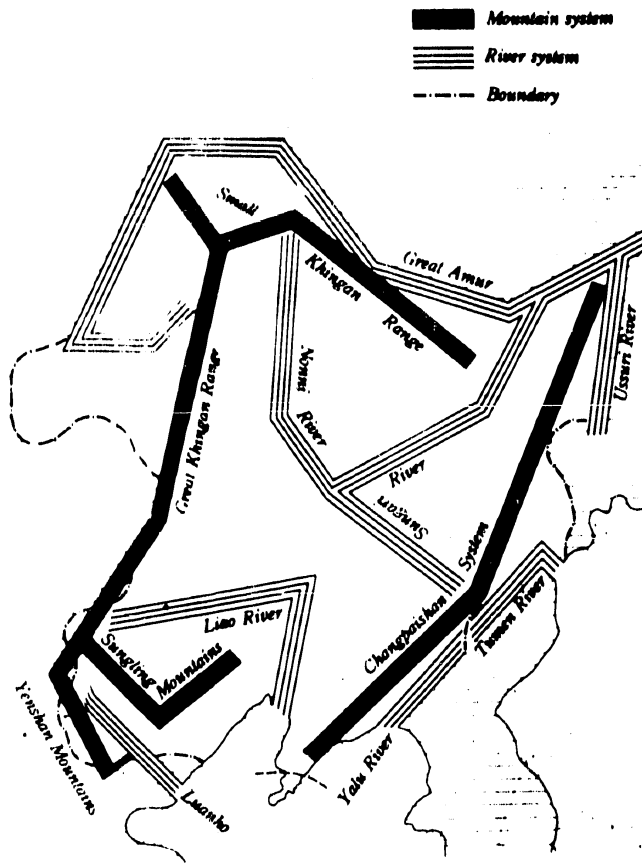


Fig. 2 - Rivers in Manchuria

Source: M: Manchoukuo Yearbook, Tokyo, 1934, Map opp. p. 5

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Fig. 3 - Waterfront at T'ung-chiang

Source: M: Manshu Gaikan, Dairen, 1937,
p. 94, bottom

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黒河の埠頭

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Fig. 4 - Landing at Hei-ho
Source: M. Manshu kenkokoku to Manshu Shingunai daijiten shi, Yokohama, 1932, p. 205

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Fig. 5 - Landing at Fu-chin

Source: M: Manshu Gaikan, Dairen, 1937, p. 94

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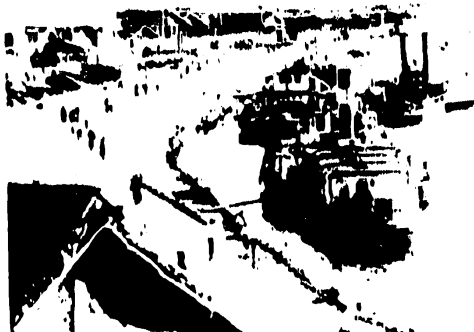


Fig. 6 - The River Port of Chia-mu-ssu

Source: P: Manchuria, No. 7, 1936, p. 401



Fig. 7 - Wharf at Chia-mu-ssu

Source: M: Manshu Gaikan, Dairen, 1937, p. 94

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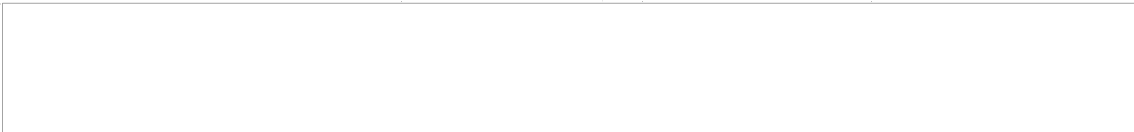


Fig. 8 - The coaling port of Lien-chiang-k'ou
Source: M; Manshu Gaikan, Dairen, 1937, p. 94



Fig. 9 - Wharf at I-lan
Source: M; Manshu Gaikan, Dairen, 1937, p. 93

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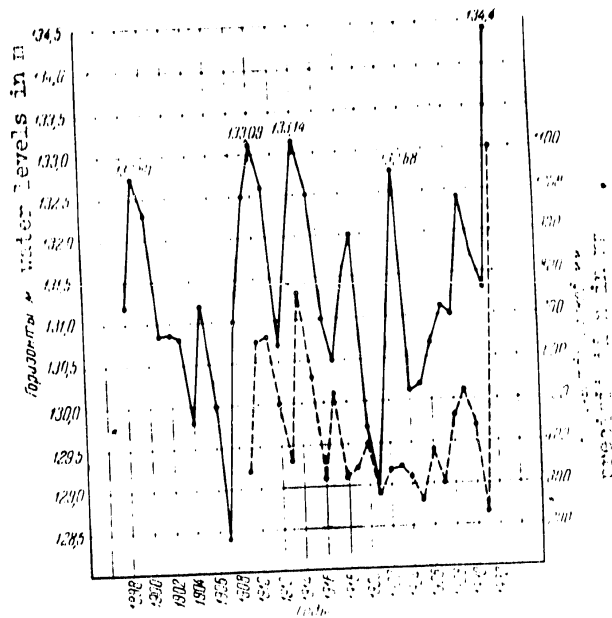


Fig. 10

Graph showing the highest levels of the Sung-hua-chiang at Ha-erh-pin and the quantity of precipitation (dotted line) in June and July at Ha-erh-pin and Ch'i-ch'i-ha-erh

