SECRET

No. 69

ECONOMIC INTELLIGENCE REPORT

THE CONSTRUCTION INDUSTRY IN COMMUNIST CHINA DURING THE FIRST FIVE YEAR PLAN (1953-57) AND THE OUTLOOK FOR THE SECOND FIVE YEAR PLAN (1958-62)

CIA/RR 59-6
March 1959

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

50X1

SECRET

WARNING

This material contains information affecting the National Defense of the United States within the meaning of the espionage laws, Title 18, USC, Secs. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

Declassified in Part - Sanitized Copy Approved for Release 2013/05/07 :
CIA-RDP79R01141A001300090002-5

S-E-C-R-E-T

ECONOMIC INTELLIGENCE REPORT

THE CONSTRUCTION INDUSTRY IN COMMUNIST CHINA DURING THE FIRST FIVE YEAR PLAN (1953-57) AND THE OUTLOOK FOR THE SECOND FIVE YEAR PLAN (1958-62)

CIA/RR 59-6

CENTRAL INTELLIGENCE AGENCY

Office of Research and Reports

S-E-C-R-E-T

Declassified in Part - Sanitized Copy Approved for Release 2013/05/07 :
CIA-RDP79R01141A001300090002-5

50X1

Declassified in Part - Sanitized Copy Approved for Release 2013/05/07 :
CIA-RDP79R01141A001300090002-5

CONTENTS

Page

Page

Appendixes

50X1

Tables

Illustrations

THE CONSTRUCTION INDUSTRY IN COMMUNIST CHINA DURING THE FIRST FIVE YEAR PLAN (1953-57) AND THE OUTLOOK FOR THE SECOND FIVE YEAR PLAN (1958-62)*

Summary

During the First Five Year Plan (1953-57) the construction industry of Communist China showed a rapid rate of growth both in volume of output and in variety of projects handled, although it often committed blunders and suffered from inefficient organizational policies and antiquated working methods. Progress was considerable in spite of the fact that China had to rely greatly on the Soviet Bloc for assistance in the construction of large-scale and complex projects.

Since 1953 the organization of the industry has been directed along increasingly efficient lines (see the chart, Figure 1**). The Ministry of Construction and Engineering was established in 1952. Although it was organized nominally on a regional basis, its bureaus reflected industrial sectors and, like the construction units of various ministries, moved from project to project irrespective of geographic location. This practice led to excessive costs and impeded a regional orientation. During the First Five Year Plan, local construction organs also grew in numbers and capability.

The bulk of construction by 1955 was performed by state-operated construction enterprises which worked under contract. By the end of 1957, coordination between design and construction elements had improved considerably, and this improvement was reflected in better quantitative and qualitative performance. As more complex projects were undertaken, specialized construction enterprises evolved. To speed construction, units of the Peoples Liberation Army assisted in the national effort, most conspicuously in the construction of new railroads.

Most of the construction targets of the First Five Year Plan were surpassed. The First Five Year Plan scheduled 1,600 above-norm construction starts*** and 1,271 above-norm construction completions by the end of 1957. About 1,731 above-norm projects were started, and 1,265 were completed during the period. About 825 of the starts and

* The estimates and conclusions in this report represent the best judgment of this Office as of 1 December 1958.

** Following p. 2.

*** See the second footnote, p. 9, below.

449 of the completions were industrial (see Table 1*). Of these industrial projects, 131 starts and 67 completions were made on projects designed and equipped with Soviet assistance.

The Chinese Communists were forced to cope with many new problems in the field of construction during the First Five Year Plan. Vast improvement in both output and techniques was made during the period. The more significant developments in these respects were as follows:

1. A start was made on a more general distribution of industrial facilities throughout the country.

2. Construction costs and construction periods for specific jobs were reduced.

3. Geological survey and construction design were improved.

4. More use was made of mechanical equipment in the construction industry.

5. There was an increase in construction employment and labor productivity.

6. There was a substantial reduction in seasonality of construction.

7. Local construction effort increased, and by 1957 the local labor force was being more fully utilized on the construction of small facilities to augment the larger (above-norm) projects.

8. Production of major construction materials (cement, steel, and lumber) increased rapidly, and these materials were in tight but adequate supply except in 1956.

Construction was not uniform in all sectors of the Chinese Communist economy during the First Five Year Plan. Construction for heavy industry had the highest priority, although construction for light industry and for most nonindustrial fields met or overfulfilled the original plans. The construction of highway and waterway facilities was generally neglected in favor of the construction of new railroad lines, about 4,900 kilometers of which were built during the 5-year period. Nonproductive construction** (housing, cultural-educational facilities, and public utilities) consumed nearly 30 percent of total capital investment during the First Five Year Plan. The

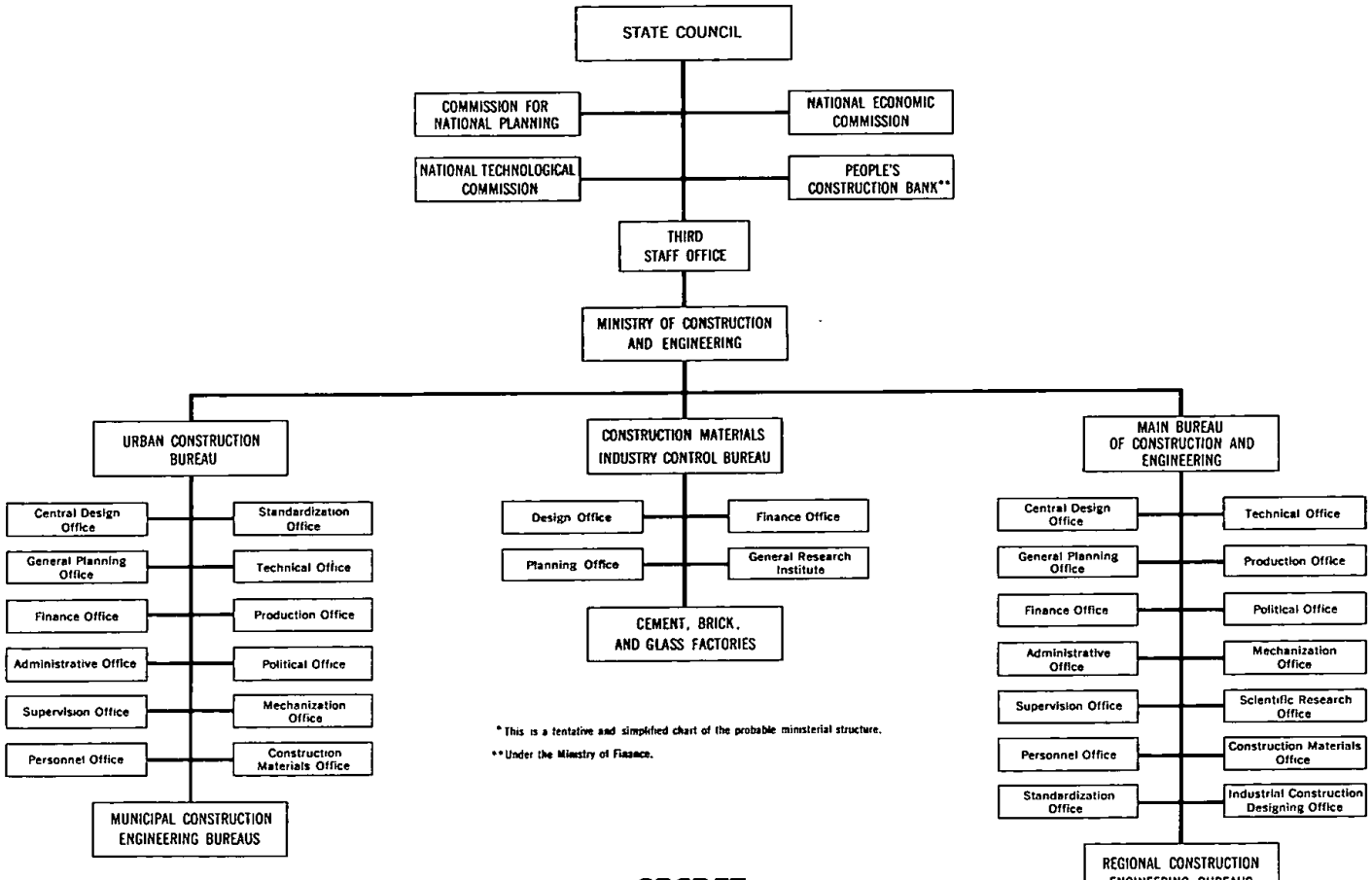
* P. 10, below.
** See the first footnote, p. 56, below.

COMMUNIST CHINA

Figure 1

ORGANIZATION OF THE MINISTRY OF CONSTRUCTION AND ENGINEERING*

OCTOBER 1958



* This is a tentative and simplified chart of the probable ministerial structure.

** Under the Ministry of Finance.

27271 12-58

Chinese reduced this expenditure during the plan period but insisted at its conclusion that nonproductive investment was excessive, pointing out that the USSR allocated only 15 percent of total capital investment to nonproductive investment during its First Five Year Plan.

Preliminary announcements on the Second Five Year Plan (1958-62) indicate that investment in capital construction will double the 42.74 billion yuan* planned in the First Five Year Plan. The "leap forward" movement, which was based on mass small-scale construction, implemented at the local level and combined with increased above-norm construction at the central level, puts this figure within easy reach. Although the movement is still too young to evaluate fully, the utilization of large labor and material resources at the local level (resources which were utilized but slightly during the First Five Year Plan) promises economic gains of some magnitude by 1962.

I. Introduction.

On 1 July 1955, midway in the First Five Year Plan, Po I-po, head of the National Economic Commission of Communist China, stated, "Capital construction** is the most important factor in the realization of socialist industrialization of our state and in the solution of our economic problems for a long period of time." 1/*** The emergence of China as an industrial power in the Far East has depended to a great extent on its construction industry.

Inasmuch as the Chinese Communists seldom announce construction-installation figures, capital investment data are often used in this report to describe construction activity. Also, because the Chinese allocate capital construction funds and announce the volume of capital construction work in terms of current prices, investment data are given in terms of current prices. The use of constant or fixed prices more accurately reflects the scale and rate of increase of capital investment than does the use of current prices. In spite of the fact that the use of current prices understates the physical

* See the second footnote, p. 7, below.

** The term capital construction, which refers to all construction that increases fixed assets and expands production, is used synonymously with capital investment in this report.

50X1

volume of capital construction (because of price changes), it is believed that prices have not fluctuated so much as to invalidate the investment data announced by the Chinese Communists and used in this report.

II. Organization of the Construction Effort.*

The national, regional, and local organization of construction activity in Communist China has improved considerably since 1953. Before that year the construction industry consisted of small private contracting firms and brigades of masons, carpenters, and other skilled artisans which went from job to job as one unit. These construction firms had little experience in large-scale modern building techniques, the use of mechanical equipment, planning, and organization. In late 1952, along with the creation of the Ministry of Construction and Engineering, the central government established state-operated construction enterprises. Within this framework, new specialized enterprises of various kinds were developed to cope with the more complex construction work encountered during the plan. The percentage of the total amount of work completed by the specialized enterprises increased from 21 percent in 1953 to 36 percent in 1955. The growth of these enterprises, distributed throughout the economy on both the national and the local levels, was as follows 2/:

Year	Specialized Construction Enterprises	Total State-Operated Construction Enterprises
1953	92	402
1954	109	421
1955	169	530
1956	224	602

Although these enterprises, which work by contract, showed rapid growth and by 1955 surpassed the self-operated enterprises in the percent of total labor force in construction and in the percent of work completed, they did not supplant the self-operated enterprises, which continued to exert a substantial influence on construction performance throughout the plan period.

The construction goals of the First Five Year Plan called forth more efficient organizational practices at all levels. Initially, organizational effort led to a rapid extension of national control.

* See the chart, Figure 1, following p. 2.

In 1954 a Peoples Construction Bank and a Commission for National Construction were established. In 1956, two new ministries, the Ministry of City Construction and the Ministry of the Building Materials Industry, were set up to meet the increased requirements of the growing economy. 3/ The Commission for National Construction and the Ministries of City Construction and of the Building Materials Industry were abolished early in 1958, however, in a general move designed to eliminate overlapping functions and to increase the area of local responsibility. 4/

The Peoples Construction Bank was established in September 1954 to supervise the allocation of funds for capital construction. Most of the accounts of various construction units and enterprises originally held by the Bank of Communications have been transferred to this Bank under the Ministry of Finance. The change created closer high-level control over investment funds. The Bank has branches in all the leading cities.

The Third Staff Office, 1 of 8 staff offices in the State Council, was established in September 1954. It supervises, coordinates, and reviews the work of ministries in the construction field as well as those in the heavy industrial and machine building fields. Along with the Commission for National Planning and the National Economic Commission, it exercises a broad coordinating function over the national construction effort.

The Commission for National Construction was established in September 1954, probably as a result of the rapid development of construction sectors in various ministries, and was abolished in the consolidation of organizations of February 1958. Although its exact functions were never defined, apparently it coordinated construction plans of the various industrial ministries and their subordinate organs; of the numerous local and provincial construction enterprises; and of the Ministries of Construction and Engineering, City Construction, and the Building Materials Industry. It also assisted the Commission for National Planning in detailed planning of the capital construction program and in establishing national construction norms. Since the reorganization of February 1958, part of the Commission's planning functions have been transferred to the two planning commissions, the National Economic Commission and the Commission for National Planning. Some planning responsibility and all of the Commission's coordination activities have passed to the Ministry of Construction and Engineering.

The Ministry of Construction and Engineering was originally established to construct public buildings such as schools, offices, hospitals, and some housing. In 1955 its 29 enterprises, which often

worked under contract to other ministries, moved into the industrial construction sphere. 5/ More than 40 percent of the Ministry's work plan for 1956 was devoted to factory construction, and the Ministry is reported to be responsible for the construction of more than one-half of the initial 156 Soviet aid projects. 6/

The administrative reorganization of February 1958 subordinated the functions of the defunct Ministries of City Construction and of the Building Materials Industry to the Ministry of Construction and Engineering and permitted better control of construction activities from the production of materials to the installation of equipment. Currently, the Ministry has several regional construction engineering bureaus that oversee numerous construction and installation enterprises as well as central design and administrative offices, the counterparts of which are found under the functional regional engineering bureaus. The Ministry also controls the major plants that produce prefabricated construction parts.* Although the Ministry of Construction and Engineering is organized nominally on a regional basis, its general construction units in many cases are actually aligned to sectors of industry, making for a mobile labor force, excessive moving costs, and a general instability of regional construction activity. Other ministries have little or no regional orientation in their construction organizations, which move from project to project irrespective of geographic location.

The organization of the construction industry in 1958, although still unwieldy and in need of streamlining as a result of the overrapid growth of the sector, is much better than that which existed in 1953. The current and future goals for construction will be met more adequately as waste, confusion, and duplication of functions are reduced and the organization is more precisely geared to the construction effort. The reorganization of February 1958 indicates that steps are being taken toward this end.

Nearly every state ministry has construction components responsible for construction in their respective sectors. Some are highly developed -- for example, those under the Ministry of the Metallurgical Industry and the Ministry of Railroads. Others are small and merely subcontract work to elements of the Ministry of Construction and Engineering or to others. Under the various ministries, there are also 140 special design institutes which are charged with the survey, planning, and design of structures and facilities in their sectors. 7/

---

* See IV, E, p. 19, below.

Construction organs of the Peoples Liberation Army (PLA) have played an important role in the construction effort, particularly in construction on railroads and other construction in frontier areas such as the Northwest and Southeast.* Since 1949, PLA units have furnished labor worth 400 million yuan** in state construction, have laid more than 2,000 kilometers (km) of railroad track, have constructed or repaired 4,300 km of highways, have built more than 40 mechanized farms and 100 factories, and have been active in water conservancy construction. 8/ During the plan, some military units were converted to civilian construction uses en masse.

During the First Five Year Plan the number of construction enterprises under local, municipal, and provincial governments increased greatly. At the beginning of 1955, there were 183 local construction enterprises, 8 installation enterprises, 50 planning and drafting units, and 178 other local organs in the construction industry. 9/ There was increased local investment for capital construction and a willingness on the part of central organs to permit construction standards, norms, and costs to be modified and controlled by local organs, and the number of local construction enterprises probably doubled by the end of 1957 over the number that existed in 1955. At Wu-han in June 1956, there were at work construction units of the central government, of Hupeh Province, and of Wu-han municipality. Nearly every ministry of the central government was represented. Such a profusion of construction units serving under three jurisdictions in one area points up the need for efficient organization and coordination. Also under provincial and local organizational control are the millions of workers engaged in part-time construction activities connected with water conservancy and road maintenance.

III. Performance During the First Five Year Plan (1953-57).

Construction activity was vital to all sectors of the Chinese Communist economy during the First Five Year Plan. The plan called for a total of 150 million square meters (sq m) of floorspace to be constructed. An official announcement stated that by the end of June 1957 more than 200 million sq m had been constructed.*** 10/ Another

---

* The names of geographic areas in this report are those of the Chinese Communist administrative divisions defined on Map 25333 (3-56), Communist China: Administrative Divisions, March 1956.

** Current yuan values in this report may be converted to US dollars at the rate of 2.46 yuan to US $1. This exchange rate, however, does not necessarily reflect the true dollar value.

*** It is believed that this figure represents an estimate of construction expected to be achieved during the First Five Year Plan period ending 31 December 1957 rather than an announcement of actual construction achieved in the 4-1/2 years ending 30 June 1957.

indicator of achievement, the amount of earth, masonry, and concrete work completed, reached 8.3 billion cubic meters (cu m) by the end of 1957, although at the end of 1955 the amount of this work completed was only a little above 3 billion cu m. The much greater accomplishment on this front in 1956 and 1957 coupled with the general success of water conservancy construction during the First Five Year Plan* suggests that the accomplishment of 8.3 billion cu m is a substantial overfulfillment of the unannounced original goal.

A. Share of Construction in Capital Investment.

The Chinese Communists, lacking previous experience in large-scale construction, have relied greatly on the USSR for assistance at all levels. The Chinese have noted that in the USSR investment in construction-installation work constitutes about 60 percent of total investment in capital construction and investment in machinery and equipment constitutes from 30 to 32 percent. In China, however, there has been some divergence from the Soviet model. The First Five Year Plan set 38 percent of total investment in capital construction to go to purchases of machinery and equipment. 11/ If this plan were achieved, construction-installation work, which is the other major component of capital construction, would be allocated about 52 percent of total capital investment. The remaining 10 percent would go to survey, design, and miscellaneous expenditure. The Chinese have released few data on actual components of investment in capital construction. The statements made, for the most part as planning figures, do permit the construction of Table 2** and Figure 2,*** both of which must be considered tentative at this time.

Expenditures for construction materials in Communist China (exclusive of transportation costs) generally make up 40 percent of the costs of construction-installation work, transportation makes up 23 percent of such costs, and wages and overhead costs represent the remaining 37 percent. 12/ The allocation of investment to various portions of construction-installation work during the First Five Year Plan is shown in Figure 2.***

About 48.78 billion yuan were invested in capital construction in Communist China during the First Five Year Plan, roughly 14 percent above the original plan. 13/ It is estimated that 26.4 billion yuan (54 percent) of this amount went to construction-installation and the remainder to purchases of machinery and equipment and to other expenditures (see Table 2** and the chart, Figure 2***).

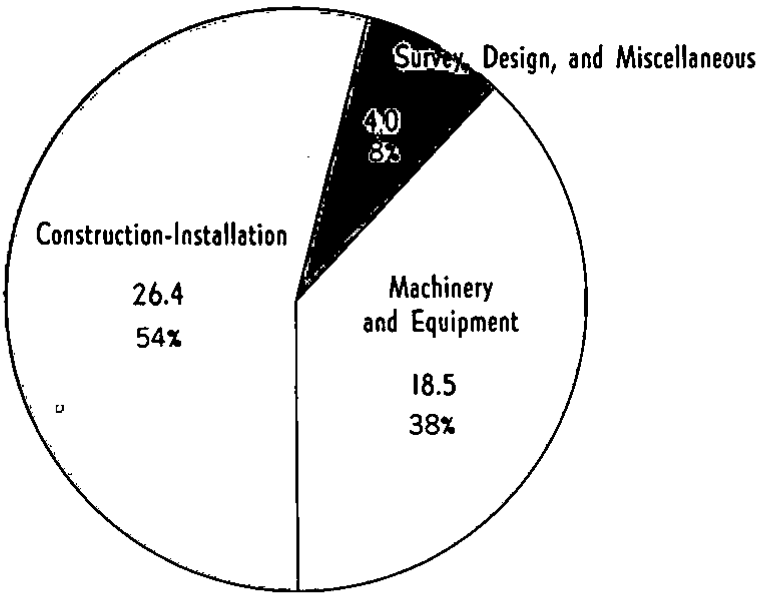
* See V, B, 3, p. 47, below.
** P. 76, below.
*** Following p. 8.

Figure 2

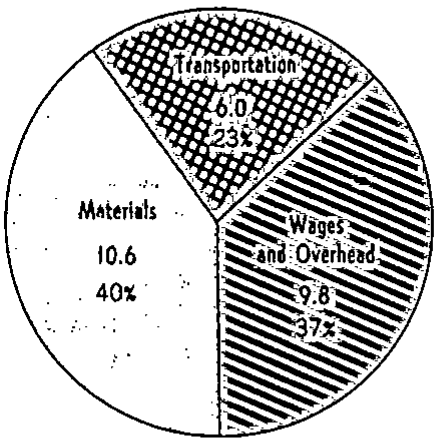
COMMUNIST CHINA

ESTIMATED ALLOCATION OF CAPITAL INVESTMENT TO VARIOUS PARTS OF CAPITAL CONSTRUCTION AND BREAKDOWN OF ESTIMATED CONSTRUCTION-INSTALLATION COSTS, 1953-57

(Billion Yuan)



ALLOCATION OF CAPITAL INVESTMENT



CONSTRUCTION-INSTALLATION COSTS

27270 12-58

B. Annual Volume of Capital Investment.

The annual volume of capital investment in the First Five Year Plan in Communist China is shown on the accompanying chart (Figure 3*). During 1954-55, most of the above-norm industrial projects** were in the initial low-value phases of capital construction,*** survey-design and excavation. In 1956, when the level of capital investment rose 62 percent above that of 1955, the majority of above-norm industrial projects were in the high-value phases of erection and installation. Capital investment in 1957 dropped 13 percent below the level of 1956, chiefly because of the retrenchment program but also because of the fact that many projects had entered the low-value phase of capital investment in which the project is put into operation.

C. Fulfillment of Annual Plans for Capital Construction.

As capital construction progressed during the First Five Year Plan, in Communist China, the gap between actual performance and the annual plans was narrowed until 1956, when virtual fulfillment of the plan was achieved. In 1957 the annual capital construction plan was overfulfilled by 9.5 percent 14/ (see Figure 3*).

D. Starts and Completions of Above-Norm Projects.

During the First Five Year Plan the Chinese Communists originally planned to start construction of 1,600 above-norm and 6,000 below-norm projects throughout the economy. About 1,271 above-norm projects and all the below-norm projects were slated for completion by the end of 1957. Table 1**** illustrates the achievement in project construction.†

---

* Following p. 10.

** A limit or norm in construction costs has been established in Communist China for both new construction projects and reconstruction projects. The norm for heavy industry generally lies between 5 million and 10 million yuan and that for light industry between 3 million and 5 million yuan.

*** There are five phases of the capital construction of an industrial project, as follows: survey and design, grading and excavation, erection, installation of machinery and equipment, and putting the project into operation. The value of capital construction is much lower per unit of time in the survey-design and excavation phases than in the erection and installation phases and is lower again in the final phase of putting the project into operation. The curve reaches its peak in the erection and installation phases, when skilled labor and processed construction materials are utilized at high rates. Also, the installation phase has a high value of capital investment.

**** Table 1 follows on p. 10.

† For a further treatment of project construction, see V, A, p. 26, below.

Table 1

Above-Norm and Below-Norm Starts and Completions in Communist China a/ 1953-57

	Above-Norm Projects		Below-Norm Projects	
Type of Project	Starts	Completions	Starts	Completions
Industrial	825	449	3,000	2,300
Nonindustrial and other b/	906	816	3,700	3,700
Total	1,731	1,265	6,700	6,000

50X1

b. This category includes nonindustrial items such as agriculture, forestry, water conservancy, urban public utilities, and education as well as transportation and communications.

