

The China Business Review


VOL. 4 NO. 5



SINO-US TRADE, JANUARY-JUNE, 1977

TOP TEN US EXPORTS TO CHINA

1976 and January-June 1977

Category	Value of Exports 1976	Value of Exports Jan-June 1977
Special purpose non-military vehicles, Nec*, new	\$ 3,066,174	\$28,847,904
Polyester staple, not carded or combed or not otherwise prepared for spinning	7,482,673	9,248,024
Parts and accessories, Nec, for automobile, truck and bus engines for replacement	1,330,277	2,312,266
Parts and accessories, Nec, for instruments except industrial processes, Nec, electrical, electronic, mechanical, and pneumatic	134,657	2,126,030
Urea, fertilizer material	....	1,795,734
Digital electronic computers, main frame and central memory, including industrial process computers	265,345	1,683,709
Other coal tar and cyclic chemical intermediaries except acids, Nec	661,532	1,564,063
Catalysts, compound, except nickel	2,489,747	1,493,035
Wood pulp, sulphite, bleached, softwood, other than dissolving grade	1,302,057	1,294,211
Valves, nonautomatic, taps, cocks, and similar fittings, Nec, and parts Nec of iron or steel	2,315,073	1,050,471
TOTAL	\$135,388,147	\$62,129,867

* Nec: Not elsewhere classified

TOP TEN US IMPORTS FROM CHINA

1976 and January-June 1977

Category	Value of Imports Total 1976	Value of Imports Jan-June 1977
Feathers not meeting federal standards	\$ 11,033,009	\$ 7,739,656
Bristles crude or processed in any way for use in brushes or other articles	8,063,715	5,679,387
Fireworks	6,565,282	5,281,109
Antiques, other than furniture and silverware	9,436,559	3,989,215
Downs not meeting federal standards	3,042,867	3,314,966
Floor covering pile, hand inserted, valued over 66.67¢ per square foot	3,694,747	3,145,208
Print cloth shirting, Nec*, white cotton, not fancy or figured, not bleached or colored	13,591,278	3,021,612
Bamboo baskets and bags, lined or unlined	4,245,626	2,764,726
Tin unwrought, other than alloys of tin	13,195,279	2,664,241
Tea, crude or prepared	2,874,177	2,639,647
TOTAL	\$201,916,921	\$101,377,160

* Nec: Not elsewhere classified

The China Business Review



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Front Cover: "Gan Bei!" Wang Yao-ting, Chairman of the China Council for the Promotion of International Trade (CCPIT), and William Hewitt, Chairman of the National Council Board of Directors, share a toast at a National Council banquet held in honor of the CCPIT delegation Mr. Wang led to the United States this September. For details, see Council Activities on page 17.

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The National Council for United States-China Trade is grateful to His Excellency Huang Chen, Chief of the Liaison Office of The People's Republic of China in Washington, for the calligraphy on the front cover of the China Business Review.

China Trade Events

RACINE, WISCONSIN, September 16-17

A conference on "Chinese and Americans: Mutual Perceptions" was sponsored by the China Council of The Asia Society at the Wingspread Conference Center in Racine. For details, contact Robert Oxnam of the China Council (212) 751-4210.

GENOA, ITALY, September 21, 1977

The Instituto Italo Cinese sponsored a symposium on "The Commercial Exchange between Europe and China with Special Emphasis on Marine Communication and Port Equipment."

NEW YORK, September 29-30

The Chase World Information Corporation held a two-day executive forum on developing US-China commerce. David Rockefeller, Chase Manhattan Chairman of the Board and NCUSCT Board member, addressed the group on "Prospects for Chinese Participation in Western Monetary and Capital Markets." For details, contact Alice Haemerli (212) 552-3238.

NEW YORK, September 30

The National Council for US-China Trade held a Canton Fair briefing with the Importers' Steering Committee. The briefing was to introduce new fairgoers to the practices of the semi-annual Canton Fair. For details, contact Carol Fox.

KWANGCHOW, CHINA, October 15-November 15

The Chinese Export Commodities Fair will be held. The National Council's office will be manned by Vice President Stanley Young, Director of Translations May Li Phipps, and Hong Kong Representative John Kamm.

UNITED STATES, October 22-November 12

The National Council for US-China Trade will host the first visit by the China National Export Commodities Packaging Corporation to this country. For details, contact Howell Jackson (202) 331-0290.

MILWAUKEE, November 16

Christopher H. Phillips, President of the National Council for US-China Trade, will address the Construction Industry Manufacturers Association's annual meeting. For details, contact George O. Headrick (414) 272-0943.