Source: M: Severo-Vostochnyy Kitay, E.M. Murzayev, Moskva, 1955, p. 107

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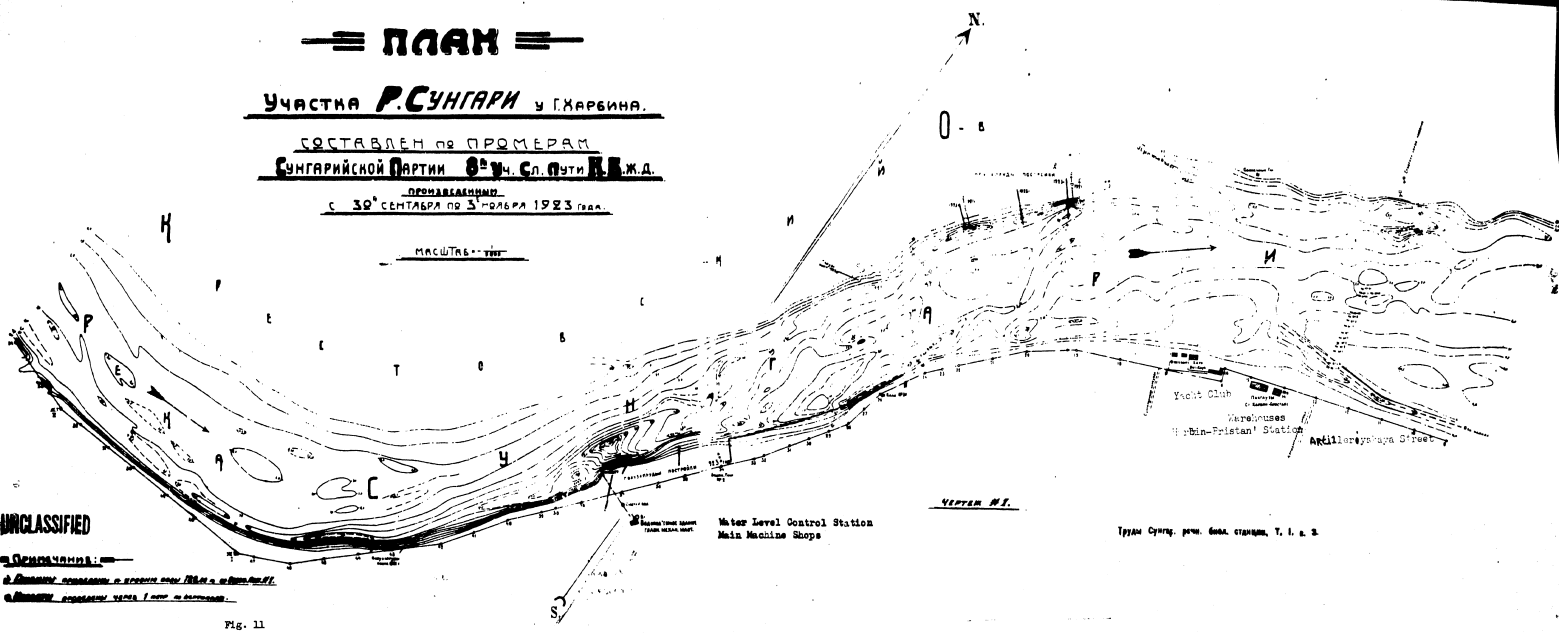
ПЛАН

УЧАСТИЯ **Р. СУНГАРИ** в ГАРБИНА.

СОСТАВЛЕН по ПРОМЕРАМ
СУНГАРИЙСКОЙ ПАРТИИ **В. Ч. С. ПУТИ В. В. Ж. Д.**

ПРЕДЛАГАЮЩИЙ
с 30 СЕНТЯБРЯ по 3 Октября 1923 года.

МАСШТАБ 1:1000



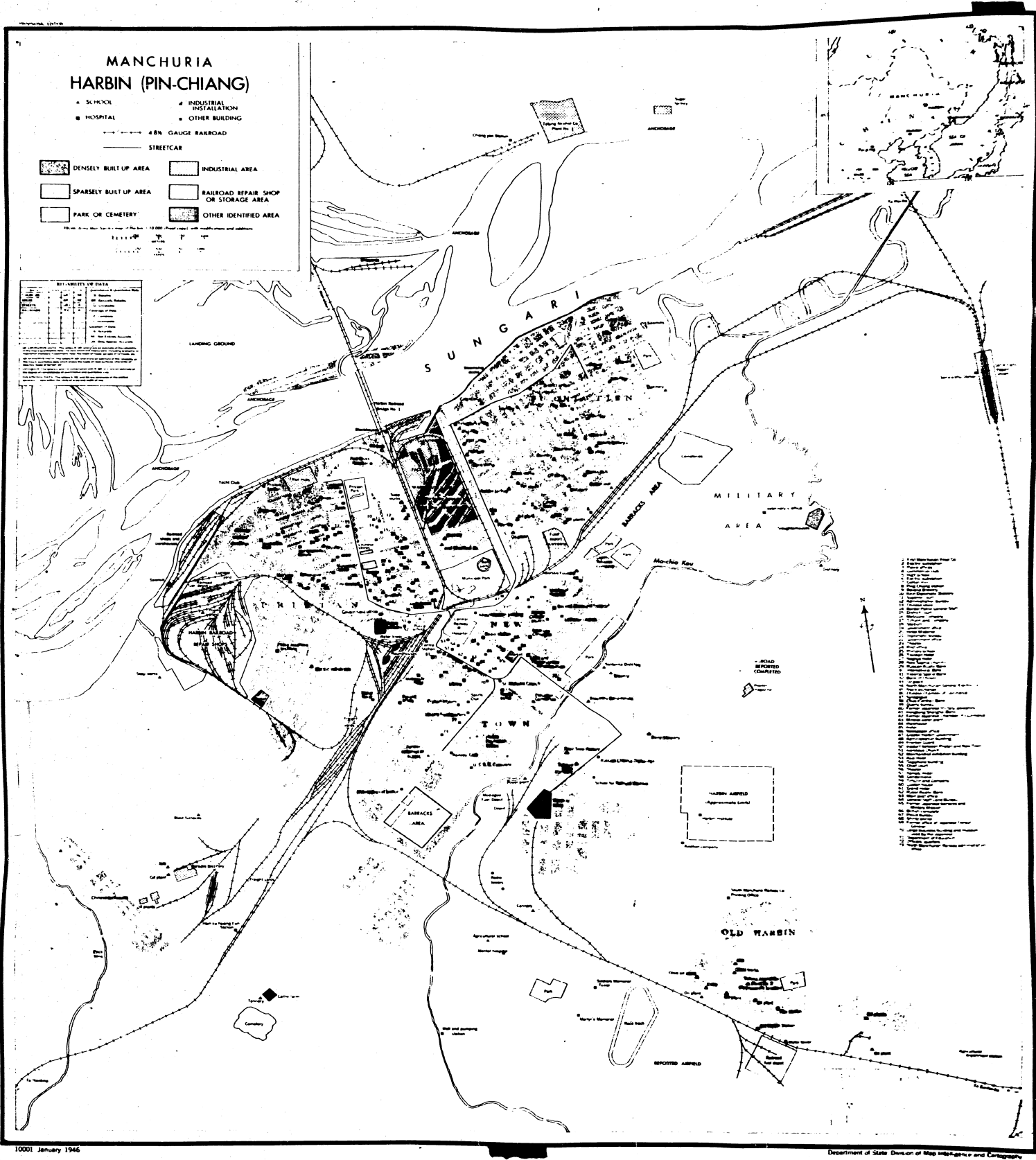
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Fig. 11

Depths of the Sung-hua-chiang at Ha-erh-pin, based on a water level of 120 m according to Water Gauge Post No. 1; isobars in meters; surveyed in 1923.