E. Soviet Bloc Assistance.

Soviet Bloc assistance to the economy of Communist China since 1949 has been both extensive and intensive. The Bloc has given substantial assistance in the construction of railroads and water conservancy installations as well as in methods of geological prospecting, survey and design, statistical reporting, and basic construction practices. The most important contribution made by the Bloc has been its intensive assistance on individual industrial construction projects.

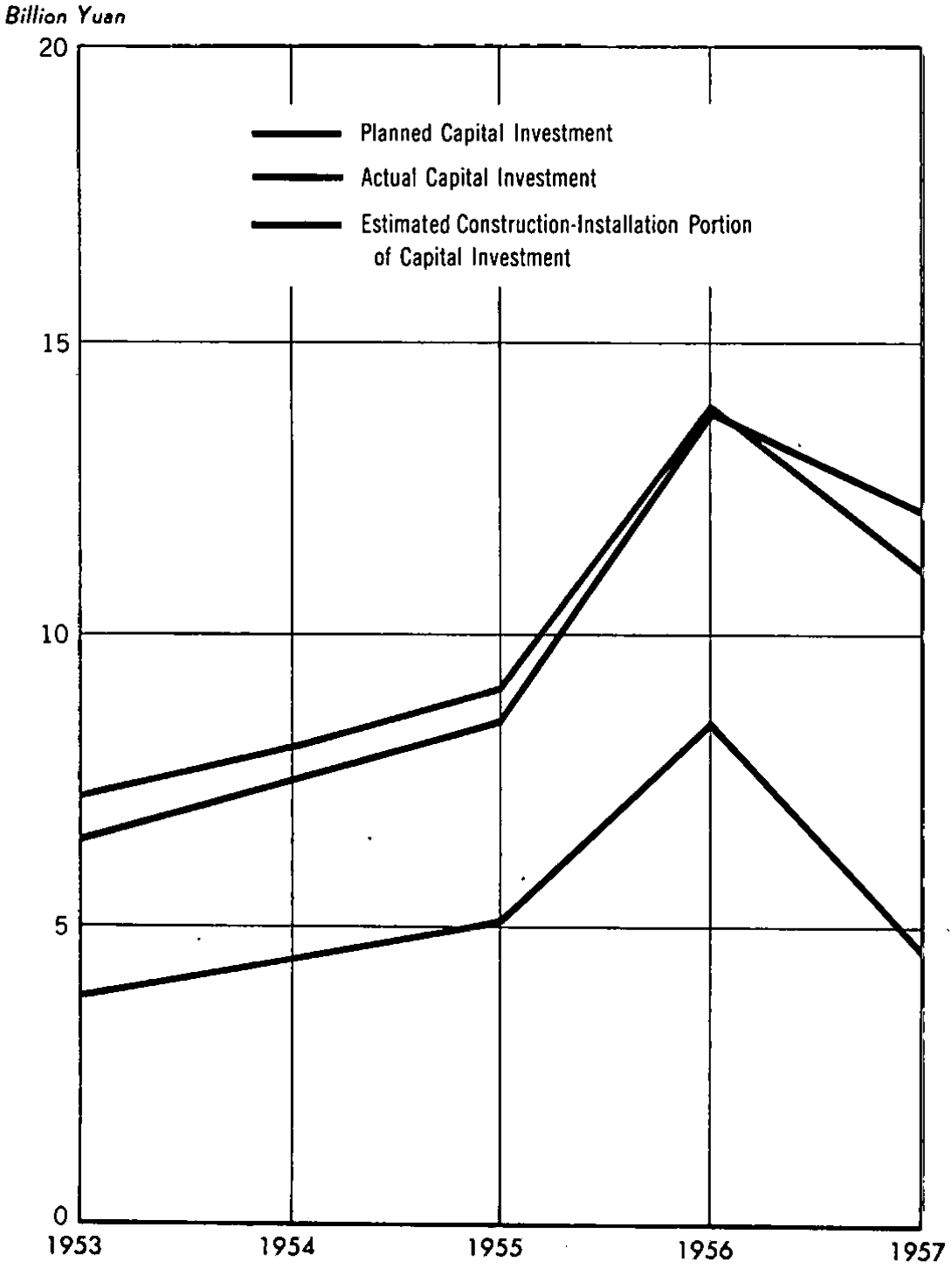
Soviet assistance has taken the form of two economic credits totaling 1,720 million rubles* against which the Chinese Communists

* Foreign trade rubles may be converted to dollars at the official exchange rate of 4 to 1, which is believed to be a good approximation of the dollar value.

Figure 3

COMMUNIST CHINA

PLANNED AND ACTUAL CAPITAL INVESTMENT AND ESTIMATED CONSTRUCTION- INSTALLATION PORTION OF CAPITAL INVESTMENT, 1953-57



27272 12-58

have drawn to help pay for imports from the USSR. These imports include equipment for the construction of 211 major projects.* The equipment which the USSR has promised to deliver to China during 1949-62 is valued at 8.1 billion rubles and includes all technical assistance relating to the 211 projects. 19/

These projects are chiefly in the field of heavy industry and include construction of metallurgical, power, machine building, chemical, defense, automobile, and tractor-manufacturing plants; petroleum installations; and the like. Assistance by the USSR includes geological surveying, selection of construction sites, design, supervision of construction-installation work, and, on completion of construction, assistance in the production process of the new plant. Besides furnishing complete sets of equipment for these projects, the USSR by mid-1957 had supplied Communist China with 4.9 million metric tons** of ferrous metals, 300,000 tons of nonferrous metals, 6.6 million tons of petroleum products, and more than 2,500 sets of metal-cutting machine tools. 20/ The Chinese originally planned to start construction of 145 projects in the First Five Year Plan, but by the end of 1957 no more than 131 were begun. By the end of 1957, 57 projects had been fully completed and 10 others partially completed. With the full completion of these 67 projects, 144 of the 211 projects remained to be completed.

Although the bulk of intra-Bloc assistance has come from the USSR, the aid given by the European Satellites to Communist China also has been significant. It is estimated that one-third of the total exports of the European Satellites to China have been in the form of equipment and services for complete industrial installations, amounting in 1956 to as much as 300 million rubles.*** 22/ The largest single project was a radio parts combine supplied by East Germany, the equipment for which was valued at almost 400 million rubles. Nearly every European Satellite furthered the industrialization of China by specialized assistance. Although the majority of the projects were electric power stations, cement plants, and sugar refineries, the remaining projects covered a wide range of industrial

* Only 205 of the 211 Soviet aid projects are considered by the Chinese Communists to be industrial construction projects. The remaining six projects involve the construction of research institutes and the renovation or expansion of previously constructed projects. Announcements indicate that agreements have been signed by which the USSR will assist China on 205 industrial projects and 21 "individual workshops." (See the map, Figure 4, inside back cover.)

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

*** In contrast, Soviet exports of such equipment to Communist China amounted to 868 million rubles in 1956. 21/

installations. Generally, East Germany and Czechoslovakia assisted on electric power and cement enterprises, Poland on sugar and mining enterprises, Rumania on petroleum-prospecting enterprises, and Hungary on metallurgical and other industrial installations.

During the First Five Year Plan the Chinese Communists were able to produce only about 60 percent of their requirements for equipment. They plan to produce 70 to 80 percent of such requirements by the end of 1962. In 1957 the Fu-la-erh-chi Heavy Machine Building Plant revised its annual investment plan, canceling orders from the Soviet Bloc for equipment valued at 32 million yuan in favor of domestically produced lathes and cranes. 23/ Other factories did the same when it was learned that certain kinds of equipment could be supplied from domestic sources. Although the Chinese publicly extol the part played by the Bloc in the economic development of China since 1949, they are dispensing with Bloc assistance as quickly as they achieve the technical skills and production capability with which to replace it.

F. Performance in 1953-56.

The first 2 years (1953-54) of the First Five Year Plan in Communist China were years in which reconstruction activities were gradually displaced by new construction. During 1949-52, capital investment had been channeled to the reconstruction and improvement of existing facilities, with proportionally less investment being allocated to new construction. Since the start of the First Five Year Plan in 1953, however, the emphasis has shifted gradually to new construction. A comparison of the percentage of capital investment allocated to reconstruction-improvement projects and to new construction in 1952 and 1955 is as follows 24/:

	Percent	
	1952	1955
Reconstruction and improvement	65.7	36.3
New construction	32.7	57.4

The Chinese state that the actual amount of capital investment during 1953-55 was 3.4 times that during the 1949-52 reconstruction period.

As the First Five Year Plan progressed, there was also a shift from simple civil construction to the construction of more complex

industrial installations. This shift is demonstrated organizationally by the growth in the number of specialized construction-installation enterprises* and functionally by the growth in the number of actual projects completed. A Chinese Communist announcement provides the following index of the construction of more complex steel and reinforced concrete factory structures compared with less complex nonproductive structures 25/:

	1953 = 100	
	1954	1955
Steel and reinforced concrete structures	126.9	186.2
General nonproductive structures	108.5	115.8

Because excessive spending on elaborate structures and nonproductive construction impinged on productive construction in 1953 and 1954, a campaign to economize on capital investment was started in the spring of 1955. This campaign, designed to save 680 million yuan in 1955 and a total of about 2.5 billion yuan in the last 3 years of the First Five Year Plan, consisted of two parts, as follows: (1) the reduction of the cost of construction inputs and (2) the cancellation of "unnecessary" subprojects. The reduction of costs was applied to both productive and nonproductive projects, whereas cancellation was applied almost wholly to nonproductive investments. The overzealousness of the drive resulted in widespread disruption. Total floorspace constructed is estimated to have fallen below the 1954 figure to the level of 1953.** Cement plant capacity was underutilized, and other construction materials were tied up by the cutback in nonproductive construction. The extravagant practice of overordering construction materials -- often considerably in advance of use -- and the frequent revisions in design required by the campaign were the chief disruptive elements.

The management of construction improved considerably as a result of the lessons learned in 1955. The economies achieved in capital construction in 1955 alone enabled Communist China to add 60 above-norm industrial construction projects to the original list of 694.*** 27/ The construction program picked up momentum in 1956,

* See II, p. 4, above.

** The state constructed a total of 30 million sq m of floorspace in 1953 and 47 million in 1954 and planned only 30 million in 1955. 26/

*** Subsequently, another 71 projects were added, making a total of 825 above-norm industrial construction projects. See Table 1, p. 10, above.

and total investment in capital construction was 62 percent greater than in 1955. Seasonal work was better balanced than in preceding years, and the plan for capital construction was 99.9-percent fulfilled -- the best performance during the period 1953-56. Industrial sectors of the economy benefited most from this construction upsurge. The construction of railroads and water conservancy projects, however, exceeded that of any preceding year, and local construction began to pick up as well.

The tempo of construction in 1956 was so great that budgeted investment funds were exceeded, and 1.5 billion to 2 billion yuan had to be withdrawn from other sources, including even state reserves. 28/ Overspending in 1956 has been given as one of the prime causes of the retrenchment in 1957. The accumulation of capital in the form of machinery, equipment, and materials not put in place was also excessive.

G. Retrenchment in 1957.

The overextension of construction activity in Communist China during 1956 brought an immediate and strong reaction. Total capital investment for 1957 was scheduled to be reduced by more than 20 percent, and industrial investment was planned to be on a par with 1956, but nonindustrial and nonproductive investment were to be cut sharply. 29/ Capital investment was to be concentrated on the fuel, metallurgical, and construction materials industries as well as on those industries (such as the chemical fertilizer industry) likely to benefit agricultural production. Construction schedules for machine building, light industry, new rail lines, and large water conservancy projects were reduced.

Within this framework, construction activity in 1957 proved eminently successful. Productive capacities in most industries were increased, local construction continued to gain momentum, and starts on many small-scale and medium-scale installations were made. A total capital investment of 12.155 billion yuan was achieved, 9.5 percent above the 11.1 billion yuan planned. Thus capital investment in 1957 fell under the 1956 total by only 13 percent rather than by the 20 percent planned. This achievement plus the amount invested during 1953-56 permitted the capital investment target of the First Five Year Plan of 42.74 billion yuan to be increased to 48.78 billion yuan, an overfulfillment of 14 percent.

IV. Problems in Construction During the First Five Year Plan (1953-57).

During the First Five Year Plan the Chinese Communists faced several major construction problems. The ability of the industry to achieve

and overfulfill goals in spite of these problems indicates a relatively high level of competence.

A. Geological Survey.

Before 1955, all expenditures for geological prospecting work in Communist China were budgeted under capital construction. In that year, however, the State Planning Commission decided that, except for geological survey directly related to specific project construction and to drilling work for petroleum and natural gas, funds for geological prospecting would be expended from the state budget as a form of operating expense. 30/ During 1953-55, survey data often were not completed until after actual construction had begun. [redacted] this problem was largely eliminated in 1956-57. 50X1

In 1957, there were 240,000 workers in the survey field. About 26,000 of the total were classified as engineers and technicians, and 8,000 were college-trained geologists. More than 100 Soviet experts assisted the Chinese Communists in this effort. The labor force was equipped with more than 4,000 units of drilling and allied equipment. In contrast, there were only 19,393 geological prospecting workers (including few engineers or technicians) and little equipment in 1952. During 1952-56 the state invested 2.45 billion yuan in geological prospecting. The target of 9.2 million meters (m) of test drilling in the First Five Year Plan was overfulfilled, and about 10 million m actually were achieved.

Geological survey plans for locating and confirming new reserves for most minerals were exceeded. The achievement with respect to coal and iron ore reserves was as follows 31/:

Million Metric Tons

Reserves	First Five Year Plan Goal	Actual Achievement
Coal	20,270	32,500
Iron ore	2,470	4,554

B. Geographic Distribution of Construction Activity.

In 1949, 77 percent of the total industrial output in Communist China originated in the coastal provinces, whereas the vast

hinterland (containing nearly 70 percent of the total land area of the country and including the frontier regions of the Southwest, the Northwest, and Tibet and the Inner Mongolian and Sinkiang Uighur Autonomous Regions) accounted for only about 8 percent of the national industrial production in the same year. 32/ The government planned to reduce this concentration of industry within three 5-year plans. The First Five Year Plan enunciated the following general principles: industrial capacity must be distributed appropriately to all regions of the country, industries must be placed near areas producing raw materials and fuels as well as consumer areas, distribution of industry must be aligned to the requirements of national defense, economic standards of backward areas must be gradually raised, and reconstruction and expansion of existing facilities in established areas must precede construction of new industrial bases.

During the First Five Year Plan, Communist China concentrated on rebuilding and expanding existing industrial bases in the Northeast and along the coast in order to secure quick increases in production, to supply current needs, and to provide capital equipment for future construction. Four-fifths of the total investment in China's iron and steel industry during the plan, half of the 156 key projects receiving Soviet assistance,* and one-third of the total above-norm industrial completions were allocated to the Northeast. 33/

More than 70 percent of total industrial investment during the period 1953-55 was channeled into the Northeast and the North, which regions together accounted for 85 and 66 percent, respectively, of coal and electric power production in Communist China. Approximately 45 percent of all capital investment during the same period was allocated to the existing industrial bases in the coastal provinces, and a considerably higher proportion of industrial investment was given to these areas than to the inland areas.

Concurrently, however, a substantial start was made in carrying construction into the hinterland. More than 500 of the 825 above-norm industrial projects started during the First Five Year Plan were inland, and by the end of 1957 the value of fixed assets in these regions had doubled 34/ (presumably since 1952). Most of these projects, however, started construction relatively late in the plan period and will not be completed until the Second Five Year Plan. One harbinger of the future shift to inland construction has been the program for construction of new rail lines in the First Five Year

* For the concentration of the locations of the key Soviet aid projects, see the map, Figure 4, inside back cover.

Plan,* which has been concentrated in the underdeveloped regions of western China. The completion of metallurgical combines at Pao-t'ou and Wu-han and of hydroelectric facilities at San-men Gorge and on the I-li River in Yunnan are examples of construction outside established industrial areas in locations which will be nuclei for future economic expansion.

C. Reduction of Costs of Capital Construction.**

Abundant data on the construction of specific plants and projects in Communist China have come to hand indicating reduced costs, but reliable data permitting an aggregative assessment are lacking. A reduction of nearly 1 billion yuan in construction costs was made in 8 major industrial ministries during 1953-55, and another reduction of 1.8 billion yuan was planned in 1956-57, making a total reduction in construction costs of 2.8 billion yuan during the First Five Year Plan. 35/ Even if this goal had been met, the figures would not indicate true reductions in construction costs, because a good proportion of the total so-called cost reduction consisted of canceled projects.*** The organizational efficiency of the construction industry plus the successful reductions reported on specific projects and in ministerial statements**** do indicate that construction costs have been lowered, although the extent of this reduction cannot be measured at present.

---

* See V, C, 1, p. 49, below.

** Hereafter referred to as construction costs. The Chinese Communists do not define what they mean by reduced construction costs (that is, whether costs are reduced below original estimated costs for a given project or whether actual costs are reduced from year to year for given projects), but it is believed that they generally refer to costs reduced below estimated figures for a given project. Moreover, the context of their statements makes it clear that in speaking of reduced construction costs the Chinese are not speaking of the costs of construction-installation work but rather of capital construction as a whole.

*** See III, F, p. 12, above.

**** Recently Chao Erh-lu, Minister of the First Ministry of Machine Building, stated, "By the end of 1957 [in the machine building industry] ... it was possible to cut building costs by 30 to 50 percent and to shorten the construction time by half." 36/ Also, the Chinese Communists state that the average cost of construction per kilometer of new railroads was lowered from a planned figure of 578,000 yuan to an actual figure of 566,000 yuan during the First Five Year Plan.

D. Reduction of Construction Time.

An intensive effort has been made by the Chinese Communists to shorten the time period of construction for various projects. The building process can be accelerated with rational planning, design, and coordination as well as with more efficient use of labor, materials, and equipment. During the First Five Year Plan an iron and steel combine having an annual capacity of 1.5 million tons required 8 to 10 years for construction, nearly half of this time being spent on survey and design. 37/ A construction period of 4 years was required for the construction of the small-scale Shou-wang-kung copper mine, 3 years for a small ore-dressing plant at Kan-chou, and 3 years for a "small" cement plant. 38/ In 1956 the renovation of a blast furnace with a capacity of 900 cu m required 10 to 13 months in Communist China, whereas the building of a new blast furnace with a capacity of from 1,000 to 1,300 cu m required only 4 to 6 months in the USSR. In the same year the construction of a new thermal electric power station of 50,000-kw capacity required 20 to 22 months in China but only 18 months in the USSR, and the building of a new fertilizer plant of 50,000 tons' annual capacity required 30 months in China but only 14 months in Bulgaria.

Considerable progress on this front was made in the First Five Year Plan. The construction time necessary to dig a pair of vertical coal shafts was reduced by 6 to 12 months, and the construction time of a chemical fertilizer plant, a nonferrous metals processing plant, and a high-grade steel plant was reduced, in some instances by 12 months.

Although the Chinese Communists have made progress in reducing construction periods, some of this achievement must be ascribed to the method used rather than to speed. The so-called "one-plan multiphase" method of construction is being used increasingly throughout China. 39/ This method envisages expeditious construction on key projects and, after partial production has started, the expansion of these projects up to and often beyond the capacity called for in the original plan. The Kirin Nitrogenous Fertilizer Plant is a good example of this method. Originally scheduled for full completion in 1958, it was announced to be partially completed in May 1957 and fully completed in October 1957. Before the end of 1957, however, preparations were under way to expand the plant. Although this method of construction may cost more in the long run, the Chinese are increasing its use so as to achieve speedy production of key items -- in this case chemical fertilizers, which are currently in very short supply.

E. Improvement of Design and Technology.

By the end of 1957, there were more than 116,000 design workers employed by the more than 140 special design institutes attached to the various ministries in Communist China. 40/ About half of the total were employed in industry, but only about half of these were trained technicians. More than 400 above-norm industrial projects as well as many transportation-communications and water conservancy projects were designed by these units, which leaned heavily on Soviet assistance throughout the First Five Year Plan. 41/ The increased standardization of designs and the reuse of blueprints have been major factors in the improvement of over-all design work.

As early as 1951 the Chinese Communists began drawing up standard designs for civil and industrial construction. During 1954-56, approximately 40 percent of the blueprints designed were used on more than 1 project.* The reuse of blueprints (the Ch'eng-tu Cutting Tools and Measuring Instruments Plant was constructed on the basis of Soviet-designed blueprints previously used at its Harbin counterpart) and of existing structures and machinery, plus progressively better designing, has contributed to increased efficiency. There remains room for improvement, however -- at least 10 percent of all the blueprints used during 1954-56 were completed behind schedule, and many were returned to the designers for correction of imperfections. 42/

The Chinese Communists stated in 1957 that their design organizations had the capability to design all blueprints for the following projects 43/:

Type of Installation	Annual Capacity
Aluminum plant	50,000 to 100,000 metric tons
Copper refinery	50,000 metric tons
Lead refinery	100,000 metric tons
Tin refinery	30,000 metric tons
Zinc refinery	100,000 metric tons
Coal mines	2 million metric tons
Coal-washing plant	1.5 million metric tons
Metallurgical plant	1.5 million metric tons
Petroleum refinery	1 million metric tons
Hydroelectric power station	1 million kilowatts
Steam power station	400,000 kilowatts

* The Chinese Communists announced that in 1956 standard designs and reused blueprints were used for about 60 percent of civil construction and 31 percent of industrial construction.

There has been considerable technological progress along with improvement in design in the construction industry in Communist China. In the First Five Year Plan the technical measures introduced were intended to effect economies in the use of steel, cement, and lumber. The trend toward general adoption in industrial construction of reinforced-concrete structures and components of the assembly type is evident in the fact that early in 1957 there were 20 permanent and 60 relatively large temporary prefabrication plants as well as prefabrication yards at nearly every large-scale project site in China. These plants produce concrete and reinforced concrete components for speedy assembly at the site, and their total capacity early in 1957 was 1.1 million cu m.* The Chinese estimate that by the end of 1957, 20 percent of the structures being erected would be of prefabricated elements.

Even prestressed reinforced concrete structural elements were produced in the First Five Year Plan.** Although the volume of prestressed reinforced concrete was less than 2 percent of the total volume of reinforced concrete in 1957, the fact that actual production using the process was begun in the First Five Year Plan speaks for the increased capability of the construction industry. Prestressed reinforced concrete elements produced included roof trusses and girders, floor slabs, mine props, and railroad ties and bridges.

Other new techniques were introduced during the First Five Year Plan in Communist China. Bamboo was used extensively instead of steel rods in reinforced concrete in 1956 and was reported to have reduced reinforcement costs 45 percent. Bamboo also gained acceptance as a substitute for wood in roof supports. In erecting

* Actual and planned production figures of enterprises subordinate to the Ministry of Construction and Engineering show that the increased output of prefabricated structural elements during 1954-56 was as follows 44/:

Cubic Meters

	1954 (Actual)	1955 (Actual)	1956 (Planned)
Steel reinforced-concrete prefabricated elements	47,000	111,000	376,000
Foam concrete prefabricated elements	N.A.	56,000	174,000

** Prestressed reinforced concrete is concrete in which the reinforcing steel is tensioned or stretched before being encased in the concrete. Prestressing imparts added strength to the reinforced concrete, saves steel, and reduces costs.

electric transmission lines, reinforced concrete towers were substituted successfully for steel towers. This substitution was planned to effect a saving of 7,000 tons of steel in 1956. Reinforced concrete railroad ties and pit props in coal mines were introduced, but large-scale usage was delayed until the Second Five Year Plan.* 46/ Lastly, newly designed steel frames replaced conventional frames for certain types of buildings, with a consequent saving of steel, and foundations of some civil buildings were constructed of natural cement rather than concrete.

The rise in the technological level of the construction industry has been retarded, however, by low-quality workmanship at many sites. Too few competent supervisors, poor coordination between contractors, and sporadic deliveries of equipment and materials combined to cause shoddy workmanship and thousands of "quality accidents" during the First Five Year Plan.