NORFOLK, VIRGINIA, November 19

A conference on "China Today: Past, Present, and Future Perspectives on Sino-American Relations" is scheduled to

be held at Old Dominion University in Norfolk, under the sponsorship of Old Dominion and the China Council of The Asia Society. For details, contact Old Dominion History Professor Thomas W. Burkman (804) 489-6557.

CHINA, November 20-December 7

The National Council for US-China Trade's Petroleum Industry Committee's first delegation will travel to China. For details, contact Stephanie Green (202) 331-0290.

MONTREAL, December 1-2

McGill University's Centre for East Asian Studies and the Faculty of Management will sponsor a two-day seminar on "The Chinese Economy and Sino-Canadian Trade." For details, call Erica Hickman at (514) 392-4582.

LONG ISLAND, NEW YORK, December 14-15

The China Council of The Asia Society has planned a conference on "Women in China," to be held at Long Island's Hofstra University. For details, contact Hofstra Professor John Rawlinson (516) 560-3229.

WASHINGTON, DC, Spring 1978

A Conference on Technology Transfer and Licensing to the PRC will be held by the National Council.

YOUR MEN IN PEKING

The US Liaison Office staff in Peking will be happy to assist you; please feel free to call them when you are in China's capital.

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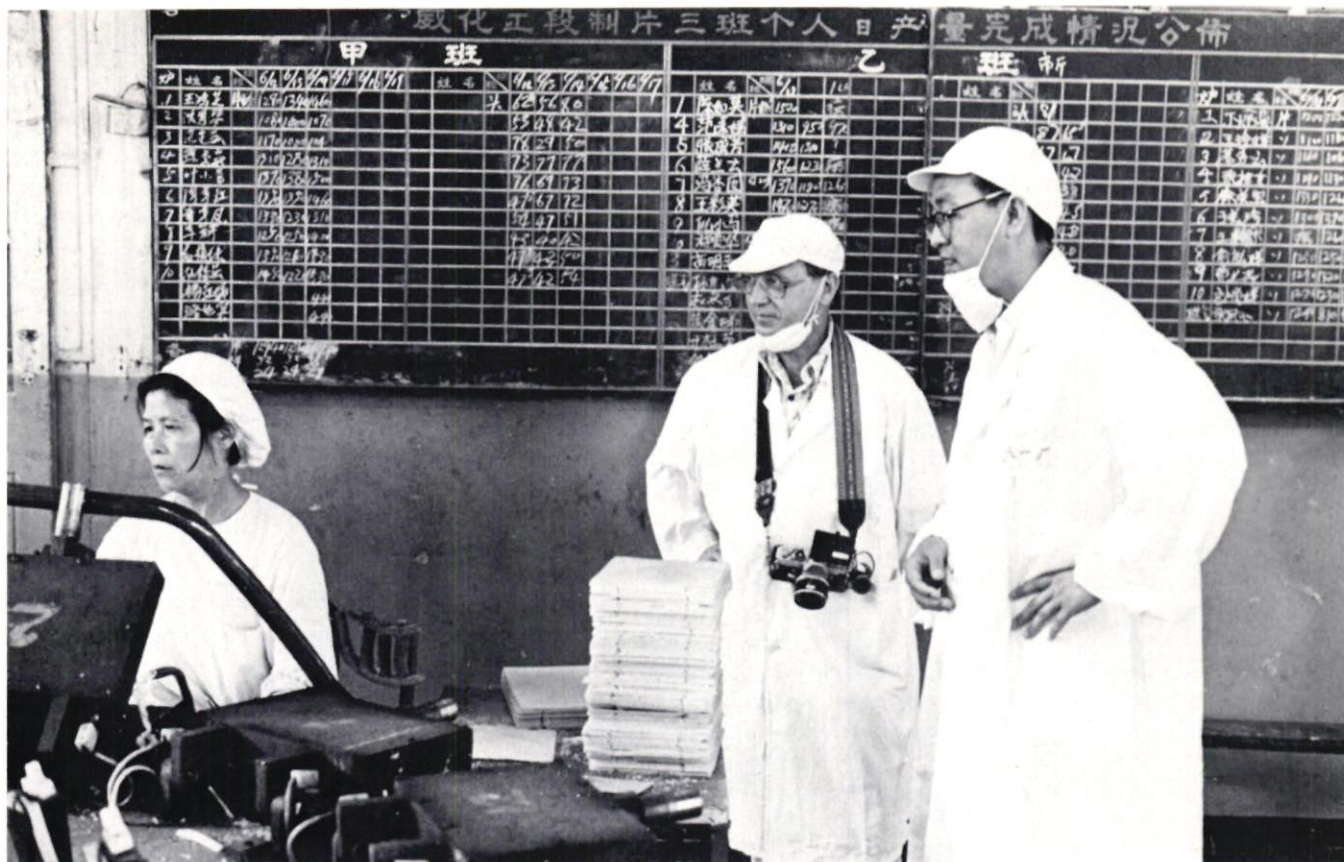
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Member of National Council packaging delegation stands in front of production planning chart at Ma Ling Food Factory, Shanghai, June, 1977.