Source: M. Trudy Sungariyaskoy rechnoy biologicheskoy stantsii, Harbin, 1925, map opp. p. 26



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Fig. 12 - Map of Ha-erh-pin
Source: Department of State, 1946 (No. 10001)

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ANTUNG AND SHING-SHI NORTH YONGAN (SOUTH) PROVINCE KOREA AND LIAONING PROVINCE, MANCHUKUO

Scale: 1:50,000

Vertical Scale: 1:50,000

Horizontal Scale: 1:50,000

Legend:

- 1:50,000
- 1:100,000
- 1:200,000
- 1:500,000
- 1:1,000,000
- 1:2,000,000
- 1:5,000,000
- 1:10,000,000
- 1:20,000,000
- 1:50,000,000
- 1:100,000,000
- 1:200,000,000
- 1:500,000,000
- 1:1,000,000,000

HEIGHTS IN METERS, DEPTHS IN FATHOMS AT NEARLY LOWEST LOW WATER

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ANTUNG AND SHING-SHI
FEB 1945

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Fig. 13 - The Port of Ha-erh-pin

Source: N: Druzhba, No. 109, 10 May 1956, p. 2

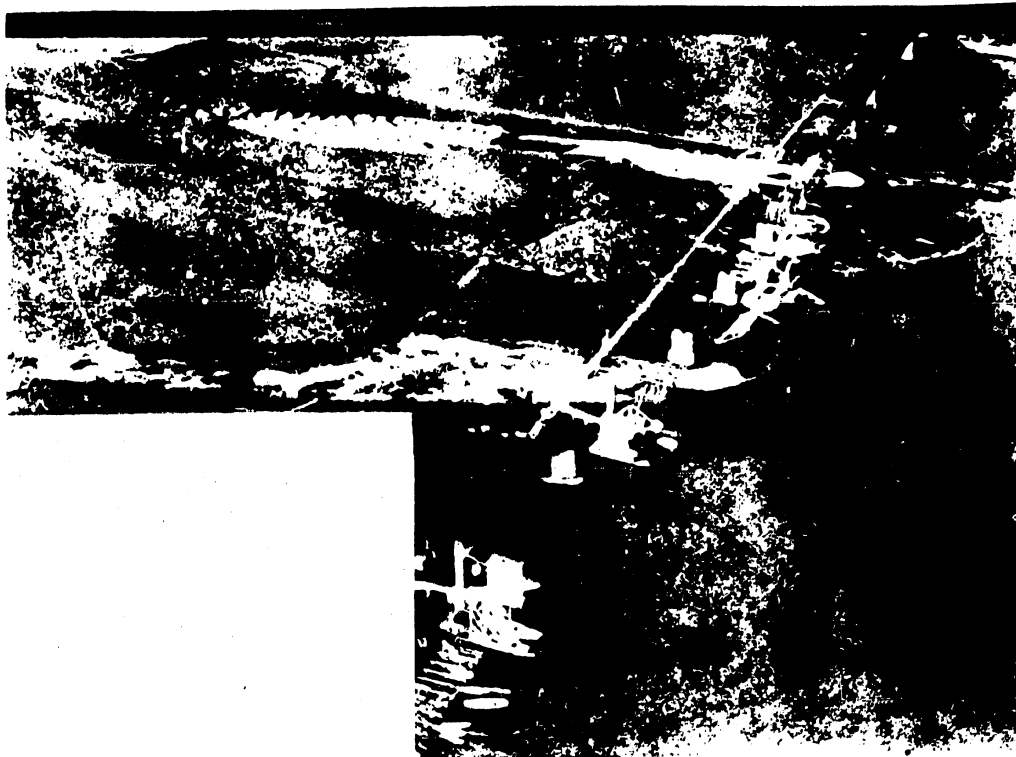


Fig. 14

Aerial view of San-k'o-shu on the Sung-hua-chiang

Source: M: Ra-hin-sen Ken-setsu Koji Sha-shin-cho, Harbin, 1924, p. 45

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Fig. 15 - Surg-hua-chiang Wharf at Ha-erh-pin

Source: W: Rahr-ser Kensetsu Koji Shashir-cho, Dairer, 25 Nov 1934, p. 32

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Fig. 16.- A busy wharf at Ha-erh-pin

Source: W: Rahin-sen Kensetsu Koji Shashin-cho, Dairen, 25 Nov 1934, p. 33

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Fig. 17 - Longshoremen unloading soy beans from a river boat at Ha-erh-pin

Source: M: Manchukuo Pictorial Record, Tokyo 1934, p. 125

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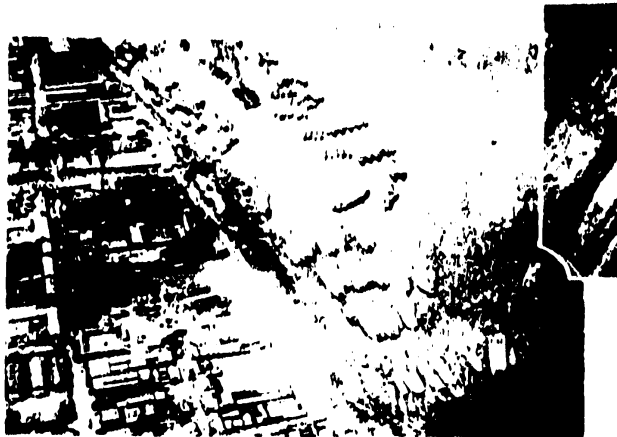


Fig. 18 - Aerial view of waterfront at Ha-erh-pin

Source: M: Showa roku shichi nen manshu jihen kanto-gun kinen shashin-cho, Wakayama, 20 June 1933, p. 34

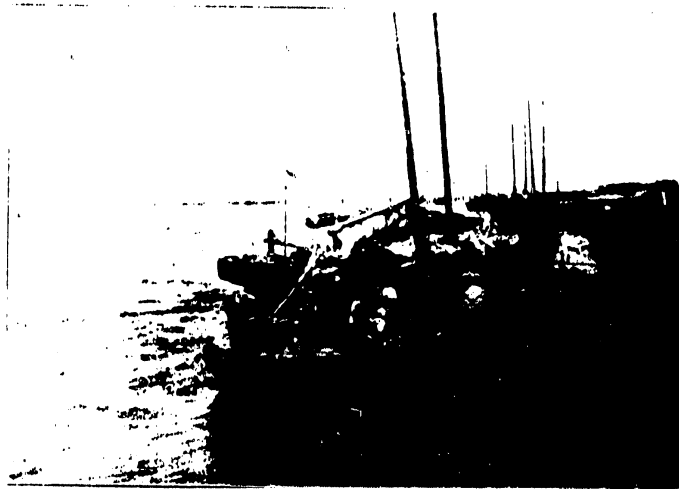


Fig. 19 - Landing on the Nen-chiang at Ch'i-ch'i-ha-erh

Source: M: North Manchuria and the Chinese Eastern Railway, Harbin 1924, p. 391

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Fig. 20 - Reloading cereals at Lao-shao-kou
(Sung-hua-chiang) Landing

Source: M: North Manchuria and the Chinese Eastern
Railroad, Harbin 1924, p. 106



Fig. 21 - Waterfront at Chi-lin

Source: M: Manshu Gaikan, Dairen 1935, p. 82

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AN-TUNG AND SHENGSHEU
NORTH PYONGAN NORTH HAI AN PROVINCE
KOREA, AND LIAONING PROVINCE, MANCHUKUO