F. Mechanization and Construction Equipment.

More and better construction equipment permitted a reduction of building costs and the completion of a large volume of construction in Communist China during the First Five Year Plan. The fixed assets of construction-installation enterprises under the State Council grew rapidly in the First Five Year Plan. The value of fixed assets held by these units during 1953-55 follows 47/:

	Machinery and Equipment		Total Fixed Assets
Year	Million Yuan	Percent of Total	(Million Yuan)
1953	220	46	480
1954	400	50	806
1955	528	49	1,078

The increase in the number of important types of construction equipment available to the state-operated contract construction enterprises in 1953-55 was as follows 48/:

* In 1957, at least 3 permanent factories were being constructed that were scheduled to produce from 2.2 million to 2.5 million prestressed reinforced concrete railroad ties annually by the end of 1959. One of these factories, located near T'ien-shui, was experimenting with the production of prestressed steel reinforced concrete bridge spans late in 1957. 45/

Equipment	1953	1954	1955
Cranes, derricks, and the like	513	955	1,379
Power shovels	45	112	159
Concrete mixers	1,676	2,249	2,443
Dump trucks	3,237	5,238	5,871

In 1957 it was announced that this inventory had been increased to about 20,000 units. 49/ The relatively rapid rate of mechanization in certain aspects of construction activity solved some problems but created others. The rate of mechanization outstripped the rate of increase in the level of organizational control and in the technical level of workers. The result of this was that construction equipment was utilized at a low rate, which further aggravated the problem of inadequate stocks.

Mechanization during the First Five Year Plan was restricted to heavy industrial construction. Most construction equipment was concentrated in those ministries having the responsibility for the key Soviet aid projects. In 1956, 76 percent of the cranes, 87 percent of the power shovels, 62 percent of the concrete mixers, and 79 percent of the trucks in the nation were held by the Ministries of Construction and Engineering, Heavy Industry, the Coal Industry, the Electric Power Industry, and Railroads. 50/ Most of the nonindustrial and nonproductive construction was performed through hand labor. As the heavier construction loads of the Second Five Year Plan are assumed, the rate of mechanization will increase, but the concentration will remain on key projects, and the bulk of construction will be carried on through intensive use of manpower.

G. Labor Force.

More than half of the annual increase in the volume of capital construction during the First Five Year Plan in Communist China was caused by the increase in the size of the labor force, although more than 40 percent of the increase in output during 1952-56 has been ascribed by the Chinese to increased labor productivity. 51/

Although there is a good deal of contradiction in reports on the level of employment, the following tabulation gives an approximation of recent changes.* 53/

* Data on construction-installation workers are announced. [redacted]

50X1
50X1

Year	Construction-Installation Workers (Million Workers)	Total Workers in Construction* (Million Workers)
1953	1.54	1.80
1955	1.60	2.08
1956	1.80	2.31
1957	2.00	2.67

With the increased volume of work and the improvement in mechanization and technology, the proportion of workers in subsidiary production activities (such as those working in prefabrication plants under the Ministry of Construction and Engineering) has increased, while that of construction-installation workers has declined. Those workers engaged in geological survey and prospecting** and in producing basic construction materials (cement, brick, and glass) as well as the millions of workers engaged on water conservancy and military projects are not included in the totals.

Within the construction-installation segment of capital construction, the proportion of engineers and technicians rose steadily in the First Five Year Plan, but more recently there has been a decline in the proportion of administrative personnel. The structure of construction-installation workers and employees was as follows 55/:

Construction-Installation Workers and Employees	1953 (Percent)	1954 (Percent)	1955 (Percent)	1956 (Percent)
Workers	81.8	80.3	78.6	81.9
Engineers and technicians	3.0	4.2	5.5	5.5
Administrative personnel	15.2	15.5	15.9	12.6
Total	100.0	100.0	100.0	100.0

The construction labor force of Communist China is predominantly young, male, and mobile. Its mobility is illustrated by the

* Besides those workers employed directly in construction-installation work, this category includes those in subsidiary production (prefabrication yards, carpentering shops, and the like); transportation; and service agencies on site. Survey-design workers, who numbered 39,000 in 1952, 85,000 in 1955, 110,000 in 1956, and 116,000 in 1957, probably are included in the totals. 54/

** See IV, A, p. 15, above.

fact that during the First Five Year Plan nearly 300,000 civilian workers left Shanghai for construction sites throughout China. 56/ Organizational instability has caused a large proportion of the total labor force in construction to be made up of temporary workers. Because of the nature of construction work and the extensive underemployed population of China, a large part of the construction labor force will continue to be temporary. There has been an urgent need, however, to recruit or train skilled workers from the temporary force and to make them permanent construction workers.

Additions to the semiskilled and skilled segment of the construction labor force were made at an increasing rate during the First Five Year Plan. On-the-job training courses under the direction of Soviet Bloc advisers at An-shan, Pao-t'ou, Wu-han, and other major sites helped to shape an increased worker capability in construction. Also, construction was probably represented by a sizable group among the 7,100 leading cadres sent to Soviet Bloc nations for study during the First Five Year Plan. 57/

Wage increases have been slow and have not been proportional with the announced increase in labor productivity. Wages are neither stable nor uniform, being differentiated by location, industry, and the seasonal aspect of construction. 58/ This instability has been a cause of absenteeism, which in turn has adversely affected labor productivity. Other factors, such as poor labor utilization at the site and work stoppages, impeded labor productivity. Excessive hiring of workers to meet short-run goals (as in 1956) diluted the achievements in labor productivity even further. All of these aspects must be corrected if the higher construction targets for the Second Five Year Plan are to be met.

H. Seasonal Variation of Construction.

A major problem in the management of construction work in Communist China has been the extreme seasonal variation in the physical volume of work completed. The proportion of the annual amount of work completed during each quarter for the years 1953-56 was as follows 59/:

Percent

	1953	1954	1955	1956
First quarter	5.7	8.1	12.5	13.4
Second quarter	20.9	23.3	24.8	22.8
Third quarter	36.7	33.1	27.7	27.5
Fourth quarter	36.7	35.5	35.0	36.3
Entire year	100.0	100.0	100.0	100.0

More than 67 percent of the annual amount of work was performed in the last 6 months of each year during the First Five Year Plan. 60/ Also, the amount of work completed in the first quarter of each year was about 28 percent of that completed in the fourth quarter. In the USSR during 1952-54 the amount of work completed in the first quarter of each year was roughly three-fourths as great as that accomplished during the fourth quarter, 61/ in spite of greater variations in mean temperature and rainfall than in Communist China.

I. Local Construction and the Size of Projects.

The First Five Year Plan in Communist China called for administration at the local, provincial, and municipal levels* of 82 of the above-norm projects and 1,400 of the below-norm projects. About 64 of the above-norm projects and about 879 of the below-norm projects were for local state-operated industries, and the remainder in both categories were for local public-private jointly operated industries or for nonindustrial local groups. The local share of total capital investment amounted to roughly 20 percent during the First Five Year Plan. 62/

In early 1957 a movement began which foreshadowed astonishingly heavy construction activity at the local level. The metallurgical and coal industries announced in April 1957 that the construction of small-scale and medium-scale plants and mines would be emphasized during the Second and Third Five Year Plans (1958-67) in order to stretch construction funds, obtain quick financial and physical returns, and improve the geographical balance of the over-concentrated industries.** Such facilities save investment, reduce the need for importing equipment and technical assistance from the Soviet Bloc, and are able to tap local productive potential and surplus manpower. Although no great effect was wrought by these pronouncements in 1957, the results were far reaching during the first half of 1958. An indication of the shift to increased local construction was apparent in 1957, however, when the state urged local construction organs to construct light industrial plants and concurrently indicated that, starting in 1958, these organs would be granted more power in construction matters.

* Hereafter referred to as the local level. All above-norm projects undertaken at the local level must be approved by the Commission for National Planning. Below-norm projects are reported for record to the National Economic Commission and the relevant ministry. When projects financed by local investments are included in state plans, all construction materials and equipment are supplied by the state through unified distribution.

** See also V, A, 1 and 3, pp. 27 and 33, respectively, below.

The Chinese Communists believe that there has been too much emphasis on constructing large-scale industrial projects, large schools, and administrative buildings. Li Fu-chun, in evaluating the problem in June 1957, stressed the need to construct plants with a low ratio of investment to production and stated that capital construction could best be served by constructing predominantly small-scale and medium-scale projects that could be integrated where possible with large-scale projects. China in its present stage, he asserted, should build fewer modern automatic installations. Pushing rudimentary construction to an operating condition would permit plants to be expanded and modernized later with profits accrued from production. Lastly, he said that nonproductive construction should emphasize the building of schools, hospitals, administrative facilities, and the like in large numbers but on a smaller individual scale than had been done previously. 63/

V. Construction in Major Economic Sectors During the First Five Year Plan (1953-57).

A. Industrial.

Investment in capital construction in industry during the First Five Year Plan in Communist China was 27.38 billion yuan, representing 56 percent of total capital investment. 64/ This investment (2.53 billion yuan above the original planned amount) was concentrated on the 825 above-norm industrial construction projects,* with emphasis on the Soviet aid projects.** Although there were considerably more above-norm industrial starts than the 694 originally planned, only 449 of an originally planned total of 455 (subsequently raised to 500) were completed. Even with the shortfall in completions, achievement in industrial construction was considerable. On the average, an above-norm industrial project was begun every other day and one completed every 4 days during the 5-year period. Total above-norm industrial starts and continuations and completions in the First Five Year Plan were as follows:

	Industrial Projects	
Year	Total Starts and Continuations	Total Completions***
1953 65/	114	36
1954 66/	300	64
1955 67/	485	82
1956 68/	625	89
1957 69/	642	178
Total		449

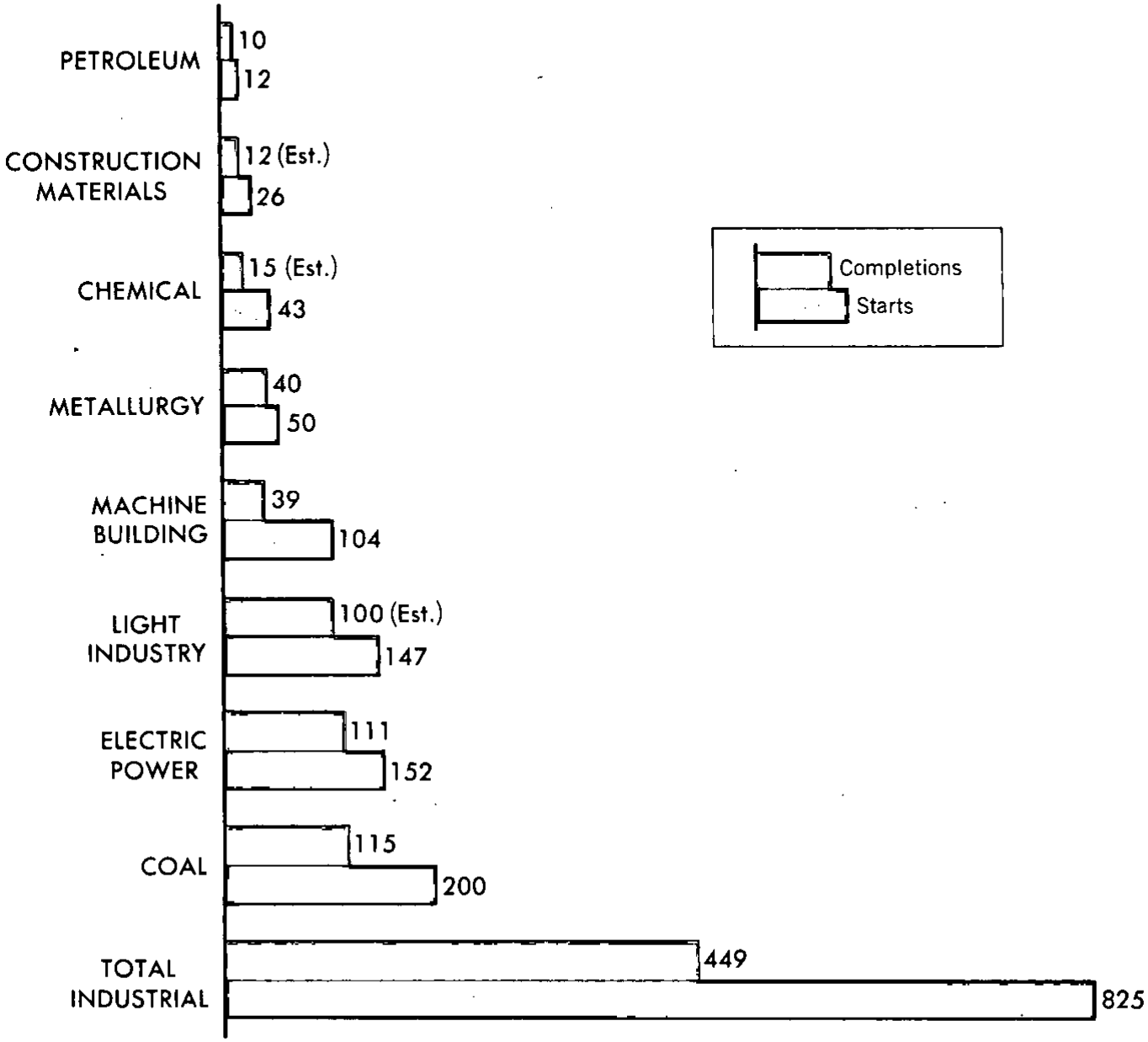
* See III, D, p. 9, above.

** See III, E, p. 10, above.

*** Completions include both full and partial completions. Because of ambiguous data announced by the Chinese Communists, the above figures are not cumulative, and only the total completions column is additive. See Figure 5, following p. 26, for above-norm projects in industrial construction during 1953-57, by major industries.

Figure 5

COMMUNIST CHINA
ABOVE-NORM PROJECTS
IN INDUSTRIAL CONSTRUCTION, 1953-57



27269 12-58

1. Metallurgical.

The metallurgical industry accounted for about 15 percent of capital investment in industry during the First Five Year Plan in Communist China. By the end of 1957 the Ministry of the Metallurgical Industry had 44 construction-installation enterprises, 9 design institutes, and 77 geological survey units, with a total labor force of 200,000. More than 400 million yuan (approximately 10 percent of total capital investment in the metallurgical industry) were spent on the construction base of the industry. 70/ About 10 million sq m of industrial and nonindustrial buildings were constructed and more than 500,000 tons of equipment installed during the First Five Year Plan.* Of the more than 50 above-norm construction projects** started during the period, at least 40 were completed.

The emphasis in construction in the metallurgical industry has been on ferrous metallurgical installations. The Chinese Communists themselves estimate that 62 percent of total capital investment in the metallurgical industry during the plan went into construction of the An-shan, Pao-t'ou, and Wu-han iron and steel combines. 72/ The increased production capacity resulting from construction for ferrous metallurgy in the First Five Year Plan was 3.27 million tons of pig iron and 2.35 million tons of crude steel. During the plan, An-shan was made a national economic model. By September 1957, 32 of the 48 major projects scheduled for construction at An-shan in the period 1953-60 were completed, and 5 more were slated for completion by the end of the year. Two-thirds of the projects at An-shan were of Soviet design and were modern, largely automatic facilities. In late 1956 and in 1957 the Chinese, however, were able to undertake some of the more advanced projects on their own. By the end of the plan a blast furnace, a firebrick plant, and an ore-sintering plant were constructed at Wu-han, and formal construction was begun at Pao-t'ou. Facilities at Pen-ch'i, Ma-an-shan, Urumchi, Chungking, Tai-yuan, and Ta-yeh were expanded considerably, and construction continued on most of them in 1958. 73/

In addition to the great amount of Soviet aid and the focus of construction on An-shan, two other factors developed in the construction for the metallurgical sector in the First Five Year Plan. Both came to a head in 1957. The first factor was the

* By the end of 1956, more than 300,000 tons of equipment were furnished the metallurgical industry by the USSR, and by October 1957 more than 100,000 tons of equipment from the USSR were installed at An-shan. 71/

** The term above-norm project in the ferrous metallurgical industry refers to a project requiring an investment of 10 million yuan or more and in the nonferrous metallurgical industry to a project requiring 6 million yuan or more.

beginning of construction of small-scale projects concurrent with construction of large-scale and medium-scale plants. In August 1957 the Chinese Communists announced that 18 new small-scale iron and steel plants under construction or slated to begin construction in 1957-58 would be completed by 1962 and on completion would have a combined capacity of 2.4 million tons of pig iron, 1.6 million tons of steel, and 1.1 million tons of steel products.* 74/ These widely dispersed plants, located near adequate but small resources of iron ore, would be furnished partially with equipment from a number of small plants that have fallen into disuse since 1950. Because of their lower technological level, they can be supplied with domestically produced equipment, require a much shorter construction period, and can utilize local labor and materials, and (the Chinese claim) each small plant will cost less per ton of annual capacity than a large integrated plant. The start of small-scale construction was predicated on the desire of the Chinese to obtain fast increases in production with a minimum outlay of capital. One result of the movement is that it will improve the geographical balance of the heavily concentrated metallurgical industry. This trend in construction was gaining momentum in 1958 and had pervaded nonferrous metallurgy and every other industry.**

The second factor was concerned with iron-smelting capacity versus mining capacity. Iron smelting developed at a faster rate than iron ore mining and beneficiation during 1953-56. To correct this situation, the Ministry of the Metallurgical Industry in 1957 planned to start or continue construction of 30 mines (15 of which were iron mines and the remainder manganese and other nonferrous metal mines) and 12 plants for selecting and sintering ores. 75/ Six of the mines were planned to be completed in 1957-58 and would then increase capacity for the production of iron ore 2 million tons. Extensive geological surveys*** were carried out during the First Five Year Plan, and by the end of 1957 several large reserves had been found. The most notable find was at P'an-chih-hua in southwest Szechwan, where the deposits are reputed to be sufficient for an iron and steel combine with a total production of 2 million tons annually. 76/

More than 32 above-norm nonferrous metal projects started construction during the First Five Year Plan. Aluminum, tin, and copper installations received the greater share of capital investment. Newly added production capacity under the First Five

---

* Subsequently, the capacity figure was increased and the construction period shortened. See VI, B, 1, p. 62, below.

** See VI, p. 58 ff., below.

*** See IV, A, p. 15, above.

Year Plan accounted for 36 percent of the copper, 90 percent of the lead, 28 percent of the tungsten, and 48 percent of the molybdenum production in 1957. 77/ Among the notable completions during the plan were a tin combine at Ko-chiu (Yunnan), an aluminum reduction plant and alumina plant at Fu-shun, an alumina plant at Nan-ting (Shantung), and an aluminum-fabricating plant at Harbin.

2. Electric Power.

Construction in the electric power industry of Communist China, as in most other industries, began from a low base. The restoration period, 1949-52, was characterized by renovation of existing electric power facilities in order to bring them closer to design capacity. The capacity of generating equipment was increased 150,000 kilowatts (kw) in this period, and at the end of 1952 total electric-power-generating capacity was only 1.96 million kw. 78/

The First Five Year Plan set 3.3 billion yuan for capital investment in the electric power sector and called for 122 above-norm construction projects* to be started during 1953-57. About 107 of these starts were to be power stations, and the remaining 15 were to be transmission and transformer projects. Of the 107 stations (total planned capacity, 3.76 million kw), 24 were scheduled for Soviet assistance. The plan stated further that by the end of 1957, 54 power stations, including 22 Soviet aid projects, could be completed. These 54 completions plus below-norm completions were scheduled to raise the generating capacity of the electric power industry by 2.05 million kw. 79/ It is estimated that 100,000 workers (of which 30,000 worked exclusively on hydroelectric projects), organized in specialized construction enterprises supported by 9 design institutes, comprised the construction labor force undertaking this work for the electric power industry. 80/

At least 152 above-norm projects were started during the First Five Year Plan and more than 111 completed.** 81/ About 3,000 km of high-tension transmission lines (110 to 220 kilovolts -- kv) were constructed and 15 networks established. Investment by the Ministry of the Electric Power Industry was about 3 billion yuan, and total capacity added by its components is estimated to have been 2,164,000 kw. Numerous other ministerial, provincial, and local projects were constructed, and these increased capacity

* The term above-norm project for electric power stations refers to a plant requiring an investment of 5 million yuan or more.
** See Appendix A, Table 3, p. 77, below, for data on capital investment, increased capacity, and equipment of facilities in the electric power industry in Communist China during 1953-57.

by 170,000 kw before December 1957.* 82/ Roughly 57 percent of the total capacity added during the plan came from restored and expanded plants and 43 percent from new plants. 83/

Although the distribution of construction in the sector was geared toward providing facilities for servicing existing industrial centers, it trended toward underdeveloped regions as the plan progressed. In 1947, more than 90 percent of total generating capacity was located in 8 large cities, only one of which, Chungking, was inland; the others being in the Northeast and along the east coast.** 84/ More than 40 percent of the estimated 2.34-million-kw capacity added during the First Five Year Plan was installed in the Northeast. Of 24 Soviet aid projects begun by late 1957, 14 were located in the North, Northwest, and Central China. Electric power generated in the Sinkiang Uighur Autonomous Region and the Northwest was 19 times that generated in 1952, and production in Chungking in 1957 had doubled since 1952.

Thermal electric powerplants newly constructed and expanded by the central government added a capacity of about 1.6 million kw (of a total of 2.2 million kw) to the electric power industry during the First Five Year Plan. The plan called for 76 above-norm thermal electric projects to be started. These facilities were built chiefly in industrial centers, and design and technology for them was furnished by the Soviet Bloc, primarily the USSR. At least 44 thermal electric projects, of which 20 were constructed with Soviet aid, were completed by the end of 1957. 85/ Many of the thermal electric plants were high-temperature, high-pressure facilities with automatic controls of the latest Soviet manufacture. The most important thermal electric power construction has occurred at Cheng-chou, Fou-hsin, Fu-la-erh-chi, Kirin, Lan-chou, Lo-yang, Peking, Shih-chia-chuang, and Sian. In December 1957 the most significant thermal electric project in the plan, a 600,000-kw plant, officially started construction in Liaoning Province. The Chinese Communists copied well from their Soviet Bloc teachers and now claim to have the capacity to build 50,000-kw and larger thermal electric plants.

* This figure, when added to the estimated 2,164,000-kw additional capacity installed by ministerial components, totals 2,334,000 kw, which corresponds to the figure of 2,335,000 kw given in the Peking Review of March 1958.

** The original First Five Year Plan recognized the concentration of generating capacity in coastal provinces and planned that by the end of 1957 these provinces would have only about 50 percent rather than more than 65 percent of the total capacity.

The First Five Year Plan called for 11 hydroelectric construction starts and 8 completions and for 469,000 kw of capacity to be added to the 170,000-kw hydroelectric capacity existing in 1952.* Although immediate industrial needs prescribed that thermal electric construction (characterized by being located near industrial centers and by shorter construction periods) be given higher priority in the plan, the hydroelectric construction program was overfulfilled in every important aspect. Capital investment in the sector was 592 million yuan, 28 percent above the planned level; 20 above-norm projects were started and 9 completed; and a capacity estimated to be 609,000 kw was installed in hydroelectric power construction during the First Five Year Plan. 86/

Extensive surveys raised the estimate of the national hydroelectric potential from 150 million kw to 540 million kw. As a result of these findings, considerable increases in capital investment, geological survey, and construction were achieved during the plan. These are shown in the following index:

1953 = 100

	1954	1955	1956	1957
Total investment in hydroelectric power construction	150	214	286	334
Earth and stone work	542	1,200	1,720	4,000
Pouring of concrete	327	1,155	1,650	1,560
Drilling	118	286	880	670
Geological survey	235	185	477	1,405

The most important hydroelectric power construction projects** of the First Five Year Plan were the expansion of the Feng-man station in the Northeast (capacity on full completion, 568,000 kw) and the start of construction at San-men Gorge (capacity, 1.1 million kw). Several factors point to a greatly increased capability of construction in this sector, as follows:

a. The Chinese Communists claim that, except for San-men Gorge and Feng-man, all hydroelectric power stations undertaken to date were designed by themselves and were equipped with machinery manufactured in China.

* See the map, Figure 6, following p. 32, which shows the hydroelectric power construction program during the First Five Year Plan.
** See Appendix A, Table 4, p. 78, below, in which specific projects are listed.

b. Generators of 15,000 kw are now in production in Communist China, and larger ones of 72,500 kw and 100,000 kw are being designed and tested.

c. Because geological conditions and the availability of construction materials vary with the location, the construction performed was highly diverse and difficult. Even with this impediment, construction schedules were overfulfilled and costs lowered.

d. Many of the stations are multipurpose and were constructed in conjunction with water conservation units where, besides generating power, they will help to alleviate floods and to increase irrigation and navigation. Multipurpose use of power facilities bespeaks long-term planning, for which the Chinese acknowledge a debt to the USSR.