INDUSTRIAL PLANNING IN THE PRC

Dwight H. Perkins

China is embarked on a "Grand Plan" to modernize completely by the year 2000 AD, and to overtake the US in fifty or sixty years' time. Never before has the PRC appeared so pragmatic in its desire to develop its industry and create an efficient economic system. But how is China's industrial planning carried out, how does it work in practice, and what adaptations are likely in the future? Is there too much flexibility and decentralization? And how does foreign trade fit into the framework? In this article Professor Perkins explains how China plans and the problems involved.

Dwight Perkins, Professor of Economics at Harvard University, specializes in the economy of the PRC. His books include Market Control and Planning in Communist China (1967), Agricultural Development in China (1969) and more recently China's Modern Economy in Historical Perspective (ed. 1975). Professor Perkins led a recent delegation to China to study rural small-scale industry and is editor of that delegation's report, recently published by the University of California Press.

China's Fifth Five-Year Plan (1976-1980) is experiencing much the same uncertainty that plagued three of its four predecessors. In principle, five-year plans are supposed to set basic priorities for the years ahead, to decide which industries will get the lion's share of new investment. In practice these priorities can be set on a firm foundation only if there is some degree of political consensus at the top. In 1976 with the death of Chou followed by the second removal from office of Teng, the death of Mao, and the purge of the "gang of four," consensus was the last word one would have used to describe the political situation in China. Compounding the effects of political disunity on the economy were the Tangshan earthquake and bad weather that resulted in a mediocre harvest.

Plan Priorities

As a result of these various disruptions, in the first half of 1977 the debate over economic priorities, in theory settled with the formulation of the five-year plan, was still very much on. Much of the emphasis was on overcoming specific bottlenecks that had ap-

peared in the previous year or earlier. Special attention has been given to coal, the sector most hurt by the earthquake; transport, the sector most disrupted by political conflicts of both 1976 and the Cultural Revolution; and iron and steel, whose output stagnated or even fell while imports of steel remained high.

The debate over priorities, however, is not confined to specific industrial sectors. More fundamental issues are at stake. Mao's 1956 speech on the "Ten

COOPERATION ARRANGEMENTS MAY FIGURE IN CHINA'S FUTURE

Teng Hsiao-ping's Ideas

Do the return of Vice Premier Teng Hsiao-ping and China's recent interest in the Yugoslavian economic system indicate that the PRC may be taking an economic posture similar to that in Eastern Europe? Will China go for cooperation arrangements involving buy-back compensation, with technology paid for by product? From the explicit remarks of Teng Hsiao-ping made in September, 1975, and recently quoted in a Hong Kong publication, this certainly seems possible. The EEC is already trying to come to a general agreement on buy-back with the PRC.

- In order to accelerate the exploitation of our coal and petroleum, it is possible that on the condition of equality and mutual benefit and in accordance with accepted practices of international trade such as deferred payment and installment payment, we may sign long-term contracts with foreign countries and fix several production points, whereby they will supply complete sets of modern equipment required by us and then we will pay for them with the coal and oil we produce.

- Let's export something and obtain in return some high, precise and top-notch things to accelerate the technical transformation of industry and raise labor productivity. As I have heard, with our geological prospecting techniques, we can only find poor mines. The foreigners using comprehensive techniques can find rich deposits. Why shouldn't we import such equipment?

- We may consider importing foreign technical equipment for coal mining. We may sign long-term contracts with them and pay them in coal. This does not mean external borrowing . . . There are several advantages in doing this. First, we can export; second, we may give an impetus to the technical transformation of the coal industry; and third, we may accommodate labor power. The efficiency of coal mining is too low. (Some people say each person extracts 0.8 ton per day.) In the past, it has been one ton, and 0.8 ton is too low.

Source: "Investigations into the 'Gang of Four' Affair" by Chai Hsin (in Chinese), Hong Kong, *The Seventies*, 1977. Quoted in SPRCM No. 926 (5/23/77).

Great Relationships" has been published in numerous Chinese papers and journals and has been made the basis of nationwide study. Although one purpose of publication of this major talk is simply to show that Mao, too, was interested in carefully planned economic growth, the speech has also been used to support more specific issues. Particular emphasis has been given to those passages that point out that a strong national defense depends fundamentally on a strong national economy and that sometimes, as in the 1950's, a shift in funds away from the military to economic construction may enhance military strength over the long run. The importance of not neglecting agriculture and light industry even though heavy industry will continue to receive a larger share of investment has also received emphasis.