CHINA MAP
414
1:100,000
1945

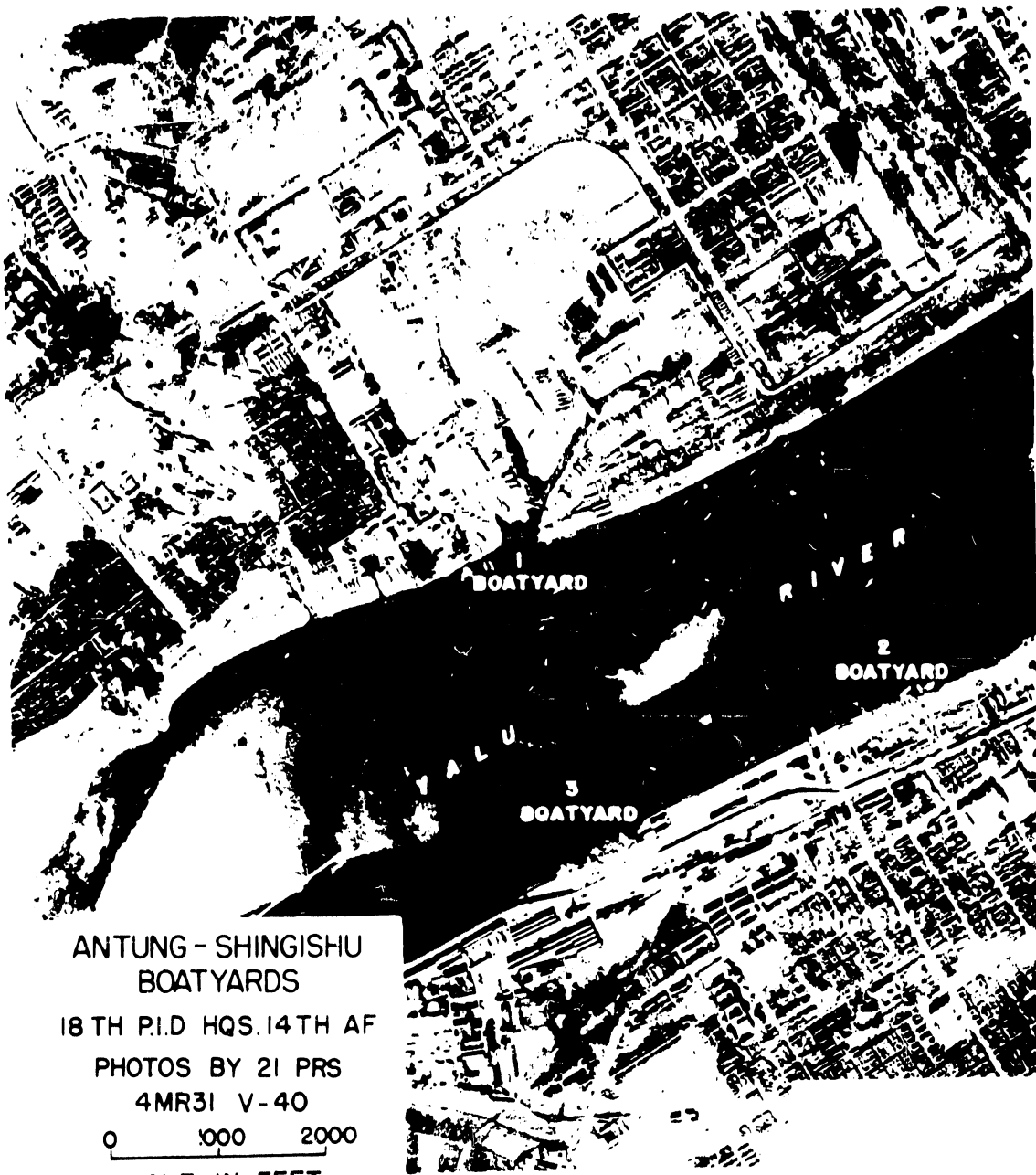


Fig. 22 - Map of An-tung

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Source: U.S. Army Map Service, Wash., D.C., 1945

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ANTUNG - SHINGISHU
BOATYARDS

18 TH P.I.D HQS. 14 TH AF
PHOTOS BY 21 PRS
4MR31 V-40

0 1000 2000
SCALE IN FEET

Fig. 23 - An-tung

Source: M: U.S. Navy - CINCPAC Bulletin 48, 1945, p. 137

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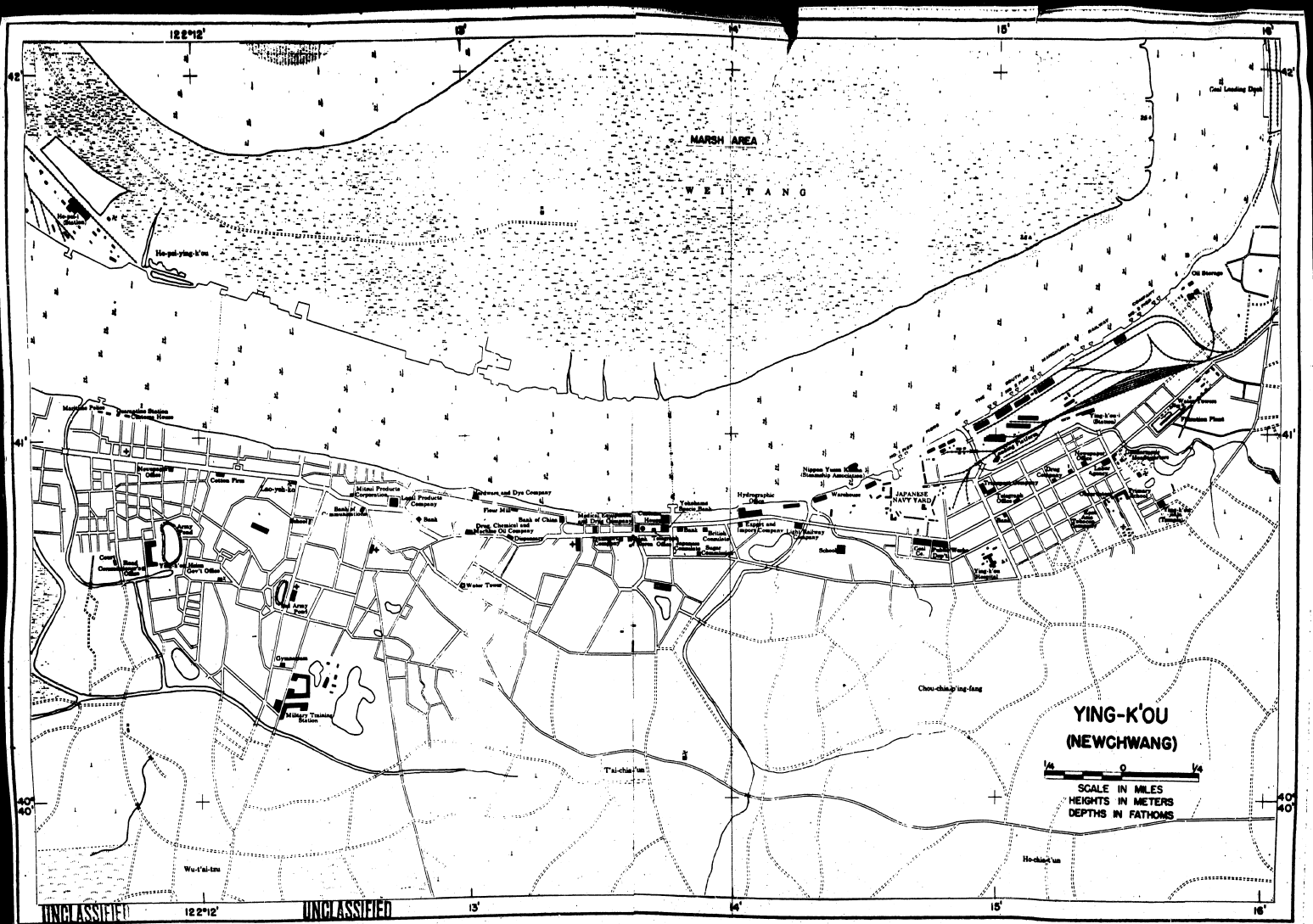