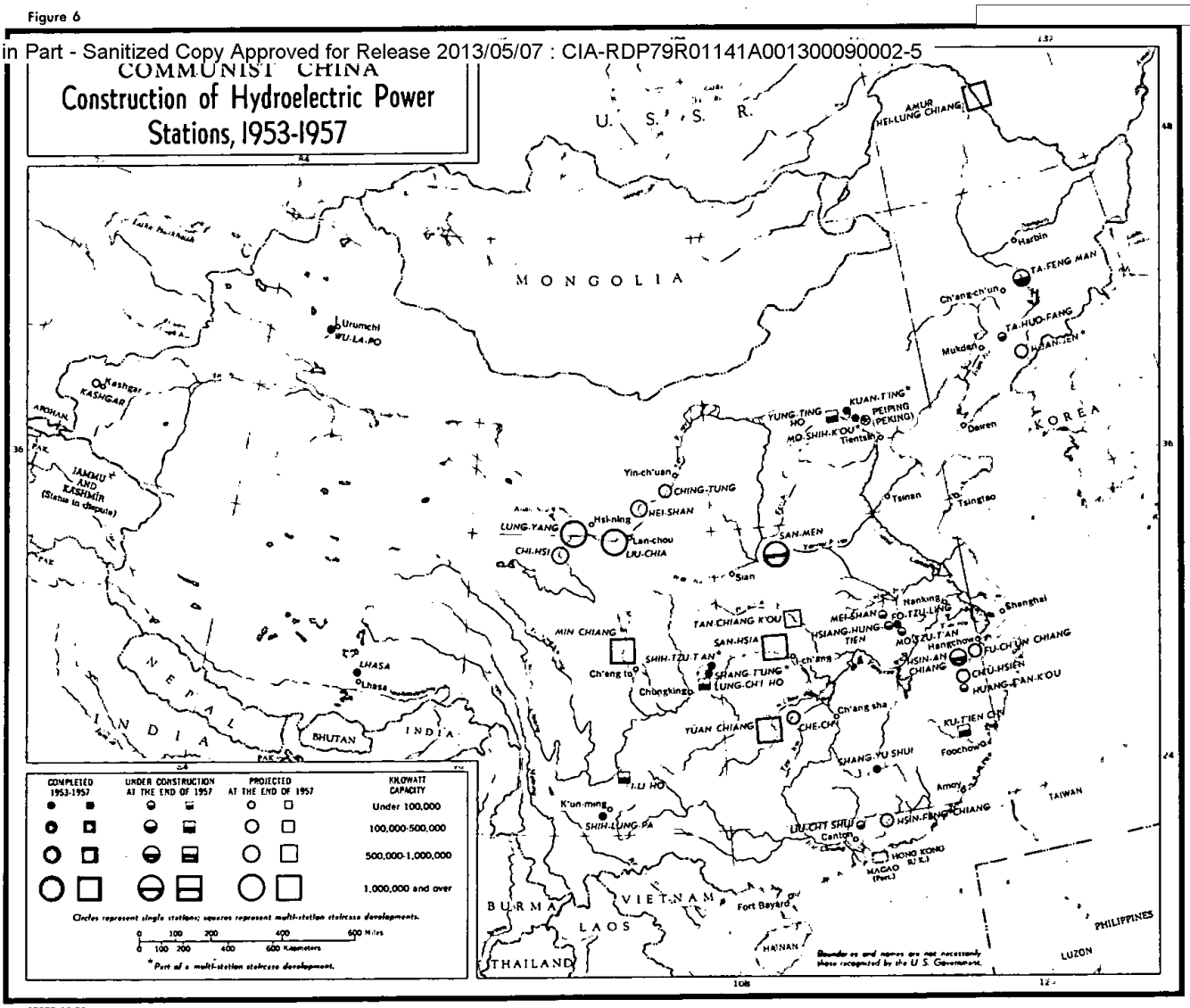
The priorities established by the First Five Year Plan in Communist China favored the construction of thermal electric powerplants over hydroelectric powerplants for at least two reasons, shorter construction periods and lower construction costs. By the end of 1957, however, the Chinese had been so successful in hydroelectric power construction that both points of difference were nearly erased. To achieve speed, construction was maintained at a pace of 3 shifts per day and 7 days per week; Soviet winter work methods were adopted; and local labor rather than machinery was used for most of the earthwork, loading, and transportation. Abundant water and labor resources* plus geological conditions permit hydroelectric construction costs to be nearly as low as thermal electric construction costs. A comparison of 8 major hydroelectric and 5 thermal electric stations completed during the plan shows that the derived average cost was 1,305 yuan per kilowatt for the hydroelectric stations and 1,210 yuan for the thermal electric stations.** Generally, in the more advanced countries of the world, the average construction cost per kilowatt for hydroelectric stations is at least twice that of thermal electric stations. Speedy construction at a minimal cost per kilowatt is a prime factor in the huge hydroelectric construction program now under way.

---

* Roughly two-thirds of hydroelectric construction costs are represented by earthwork, the bulk of which is done by low-cost hand labor.

** The hydroelectric stations embraced in this comparison are Kuan-t'ing, Mo-shih-k'ou, Ku-t'ien, Shang-yu, Shih-tzu-t'an, Shang-t'ung, Shih-lung-chu, and Wu-la-po; and the thermal electric stations are Cheng-chou, Lo-yang, Pao-t'ou, Sian, and Tsingtao.

Figure 6



27275 12-58

Another source of power used by the Chinese Communists consists of generating equipment mounted on railroad cars. About 10 such trains with a total capacity of 36,000 kw were purchased from the USSR and Czechoslovakia and are in use at San-men Gorge and elsewhere. 87/ The importance to remote construction sites of this highly mobile source of energy is apparent.

Even with the progress noted above, however, the Chinese Communists have developed electric power at a measured pace during the First Five Year Plan. Although overfulfilling original goals, capital investment was conservative, and the rapid industrialization of the economy led to acute (although localized) shortages of electric power in 1956. As a result, the electric power industry was made one of the favored economic sectors with respect to construction in the retrenchment year of 1957.

3. Coal Industry.

Communist China made great strides in construction in the coal industry during the First Five Year Plan. Blessed with abundant reserves of good-quality coal (in 1957 estimated to be 1.5 trillion tons, the third largest reserve in the world) the Chinese have sought systematically to explore new reserves and to exploit existing ones. Geological survey in the coal industry exceeded its investment goal by more than 25 million yuan and located 32.5 billion tons of exploitable coal reserves during the plan.* 88/ All provinces have sufficient coal reserves, although the heaviest concentration is in North and Northwest China. The Southwest, with the smallest percentage of total reserves, was given increasingly more attention as the plan progressed. Because a relatively small fraction of the coal reserve is believed to be suitable for coking, the location of new coking coal reserves was made a priority objective. In late 1956 the Chinese reported that 12 coking-coal-producing centers were being constructed in North and East China, and reports from other areas indicate that the search for coking coal reserves has been fairly successful

By the end of the First Five Year Plan the Ministry of the Coal Industry had two capital construction departments, 10 design institutes with 40,000 geological surveyors, 1 scientific research institute, and 9 capital construction bureaus with 130,000 workers. The state invested 3.3 billion yuan during the First Five Year Plan, and its construction organs were largely responsible for the increase in total coal production from 63.5 million tons in 1952

* See IV, A, p. 15, above.

to about 130 million tons in 1957 and the increase in annual production capacity of 63.8 million tons put into operation during the same period.* 89/

One measure of progress is to evaluate unit construction performance on the basis of the First Five Year Plan. The plan called for 194 above-norm construction starts in the coal industry,** including 179 mines, 13 coal-preparation plants, and 2 oil shale projects. Of the total, 27 projects were to be constructed with Soviet assistance. About 115 projects were planned to be completed by the end of 1957 and, when combined with below-norm completions, were scheduled to increase production capacity by 53.9 million tons.*** Although the Chinese Communists have not announced a firm figure on completions, it is believed that the goal of 115 above-norm completions was fulfilled. At least 8 of the 27 projects constructed with Soviet assistance were numbered among the completions. The annual production capacity added by all types of construction was 63.8 million tons, almost 10 million tons above the planned goal.

Much of the construction performed in the First Five Year Plan occurred in the existing five centers of Fu-shun, Fou-hsin, Ta-t'ung, Huai-nan, and K'ai-luan. In addition, construction of coal shafts in nine new coal mining areas was undertaken. It is planned that the bulk of these bases will be completed before 1962 and that each will have an annual output of from "several million to around 10 million tons."

In order to meet rapidly the increased demands of the economy, the Chinese Communists emphasized restoration, reconstruction, and improvement of production methods**** of the existing coal mines during the First Five Year Plan. Because of the higher coststt and longer construction periods involved, new construction was given

---

* Coal mine capacity is generally based on the normal capacity of hoisting and surface works and, because of the considerable underground development required, usually is not achieved until several years after the mine is announced to be completed. See Appendix A, Table 5, p. 79, below for the time required by mines of various capacities to achieve the designed capacity.

** The term above-norm project in the coal industry refers to an installation requiring an investment of 5 million yuan or more.

*** See Appendix A, Table 6, p. 80, below.

**** Hereafter this process is termed simply "reconstruction."

† The average unit cost for reconstruction is 16.2 yuan per ton of capacity and for new construction, 30 yuan per ton of capacity.

less stress. Six of the 122 new mines slated to start construction during the plan were delayed, and 90 reconstruction projects were added to the original 57. Investment in reconstruction accounted for about 31 percent of total investment in the coal industry during the plan. 90/ Of the increase in annual production of the mines subordinate to the Ministry of the Coal Industry in 1957 above the level of 1952, 67 percent resulted from reconstruction. Of the increased production capacity of 63.8 million tons, a little more than half is estimated to have resulted from reconstruction. 91/

Reconstruction costs less than new construction and permits speedy completions, but the Chinese Communists now acknowledge that nearly all of the potential to be gained through reconstruction of existing plants has been achieved. The original production goal for 1962 of 190 million to 210 million tons has since been increased to 230 million tons.* This revised goal for the Second Five Year Plan requires an average annual increase of only 12 percent compared with an average annual increase of almost 14 percent achieved in the First Five Year Plan. The near exhaustion of production gains from reconstruction and the high costs of new mine construction are probably substantial factors in this lower rate of growth.

In their emphasis on the construction and reconstruction of large-scale mines in established coal areas during 1953-56, the Chinese Communists overlooked a considerable potential in medium-scale and small-scale workings at the provincial and local levels. If they had continued their emphasis on large-scale installations, construction costs would have been excessive because (a) the potential available from reconstruction of large-scale mines had been largely realized by the end of 1957, and (b) the construction of new facilities would have to be extended outside established centers, to areas where reserves were problematical and were not connected by modern transportation with industrial centers. In 1957, therefore, along with the shift from reconstruction to new construction of large facilities, there was instituted a program of construction of medium-scale and small-scale mines and preparation plants. Early in 1957, 24 more mines were added to the annual plan, and 60 million yuan in addition were earmarked for investment in the sector. Most of these mines were medium-scale or small-scale, with an aggregate capacity of 7.7 million tons annually. 92/ It was announced that the smaller facilities would reduce costs by using available production equipment and local labor and materials and by going into production considerably earlier than large-scale units. The construction of inclined shafts (which are less expensive to build) was

* The "leap forward" goals announced in 1958 have increased this target, but still it must be reckoned as the official planned target. See VI, B, 3, p. 65, below.

to be favored over the construction of vertical shafts. Also, in December 1957 the Chinese began to include handicraft production in the state plan. Many of the small handicraft workings were closed in the early 1950's, and only during the First Five Year Plan were they reopened. About 6 million tons were provided by this means in 1957.

The construction of coal-preparation plants, important as a source of clean coking coal for the metallurgical industry, was another aspect of the coal industry given relatively little attention before 1957. Although the 6 coal-preparation plants scheduled to start construction in 1957 had a combined processing capacity of 9.5 million tons annually (making them large-scale plants on the average), a shift to the construction of smaller plants, averaging about 600,000 tons annually, was under way by the end of 1957. 93/

The construction force in the coal industry has raised its technological level largely through Soviet Bloc assistance to the sector. The USSR has furnished technical assistance and equipment for mine shaft construction. Poland has been active in the construction of coal-preparation plants. Through this assistance, the speed of sinking a vertical shaft increased from 7 m per month in 1949 to 21 m per month in 1957. Apart from borrowing techniques, the Chinese themselves have done much to increase their technological level. Conservation of materials by substituting local bamboo and stone plus better organization and utilization of construction inputs at the site have increased the construction capability in the sector considerably above that which obtained in 1953.

4. Machine Building.

The prodigious machinery and equipment requirements of Communist China have entailed a broad and intensive effort in construction in the machine building industry. In October 1957 the Chinese Communists estimated that the machine building industry would be allocated 26 percent of industrial capital investment during the First Five Year Plan. 94/ If this percentage is valid -- and the fact that the statement was made so late in the plan makes it appear fairly reliable -- it would mean that capital investment in the sector amounted to about 7.1 billion yuan, making it the most favored sector in industry.

It is estimated that 86 above-norm construction projects in machine building were slated to come under construction during the First Five Year Plan and that at least 104 actually were started.*

* The term above-norm project in the machine building industry refers to a project requiring an investment ranging from more than 5 million yuan (machine tool plants) to more than 10 million yuan (shipbuilding, tractor, and locomotive plants).

By the end of 1957 more than 39 above-norm projects were completed, and the value of the production of the machine building industry was estimated by the Chinese Communists to have increased to nearly 4 times the 1952 level. 95/ The extent of Soviet assistance to the sector can be seen in the fact that at least 26 of the total construction starts and 17 of the completions have been identified as those performed with Soviet assistance.

The extent of construction activity in the machine building industry is partially apparent in the newly added annual production capacities of various electrical equipment items during the First Five Year Plan, which were as follows 96/:

Item	Newly Added Capacity
Electric cable and wire	12,000 metric tons
Electric motors	350,000 kilowatts
Generators	540,000 kilowatts
High-voltage and low-voltage switches	8,000 units
Precision meters	1,035,000 units
Transformers	390,000 kilovolt-amperes

According to Chinese Communist statistics, investments in new and reconstructed machine tool facilities were to be in a ratio of 85 to 15 (presumably in the entire First Five Year Plan), but the products of reconstructed plants were to make up 52 percent of the total machine tool output compared with 48 percent for the portion of total output provided by new construction. Reconstructed machine tool plants required 30 percent less investment per ton of products than did new plants. 97/ In other subsectors as well as this one, however, and in spite of early resolutions to exploit the possibilities of quick yields by renovation and expansion of existing plants, the Chinese have acknowledged that latent capacities for machine building were not sufficiently emphasized during the First Five Year Plan. Instead, too much emphasis was put on new construction of large-scale, highly mechanized plants.

Heavy investment in machine building during 1953-56 brought on increased output and favorable conditions for trimming capital expenditures in 1957 so that funds could be channeled to those industrial sectors (coal, power, and ferrous metallurgy) in which the disparity between output and demand was imposing serious strains on the economy. With the reduction of capital investment in the machine building industry in 1957, major projects at Wu-han, Lo-yang, Tientsin, and other places were delayed or canceled.

Because of speedy construction during 1953-56, a lack of raw materials, and the unbalanced development of other economic sectors, there was considerable unused capacity in the machine building industries in 1957. Concurrently, however, production capacities for the manufacture of electrical machinery, roller bearings, and steam boilers were cited by the Chinese Communists as examples of insufficient capacity in the machine building industry.

The list of important projects in the machine building industry is too lengthy for enumeration here. The most significant construction project in the sector was the Ch'ang-ch'un Automobile Manufacturing Plant, constructed with extensive Soviet assistance in 3 years. The range in types of machine building plants for which construction was undertaken during the plan was great. Construction was completed on two cutting tool and measuring instrument plants at Harbin and Ch'eng-tu.* Concurrently, there was considerable achievement in the construction of heavy machinery plants. Construction was completed on plants at Fu-shun and Mukden, the T'ai-yuan plant was put in partial operation, and construction was started on a huge plant at Fu-la-erh-chi. The latter is the core industrial project in a city of more than 100,000, which had a population of only 6,000 in 1949. 98/

The one-plan, multiphase construction method originated in machine building construction projects at Wu-han, Cheng-chou, and Lo-yang and has since been used in various other industries. Under this method, subprojects are speeded to completion and enter operation while the builders move on to other subprojects. Thus partial operation of the project is achieved, often years in advance of completion. Construction periods were reduced along with costs during the plan. The Ch'eng-tu Cutting Tools and Measuring Instruments Plant, for example, was constructed at three-fifths of the cost, took 2 years less to build, and has a capacity roughly 50 percent more than its Harbin counterpart, which was completed in 1954. 99/

As a result of construction during the First Five Year Plan, many types of machinery and equipment never before manufactured in China were produced. Basically, however, the machine building industry still has a weak foundation. The majority of the existing plants are designed to make single machines. Complete sets of equipment for constructing large-scale integrated plants still must be imported. The Chinese Communists cannot yet produce heavy-duty rolling mills and forges, precision measuring instruments, automatic controls, diesel locomotives, and many other industrial items required in their past and future program of speedy industrialization.

* The Ch'eng-tu plant, however, was not formally completed until March 1958.

5. Construction Materials.

a. General.

Since 1952 the antiquated construction materials industry, formerly concentrated in the Northeast and the coastal regions, has been converted into a relatively solid element in the economic structure of Communist China. The First Five Year Plan called for 27 above-norm construction projects* to be started before the end of 1957 in this industry. About 26 projects actually were begun in the period. 100/ Emphasis was placed on the cement industry, but targets were enumerated also for brick, glass, lumber, and other construction materials facilities. Large brick plants were constructed in places as diverse as Huhehot, Sian, Ch'eng-tu, and Peking, and in 1956-57 about 28 billion bricks were produced. By the end of 1957, tile production had increased to 2.7 billion units and the production of sheet glass to about 46 million sq m. 101/

Recognizing the fact that basic construction activity is heavily dependent on lumber, the Chinese Communists planned 14 new logging centers and 6 above-norm lumber processing projects for the period 1953-57. With an investment of 650 million yuan for capital construction, the industry constructed 18 logging centers, many sawmills, 2,621 km of light forestry railroads, and 4 railroad tie preservative plants during the First Five Year Plan. 102/ Production of raw timber during the period exceeded the original plan goal.

Accomplishments in the construction materials field were not without shortcomings. Major defects in the industry were a slow rate of geological survey, belated deliveries of designs and equipment, and a lack of over-all, long-range planning. Most construction materials were in tight supply during the plan. Although adequate amounts of most materials were produced, the great area over which the construction program was spread coupled with limitations in transportation caused short-term scarcity in many areas and exceedingly high transport costs and caused reliance to be placed on local suppliers for secondary construction materials (bricks, tiles, sand, and stone). The substitution of bamboo and reinforced concrete for timber in certain types of construction** was designed to alleviate the shortage of lumber which persisted throughout the plan. Other conservation devices included the use of clay substitutes such as slag for making bricks and the substitution of natural cement foundations for concrete in some civil structures. 103/

* Including projects in the lumber industry.
** See also IV, E, pp. 19-20, above.

b. Cement Industry.

The cement industry holds central place in the industrial construction program of Communist China. The First Five Year Plan established an increase in production from 2.86 million tons in 1952 to 6.0 million tons in 1957 and an increase in annual production capacity of 2.36 million tons. 104/ Production actually increased to 6.7 million tons in 1957 (see Figure 7*), and about 2.5 million tons of capacity were added during the plan period.

The First Five Year Plan specified that 10 above-norm projects** in the construction or reconstruction of cement plants during 1953-59 were to be completed, thereby adding 3.1 million tons of capacity. 105/ The Chinese Communists announced that by the end of 1957, 3 large new cement plants at K'un-ming, Ta-t'ung, and Yung-teng were completed and 7 plants were restored or reconstructed. Soviet Bloc assistance in this effort was considerable. Major plants completed or started by the end of 1957 are listed in Table 7.*** Besides these plants, others at Canton, Harbin, Chungking, and other places were expanded during the plan, thus adding capacity to the national total.

Much of the addition to production capacity during 1949-54 was obtained by rehabilitating and reconstructing facilities fairly well developed before World War II. The relative ease with which production capacity was expanded by rehabilitation in 1949-52 and the rapid improvement in the rate of utilization of capacity in 1953 and 1954 were primarily responsible for the rapid increase in the production of cement from 660,000 tons in 1949 to 4.6 million tons in 1954. 106/ The pattern for 1955-57, however, was one in which the construction of new facilities predominated, thus requiring greater expenditures of time and investment funds per ton of increase in production capacity than in the earlier period.

Intensive construction activity in 1956 placed extreme demands on the cement industry. In spite of the substantial increase in production in that year (42 percent above that achieved in 1955), there were shortages of cement throughout the economy. The increase in production fell below the anticipated

* Following p. 40.

** The term above-norm project in the cement industry refers to a project requiring an investment of 6 million yuan or more.

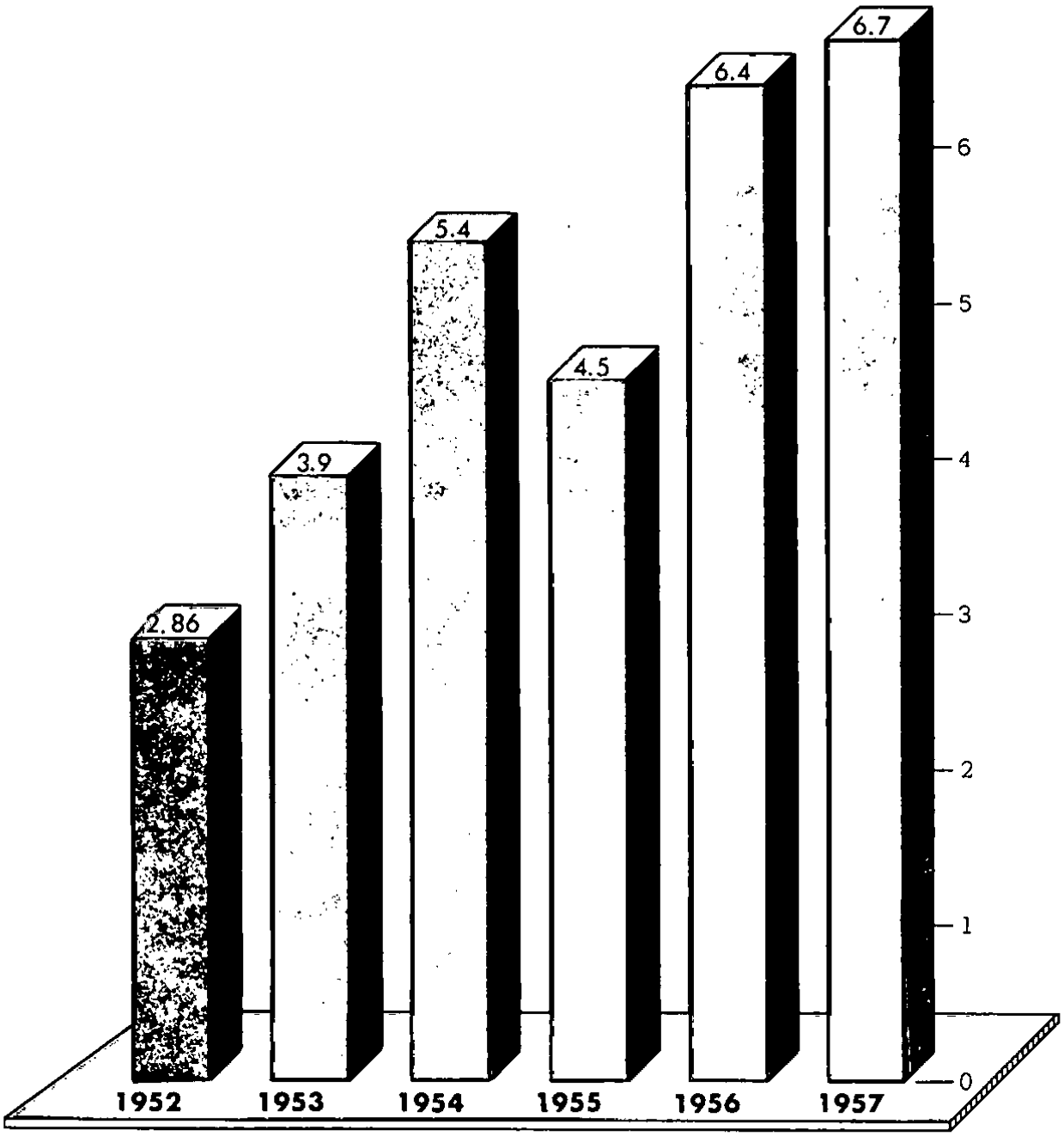
*** See Appendix A, Table 7, p. 81, below, for a list of cement plants under construction during the First Five Year Plan.