Plan Targets

The continuing debate over priorities is only one part of the planning process. Even when basic goals remain undetermined, individual enterprises must continue to receive annual (and shorter term) targets from the State Planning Commission and from Planning Commission of the provinces and lower levels. Without such targets there would be chaos as there was during the Great Leap Forward. In any economy there must be coordination of inputs with outputs, and that coordination can be handled either by a market determining prices as guides to profit-oriented enterprises or by central planners telling firms what to produce in specific, usually physical, terms. China, having rejected a role for the market except to some degree for agriculture, must therefore rely on planning in physical terms to achieve the necessary coordination.

The basic plans, both five-year and annual, are drawn up in three stages. Initially, the State Planning Commission draws up a tentative plan that includes only key targets for major products or items. These targets are then passed down through the planning organizations at each level of government and finally to the enterprise itself. At each level the outline plan is thoroughly discussed, and changes are suggested and detail added to bring the plan in closer conformity with reality.

These suggestions are then passed back up through the various levels to the center, which reconciles the many requests in order to achieve a balance. In a sense there is also a fourth stage to this process when the approved plans are sent back down through the various levels to the enterprise for a general discussion of how best to implement the new targets; but the targets themselves are usually not changed at this stage.

The planning of foreign trade takes place within this same general framework. The State Planning Commission, together with the Ministry of Foreign Trade, draws up an initial set of targets for the export

and import of major commodities; and these are passed through the provincial Foreign Trade Bureaus and the central offices of the Foreign Trade Corporations to the provincial Foreign Trade Corporations. These provincial corporations then discuss the targets with the enterprises which will be responsible for fulfilling them and send suggestions for revision back up the ladder for final decision.

Different Targets

The specific targets drawn up for each enterprise producing for either a domestic or a foreign consumer have varied over time and between industries. In form the system was adopted with minor modifications from that in use in the Soviet Union following liberation in 1949, but the Chinese early on began to introduce more flexibility into their planning than was the case in the USSR.

In the early 1950's each enterprise received twelve different kinds of targets that it was "required" to meet or exceed. In 1957 the number of compulsory plan targets was reduced from twelve to four (output of major products, total number of workers and employees, total wage bill, and profits). Following the turmoil of the 1958-1960 period, regulations approximating those of 1957 were reintroduced, but with even greater flexibility. Not only did the number of compulsory targets remain small, but the targets that had to be obeyed actually varied from industry to industry. For some enterprises, for example, gross value of output was the key target, whereas for other enterprises gross value of output does not appear to have been a compulsory target at all.

Perhaps the most controversial target throughout the past two and a half decades has been profits, which has regularly found itself at the center of ideological controversy. In 1957, for example, a number of measures were introduced for the purpose of increasing the attention paid by plant managers to the profits target. In no sense did these regulations turn Chinese managers into profit maximizers, since firms still had to meet their output targets whether or not meeting these targets raised profits, and prices were set by the state, not the enterprise.

In the early 1960's there was even talk of making the profits target the principal enterprise goal. The major advocates of this policy, however, notably Sun Yeh-fang, then head of the Economics Institute of the Chinese Academy of Sciences, were purged for this advocacy during the Cultural Revolution. The profits target itself did not disappear either during the Cultural Revolution or in the early 1970's; but much less was heard of it, and factory personnel preferred to talk about something else when they were visited by foreigners.

By June of 1977, however, the debate had come full circle once again, and the Chinese press began criticizing those who had said that "anyone who spoke