Fig. 24 - Ying-k'ou

Source: M: U.S. Navy - CINCPAC Bulletin 48, 1945, p. 135

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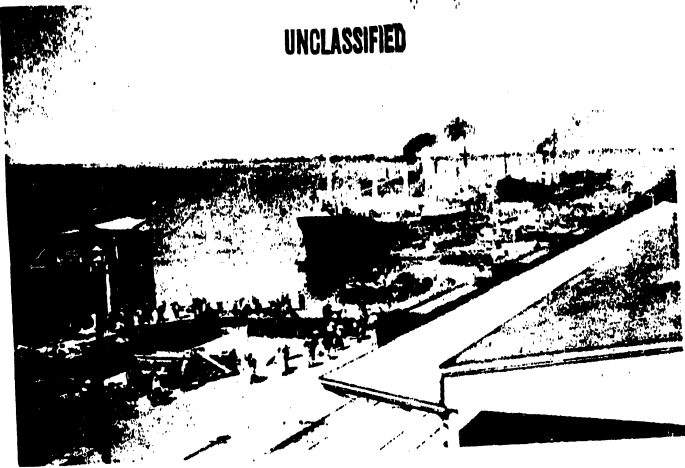


Fig. 25 - Ying-k'ou Port on the Liao-ho
Source: M: Manshu Gaikan, Dairen, 1935, p. 53



Fig. 26 - Ying-k'ou Port
Source: M: Manshukoku Gensei, Ch'ang-ch'un, 1938, p. 64

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Fig. 27 - Wharf at Ying-k'ou
Source: M: Directory of Manchoukuo, Dairen, 1938-39, p.256



Fig. 28 - Wharf of South Manchuria Railway at Ying-k'ou
Source: P: Light of Manchuria, No. 16, Dairen, 1 Dec 1921, p. 22



Fig. 29 - Ying-k'ou Port with railroad
Source: M: Manshu Kenkoku; Manshu, Shanhai Dai Jihen-shi, Yokohama, 1935, p. 203

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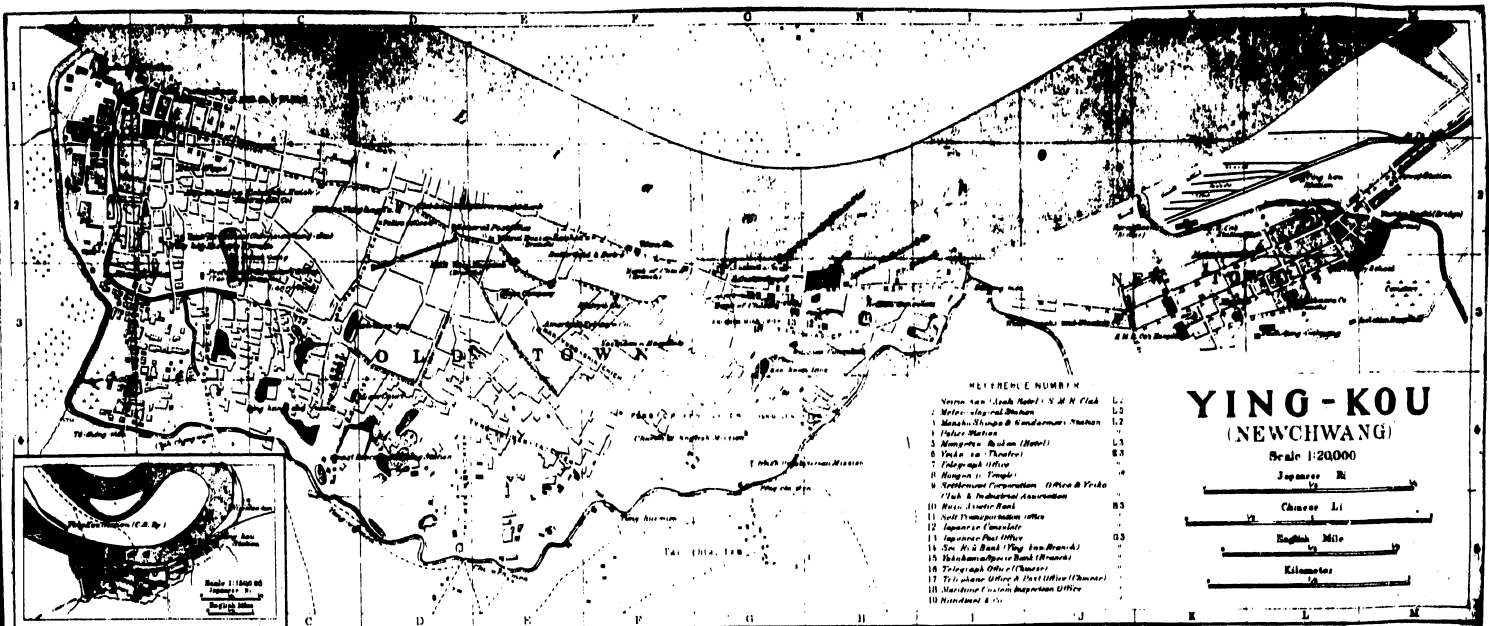


Fig. 30 - Ying-k'ou (Niu-chuang)

Source: M: Official Guide to Eastern Asia, Tokyo, 1920, Vol. I, btw. pp. 210-211

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TIENTSIN CHINA

- Various installations in Tientsin located by two former... one, the representative for Texas and the other... for California-Texas Oil Company in Tientsin.
1. Freight yards built by the Japanese north of the North Station.
 2. Central Station, rebuilt by the Japanese and used as a... botanical garden and park to help locate...
Athletic stadium used as a motor transport depot for...
hundred vehicles. Repair facilities, gas and oil...
Japs may have moved all petroleum products to... terminals.
 3. Chinese civil administration offices (area with... in dotted line marked by 17/2).
 4. Steel bridge (not portion... on map).
 5. Bus yards for buses to Peking and other points.
 6. Belgian Power Plant.
 7. Waterworks supply... city and the...
French Concessions.
 8. Important godown and storage area west... of East Station.
 9. Wooden bridge built by the Jap Army.
 10. Extensive Japanese military dumps. Open... air storage of...
of all kinds (shown... lines...
marked by 18/2).
 11. Chung Kuan Department plant, an...
standing high... for foreign...
concessions, except... since...
change was located...
Yuan Department...
Leopold Building - tall and...
British waterworks.
 12. French Power Plant.
 13. Japanese barracks.
 14. Additional administration building...
Japanese Tientsin area...
British Power Plant.
 15. Japanese Power Plant.
 16. Japanese garrison headquarters...
small port area.
 17. Hankai Race Course, used...
into barracks.
 18. Two Fong Cotton...
equally large...
on map on oppo...