Figure 7

COMMUNIST CHINA

CEMENT PRODUCTION, 1952-57

(Millions of metric tons)



27268 12-58

increase in requirements of 59 percent. It appears probable that this shortage was aggravated by exports to the USSR.*

The Chinese Communists announced that during 1957 production increased only 300,000 tons above the level of 1956 (from 6.4 million tons to 6.7 million tons), and capacity added was announced to be 1.1 million tons. This fact indicates that plants were operated at peak rates in 1956 to alleviate the shortage (leaving little margin for additional production in 1957 from existing capacity) and also that accelerated production in 1956 may have resulted in considerable "down time"** in 1957.

The bulk of the cement produced during the First Five Year Plan was grade 400 or above.*** In 1953, nearly 90 percent of total output was in this category. 108/ It is likely that the proportion of lower grade cement was increased as the plan progressed and requirements climbed. Quality, however, probably remained fairly high in the industry during the plan. Even some new types of cement, such as low-heat cement, oil well cement, and high early strength cement, were produced.

6. Petroleum.

The Chinese Communists realize that the long-term nature of the processes of exploring and exploiting petroleum resources precludes speedy production returns. In 1957 the Chinese met only 50 percent of domestic requirements from production, and this supply deficiency with its implications for the entire economy was not expected to be corrected before 1967. Starting from a low base in 1952, the Chinese found it necessary both to explore new fields in order to satisfy future industrial requirements and to rehabilitate and expand speedily the existing petroleum facilities in order to meet immediate industrial needs. The Chinese invested

* During 1956 a threatened shortage of more than 1 million tons of cement at construction sites in the USSR was announced. 107/ Communist China probably has exported substantial quantities of cement, especially to the eastern regions of the USSR. During the first 6 months of 1957, the Chinese Communists reported that 500,000 tons of cement were exported but did not indicate a recipient. Net exports during the period of rapid expansion of construction activity in the First Five Year Plan put an additional burden on the cement industry.

** The term down time refers to the time when the plant is idle because of the necessity for repairing and renovating kilns, grinders, and other production machinery.

*** Grade 400 cement is cement that is capable of resisting a load pressure of 400 kg per square centimeter. Grade 400 cement is probably comparable to general-purpose portland cement in use in the West.

1.9 billion yuan in capital construction for the petroleum sector during 1953-57. 109/ There are estimated to have been 100,000 workers engaged in capital construction in the petroleum industry in 1957, of which 30,000 worked in geological prospecting. 110/ The First Five Year Plan called for 13 above-norm construction starts (including two Soviet aid projects) and 9 above-norm completions.* Although only 12 projects were actually started, the Chinese claim that "more than 10" of these projects were completed by the end of 1957.

The First Five Year Plan set a goal of 55.2 million tons of exploitable petroleum reserves by 1957, nearly 3 times the total reserves in 1952. Systematic surveys were begun in 1953 and were concentrated in six areas, as follows: the Chiu-ch'uan Basin (Kansu); the Szechwan Basin (Szechwan); the Tsaidam Basin (Tsinghai); and the Dzungarian, Tarim, and Turfan Basins in the Sinkiang Uighur Autonomous Region. The Karamai field in northwest Sinkiang, with reported reserves of more than 100 million tons of crude oil, was the most important find in the 5-year period, but considerable testing remains before the proportion of this total which is exploitable may be ascertained. At least 950 million yuan, 50 percent of the total capital investment in the petroleum industry, were invested in prospecting, in which 1.2 million m of drilling were accomplished.

The most noteworthy construction projects in the line of refining and processing were the refineries at Lan-chou, Tu-shan-tzu, and Yu-men, and the shale-oil-processing plants at Fu-shun and Mao-ming (Kwangtung). Another large refinery, scheduled for construction on the Manas River in Sinkiang, has not started construction to date. Expansion and new construction provided a natural crude oil charge capacity of about 1.2 million tons in 1957, approximately double the estimated capacity for 1952. By the end of 1957 the Chinese Communists claimed the capability to design crude oil refineries and synthetic processing plants, each having 1 million tons annual capacity.

The major mistakes made in construction for the petroleum industry during the First Five Year Plan are implicit in the May 1957 announcement by the Ministry of the Petroleum Industry that three principles had been adopted to guide construction in this sector in the Second Five Year Plan, as follows 111/:

* The term above-norm project in the petroleum industry refers to a project requiring an investment of 5 million yuan or more.

a. No permanent construction will be performed in prospecting areas in which the existence of oilfields has not yet been proved.

b. As long as the output, quality, and variety of products are not affected, production units will do their production work by the most simple methods and will not use unnecessary mechanization and automation.

c. No workers' cities or housing areas will be built in areas where petroleum is the only industry. Instead, residential areas will be set up in nearby localities.

7. Chemical.

The First Five Year Plan scheduled 24 above-norm construction starts* in the chemical industry of Communist China. With an estimated capital investment of roughly 1.3 billion yuan, 43 above-norm projects were started, among them 8 Soviet aid projects. 112/ The number of design institutes increased from 1 in 1952 to 5 in 1957, with an attendant twentyfold increase in design personnel during the same period. The total value of production of the chemical industry is estimated to have increased an average of 30 percent per year during the plan. Reconstruction and expansion of existing facilities was responsible for the larger portion of this increase, as new construction lagged until 1957.

During the First Five Year Plan, about 40 percent of capital investment in the chemical industry went to chemical fertilizers, the production of which in 1957 was about 800,000 tons, roughly 4 times the 1952 output. The Dairen and Nanking nitrogenous fertilizer plants were expanded, and 6 others, 2 of which were phosphate plants, were newly constructed during the plan period. The designed production capacity of these 8 plants on full completion was planned to be 1.8 million tons of nitrogenous and 600,000 tons of phosphate fertilizers annually. The most noteworthy project was the nitrogenous fertilizer plant at Kirin, which was completed in October 1957 and is undergoing expansion to a designed annual capacity of more than 300,000 tons. The total national production of nitrogenous fertilizers in 1952 was only 194,000 tons. 113/ It was only late in the plan, however, that chemical fertilizers received any priority from the planners. In 1957, about 13 percent more investment was allocated to the sector than in 1956, giving impetus to the construction of fertilizer facilities.

* The term above-norm project in the chemical industry refers to a project requiring an investment of 6 million yuan or more.

Construction in other segments of the chemical industry helped to increase the output of most chemical products and to increase the number of chemical items produced from 460 in 1952 to 1,400 in 1957. During the plan period, two dyestuff plants, a rubber plant, a calcium carbide plant, a starch plant, and a large plastics plant were newly constructed. 114/ Numberous other projects were reconstructed and expanded.

8. Light Industry.*

Mao Tse-tung has said, "The development of light industry has satisfied the material needs of the peasants and the nation and has accumulated capital for the nation." 115/ In order for light industry to fulfill these two tasks, it was necessary to restore and expand existing facilities and to undertake construction at new sites on other facilities during 1953-57. The First Five Year Plan scheduled 104 above-norm construction starts in light industry, and 147 projects actually were started.** Under the plan, there were also many below-norm projects, of which 870 were to be constructed at the local level in support of rural agricultural areas. The state is estimated to have invested 3.3 billion yuan in capital construction for the sector during the plan, which saw the total output of light industry double. 116/ Generally, light industrial construction in Communist China has the following characteristics: (a) capital investment per project is relatively small compared with heavy industrial projects, (b) construction is uncomplicated and requires little mechanization, (c) construction periods are short, (d) capital accumulations are rapid and relatively large, and (e) local and provincial organs can and do handle a considerable portion of the construction program.

The principal plants involved in investment in light industry have about a 1-year payout cycle -- that is, prices of consumer goods produced by these factories are such that the profits from 1 year's operation will pay off the entire investment outlay for the plant. 117/

In spite of high profits from construction in light industry, which provided funds for construction in heavy industry, construction in the light industry sector lagged until 1956. In that year the number of above-norm projects to be started under the

* The term light industry generally refers to industries producing consumer goods. The main industries discussed in this report are textiles, food, and paper.

** The term above-norm project in light industry refers to a project requiring an investment of more than 3 million yuan.

First Five Year Plan was increased, and additional funds were allocated to the sector for capital construction in 1956-57. This increase in investment was not substantial enough during the First Five Year Plan, however, to change the ratio of investment in heavy industry to that in light industry, which was about the 8 to 1 ratio prescribed in the plan.

a. Textiles.

The First Five Year Plan called for 53 above-norm starts in the textile industry in Communist China, and the Chinese report that 75 projects were actually started. At least 44 of these projects were cotton textile plants, with a total of 2.4 million spindles. It is estimated that about 1.9 million spindles were added in the First Five Year Plan, although the original plan called for the addition of only 1.65 million spindles. 118/ Besides the construction of 4 printing and dyeing plants, 3 wool plants, 7 silk plants, and 6 hemp textile plants either newly constructed or reconstructed, a start was made in the creation of a synthetic fiber industry. The An-lo (Shanghai) and An-tung (Northeast) synthetic plants have been restored and expanded. Additional plants in Ho-ch'eng and Pao-ting are currently being built with East German assistance.

Besides the increased volume of construction in the sector, three other aspects of construction in the textile industry seem significant, as follows:

(1) A trend toward establishing large integrated combines was noticeable. Combines have been started at Han-tan and Sian, and one has been projected for Szechwan.

(2) New mills have been set up in or adjacent to cotton-producing regions at Cheng-chou, Sian, and Urumchi.

(3) Construction costs have been substantially reduced. The construction companies in the sector* have used standardized plans, have reduced construction periods, and thus have been able to achieve substantial savings in capital. The Chinese Communists report that the construction cost of a 100,000-spindle cotton mill was 40 percent less by the end of 1956 than it was during 1953. 120/

* In March 1956, there were at least 5 construction companies in the textile industry, each of which employed an average of 4,500 workers. 119/

b. Food, Paper, and Other.

The First Five Year Plan scheduled 34 above-norm construction starts for the food industry in Communist China, and the Chinese report that at least 48 projects were started. The 7 sugar refineries scheduled for completion in 1957 were planned to bring the number of such completions during the plan to 20 (presumably above-norm projects) and were slated to add 428,000 tons of production capacity during the period. Actual sugar capacity added during the plan has been reported to be 650,000 tons. 121/ Construction of facilities for meat packing and refrigeration and for processing salt, flour, and edible oils also added to the potential of the food industry in servicing and supporting other parts of the economy.

The First Five Year Plan called for 10 above-norm projects to be started in the paper industry, and the Chinese Communists report that 24 projects actually were started. By the end of 1957, annual capacity added in the industry was 268,000 tons, the most noteworthy projects being the large Chia-mu-ssu and Canton paper mills, the former constructed with extensive Soviet assistance. As in other industrial fields, the reduction of construction costs was significant. The Chinese have stated that a paper mill with a daily production of 100 tons of printing paper formerly required 30 million yuan investment and 3-1/2 years to construct, but in 1957 only 15 million yuan of investment and a construction period of 2 years were required to construct the same plant. 122/ The construction of several pharmaceutical, printing, rubber goods, and enamelware plants was also undertaken during the First Five Year Plan.

B. Nonindustrial.*

1. General.

Capital construction in the nonindustrial part of the economy of Communist China constituted about 20 percent of total capital investment during the First Five Year Plan. About 25 departments, the principal ones being agriculture, forestry, water conservancy, culture, and education, are included in this broad

* The term nonindustrial construction in this report refers to construction performed for all departments of the economy except industry, transportation, and communications. Although transportation and communications are essentially nonindustrial, the fact that the Chinese Communists deal with these departments separately has led to their being discussed separately in this report.

system. The chief characteristic of the system is the wide dispersion of its investment -- for example, in early 1957 there were 60,000 nonindustrial construction sites in China, the average amount of investment being less than 10,000 yuan per site. 123/

2. Agriculture.

The First Five Year Plan in Communist China scheduled direct investment of 2.68 billion yuan for agriculture, water conservancy, and forestry,* or just above 6 percent of planned total capital investment (42.74 billion yuan). The Chinese estimate that 3.81 billion yuan actually were invested by the state in these sectors, exceeding the original plan by 42 percent and representing nearly 8 percent of estimated total capital investment (48.78 billion yuan). 124/ During the same period the peasants invested 12 billion yuan in these sectors. Loans advanced through the state bank during the plan totaled about 8 billion yuan and comprised a significant part of the peasants' personal expenditures. About 25 percent of this amount was used for capital construction. 125/

To help speed the program of socialization of agriculture, during the plan the state invested an amount estimated to be 1.85 billion yuan in the agricultural sector for tractors and for the construction of garages, granaries, repair shops, powerplants, dormitories, and offices in connection with organizing mechanized state farms and machine tractor stations. These stations require relatively little investment** but provide a base for future mechanization in the countryside.

3. Water Conservancy.

Construction activity in water conservancy in Communist China, using chiefly hand labor, has made an impressive beginning on the ancient Chinese problem of soil erosion and drought. About 100 above-norm construction projects were scheduled in water conservancy, 92 of which were to be completed by the end of 1957. The state invested nearly 2 billion yuan in such capital construction, of which it is estimated that 1.5 billion yuan represented the construction portion alone. 127/ Total earth, masonry, and concrete work was expected to amount to 6.3 billion cu m by the end of 1957, or about 76 percent of the total volume of such work performed in

* Meteorological investment was covered by this figure but was so minor (planned investment was only 36 million yuan) that it is not discussed here. Because the bulk of capital investment in forestry was allocated to logging enterprises, this aspect of construction is discussed under Construction Materials, V, A, 5, p. 39, above.
** A derived cost figure for 41 machine tractor stations averaged about 600,000 yuan each. 126/

construction during the First Five Year Plan.* The construction of 11 large reservoirs, 11 sluice gates, 8 million wells, and thousands of kilometers of newly constructed, enlarged, and maintained dikes was completed during the plan.**

Construction was focused on the Huai, Yellow (Huang), and Yangtze Rivers, together with their tributaries. The following projects have been completed (see the map, Figure 8***):

a. Huai River.

Since 1949, about 1.6 billion yuan (the bulk of the investment allocated during the First Five Year Plan) were invested in projects on the Huai or its tributaries. 129/ The large Fo-tzu-ling, Hsiang-hung-t'ien, Mei-shan, and Mo-tzu-t'an concrete reservoir dams were fully or partially completed, the Nan-wan and Po-shan earth reservoir dams were completed, 9 flood detention projects were put in operation, 7,600 km of channel were dredged, and 5,800 km of dikes were reinforced.

b. Yellow River.

The first phase of construction of this long-range project was to be completed in 1967. About 46 dams; many reservoirs; and 2 hydroelectric power stations, each having a capacity of 1 million kw, were planned. By mid-1955, more than 130 million cu m of earthwork had been moved and 1,800 km of dikes repaired. The site for the Liu-chia dam had been selected, and preparation work was under way in 1957. In January 1957 the huge San-men Gorge project came under construction.

Flood diversion projects such as the Ching-chiang projects on the Yangtze River, the Kuan-t'ing reservoir and spillway channel 40 km long on the Yung-ting River, the Shih-men reservoir in Hupeh Province, and the Ta-huo-fang reservoir in Liaoning Province are other major projects undertaken during the First Five Year Plan.

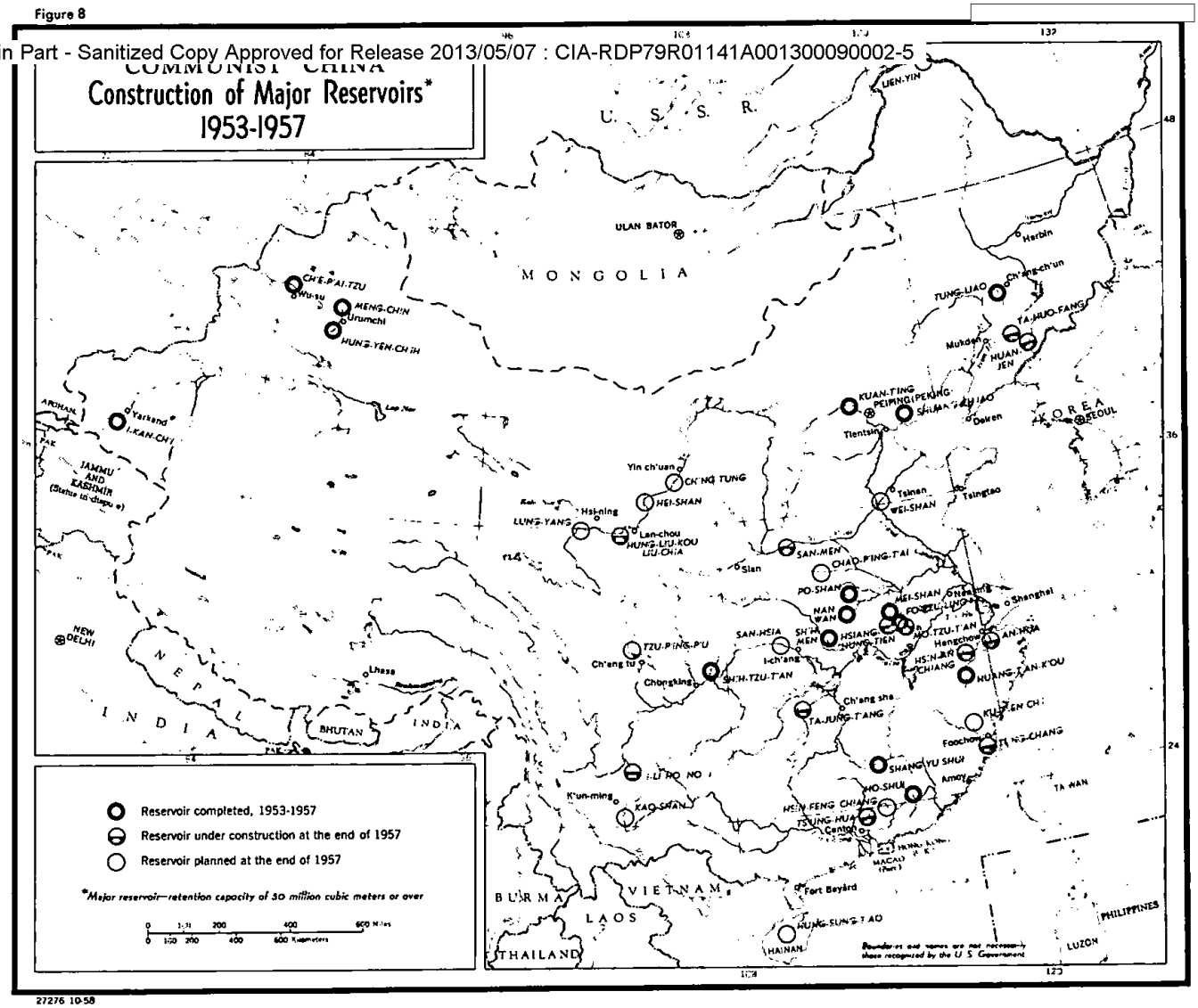
---

* See III, A, p. 8, above. The massive water conservancy campaign initiated in October 1957 and carried forward by more than 100 million peasants for 9 months was said to have involved 33 billion cu m of earthwork.

** Some of this work was completed initially in the restoration period (1949-52), when the state allocated 700 million yuan for water conservancy purposes. All of the projects completed in that period, however, were expanded during the First Five Year Plan. 128/

*** Following p. 48.

Figure 8



The First Five Year Plan called for an expansion of the irrigated area by 4.8 million hectares. According to Chinese Communist announcements, more than 14 million hectares (three times the planned amount) have been added to the irrigated area.* This increase is so large that it must be assumed that drainage improvement and well projects are being included in the totals. Most of the construction work involved in irrigation is small scale and is done by the peasants themselves. Much of it, moreover, is of a temporary nature and requires continuing maintenance. The same holds true for dike maintenance. In late 1956, there were 41,600 km of earth dikes in Communist China, 130/ and the reinforcement, expansion, and maintenance of this system requires the continuous use of considerable manpower, a commodity in ample supply.

There were several hydraulic research institutes established in Communist China under ministerial and university sponsorship during the First Five Year Plan. Interministerial jurisdiction for various types of construction was clarified. In order to supplant the considerable Soviet aid in water conservancy, many schools (including the water conservancy college at Wu-han) were established and thousands of specialists trained during the period. 131/ Thus a core of skilled technicians is growing, but achievement in construction in water conservancy will be based on intensive use of the peasantry as a labor supply during the indefinite future, just as it was in the First Five Year Plan.

C. Transportation.

1. New Railroads.**

The construction of new railroad lines in Communist China has been based on Nationalist plans which were largely unimplemented before 1949. Most of the lines constructed before 1949 were built in the north and northeast to connect ports with inland markets and sources of raw materials. In 1946, 38 percent of the total trackage was in Manchuria. On coming to power in 1949 the Communists sought to rectify this disproportionate distribution. The existing network had sustained much war damage, however, which first had to be repaired. Accordingly, during 1949-52 the major effort in railroad construction was devoted to the rehabilitation of the existing network. Three new lines were completed during

* This estimate was given in the Chinese Communist press as late as October 1957. It is less than actual accomplishment, however, because it does not include the increase in irrigated area derived from the massive water conservancy program undertaken in October 1957.

** 132/

this period, as follows: (a) the Lai-pin - Mu-nan Kuan line, built primarily to support the Vietnamese Communists in their struggle for power; (b) the Ch'eng-tu - Chungking line; and (c) the T'ien-shui - Lan-chou line, an extension westward of the vital Lung-hai Railroad.

The First Five Year Plan called for the construction of 4,084 km of new railroad lines (see the map, Figure 9*). The general scheme of the program was (a) to expand the established net into peripheral areas for the purpose of exploiting natural resources; (b) to connect new industrial centers with one another, with natural resources, and with the sea; (c) to provide overland links with partners in the Sino-Soviet Bloc for the purpose of economic and military assistance; and (d) to construct lines in the east and south predominantly for military reasons.

In order to fulfill this program, the construction effort was centralized under the control of regional engineering bureaus and design institutes of the Ministry of Railroads and the Railroad Engineering Corps of the Peoples Liberation Army (PLA). By the end of 1956 a total of 4,387 km of new lines had been constructed, thus overfulfilling the First Five Year Plan goal of 4,084 km, 1 year ahead of schedule. In 1956 an upward revision of the goal for the 5-year period was announced, from 4,084 km to 7,592 km. This grandiose program was canceled by announcement of the 1957 Plan, which called for the construction of only 535 km of new lines during the year (in 1956, 1,747 km had been constructed). The drastic reduction in the construction of new lines in 1957 was the result of material shortages, financial difficulties, and traffic congestion on existing lines. The reduction indicated that the Chinese Communists had renounced their option of a large overfulfillment of kilometrage in favor of increasing the capacity of existing lines. Although the Chinese state that kilometrage performance in the First Five Year Plan was "over 4,800 km," it is believed that at least 500 km of the 535 km planned for 1957 were achieved, making a total estimated accomplishment of about 4,900 km of new lines constructed during the 5-year period.