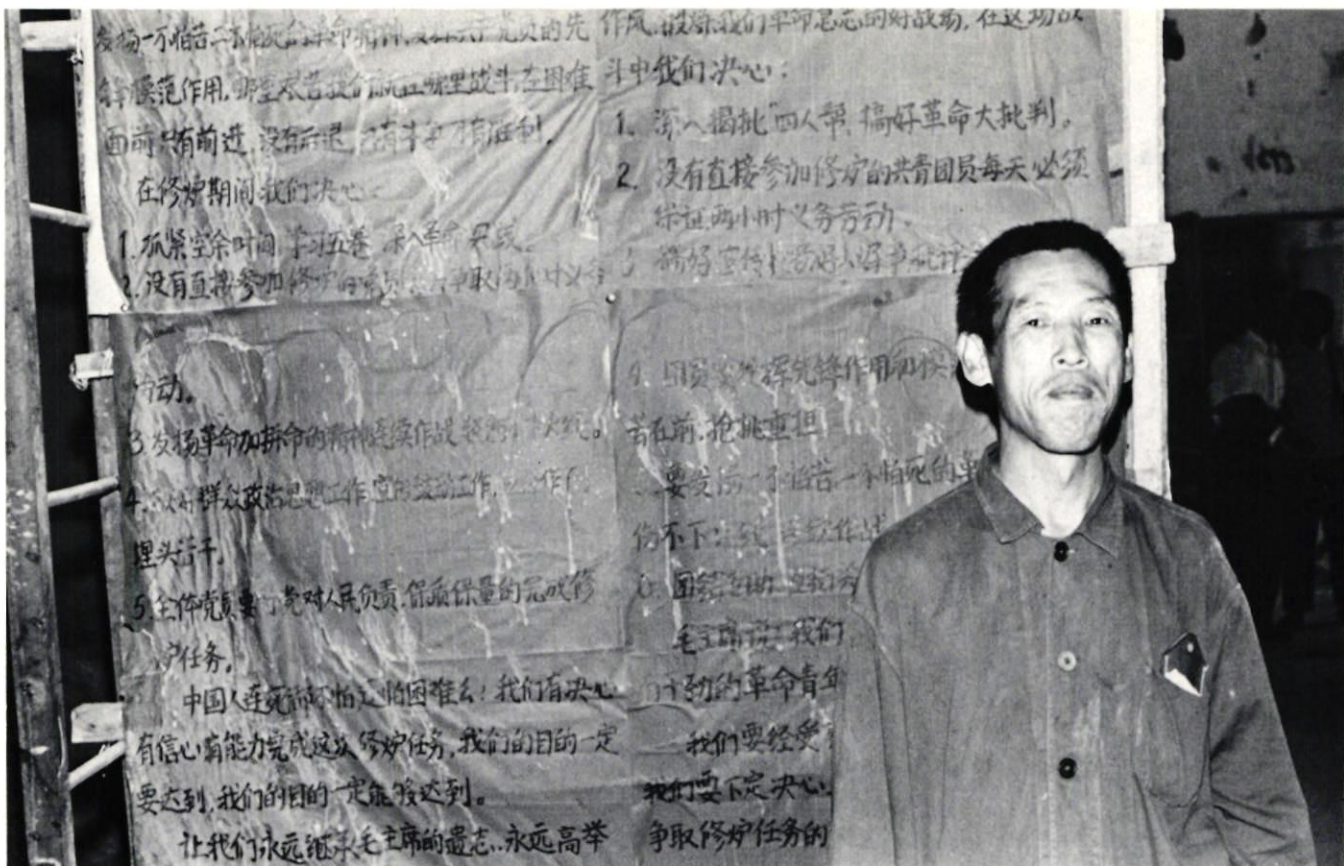
Perhaps the most controversial plan target throughout the past two and a half decades has been profits, which has regularly found itself at the center of ideological controversy: Managers are in no sense profit maximizers.

of accumulating funds for socialism was (guilty) of putting profits in command; anyone who touched on economic accounting was (guilty) of replacing politics with accounting." (Peking, Foreign Broadcasts Information Service, June 3, 1977, p. E1.)

Drawing up annual and five-year plans is one thing; getting managers and workers to comply with them is another. Some regulations, to be sure, can be enforced by passing a law, provided that the law can be easily enforced. The wages of factory workers are all set in accordance with an eight-grade scale. The state determines the scale as well as when it is permissible to make promotions. Since there have been few changes in the scale during the past twenty years and promotions on the basis of the existing scale have been infrequent, checking on factory compliance with

China's children: Planning decisions made now will affect the next generation.





Worker leans against anti-'gang of four' wall poster encouraging increased production.

the wage regulations is comparatively simple.

But the same cannot be said about compliance with plan targets in general. These targets must retain a degree of flexibility if they are not to become strait-jackets for the enterprise. Flexibility in turn provides the enterprise with the opportunity to cheat unless there are incentives not to do so. Cheating is difficult to detect because it is difficult for a planner to determine whether an action that deviates from the plan represents a deliberate attempt to circumvent the plan or is instead a sincere effort by the enterprise to attain overall compliance with a plan that is in certain respects unrealistic. In practice, if an enterprise meets its key targets, particularly the output targets, it is forgiven noncompliance with lesser regulations or targets.

Motivating Managers

Motivating managers to work effectively within this kind of a system has received much attention from China's leadership. The Soviet Union makes extensive use of managerial bonuses for exceeding plan targets, and China has also employed such bonuses. But managerial bonuses have been frowned on by Peking because of the excessive role they are perceived to give to material incentives. Most bonuses, as a result, have either gone to factory workers or, during such periods as the Cultural Revolution, appear to

have been abolished altogether. Instead of bonuses, the leadership attempts to insure plan compliance have put greater emphasis on selecting factory leaders of proven loyalty.