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Fig. 31 - Map of T'ien-chin

Source: Map 6703 (1941), Map Div., Library of Congress

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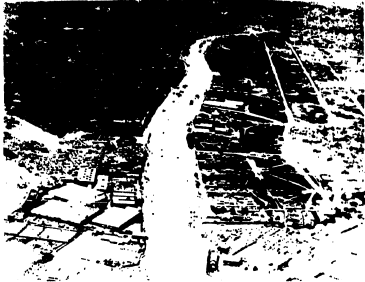


Fig. 32 - T'ien-chin

Source: M. U.S. Navy - CINCPAC Bulletin 48, 1945, p. 132

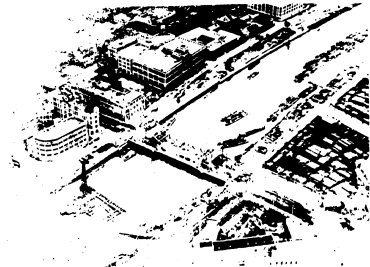


Fig. 33 - T'ien-chin with drawbridge across Hai-ho. French Concession in background
Source: Ibid.

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Fig. 34 - T'ien-chin. British Concession. Dam along Hai-ho, just east of Astor House Hotel. Looking south.

Source: M. U.S. Navy - CINCPAC Bulletin 119, 1945, p. 132



Fig. 35 - The shallow Hai-ho provides the harbor for T'ien-chin. Repeated dredging is necessary.

Source: M. Land of the 500 Million, Geo. B. Cressey, New York, 1955, p. 277

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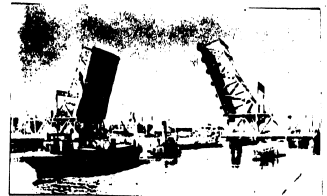


Fig. 36 - This bridge across the Hai-ho at T'ien-chin opens electrically to pass small steamers
Source: M. China The Beautiful, Ting Hsing-wu, Hongkong, 1955, p. 129

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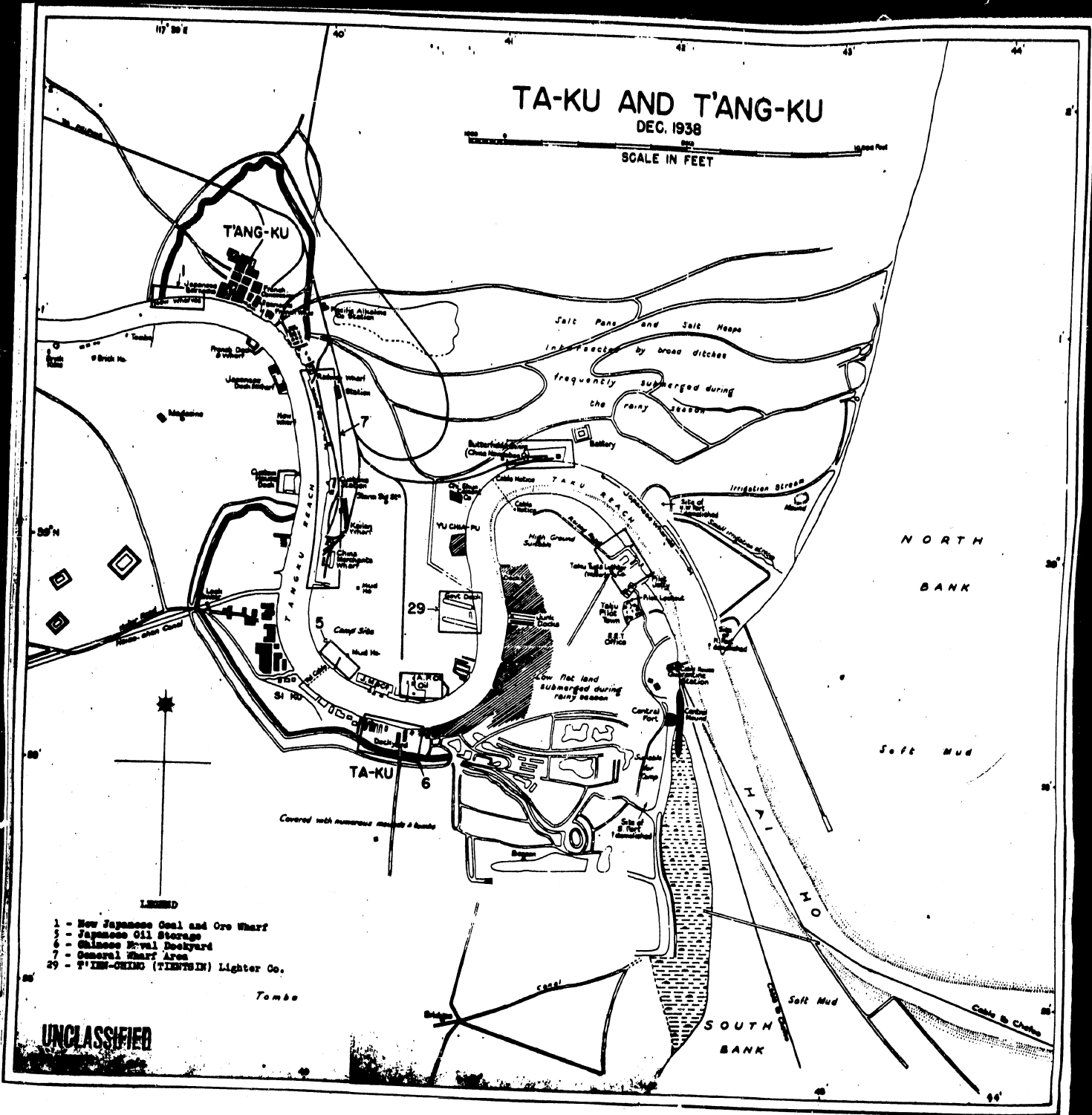