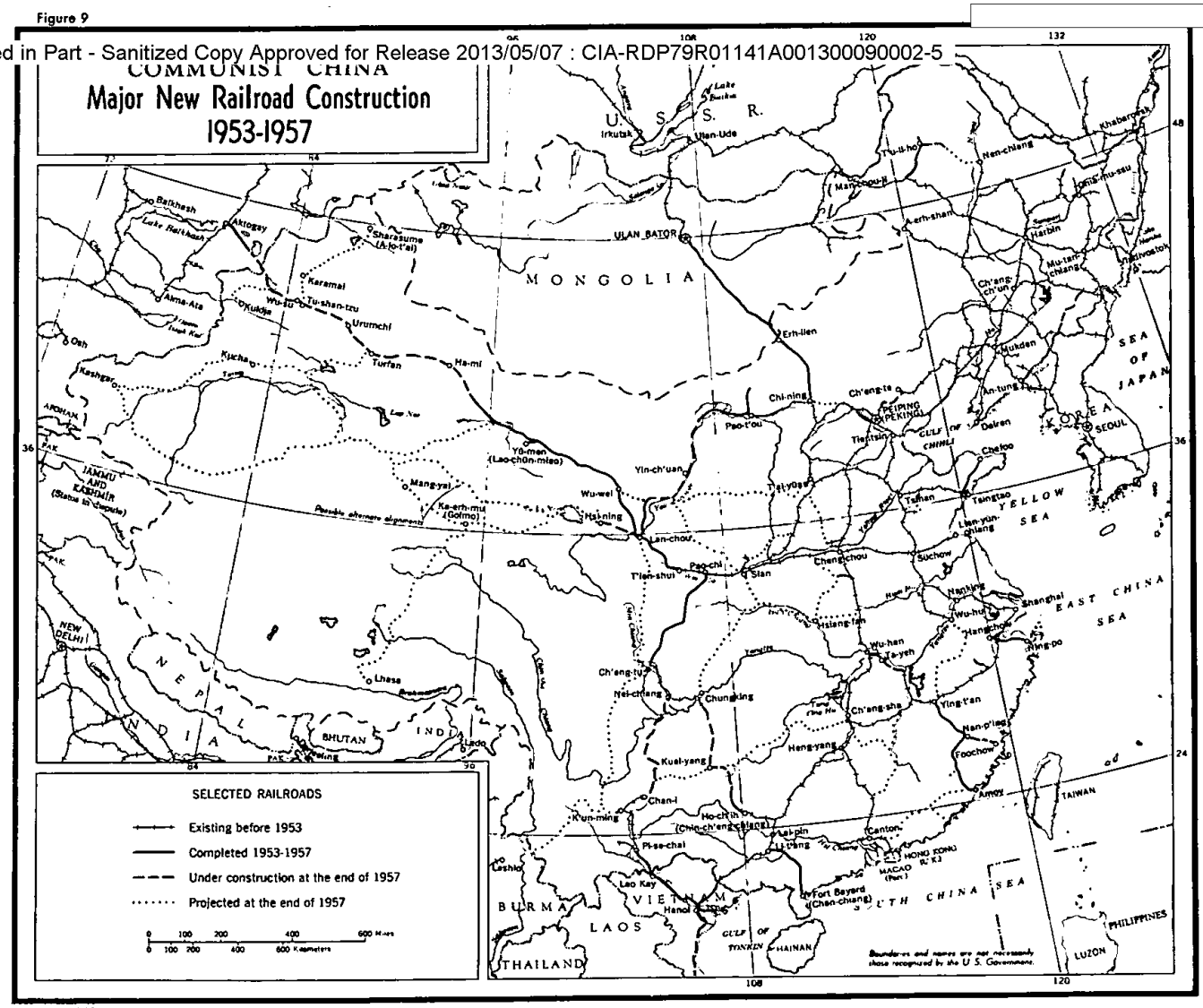
The First Five Year Plan of Communist China stated that the Ministry of Railroads was to allocate 41.7 percent (2.36 billion yuan) of its total investment in the construction of new lines, or 5.5 percent of the total planned capital investment of 42.74 billion yuan. It is estimated that about 3.05 billion yuan, or about 6.3 percent of total capital investment, actually were expended for the construction of new lines in the 5-year period.** The construction

* Following p. 50.

50X1

50X1

Figure 9



27277 10-58

of new lines not only involved substantial investment but also consumed large amounts of construction materials, chiefly steel, cement, and lumber. Because domestic supply was inadequate, some of the steel materials for the construction of new lines had to be imported. Cement and lumber, although also in short supply, were made available in adequate amounts to the railroad constructors for them to meet kilometrage goals -- a fact which indicates the high priority given the construction of new lines by the Chinese planners.

A large part of the successful performance in the construction of new lines in Communist China can be ascribed to the concentration of labor involved. Although the permanent labor force engaged in the construction of new lines is estimated to be only between 125,000 and 150,000 persons, hundreds of thousands more in the form of troops of the PLA and recruited peasants took part in the construction. Skilled workers, although still in short supply, were trained at work and in schools, and the fact that the labor productivity of railroad construction workers increased during the plan indicates that the training is proving of value to the sector.

2. Highways.*

The highway system of Communist China lags far behind railroads and waterways as a transportation facility. In most parts of the country, roads are used primarily to feed traffic to railroads and waterways or to carry short-haul traffic between cities. Only where adequate rail or water routes are not available are highways used for long-haul traffic. Even as late as the end of 1957, there were few modern, high-speed, hard-surfaced highways. The better roads were constructed on earth foundations with surfaces of crushed rock grouted with liquid clay or earth. Surfaces were poor, and the usefulness of the roads was restricted further by inadequate drainage features, low-capacity bridges, and ferries. Of the announced total of 250,000 km at the end of 1957, less than half were all-weather roads. 134/ Some truck routes across plateau or desert areas were completed simply by improving approaches to gullies and fords. An example of this, the 1,300-km Hei-ho - Gartok road, was constructed in 68 days in 1956.

The Chinese Communists began their highway construction from a low base in terms of both quantity and quality of kilometrage. The total length of the highway net dropped from 75,000 km to 25,000 km as a result of the civil war, but by the end of 1949 it had risen back to 75,000 km. During 1949-52, reconstruction, improvement, and new construction increased the national highway net to about

* See the map, Figure 10, following p. 52.

130,000 km. 135/ By the end of 1957 this figure had been increased to 250,000 km, chiefly through the use of part-time local labor. Currently, it is planned that by the end of 1962 the total highway net will be expanded to 600,000 km.

Nowhere in Chinese Communist statistics is there more ambiguity and confusion than in the field of highway construction. The Chinese distinguish among the following 4 types of overland transportation routes (other than railroads): (a) motor highways of 6 categories,* depending on the traffic they are capable of accommodating; (b) secondary highways; (c) cart roads; and (d) pack transport roads. Information on progress in construction of the various categories of roads as well as on types of construction (new, restored, or improved) is seldom differentiated, and it is assumed that the achieved and projected kilometrage figures include at least 2 (a and b) and possibly all of the road types enumerated above. In Chinese usage the term trunk highways probably refers to motor highways, and rough roads probably refers to secondary (simple) highways and perhaps cart roads. At least 50 percent of the total net is designated further as military roads, indicating that most motor highways and a substantial portion of the secondary highways, irrespective of location, are counted as strategic assets to the state in transportation-poor China.

Another distinction is made between national and local highways. Construction of national roads is financed and supervised by the state and has been concentrated in peripheral and coastal areas as well as in areas inhabited by national minorities.** Local roads are financed and built largely with local funds and are designed primarily to serve provincial, regional, or local needs. These roads are built by hand labor to low construction standards and usually have earth surfaces and one lane. A major portion of the traffic on such roads probably is still by animal-drawn carts, pack animals, and human porters. Maintenance, often of an extremely low caliber, is the responsibility of those living along the roadway.

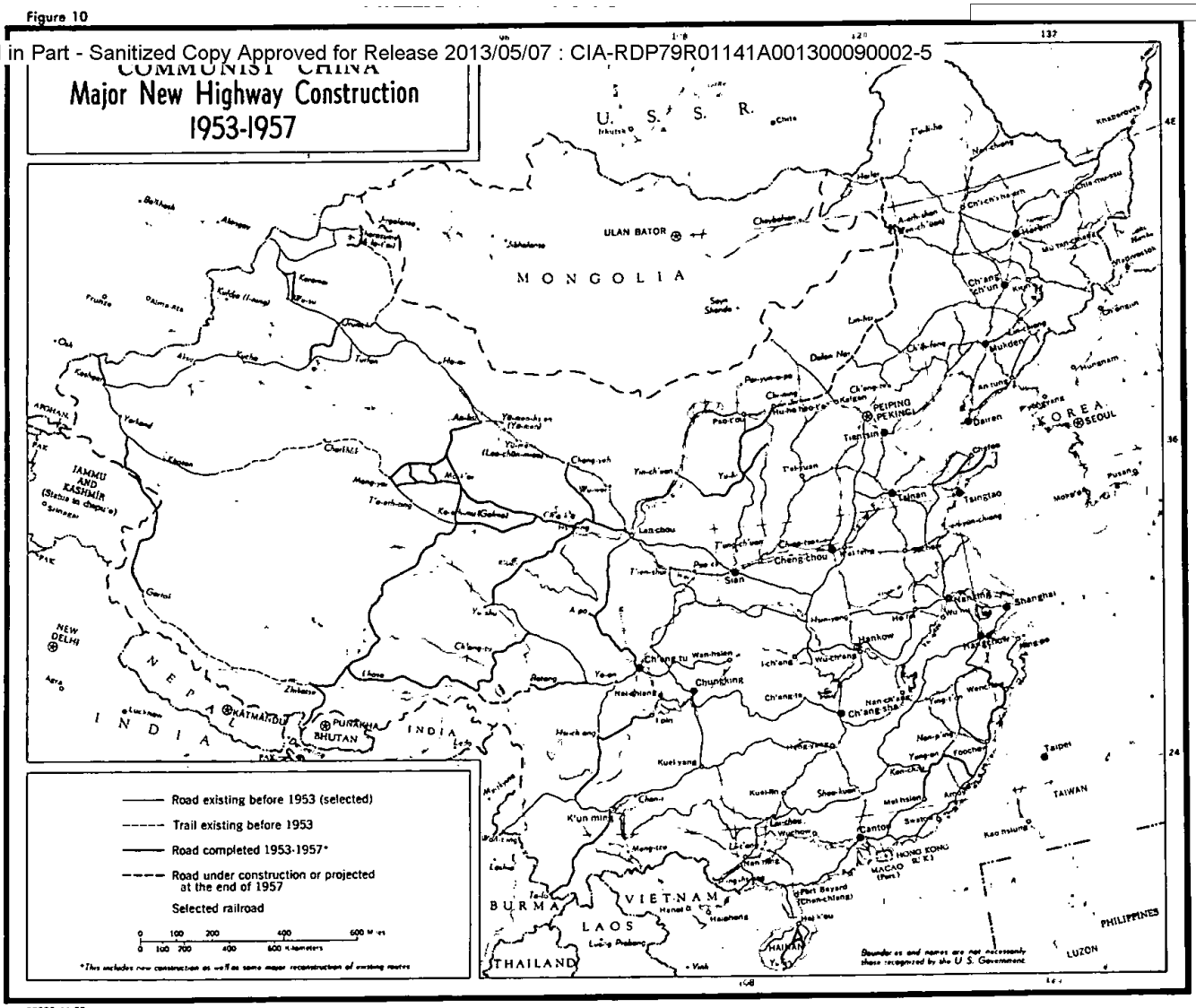
The First Five Year Plan of Communist China provided that 10,100 km of motor and secondary highways were to be constructed, restored, or improved with state funds. Of this total, motor highways amounted to 7,782 km, of which new construction projects were to total 4,866 km and the remainder was to be in restoration-repair projects. Local government organs were to construct 15,000 km of highways (probably predominantly secondary) in the 5-year period, of which 6,409 km were to be new projects.

[redacted] 50X1

** Nearly 70 percent of the highways constructed with state funds in recent years were located in the Southwest and the Northwest. 137/

50X1

Figure 10



27278 11-58

Li Fu-chun, a vice premier of the State Council of Communist China, announced in mid-1956 that state-financed highways constructed, restored, and improved during 1953-55 totaled 9,053 km. In addition, 4,611 km were planned to be under construction in 1956. It is estimated that a total of about 12,000 km of motor and secondary highways have been constructed, restored, or improved since 1953, overfulfilling the First Five Year Plan by about 20 percent. 138/ In July 1957 the Chinese announced that a total of 10,100 km of motor roads had been constructed, restored, and improved, 30 percent above the 7,782 km planned. This achievement leaves much development yet to be accomplished, however, in transportation-poor China. Major achievements in highway construction were the 2,255-km Sikang-Tibet, the 2,100-km Tsinghai-Tibet, and the 1,200-km Sinkiang-Tibet highways.

On the local level, during 1953-55 some 13,000 km of highways (predominantly secondary) were constructed, restored, or improved with local funds and corvee labor. Such a performance in 3 years suggests that the planned total of 15,000 km of locally financed highways was substantially exceeded.

The First Five Year Plan provided an allocation of 560.8 million yuan for construction, restoration, and improvement of 7,782 km of motor highways. A planned unit cost per kilometer for different types of highways has been developed as follows 139/:

Type of Highway	Planned Cost Per Kilometer (Yuan)
State-constructed motor roads, new and restored	72,065
State-constructed motor roads, new	102,405
State-constructed motor roads, restored	21,435
Locally constructed roads (chiefly secondary), new	40,570

On the basis of the above data and previous estimates, it is estimated that between 800 million yuan and 1.2 billion yuan were expended on the construction, restoration, and improvement of highways by the Chinese Communist government during 1953-57.*

* See Methodology, Appendix B.

In 1956 it was announced that 560 counties in Communist China had no highways. A total of 350,000 km is scheduled to be added to the highway network during 1958-62, of which 15,000 to 18,000 km will be motor highways (approximately double the total of the First Five Year Plan). 140/ Such a vast program has as its aim the linking up of all county seats in China by motor and secondary highways.

3. Waterways and Other.

In 1957, combined ton-kilometer performance of inland waterways and coastal shipping in Communist China was 210 percent above the level of 1952. Although the greater part of this increase must be ascribed to expansion of the fleet and to improved operating techniques, the improvement of port facilities has played a significant part. The completion of the Yangtze River harbor of Yu-ch'i-k'ou in April 1958 was the most recent of a series of projects designed to expand water transport. During the First Five Year Plan, modern loading and unloading equipment was installed at the six largest ports -- Shanghai, Tientsin, Canton, Dairen, Tsingtao, and Ch'in-huang-tao; large-scale construction of the Fort Bayard port (first phase) was completed; and restoration and expansion work was begun at Pa-so (Hainan Island), Chungking, and Han-kou. 141/ Generally, however, investment channeled to the sector has been relatively minor. Construction lagged until 1956, when severe congestion of vessels in various inland ports led the Communists to increase investment to inland port construction projects. The preliminary plan for 1958 included further expansion of several harbors, and this and other construction to increase the capacity of ports for handling traffic is expected to continue in the indefinite future.

Construction for the civil airways of Communist China has been at best minimal. Although the loading capacity of the civil air fleet was increased by more than 80 percent above the 1952 level, 142/ most of the increase must be attributed to a larger inventory of aircraft rather than to construction of airfields. The only noteworthy project in this context was the new civil airport in the eastern suburbs of Peking, which entered provisional operation on 1 March 1958. Construction began on this, the largest and best-equipped field in China, in June 1955.

D. Post and Telecommunications.

The significant progress which Communist China has made in developing the post and telecommunications sector of its economy since 1952 can be ascribed in large part to new construction. During the First Five Year Plan, roughly 390 million yuan were invested

in capital construction in the sector, 143/ more than 80 percent of which were allocated to construction of telecommunications facilities. About 18 of the 21 above-norm construction projects* in the sector were in the field of telecommunications.

Performance is indicated by the announcement that the capital investment plan was fulfilled 109.2 percent. New telecommunications buildings in Peking, Ch'eng-tu, T'ai-yuan, Urumchi, and Canton, constructed with considerable Soviet Bloc assistance, were among the 520,000 sq m of floorspace constructed for the sector during the First Five Year Plan. 144/ By the end of 1957 the length of the long-distance pole route was increased 36 percent and the municipal telephone capacity 55 percent above the level of 1952. One effect of this construction is that by the end of 1957 more than 95 percent of the counties (hsien) in Communist China were connected by telephone or radiotelephone services.** The construction of such facilities as the Peking Electron Tube Plant, the Peking Wire Communications Plant, and the Hua-pei Radio Equipment and Materials Plant, which produce components for the telecommunications sector, has added further to the capability of this sector to service the economy.

Construction in this sector reflected that in the rest of the economy during the First Five Year Plan. The work volume was retarded in the first half of each year, and workers were forced to rush operations in the latter half to meet annual goals. Until 1956, blueprints were invariably corrected and revised because of mistakes and reached the construction site behind schedule. Higher quality was in evidence by 1956. Of 134 designs drawn up by the Design Institute of the Ministry of Telecommunications in that year, 124 were completed and delivered ahead of schedule, and these had fewer mistakes than previously. Standard drawings were planned for 20 percent of the total projects in 1956, and this proportion was slated to rise to 40 percent in 1957. In 1956-57, moreover, labor productivity in capital construction increased concurrently with a reduction in construction costs.

* The term above-norm project in the post and telecommunications industry refers to a project requiring an investment of more than 3 million yuan.

** It must be noted, however, that in many hsien only the administrative center was connected to the system.

E. Nonproductive Construction.*

1. General.

According to preliminary official estimates, 14.6 billion yuan were invested in nonproductive capital construction during the First Five Year Plan in Communist China, or 30 percent of total capital investment. 145/ As a result of following the Soviet model too closely, the proportion of capital investment allocated to nonproductive construction by the Chinese was excessive and was considerably higher than the average Chinese standard of living warranted.** Roughly 11.7 billion yuan of the total 14.6 billion yuan represented actual construction, and the remainder went to equipment, design, and miscellaneous expenses. About 160 million sq m of floorspace were constructed for nonproductive purposes, 80 percent of the total floorspace constructed during the First Five Year Plan. 147/ Housing constituted about 63 percent of the total nonproductive floorspace constructed.

In constructing new industrial areas and rehabilitating and expanding existing ones, nonproductive capital investment has been distributed across both the industrial and nonindustrial parts of the economy. The rapid increase in urban population has involved considerable outlays for urban public utilities, residential housing, and other nonproductive facilities. During the first 4 years of the plan (1953-56), some of the achievements in urban construction were the following: the construction of 38 water supply stations, the laying of more than 2,000 km of sewerage pipes, and the paving of 3,600 km of streets in 52 cities. 148/ Even with the intensive efforts to pare the nonproductive portion of capital investment during the plan, especially in 1955 and 1957, the nonproductive share remained high because of the rapid growth of population, industrialization, and urbanization.

Hospitals, stadiums, offices, and schools were constructed in increasing numbers. More than 700 million yuan were invested

* The term nonproductive construction refers to fixed assets which contribute to the wellbeing of the people but do not directly influence the production of goods. Included under this title are workers' housing, cultural and educational facilities, health institutions, and public installations.

** In spite of stringent campaigns to reduce nonproductive construction, the proportion of capital investment allocated to nonproductive construction by the Chinese Communists remained high throughout the First Five Year Plan, although diminishing each year. In contrast, the industrial ministries of the USSR allocated only 15 percent of total capital investment to nonproductive construction in the Soviet First Five Year Plan (1928-32). 146/

during the First Five Year Plan in constructing 7 million sq m of schools alone. 149/

2. New Housing.*

The total floorspace of new housing constructed during the First Five Year Plan in Communist China was 74 percent greater than the original goal. For the 80 million sq m** of new housing constructed for wage and salary workers during the plan, expenditures amounted to 4.26 billion yuan, or about 8.7 percent of the total investment of 48.78 billion yuan in capital construction. 151/ The new housing construction constituted 40 percent of the estimated total floorspace of 200 million sq m constructed during the First Five Year Plan. Even though the amount of housing constructed was substantially in excess of the plan goal of 46 million sq m, living quarters were provided for little more than the equivalent of the increase of 5.2 million workers added to the labor force during the plan. 152/ Housing construction did not keep pace with the steady influx of workers and their dependents into the industrial and urban areas. The amount of housing available was also reduced by the excessive migration of rural inhabitants to these areas and by the state's policy of confiscation of private housing. Official measures to relieve the resulting housing shortage included attempts to stem the rapid growth of cities by the control of migration from rural areas and to increase the amount of housing constructed by a lowering of standards to effect economies in construction.

At the beginning of the First Five Year Plan, construction costs of housing were prohibitive, primarily because of high standards of design. Construction costs and construction standards were lowered in the economy drive in 1955, less expensive construction materials were used, some structural features were eliminated from permanent housing designs, and the construction of temporary housing was increased. To conserve state investment funds, workers were encouraged to build their own homes by using discarded construction

50X1

** A later official announcement stated that 100 million sq m were constructed, but it is not clear what is included in this expanded figure. The Chinese Communists have never stated the proportion of temporary to permanent housing constructed, nor is there any indication that they have attempted to categorize measurements of housing as has been done in the USSR. Therefore it is possible that the later figure may include temporary housing, military barracks, and housing constructed by the workers themselves. In addition, this figure may include corridor and kitchen space within the dormitory building itself and/or commissaries, bath houses, and other adjacent structures constructed as part of a housing project.

materials and their own labor. As a result, substantially more housing was constructed, but these practices tended to spread low-quality housing over a wider area and to shorten housing life in the economy as a whole.

VI. Outlook for the Second Five Year Plan (1958-62).

Preliminary announcements by the Chinese Communists state that capital investment during the Second Five Year Plan will double the 42.74 billion yuan planned in the First Five Year Plan. Eight principal industrial ministries were scheduled to start 1,200 new above-norm projects as opposed to 825 during the First Five Year Plan. Developments in 1958 indicated a considerable expansion of these goals. Because the 1958 construction program has been in such a state of flux, no definitive conclusions can be drawn at this time. Rather, this section will seek merely to present and evaluate the general pattern which appears to be evolving and its implications on the preliminary construction goals of the Second Five Year Plan.

A. Developments in 1958.

Po I-po, Chairman of the National Economic Commission of Communist China, enunciated rather modest construction goals for 1958 in a speech of 3 February 1958. Total investment in capital construction was planned tentatively to be 14.6 billion yuan, or about 2.5 billion yuan above the level of 1957. About 1,185 above-norm construction projects were scheduled to be under way during the year, of which 716 were to be industrial. In 1958, 188 above-norm industrial projects were slated for completion compared with 178 completed in 1957. Planned above-norm construction activity for 1958 by industry was announced as follows 153/:

Industry	Starts and Continuations	Completions
Chemical	42	4
Construction materials	44	7
Electric power	119	35
Fuel	232	52
Light	92	31
Machine building	79	27
Metallurgical	71	14

Subsequent developments in 1958 stemming from the "leap forward" movement,* with its emphasis on better organization, reduced

* The "leap forward" movement is the technical revolution which Communist China is undergoing in all phases /footnote continued on p. 59/

construction costs, and increased local construction have enlarged the proportions of both the construction plan for 1958 and the Second Five Year Plan.

1. Reorganization of Economic Ministries.

The reorganization of Chinese Communist economic ministries announced on 11 February 1958 appears to have been a consolidation and retrenchment of administration rather than the proliferation and specialization which characterized previous reorganizations. 155/ Overstaffing by nonproductive personnel and the overlapping functions of many departments motivated the consolidation, which resulted in the return of many persons to the countryside to engage in "production." Because these persons can be used in local construction, one effect of the reorganization has been to enlarge local construction cadres by accretions of workers returning from urban areas. The effect of the reorganization on the construction departments has been discussed above.* The merging of the Ministries of Water Conservancy and of the Electric Power Industry resolved jurisdictional disputes over the construction of rural hydroelectric plants and apparently provided a logical way to plan and implement the construction and operation of the water and electric power resources of Communist China.

2. Reduction of Costs of Capital Construction.

The old theme of reducing construction costs was mentioned in nearly every Chinese Communist report on economic development during 1958. Po I-po stated in February 1958 that it was then possible to accomplish the same amount of construction with 60 to 80 yuan that formerly required 100 yuan. Finance Minister Li Hsien-nien said on 1 February 1958 that it would be feasible to save 7 to 10 percent of the approved total investment in capital construction in 1958. These planned aggregative reductions are posited on the premise that waste and excessive nonproductive construction will be curbed. Even though the ratio of investment in nonproductive construction has been reduced from more than 30 percent to about 20 percent of total investment in capital construction since 1955, the fact that nonproductive floorspace constructed during the First Five Year Plan (160 million sq m) constituted 80 percent of the total

---

of economic activity. By means of this revolution, the Chinese expect to outstrip the industrial production of Great Britain in less than 15 years. The movement envisions the establishment of scores of large, 100 medium-sized, and 1,000 small industrial cities. 154/

* See II, p. 4, above.

floorspace constructed indicates that there may be opportunity for trimming this segment of capital investment.