In practice this has meant placing senior Communist Party cadres, many of whom joined the Party during the guerilla war period, in key positions within the enterprise. In fact, the more economic decision making is decentralized, the greater is the tendency to increase the authority of the enterprise's Communist Party members. In recent years it is Revolutionary Committees that have been running factories, but as the Party has been rebuilt following the Cultural Revolution, it is the Party members within those committees who have been playing the key roles.

More than loyalty is required to insure plan compliance, however. Backing up the plan targets are a variety of additional measures designed to constrain managerial actions. To begin with, investment in new plant capacity is clearly separated from production with existing capacity. Except for "below norm" projects, those costing less than 3 to 10 million yuan (about \$1.5 to 5 million) depending on the industry, all other investment in new plant capacity is usually undertaken by separate construction firms and not turned over to the operating management until after construction is completed.

Enterprises are also deprived of most net revenue

that they receive. Because taxation in China is mainly in the form of a markup over cost in the price of industrial products, enterprise before-tax profits are often quite high (in the 1950's they averaged about 30 percent of sales revenue). Part of these before-tax profits is removed from the enterprise by the Chinese equivalent of the Soviet turnover tax, a fixed percentage of cost or price much like US sales taxes.

Profits over and above this amount are also taxed away except for a small percent (10 percent of total profits in 1958, less in earlier years) that the enterprise is allowed to retain for its own purposes. Plant expansion is financed not out of these retained earnings but from direct allocations from the state budget.

Even the money retained by the enterprises is not theirs to spend freely. All firms are required to deposit the cash they receive in the People's Bank, and it is the job of the bank to make sure that all withdrawals from those deposits are consistent with the purposes of the plan. The bank also receives savings deposits from individuals or organizational units, but its main function is to police the plan.

Finally and perhaps most important, even if an enterprise manages to accumulate a little excess cash, there are severe limits to that enterprise's ability to spend the money. Key inputs—from major pieces of machinery to essential raw materials—simply are not available on the market. They are allocated instead by the state directly and in accordance with the amounts recorded in the plan as being necessary for the firm to meet its main targets. It is not known how many commodities are allocated in this manner at the present time, but in 1957 some 729 items were being handled, in part at least, in this way.

Flexibility and Decentralization

In broad outline, as already suggested, this system of planning and control is very similar to that found in the Soviet Union and Eastern Europe and was, in fact, directly copied from the USSR in the 1950's with the aid of thousands of Soviet advisors and technicians. The Soviet system is highly centralized and quite rigid; most important economic decisions are made in Moscow.

In China in the mid-1950's most important economic decisions were being made in Peking, but the results were far from satisfactory. Even at that time there were over 100,000 enterprises in China, and wide varieties of conditions prevailed even within single industries. There was no way that Peking could keep careful track of what was going on in each of these enterprises, owing particularly to the rudimentary level at which accounts were being kept.

Some method had to be devised to widen the scope for local initiative. Certain specific measures, such as the reduction in the number of compulsory targets, have already been mentioned. The key efforts to bring decision-making closer to the operational level,

however, followed two routes, one considerably more successful than the other.

One method of decentralizing authority involved a frontal attack on the various central regulations that hamstrung enterprise managers or Party Committees. The regulations that most often came under attack were those in the financial sphere. A common theme throughout the 1950's was the struggle between those who were attempting to institute thoroughgoing financial and banking controls over enterprises and those who felt that such controls stifled the "initiative of the masses."

Although the latter group was responding to a real problem, the overcentralization of Soviet-type planning, their criticisms of the system had a Luddite quality. In 1958 and 1959, when those who opposed tight financial controls temporarily won the field, the result was not an alternative system of decentralized controls, but no controls at all.

The predictable effects, as pointed out earlier, were chaos and a reinstitution of systematic financial accounting and control in the early 1960's. But the debate has continued. Whenever "radical" political power has waxed as during the Cultural Revolution or during various periods of the 1970's, bank and other financial regulations, together with systematic planning in general, have come under attack.

Increased Local Authority

The more successful route to decentralized planning involved an increase in the authority of planners at the provincial, district, and county level. Chinese decentralization of the economy has differed considerably from that which has taken place in Eastern Europe and to a lesser degree in the Soviet Union.

In Eastern Europe the major problem has been to design a system that could meet the increasingly sophisticated and rapidly changing needs of Eastern Europe's own consumers and those of Western Europe, their principal export market. To make factories more responsive, sales targets have been substituted for output targets (under the latter, one received credit even if the output sat for months in a warehouse because of lack of demand). In general,

Today, the plan most relevant to enterprises is not the one drawn up in Peking but the one compiled by their own province or county level planners, who create the local plans that directly govern enterprise actions.

Teng Hsiao-ping's Principles of Management

"... Industrial management agencies in many localities are not sound. They have an inadequate staff who are incapable of coping with the situation following decentralization. Many things are left unattended, the work of production supervision has not been grasped tightly, and the development of production has been adversely affected."