Fig. 37 - Plan of Ta-ku and T'ang-ku
Source: M: U.S. Navy - CINCPAC Bulletin 119, 1945, p. 131

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Sketch Plan of the YUNG-TING-HO DIVERSION PROJECT

永定河引水工程示意图

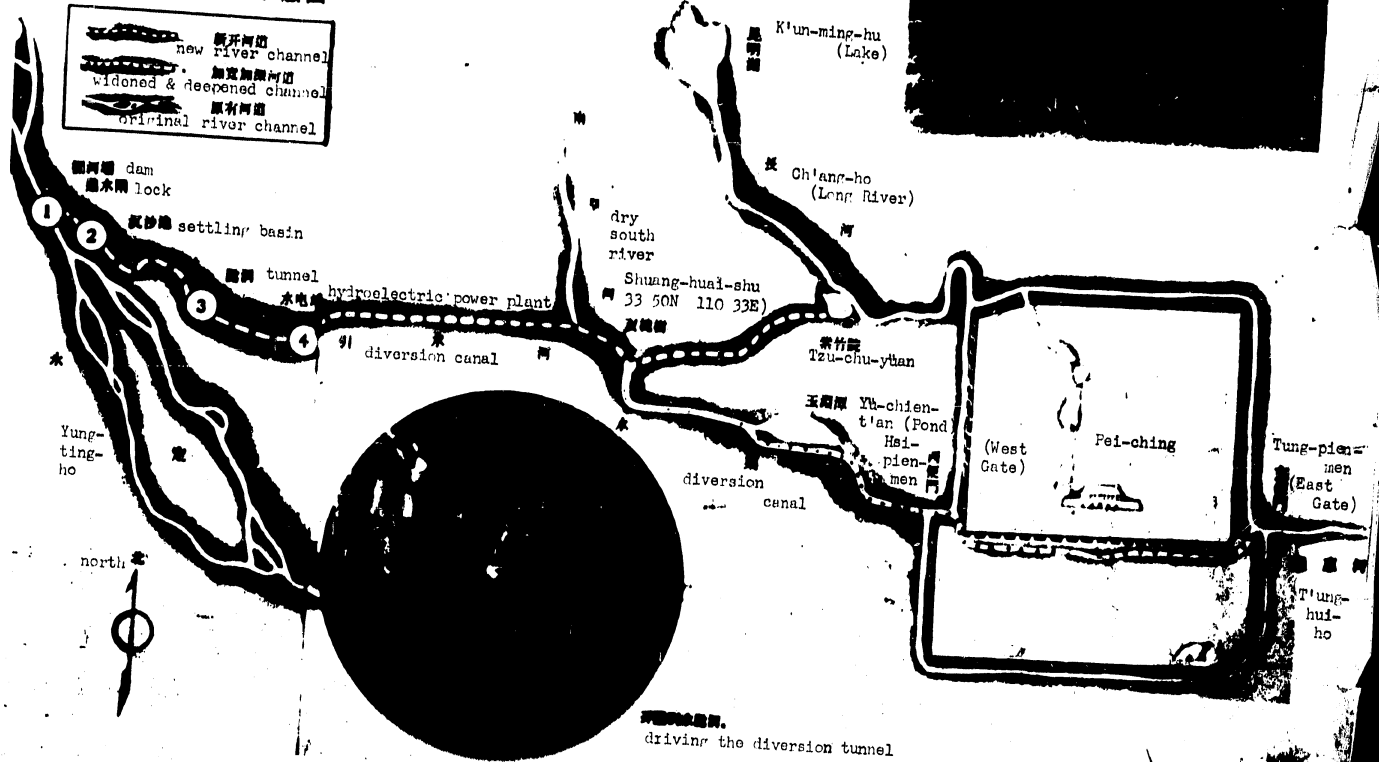


Fig. 44 - Sketch Plan of the Yung-ting-ho Diversion Project
Source: P: Chieh-fang-ch'ün Hua-pao, Pei-ching, June 1956, p. 31

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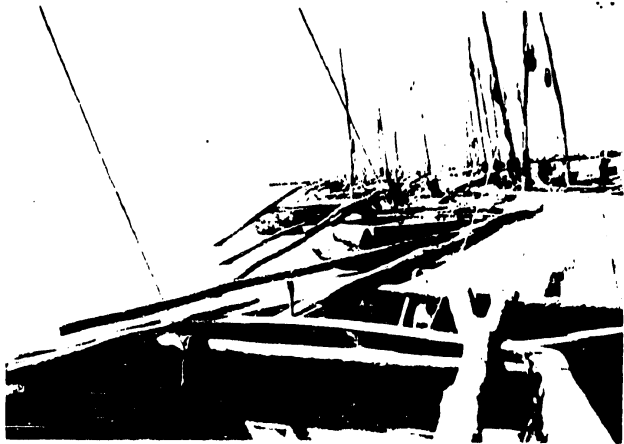


Fig. 45 - Landing at Pao-t'ou

Source: M: Manshu Gaikan, Dairen, 1937, p. 134

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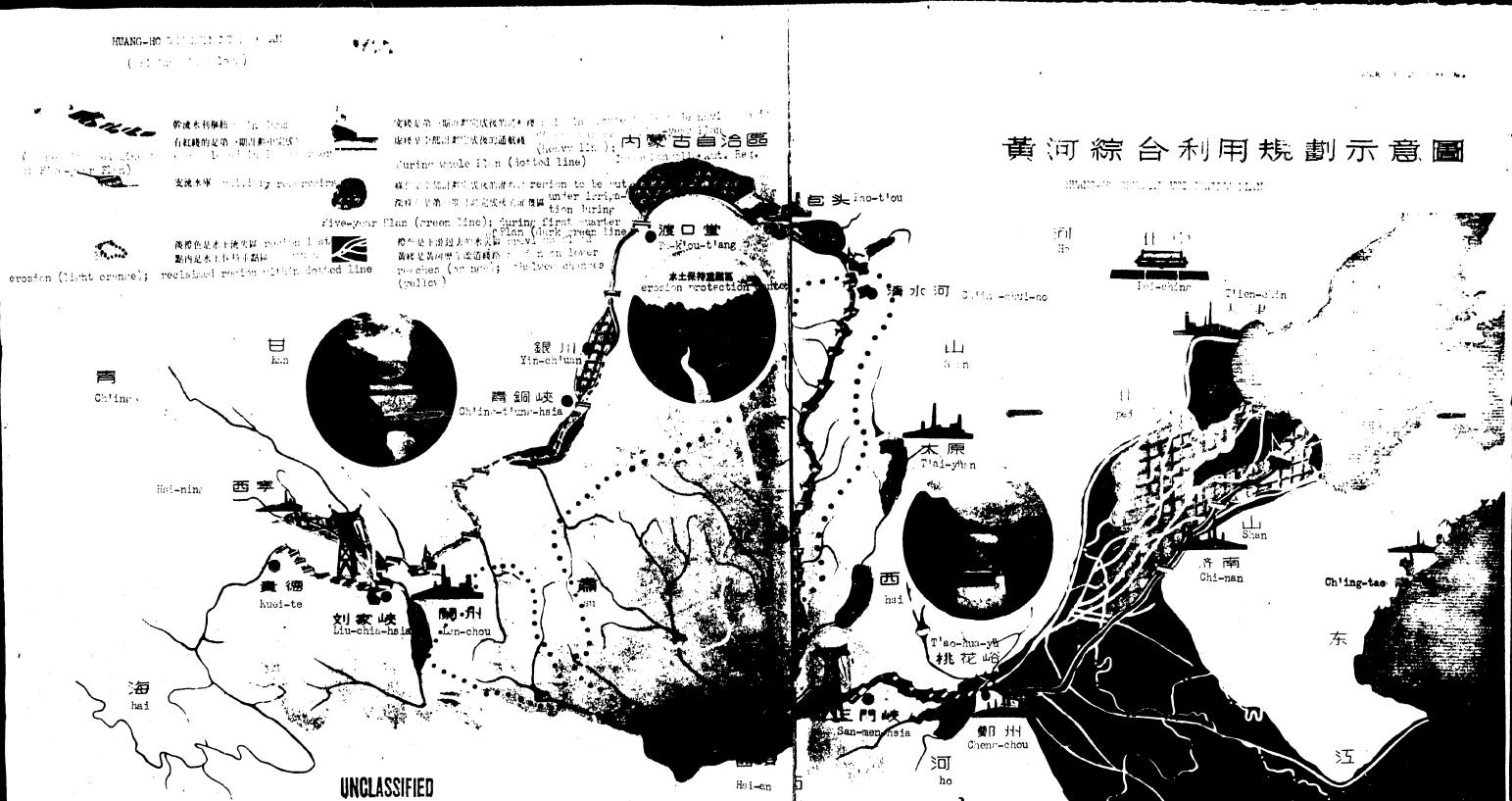