3. Increased Local Construction.

Beginning in the first quarter of 1958, the Chinese Communist press placed great stress on a new program for industrial construction. This development called for a balanced construction of medium-scale and small-scale facilities as well as small native-type installations by local authorities to be added to the previously established construction of large-scale industrial units by the central government. The following principles are to serve as guidelines in the development of local construction.156/:

a. Development is to be based on national as well as regional plans, and local industries will rely on existing industrial cities as technical centers.

b. Diligence and thrift must be used in all construction.

c. Construction serving heavy industry and agriculture is to be given priority.

d. Most of the capital, except for large projects, is to come from local authorities.

New financial policies giving local areas greater latitude in compiling and implementing budgets and in utilizing income were announced in 1958. Local budgets, however, still must be drawn up within the state construction plan, and above-norm projects still must be reviewed and approved by central authorities. The only real departure from past control procedure is to permit the departments in charge of capital construction projects to do the following: (a) revise designs and quotas, (b) readjust items of construction according to local conditions, and (c) use surplus funds, after completion of the project, for further construction to expand production instead of returning the surplus funds to the state, as was done formerly.

To assist local construction in the "leap forward" movement, 132 standard designs for small low-cost facilities have been produced by central ministries and passed forward to local organs. Ranging from small ferrous metallurgical installations to starch factories, these plants will use local funds, materials, and labor and can be built and put into operation in relatively short periods.

The state has exhorted each of the more than 2,000 hsien to construct one each of the following installations: coal mines, iron smelters, cement plants, power stations, chemical fertilizer plants, coal liquefaction plants, and machinery repair plants, at a total cost to each hsien of about 12 million yuan. 157/ The Chinese Communists claim that during the first 6 months of 1958 the following small facilities were constructed: 11,000 iron smelters, 20,000 electric power stations, 10,000 cement kilns, and 8,000 coal mines. The majority of these additions were doubtless of the one-man, one-tool variety, requiring only rudimentary construction and contributing little to the growth of modern industry in Communist China.

4. Progress.

The report of the National Statistical Bureau of Communist China in mid-1958 indicates that the construction part of this program was proceeding rapidly.* Investment in capital construction during the first 6 months of 1958 was more than 88 and 41 percent, respectively, above the level of that for the same period in 1957 and in 1956. The capital investment target for the year was 48-percent fulfilled by the end of June, leaving 52 percent to be fulfilled in the last 6 months. On the average, more than 67 percent of the annual capital investment plan was performed in the last 6 months of each year during the First Five Year Plan, and performance by mid-1958 pointed to a probable overfulfillment of the 1958 Plan for capital investment. 159/ By the end of June 1958, 62 above-norm projects in industrial construction were fully or partially completed, indicating that the goal of 188 above-norm completions scheduled for the year probably would be overfulfilled as well.**

In the outlook for the construction program in Communist China during 1958-62, vast "leap forward" claims must be tempered by sober assessment of the capability of the builders to coordinate and integrate the survey-design and construction-installation phases of hundreds of large-scale and medium-scale plants plus thousands of small-scale and native-type projects simultaneously. Many of the optimistic goals set by various organizations will prove to be paper or incentive goals. To mount such a program as this requires the following: (a) mature industrial planning and organization, (b) a

* The discussion which follows supports this thesis, as does the recent announcement that the USSR plans to forward designs and equipment for many key projects 2 to 3 years ahead of the agreed delivery dates. 158/

** By midyear 1957, only 29 above-norm industrial projects had been fully or partially completed. By the end of that year, 178 such projects were completed.

flexible transportation network, (c) available funds for investment and loan purposes, (d) large numbers of skilled builders, and (e) ample supplies of construction materials and a sizable inventory of construction equipment. Although the Chinese Communists have demonstrated great improvement on each of these counts since 1953, it is not believed that they possess the requisite flexibility to implement fully the program set for them in the "leap forward" movement.

B. Selected Economic Sectors.

1. Metallurgical.

Production goals for the metallurgical industry in Communist China in 1962 have been revised upward considerably since the "leap forward" movement began. Although the unofficial goal set by the Ministry of the Metallurgical Industry in March 1958 of 15 million to 16 million tons of crude steel in 1962 160/ is still believed to represent the anticipated increase, subsequent "leap forward" announcements have indicated that the Chinese feel that this goal may be reached in 1959. Because the latter goals appear to incorporate the production of many small native-type facilities currently under construction or projected, and because this production without further processing will have only local use, its ability to add significantly to the growth of modern industry in China is believed to be small. The current construction program is an amalgam of plants of differing sizes constructed partly by central enterprises and partly by local authorities.

Large plants (having an annual crude steel capacity of more than 1.5 million tons) are at An-shan, Pao-t'ou, and Wu-han. These 3 combines were planned to produce 10 million tons of crude steel by the end of 1962.* Medium-scale projects (300,000 to 1.5 million tons of annual crude steel capacity) are the Chungking,** Ma-an-shan, Hunan, T'ai-yuan, and Shi-ching-shan plants, which were scheduled to add 4 million tons of crude steel capacity by 1962, but which since have had their completion dates moved forward to 1960. 161/ Lastly, 18 small-scale plants (less than 300,000 tons of annual crude steel capacity) which are jointly financed by central and provincial funds and which have an aggregate capacity of 3.7 million tons of pig iron, 2.3 million tons of crude steel, and

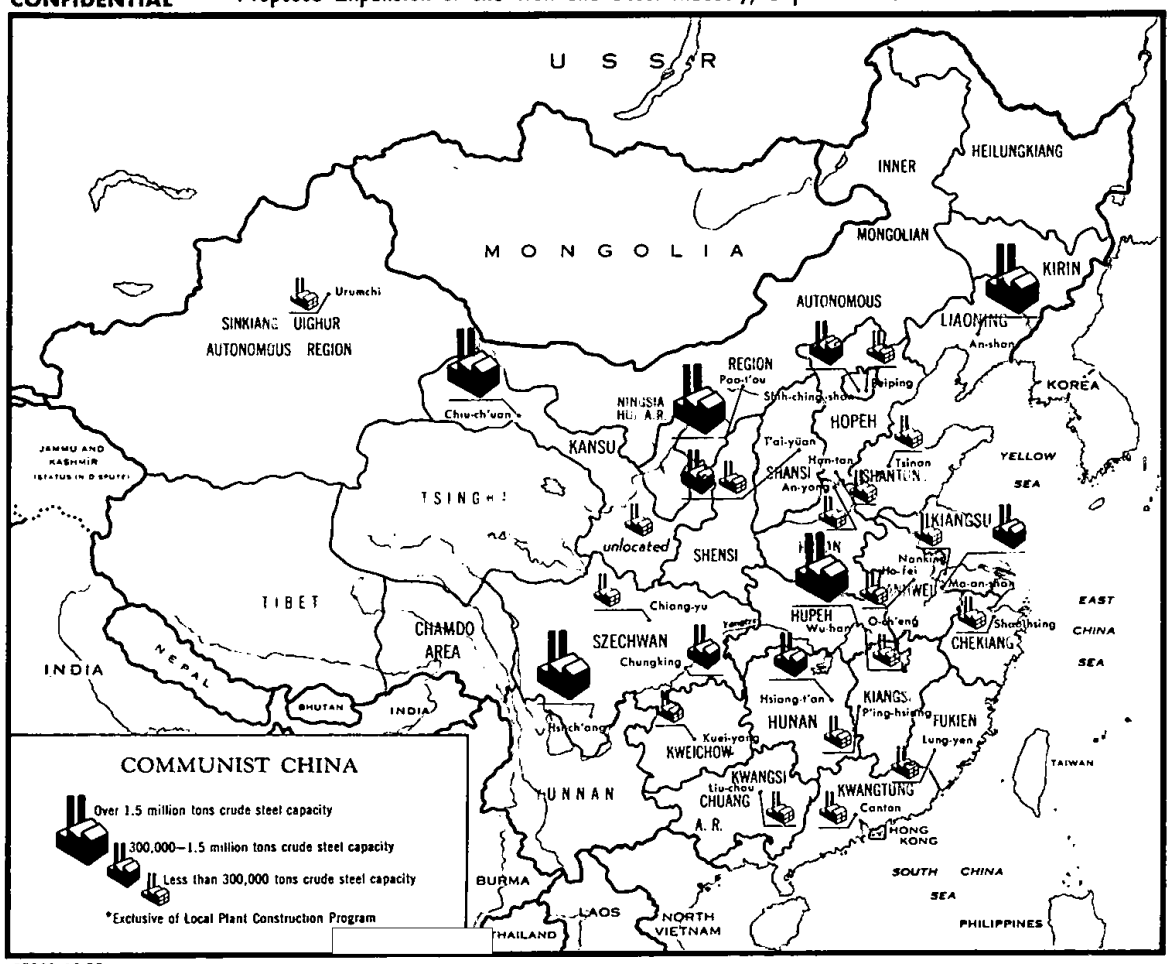
* Two other large-scale combines at Chiu-ch'uan (Kansu) and Hsi-ch'ang (Szechwan) are in the design stage. See the map, Figure 11, following p. 62.

** A recent announcement, however, stated that increased expansion goals at this plant would have the effect of making it a large-scale, integrated combine by 1960.

CONFIDENTIAL

Proposed Expansion of the Iron and Steel Industry,* September 1958

Figure 11



27303 12-58

CONFIDENTIAL

50X1

1.4 million tons of finished steel have been started and should be completed in 1960.

The other category of plant construction in the ferrous metallurgical industry of Communist China includes those medium-scale, small-scale, and small native-type plants which are being constructed by local authorities solely with local funds and materials.* The Ministry of the Metallurgical Industry already has sent 27 standard designs for iron and steel complexes, iron smelting plants, steel smelting plants, and steel rolling mills to local enterprises in support of the "leap forward" movement. The Chinese have stated that construction of 13,000 medium-scale and small-scale blast furnaces (with an ultimate capacity of more than 20 million tons of pig iron) and more than 200 Bessemer converters (with an ultimate capacity of 10 million tons of crude steel) was to begin in 1958. Most of the blast furnaces were to be small native-type facilities producing pig iron of variable quality for use in local areas.

Many of these announcements have been inflated for propaganda effect during the "leap forward" movement. Granting the huge labor and favorable material resources available to Communist China, the design-construction-installation phasing of capital construction at many sites at which there are relatively few skilled cadres of workers poses enormous problems. Facilities and equipment constructed and installed on the basis of the standard designs produced by ministerial design units must be tested by trial. Equipment must be produced in quantity before production can be achieved. This procedure requires time, funds, and -- perhaps most important -- astute planning. Considerable clarification of the mass construction program must be had before capacity goals for the ferrous metallurgical industry in 1962 can be projected. Because of the factors stated above, it is believed that the optimistic accretions to capacity projected to come from smaller units will require a longer time span than the Chinese have announced.

In the nonferrous metallurgical industry the program for construction of small facilities is much in evidence. About 3,000 small native-type copper smelters with a total annual production capacity of more than 150,000 tons of crude copper are planned to be constructed and in operation by mid-1959. 162/ Lead, zinc, tin, gold, and other facilities for processing nonferrous metals are also being constructed, the emphasis being on small facilities in or near mining areas. The small-plant program has not, however, impeded the

* Initially, at least, some of the equipment and most of the designs are to come from central supply sources.

construction of larger scale facilities. Mechanized copper installations at Hsin-yeh (Hupeh), T'ung-kuan-shan (Anhwei), and near Lan-chou, started during the First Five Year Plan, will be completed, and a large-scale copper base at Tung-ch'uan (Yunnan) will be started before the end of 1962. A large aluminum reduction plant entered construction in Ho-fei in 1958.

2. Electric Power.

The Chinese Communists claim to be able to do most of the designs involved in the construction of power facilities and plan to construct by the end of 1962 more than 150 above-norm thermal electric power and hydroelectric stations, for which more than half of the equipment is to be produced in China. 163/ Construction costs per kilowatt of capacity are scheduled to be pared by more than 40 percent during the Second Five Year Plan, and labor productivity among construction enterprises is scheduled to increase 42 percent above the level of 1957, thus making possible the addition of 2 million kw of additional generating, transmission, and transformer projects with the originally allotted investment. The only statement made by the Chinese in regard to capacity to be added during the Second Five Year Plan is an unofficial one which permits a range estimated to be from 10 million to 12 million kw, or well above 4 times the capacity installed in the First Five Year Plan.* 164/

The latest plan for new power-generating capacity to be installed during 1958 stated that the total was to be "almost equal" to the more than 2.3 million kw added during the First Five Year Plan. Most of the power stations to be constructed during 1958-59 are to use generating equipment of 12,000 kw or less, which is currently being mass-produced in Communist China. 165/ Simultaneously, the installation of high-tension lines (above 110 kv) in 1958 was planned to exceed the 3,000 km installed in the entire First Five Year Plan. Concurrent with this construction the Ministry of Water Conservancy and Electric Power plans to locate sites and to begin designs of 114 hydroelectric stations having a total power-generating capacity of 18.7 million kw, which will come under construction during the Second and Third Five Year Plans. The trend toward the construction of hydroelectric facilities will continue, and in 1962 the Chinese expect the production of the hydroelectric stations to equal that of the thermal electric stations.

As in other industries, however, a great portion of the increase in capacity will come from small projects constructed at the local level. Small rural hydroelectric stations were scheduled

* See V, A, 2, p. 29, above.

to add 900,000 kw of capacity in 1958 and to add more than 3 million kw of capacity by 1962 to the electric power industry.* 166/ Many small hydroelectric and thermal electric stations are being constructed to service chemical fertilizer and other small industrial enterprises under construction at the local level. Most of the hydroelectric stations are to have a capacity of less than 40 kw. By substituting wood and bamboo for steel and by using low-grade cement and other construction materials obtained locally as well as local labor, the Chinese Communists claim that these hydroelectric stations can be constructed for about 400 yuan per kilowatt. 167/

3. Coal.

In March 1958 the Ministry of the Coal Industry of Communist China announced the production slogan "Strive to achieve 3, 5, and 8," meaning that production of coal was expected to increase to 300 million tons in 1962, 500 million tons in 1967, and 800 million tons in 1972.** Such an optimistic program implies a much greater effort in underground development, a greater utilization of existing mines, speedier construction periods, reduced costs, and an increased exploitation of coal reserves at the local level. Construction in 1958 was planned to begin on new coal pits having a total production capacity of 70 million tons, more than 6 million tons above the level of total capacity added during the First Five Year Plan. About 43 percent of this capacity was to be added by new locally operated shafts. 169/ In 1958 alone the capacity of new coal pits to be opened at the local level was planned to amount to 38 million tons. The coal industry claims that there are exploitable coal reserves in 1,300 hsien out of the total of more than 2,000 hsien in China and expects to surpass the coal production of the UK in 1959 and to meet the goals of the Second, Third, and Fourth Five Year Plans set forth in the slogan.

4. Machine Building.

The original construction plan for 1958 in Communist China called for 79 above-norm starts and continuations and 14 completions in the machine building industry during the year. The "leap forward" movement with its heavy dependence on the machine building industry to supply equipment and machinery for agriculture, local industry, and heavy industry probably raised these goals considerably. Among the completions will be the Wu-han Heavy Machinery Plant and the first phase of the T'ai-yuan Heavy Machinery Plant. Numerous

* At the end of 1957 there were 540 small rural hydroelectric stations with a total generating capacity of about 20,000 kw.
** The slogan as stated two weeks before this announcement referred to 3, 6, and 9. 168/

expansions during the year will include the Ch'ang-ch'un Motor Vehicle Plant and the Lo-yang Mining Machinery Plant.

The First Ministry of Machine Building has stipulated that during the Second Five Year Plan its construction cadres must accomplish the following 170/:

a. Economy in management so as to permit the construction of 3 plants with the amount of capital investment which would have been sufficient to construct only 2 during the First Five Year Plan.

b. Shortening of design time and construction periods.

c. Domestic design of 80 percent of the construction projects of the Second Five Year Plan.

d. Diversion of 30 percent of design capability to help local industry.

5. Construction Materials.

The official plan for the construction materials industry in Communist China in 1958 called for 44 above-norm starts and continuations and 7 completions during the year. Geologists of the construction industry were transferred to the Ministry of Geology for more unified control, and survey goals were substantially higher than in 1957. Targets for glass, brick, and other basic construction materials likewise were scheduled to increase above the level of 1957.

An announcement on 11 March 1958 throws considerable light on the cement industry in Communist China in 1958 and thereafter. Major points covered in the announcement are as follows 171/:

a. The 1958 goal of 7.7 million tons for the production of cement was revised upward to 8.2 million tons and in September 1958 was increased again to 10 million tons. This increased goal reflects the recent increase in construction in sectors such as chemical fertilizer, coal, water conservancy, and sugar, which previously had been allocated relatively little investment. Whereas production of cement rose only 300,000 tons from 1956 to 1957 (from 6.4 million tons to 6.7 million tons), the planned increase in 1958 was to be 1.5 million tons, or a 22-percent increase in 1 year.

b. The construction of 15 cement plants having a total annual capacity of more than 7 million tons was to be started

or continued in 1958. Of this number, 4 have had their construction schedules accelerated and were started from 6 to 12 months ahead of plan.

c. In support of water conservancy and other local construction, small standardized kilns having an annual capacity of 15,000 tons and 30,000 tons, respectively, were to be installed at 100 sites in 1958. From the context it appears that the output of these kilns was not included in the 1958 production figure. It is doubtful whether they could have been established in time to add appreciably to production in 1958. If installed on schedule, the kilns would add more than 2 million tons in 1959 and thereafter. This additional capacity will ease strains on domestic supplies of cement and will enable Communist China to export to the Soviet Bloc or to the Free World in larger quantities than in the past.

Along with the "leap forward" movement, native methods of producing cement are being pushed. Agricultural cooperatives are establishing small kilns designed to produce up to 30 tons of cement daily (about 9,000 tons annually) from local lime and gypsum supplies. 172/ Little or no state assistance is involved in the construction of these kilns, and, although the quality of the cement produced is rather low, it should suffice for requirements in small-scale water conservancy and agriculture.

The Peoples Daily (Peking) stated on 11 June 1958 that 27 of 31 state construction material enterprises would be transferred to local control as part of the decentralization movement. Only 5 of a total of 22 cement plants will be retained by the central government. Because further details of the mechanics of this shift are not at hand, it is difficult to assess the action. It is not believed, however, that the production plan for cement in 1962 is jeopardized. On the contrary, it is estimated that, by using modern industrial methods as well as small kilns and native methods of cement manufacture, the goal of 12.5 million tons for 1962 will be overfulfilled substantially. Communist China claims to have the capability to produce kilns for a 300,000-ton cement plant, and, after completion of those plants currently under construction, East German and Czechoslovak assistance in supplying such equipment will probably be curtailed. 173/

The use of prefabricated and prestressed concrete elements is scheduled to be increased greatly during the Second Five Year Plan. During 1958, about 400,000 prestressed concrete railroad ties were produced, and by 1962, production is to exceed 2 million ties annually. The quantity of prestressed concrete in 1958 and 1962 was planned to reach 6.6 percent and 20 to 25 percent, respectively, of the total volume of all reinforced concrete placed

throughout Communist China. These figures indicate tremendous technological growth in the construction industry during the Second Five Year Plan. 174/ On the basis of Soviet practice and experience, however, the gains planned seem overly optimistic.

6. Petroleum.

According to the original plan for 1958, investment in capital construction for the petroleum industry in Communist China was to be less than in 1957, but the volume of construction was to be greater. This was to be achieved by a 20-percent economy in capital construction. The refinery at Tu-shan-tzu was scheduled to be expanded to a capacity of 400,000 tons, and a 147-km pipeline connecting it with the Karamai fields was to be constructed. The "leap forward" movement plus a major new discovery in the central Szechwan fields probably have revised the 1958 construction plan upward. During 1958 a 1-million-ton refinery at Lan-chou was slated for completion, a 1-million-ton synthetic petroleum refinery at Mao-ming and a 300,000-ton plant at Nan-ching were under construction, the refinery at Shanghai was being expanded to 4 times its former capacity, and a campaign of constructing smaller facilities was well under way. During the Second Five Year Plan the central ministries planned to help local organs open up 200 oilfields. In June 1958 the Chinese Communists announced that 500 medium-scale and small-scale refineries having a total annual capacity of 1.2 million tons would be started during 1958 and the majority of them would be completed in that year. "Thousands" more would be constructed subsequently. Fifteen standard designs for small refineries were sent to local authorities, and other designs for small facilities for processing shale oil and natural gas and for coal liquefaction were being prepared by the Ministry of the Petroleum Industry. 175/ This pace of construction activity puts the 1962 goal of 5 million to 6 million tons well within reach of the industry.*

7. Chemical.

The volume of capital investment in the chemical industry of Communist China during the Second Five Year Plan was originally scheduled to be 4 or 5 times higher than it was during the First Five Year Plan. Within the industry, emphasis was to be accorded the construction of chemical fertilizer and synthetic fiber installations. By the end of the Second Five Year Plan the Chinese expect these and

* On 6 August 1958 the Chinese Communists announced that production of crude oil would be 5 to 6 times the preliminary goal of 5 million to 6 million tons. 176/ More results of the current construction program must be evident before such an increase can be considered feasible.

other construction projects to make the country self-sufficient in respect to all chemical products except crude rubber and chemical fertilizers. 177/

In order to increase its agricultural yield, Communist China is emphasizing the speedy construction of chemical fertilizer plants.* Large new nitrogenous fertilizer plants at Lan-chou, T'ai-yuan, Shanghai, and Kirin (second phase) and in Anhwei, Kweichow, Szechwan, and Chekiang; expanded nitrogenous fertilizer plants at Dairen and Nanking; and numerous new phosphate fertilizer plants are being expedited so as to be completed ahead of target dates. Preparations for large plants at Wu-han and elsewhere are likewise being rushed.

To meet the 1962 goal for chemical fertilizer,** however, a substantial part of the construction effort will be in locally constructed facilities. A total of 66 new medium-scale and small-scale chemical fertilizer plants with a combined annual capacity of 2.7 million tons (individual capacities range from 8,000 to 100,000 tons annually) were planned to start construction in 1958. These plants are the first of 1,000 such plants earmarked for construction during the Second Five Year Plan. 180/ The 66 plants are of 3 basic types, as follows: (a) 21 are to be medium-scale plants producing 100,000 tons of nitrogenous fertilizer per year, to be constructed by provinces and municipalities; (b) 7 are to be small-scale plants producing 40,000 tons of ammonium bicarbonate annually, to be constructed in special districts set up for this purpose; and (c) 36 are to be plants on the hsien level producing 8,000 tons of ammonium bicarbonate annually. The remaining two are ammonium bicarbonate pilot plants at Peking and Shanghai. Both of the pilot plants have been started, and the Shanghai plant (an 8,000-ton plant) has already been completed. The Peking pilot plant has both a 40,000-ton plant and an 8,000-ton plant under construction, from which construction and production data for use on other plants will be derived. The Chinese Communists state that 24 million tons of chemical fertilizer can be produced annually if each of the 190 special districts constructs a 40,000-ton plant and each of the 2,000 hsiens constructs an 8,000-ton plant.

The Chinese Communists state that by using standard designs and local labor, materials, and equipment these plants can be constructed speedily and inexpensively. The supply of technicians

---

* See the map, Figure 12, following p. 70.

** The official goal appears to be 5 million to 7 million tons. 178/ Other announcements by apparently responsible officials have given the goal as 10 million, 15 million to 20 million, and even 25 million tons. 179/

skilled in chemical engineering is, however, slim at present and must be augmented at a rapid rate if current and future production goals are to be met. Problems of coordination of construction of the plants, of their auxiliary power facilities, and of suppliers of machinery and equipment will be enormous. The combination of all these factors almost certainly will delay the construction of facilities for chemical fertilizer. Moreover, the nature of these problems is such that an estimate on the likelihood of the Chinese Communists fulfilling the production goal for 1962 must be delayed until after performance in 1958 can be assessed.