Teng Hsiao-ping, officially reinstated to his posts by the Chinese in July, is China's leading proponent of pragmatic industrial planning. The following remarks, made in September, 1975, and recently published in a Hong Kong Chinese language journal, *The Seventies*, includes Teng's "18 Points" and other sayings directly or indirectly attributed to Teng. Interestingly, while China is keen about learning from the experience of other countries and gains much knowledge from foreign companies by various means, Teng Hsiao-ping emphasizes that new Chinese technology, "new inventions and new creations must be kept secret and there must be a system for this." Teng's major recommendations concern production management and control, the importance of science as a catalyst to industrial development, and planning for the well-being of labor.

Production Management and Control

• **All enterprises must . . . establish and strengthen the following principal production management systems:** (1) the system of responsibility at each post (or personal responsibility); (2) the system of checking attendance; (3) technical operating procedures; (4) the system of quality inspection; (5) the system of equipment control and maintenance; (6) the system of production safety; (7) the system of economic accounting, and so on.

• **The system of responsibility is the core of an enterprise's rules and regulations.** Without a strict system of responsibility, production can only proceed in a chaotic manner . . . Since 1970, the industrial management structure has been transformed, an overwhelming majority of enterprises have been turned over to the local authorities . . . Enterprises that should be turned over to local authorities must be turned over.

• **Production control and rules and regulations are needed at all times . . .** All enterprises must . . . set up an effective and independent production management command system . . . All enterprises must grasp the following principal economic and technical targets: (1) output target; (2) variety target; (3) quality target; (4) consumption target for raw materials, other materials, fuels and power; (5) labor productivity target; (6) cost target; (7) profit target; (8) target of ratio of working capital, and so on and so forth.

• **We must give top priority to quality, variety and specifications.** Products which are below the quality standard should not be allowed to leave the plant. Commodity departments and commercial departments

have the right to refuse to purchase things that cannot be used. Where defective products have left the plant, the enterprise concerned must guarantee repair, replacements, and compensation.

• **Attaching first priority to quality is a major policy,** and this includes variety, specifications and quality. Good quality can mean a great difference in the practice of economy, and can also help open up more export outlets.

• **An effort must be made to reduce the consumption quotas of raw materials, fuels, and power.** Leakages must be eliminated. Inventories must be drawn in order to reduce stockpiling and reduce losses through wear and tear.

• **Labor organization must be improved,** a good job must be done of the work of fixing personnel and setting labor quotas.

• **. . . Many specialized agencies have not been replenished with new forces for many years,** with the average age of the members approaching 40. The urgent need now is to systematically reinforce and strengthen the professional contingent with a number of people to be selected from among graduates of engineering colleges and technical institutes who have been sent down to labor for many years and from among activists with definite scientific and cultural knowledge.

• **We must be practical, guard against empty talks, reduce the number of conferences, hold short conferences, and make short speeches.** We must not hold discussions without reaching resolutions and putting them into effect.

Industrial Planning

• **From now on, the growth of industrial production should depend primarily on developing the role of existing enterprises,** not on building new enterprises. This will prove more economical than investing in new construction projects, and yield fast and handsome returns . . . It is necessary to break the boundaries between industries and between regions . . .

• **We must resolutely eliminate the "three wastes,"** protect the environment, and protect the physical health of the workers. Unless proper arrangements are made for the disposal of the "three wastes," permission will not be granted for the construction of new projects. In old cities and existing enterprises, the problem of pollution must be solved according to plan.

• **Cities must lead the countryside forward.** Every industrial city must, in the light of its own strength, lead one to several counties forward, helping them develop agriculture, forestry, animal husbandry, sideline occupations and fisheries. . .

• **Planning and statistical agencies at various levels must be reinforced and streamlined.** Planning and statistical work must be strengthened, and statistics must reflect the actual conditions. Failure to report or falsification of reports must be opposed . . .

• **Efforts must be made to improve the supply of subsidiary foodstuffs** in cities and industrial and mining enterprises.

AND DEVELOPMENT OF TECHNOLOGY

Technology and Scientific Research

• . . . Without modern science and technology, there also can hardly be modernization of industry, agriculture, and national defense. . . . In grasping production, we must grasp scientific experiment and new technology. We must have not only output targets but also technical and economic targets . . .

• New technology, new inventions and new creations must be kept secret and there must be a system for this.

• The more industry develops, the greater should be the number of scientific research personnel in the enterprises, and their proportion of the work force should grow more and more . . .