Fig. 46 - Sketch Plan of Huang-ho Development Program
Source: P: Jen-min hua-pao, Pei-ching, Sep 1955, pp. 6-7

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T'ANG-KU
18 TH P.I.D. HQS. 14 TH AF
PHOTOS BY 21 PRS
4MR43 IV4
0 1000 2000
SCALE IN FEET

J10P0A L-50251-88

Fig. 38 - Aerial photo of T'ang-ku

Source: M: U.S. Navy - CINCPAC Bulletin 119, 1945, p. 130

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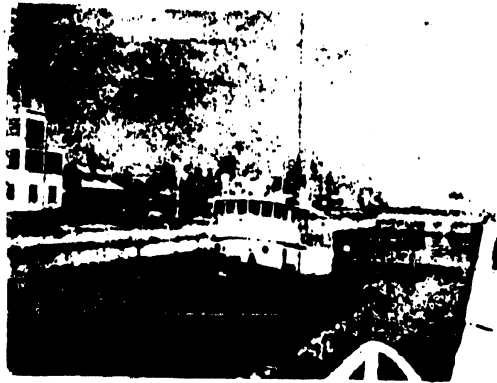


Fig. 39 - T'ang-ku Hsin-kang shiplock for seagoing vessels of 3,000-t capacity has started operating after its first major repair in ten years.

Source: P: Chou-mo Pao, No. 36, Hongkong, 1956, inside back cover

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Fig. 40 - Dredging at T'ang-ku Hsin-kang (New Port)

Source: P; China Reconstructs, Pei-ching, Jan-Feb 1954, p. 13

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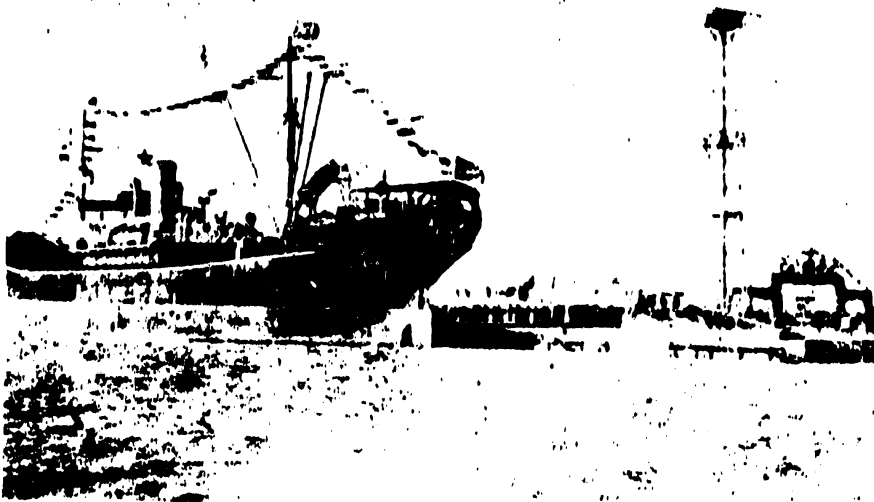


Fig. 41 - Wharf No. 1 at T'ang-ku Hsin-kang

Source: P: Chou ~~no~~ Pao, Hongkong, No. 40, 1954, back cover.

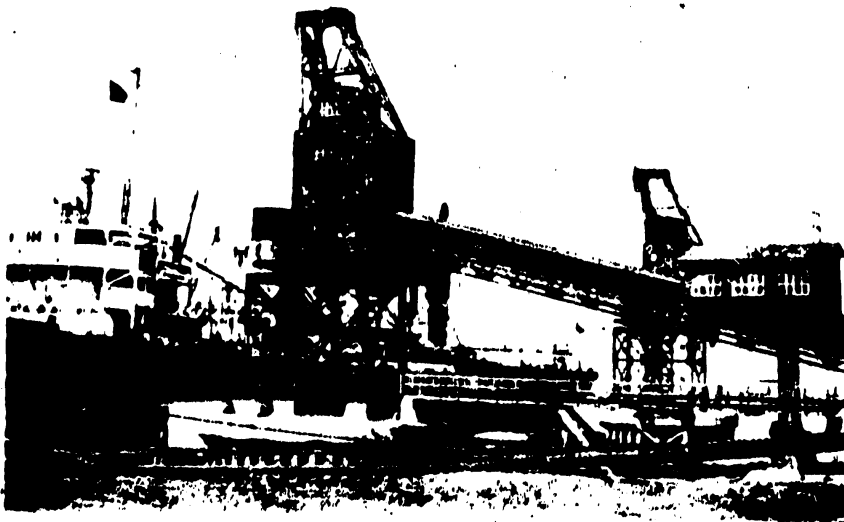


Fig. 42 - An automatic coal loader at Wharf No. 2 in T'ang-ku Hsin-kang

Source: Ibid., No. 23, 1956, inside front cover

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Fig. 43 - The Shipbuilding and Repair Yard at T'ang-ku Hsin-kang

Source: N: Druzhba, Pei-ching, No. 40, 19 Feb 1957, p. 3

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