8. Light Industry.

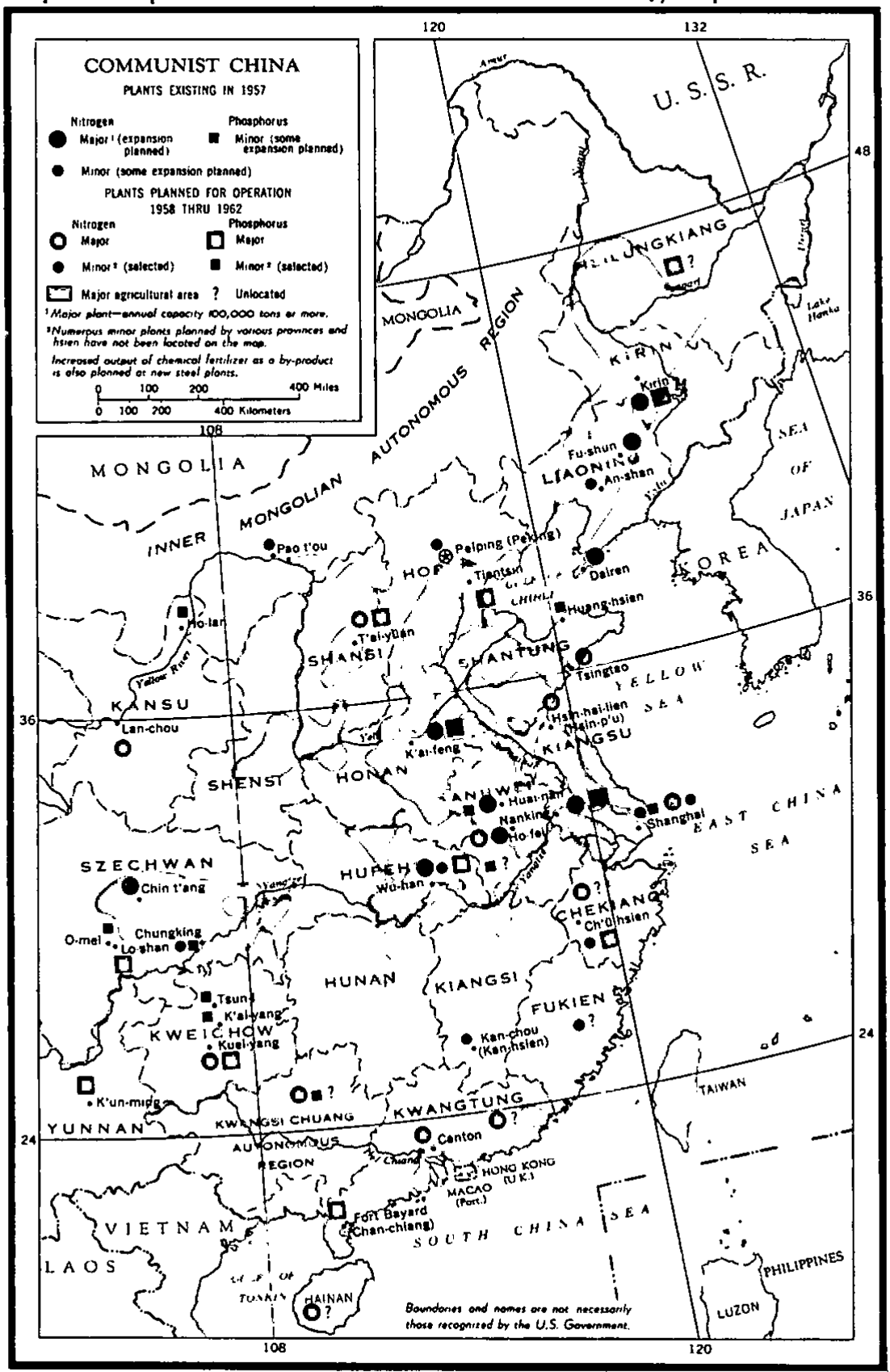
New design institutes were established in 1958 under the plan for construction in light industry in Communist China, and standard designs for small factories in most subsectors in light industry were issued. Two-thirds of the plants under construction in the textile industry in 1958 were planned to be medium-scale and small-scale facilities, and most provinces and municipalities will be constructing textile plants during the year. 181/ This plan reverses the trend toward giant combines so noticeable during the First Five Year Plan. The annual value of production in the food industry is scheduled to increase from 5 billion yuan in 1957 to 25 billion yuan in 1962, such a jump implying a construction program which is greatly expanded over that of the First Five Year Plan. To assist backward areas to establish viable construction programs, established centers of light industry such as Shanghai and Canton will help in all phases of capital construction.

9. Agriculture and Water Conservancy.

About 2.1 billion yuan were planned to be allocated to agriculture, water conservancy, forestry, and meteorology in 1958, more than 14 percent of the total planned capital investment of 14.6 billion yuan in Communist China. 182/ These nonindustrial sectors are scheduled to receive 10 percent of total capital investment during the Second Five Year Plan compared with nearly 8 percent that they actually received during the First Five Year Plan. 183/ In 1958 the Chinese Communists released performance figures of astounding proportions. At the height of the intensive irrigation drive from October 1957 through June 1958, about 28 million hectares of dry land were brought under irrigation (more than twice the achievement of the preceding 8 years), and about 33 million cu m of earth were moved during this period (5 times that performed during the preceding 8 years). 184/ At one time in the spring of 1958, more than 120 million peasants were engaged in full-time construction work in water conservancy.

Figure 12

Proposed Expansion of the Chemical Fertilizer Industry, September 1958



27304 12-58

50X1

Although press coverage has dealt largely with small projects, construction of major projects also is moving at a rapid pace. Since the beginning of 1958 the completion date of the San-men Gorge project was moved forward twice. Current plans call for completion by October 1960. 185/ Work has begun on the tenth large reservoir on the Huai River, a large irrigation system of canals near Chengchou on the Yellow River, and a multipurpose project in Kiangsu; and work was to start in 1958 on a large flood control development on the Han River and on several major projects on the Yangtze and Huai Rivers.

10. Transportation.

a. New Railroads.

Because of conflicting statements, it is difficult to assess the program for new rail line construction in the Second Five Year Plan in Communist China. On 1 February 1958 the 1958 Plan was announced. The plan, which was surprisingly modest, called for the construction of 1,290 km of new lines and a capital investment in railroads of 1.52 billion yuan during the year, both figures being well below these categories in 1956.*

Since the issuance of the 1958 Plan, many other data have combined to suggest that the kilometrage goals for both 1958 and the entire Second Five Year Plan have been increased. The reorganization of the Ministry of Railroads, in which major construction and design components were merged, has provided the base for the upward revisions. Cost reductions of 18 percent in both productive and nonproductive construction are believed to have created additional funds for further construction in 1958 and thereafter.** Additions to the original railroad construction program for 1958 plus accelerated construction on scheduled lines (for example, the Pao-t'ou - Lan-chou line was completed on 30 July 1958, 5 months ahead of schedule, and the Trans-Sinkiang line was slated to go beyond Ha-mi to Chik Tam (Ch'i-ko-t'ai) by the end of the year) indicate the construction of 1,500 km to 2,000 km of new lines during 1958.

---

* In 1956, about 1,747 km of new lines were laid and a total of 1.88 billion yuan spent for capital construction in railroads. 186/

** There is considerable room for reducing capital construction costs by paring the proportion allocated to nonproductive purposes. [redacted] during the First Five Year Plan only 60 percent of the investment in new railroads was for a productive purpose and that the remaining 40 percent went for administrative and other nonproductive uses. 187/ 50X1

Originally, 8,000 km to 9,000 km of new lines were scheduled for completion during the Second Five Year Plan. The Ministry of Railroads stated in March 1958 that 15,000 km of new lines would be constructed during the Second Five Year Plan. 188/ Moreover, the same statement disclosed that the average construction cost for new lines of 566,000 yuan per kilometer during the First Five Year Plan would be lowered in the Second Five Year Plan to 400,000 yuan per kilometer, thus saving 2.5 billion yuan. Data on the Railroad Engineering Corps of the PLA support this sharply increased goal. In March 1958 the Corps doubled its original track-laying goal for the Second Five Year Plan, from 2,500 to 5,000 km of track. 189/ In July the goal was again doubled, and the present target is 10,000 km. Assuming that the Corps is used, as in the past, exclusively on main line construction, there is a strong presumption that Communist China will add at least 15,000 km of construction on new lines during the Second Five Year Plan.

b. Other.

In the transportation sector as in other economic sectors in Communist China, the "leap forward" movement involves the dissemination of only the most elementary technological advances to the countryside. Nevertheless, the movement aims to improve the utilization of the labor of a population of nearly 500 million located in these areas. An average of 30 percent of the manpower in rural areas is engaged in transportation, chiefly by the ancient system of the carrying pole. The wheel, exemplified by wheelbarrows and pushcarts, only now is being widely introduced in the countryside. This innovation will necessitate road facilities of a type described in the announcement that in Hunan during the period January to May 1958 about 196,000 km of roads were built. These roads cost less than 50 yuan per kilometer (new motor highways during the First Five Year Plan were planned to cost more than 100,000 yuan per kilometer*) and are doubtless merely widened earth trails for use by carts. 190/

In 1956 it was announced that 560 hsien in Communist China had no highways. The Second Five Year Plan, in which 15,000 to 18,000 km of motor highways and more than 300,000 km of other roads are to be constructed or restored, has as its aim the linking up by motor and secondary highways of all the county seats in the country. Because motor transport is restricted in some measure by the shortage of petroleum, the kilometrage of better class highways will be kept to a minor portion of total road construction, at least until 1962. The 1958 Plan follows this principle: 6,000 km of motor highways were scheduled to be under construction, but only 2,500 km were planned to be completed during the year. 191/

* See V, C, 2, p. 53, above.

Waterway construction in Communist China is gaining impetus. Several major rivers are being dredged, and other construction aimed to improve navigation is in progress. The most noteworthy project currently under way is the restoration and expansion of the Grand Canal from Peking to Hangchow. In May 1958, "hundreds of thousands" of workers were engaged in digging a new canal between Peking and Tientsin and in widening and deepening the section between Tientsin and Hangchow. The present canal is unnavigable in the middle and north sections save by extremely small vessels. When completed, its length will be reduced from 1,700 km to 1,573 km. It will be navigable by 2,000-ton motor barges and thus will partly relieve the traffic pressure on the existing railroad net. 192/

APPENDIX A

STATISTICAL TABLES

Table 2

Estimated Investment in Construction-Installation, Machinery and Equipment, and Survey and Design in Communist China a/
1953-57

Year	Construction-Installation Work: Investment (Billion Yuan)	Construction-Installation Work: Percent of Total	Machinery and Equipment: Investment (Billion Yuan)	Machinery and Equipment: Percent of Total	Survey, Design, and Miscellaneous: Investment (Billion Yuan)	Survey, Design, and Miscellaneous: Percent of Total	Total Investment (Billion Yuan)
1953	3.8	58	1.8	28	1.0	14	6.506
1954	4.4	59	2.3	31	0.8	10	7.498
1955	5.1	59	2.9	33 b/	0.7	8	8.632
1956	8.5 c/	61 c/	4.7 c/	33 c/	0.8	6	13.986
1957	4.6	38	6.8	56	0.7	6	12.155 d/
Total	26.4	54	18.5	38	4.0	8	48.777 d/

a. See Methodology, Appendix B. Totals are derived from unrounded data and may not agree with the sums of their rounded components.
b. 193/
c. 194/
d. 195/

Table 3

Planned, Actual, and Estimated Capital Investment, Capacity, and Equipment of Facilities Controlled by the Ministry of the Electric Power Industry in Communist China a/
1953-57

	Unit	Original First Five Year Plan	Actual Performance				Estimated Performance	
			1953	1954	1955	1956	1957	Total First Five Year Plan
Capital investment	Million yuan	2,753	320	377	531	726	1,025	2,979
Total capacity added	Thousand kilowatts	1,863	267	252	360	632	653	2,164
Hydroelectric capacity added	Thousand kilowatts	469	145	78	85	226	75	609
Boiler evaporation capacity	Metric tons per hour	N.A.	733	874	2,184	2,772	3,440	10,002
Total transmission lines	Kilometers	N.A.	670	894	725	777	1,891	4,957
Transmission lines of more than 110 kilovolts	Kilometers	N.A.	145	523	515	435	1,364	2,982
Capacity of transformers	Thousand kilovolt-amperes	N.A.	514	575	674	988	1,351	4,102

a. 196/

Table 4

Construction of Hydroelectric Power Stations in Communist China a/
1953-57

Name	Generating Capacity (10,000 Kilowatts)	Construction Cost (10,000 Yuan)	Cost Per Kilowatt (Yuan)	Type of Construction
Feng-man	43.50	9,640	221	Expansion
Huang-t'an-k'ou	3.00	5,300	1,770	New
Kuan-t'ing	3.00	4,697	1,560	New
Liu-ch'i	4.20	4,900	1,170	New
Lung-ch'i (4 stations)	10.45	11,358	1,090	New
Mei-shan	4.00	1,677	420	New
Mo-shih-k'ou	0.60	473	790	New
Shang-t'ung	1.05	937	893	Expansion
Shang-yu	6.00	5,800	967	New
Shih-lung-chu	0.30	322	1,075	Expansion
Ta-huo-fang	3.20	1,503	470	New

a. 197/

Table 5

Sizes of Coal Mines Constructed in Communist China a/
1950-56

Design Capacity (Metric Tons of Production Per Year)	Average Investment (Yuan Per Metric Ton of Annual Capacity)	Time Required to Bring into Production (Years)	
		Initially	At Designed Capacity
"Several thousand" to 10,000	3.00	Less than 1	1
10,001 to 150,000	12.80		
150,001 to 900,000	27.50	1 to 2	4
900,001 and over	49.10	3-1/2 to 4	7 to 8

a. 198/

Table 6

Starts in Coal Mine Construction
During the First Five Year Plan in Communist China
1953-57

	Number of Shafts	Total Design Capacity (Million Metric Tons)	Average Design Capacity (Thousand Metric Tons)
Under the Ministry of the Coal Industry			
Restored and reconstructed mines	147 a/	50.74 a/	345
New mines			
Large (more than 900,000 metric tons per year)	13 b/	12.3 b/	946
Medium (400,000 to 600,000 metric tons per year)	26 b/	14.2 b/	546
Small (300,000 metric tons and less per year)	76 b/	17.0 b/	224
Subtotal	115 a/ b/	43.53 a/ b/	378
Total under the Ministry	262 a/	94.27 a/	360
Under local-state control	199 a/	23.11 a/	116
Total during the plan	461 a/	117.38 a/	255

a. 199/
b. 200/

Table 7

Cement Plants Under Construction in Communist China a/
1953-57

Location	Estimated Annual Capacity (Thousand Metric Tons)	Date of Completion
Kung-yuan	450 b/	1956
K'un-ming	150 c/	1957
Ta-t'ung	480	1957
Yung-teng	450	1957
Urumchi (No. 2)	150	1958 d/
Chiang-shan	150 c/	1959 d/
K'uei-shan	150 c/	1959 d/
Lo-yang	450	1959 d/
Ma-chia-po	360	1959 d/
Sian	680	1959 d/
Total	3,470	

a. 201/
b. Reconstructed and expanded from a pre-World War II capacity of 170,000 tons.
c. Capacity at completion of first stage of construction. The estimated capacity after the final stage is 360,000 tons.
d. Estimated.

APPENDIX B

METHODOLOGY

1. Investment in Construction-Installation; Machinery and Equipment; and Survey, Design, and Miscellaneous Work (Table 2).

Figures for 1953 are based on the percentage of total capital investment allocated to machinery and equipment. 202/ [redacted] 50X1
[redacted] the portion of total capital investment allocated to construction-installation did not exceed 60 percent before 1956 and that the allocation to survey, design, and miscellaneous work decreased during 1953-56. These factors determined the estimates for these two categories. Although the survey, design, and miscellaneous category appears rather high, the validity of the estimate is buttressed by the fact that such expenses could be expected to be relatively high in the initial years of a 5-year program and to diminish as the later phases of construction occur. 50X1

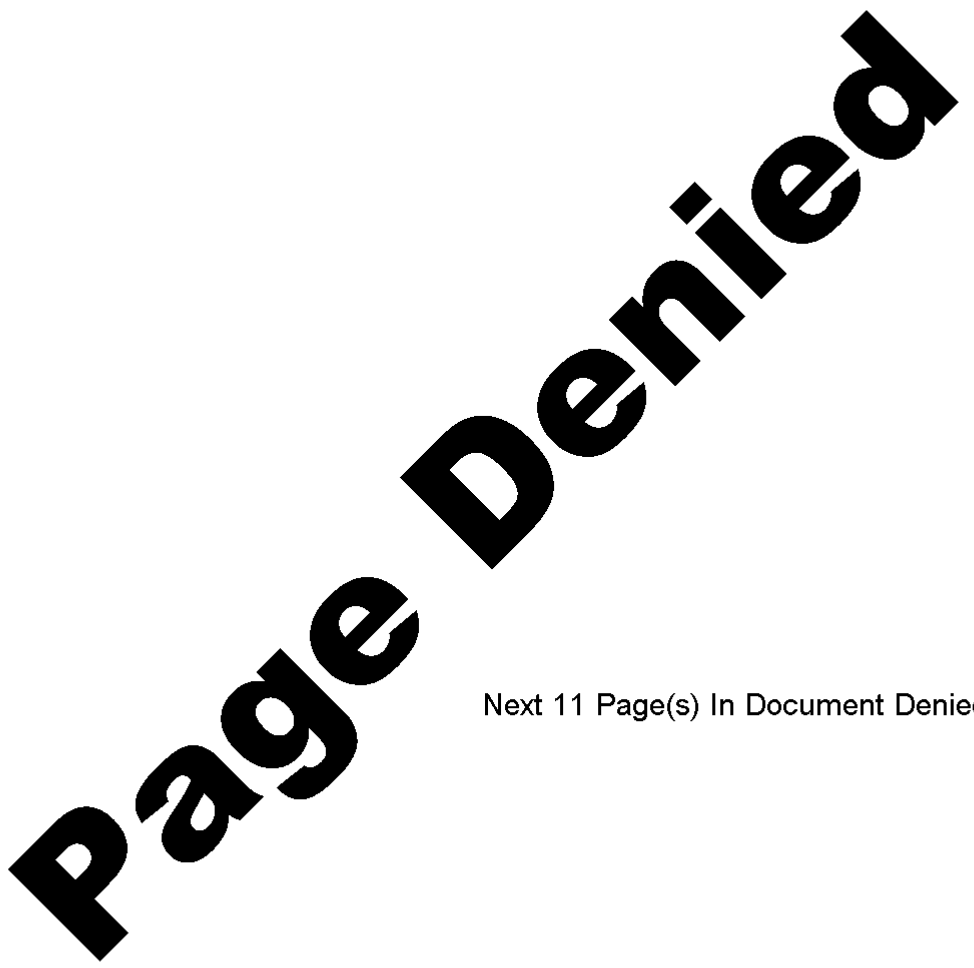
Figures for 1954 are based on the percentage of total capital investment allocated to machinery and equipment. 204/ Figures for 1955 and 1956 are based on data concerning increases in both the construction-installation and the machinery and equipment category [redacted] 50X1
[redacted]. The portion of capital investment allocated to survey, design, and miscellaneous work is the residue of those categories for both years. 50X1

Figures for 1957 are based on the 38-percent allocation planned for machinery and equipment over the 5-year period. Although 1956 was a year of great construction activity, completions of above-norm projects were relatively low, thus necessitating many carryovers into 1957. During 1957, 178 above-norm industrial projects were completed, making it the prime year in this respect during the First Five Year Plan. Because expenditures for machinery and equipment occur in the later phase of capital construction, it is believed that there was a rather sharp reduction in construction-installation work and an accompanying increase in investment for machinery and equipment in that year.

2. Investment in the Construction of Highways.

It is estimated that state funds were used to construct 12,000 km of motor and secondary highways during the First Five Year Plan. About 10,500 km of this total are believed to have been motor highways. Using planned unit costs per kilometer as cited, a figure of nearly

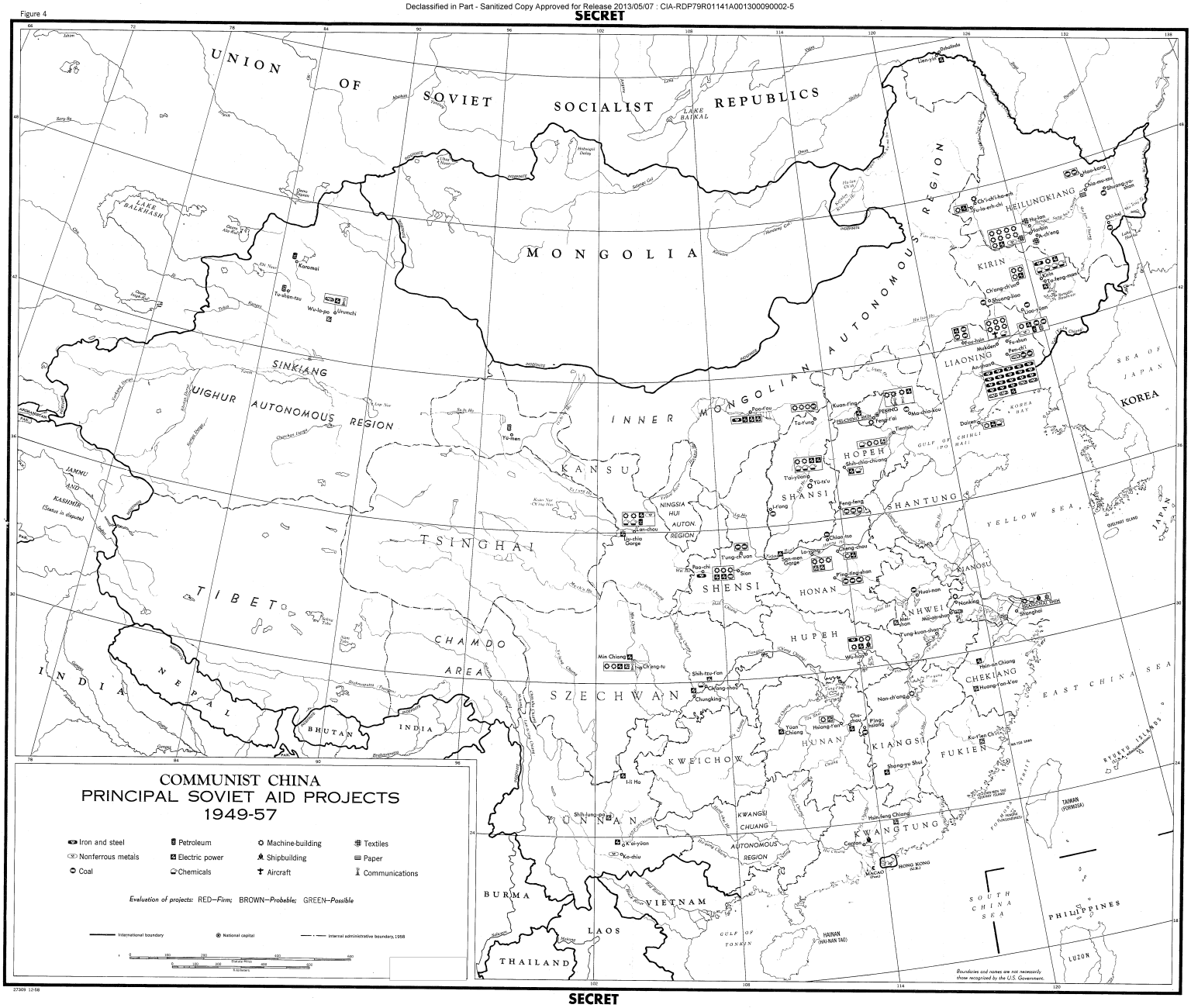
820 million yuan is derived. Using the percentage increase announced [redacted], a figure of nearly 1 billion yuan is derived. Based on these and other data (some of which give derivations of more than 1 billion yuan), it is estimated that between 800 million and 1.2 billion yuan were invested in the construction, restoration, and improvement of highways by the state in Communist China during 1953-57. 50X1



Next 11 Page(s) In Document Denied

Figure 4

SECRET



COMMUNIST CHINA
PRINCIPAL SOVIET AID PROJECTS
1949-57

Iron and steel	Petroleum	Machine-building	Textiles
Nonferrous metals	Electric power	Shipbuilding	Paper
Coal	Chemicals	Aircraft	Communications

Evaluation of projects: RED—*Firm;* BROWN—*Probable;* GREEN—*Possible*

International boundary — National capital — Internal administrative boundary, 1958

Statute Miles 0 100 200 300 400 500 600
Kilometers 0 100 200 400 600 800

27309 12-58

SECRET

50X1

Declassified in Part - Sanitized Copy Approved for Release 2013/05/07 :
CIA-RDP79R01141A001300090002-5