• One of the important reasons why many of our production techniques have not proved effective is lack of theoretical research and fundamental work. Today in our science and technology we have still imitated more and created less. If we are to catch up with and surpass the advanced levels of the world, "have what other countries do not have," and develop our own creations, we must also step up theoretical research . . . There are also some types of theoretical research whose application we still do not see at the moment but which are vitally significant to knowing nature and developing science . . . These types of theoretical research must not be neglected.

• . . . How can a country afford not to put scientific research in the fore? At the Tachai conference we said agriculture acted as a drag to industry, and scientific research a drag to both. One must attach first importance to applied science, and applied science also has theory.

• It is also necessary to gradually build a number of now specialized scientific research agencies . . . There is still a considerable gap between the level of our science and technology and the advanced level of the world . . . In doing scientific and technological work, we must pay attention to investigating and studying the international trends of scientific and technological development . . .

• The debate between different opinions on the academic questions of natural science is a good and not a bad thing. Such right and wrong must be settled by means of academic discussion and through scientific practice. We must not jump to conclusions by means of administrative order, nor must we support one faction and suppress another. Still less must we judge an academic issue on the basis of whether it is supported by the majority or by the minority, by the young or by the old, and on the basis of the political behavior of its proponent or opponent. We must not dismiss as bourgeois or revisionist the academic viewpoints of scientists in capitalist and revisionist countries . . .

• We must improve and strengthen scientific and technological activities abroad, conduct friendly activities in international scientific circles, and strive to

use all kinds of opportunities to do more things academically while reducing or stopping sightseeing activities of a general nature . . .

• What kind of intelligence can you gather if you don't know foreign languages?

• Why should people who have no professional knowledge, are not zealous, and are factionalist be retained? Why should those who have a high level and knowledge among scientific researchers not be promoted to institute directors? People in their forties have engaged in scientific research for more than ten years, and we rely principally on people in their forties in doing our work now . . .

• Logistics are very important. We must create the conditions for research work. Unless people are loyal to their work, they cannot properly look after the data, supplies, equipment and machines. . . . Without logistics, scientific research cannot be conducted successfully. You can't ask scientific researchers to move here and there all day long . . .

• There is a Preliminary Conception of the Outline of the Ten-year Plan for Science and Technology (details not given).

Labor, Wages, and Welfare

• Discipline is a guarantee for the execution of the line.

• We must gradually raise the wages of workers receiving low wages and reduce the gap between high and low wages. We must enforce the system of regular promotions. Every year or every two years we should raise the wages of a number of workers.

• We must give personal allowances to those who work under bad working conditions and whose labor intensity is great.

• We must actively improve the operation of social collective welfare undertakings such as mess halls, nurseries, and medical and health services. We must organize well spare-time educational and cultural, recreational and sports activities. We must make a success of birth control.

• We must solve step by step the problem of husband and wife working in separate places for a long time.

• We must make a success of labor protection, improve the working conditions, and insure safety in production. Protection for women workers must be given attention.

• Attention must be given to a combination of labor and rest.

Source: "Investigations into the 'Gang of Four' Affair" by Chai Hsin (in Chinese), Hong Kong, *The Seventies*, 1977. Quoted in SPRCM No. 926 (5/23/77). "Some Questions on Accelerating the Development of Industry" (Discussion draft, Sept. 2, 1975), Appendix: Teng Hsiao-ping's Talk on Problems Concerning the Development of Industry; "Several Questions on the Work in Science and Technology" (Summary report, first discussion draft) [excerpts]. Appendix: Teng Hsiao-ping's Interpolated Remarks When Listening to Hu Yaopang's Summary Report (Sept. 26, 1975).

there has been an effort to orient firms more toward the market with a greater use of financial over physical targets and the like.

In China decentralization has not involved an enhanced role for financial controls or market forces. The planning system is still largely operated in physical terms with financial targets and controls as a backup. Enterprises, for the most part, will not be motivated to increase output on a certain item because its price and its profit are high. Instead enterprises attempt to follow the directions given them by the plan.

The only difference today is that the plan most relevant to these enterprises is not the one drawn up in Peking, but the one compiled by their own province or county level planners. As mentioned above, Peking's plans do set the parameters within which provincial and lower level planners must operate, but it is the more detailed local plans that directly govern enterprise actions.

Importance of Provincial Role

The major principle underlying this form of decentralization is that enterprises can be turned over to primary control by a province if they sell most of their output within that province and receive most of their inputs from within the province as well. For such enterprises there is little point in having their

inputs and outputs coordinated (planned) in Peking. Peking has no information not available to the province in such cases, and Peking is one large step further removed from the scene of operations.

Certain inputs, of course, may come from outside the province, and a share of output may be sold outside as well; these interprovincial transfers must be coordinated at a higher level. But as long as these transfers remain small relative to intraprovince movements of products, they can be treated in a fashion not unlike that used for items that are sold or purchased from abroad.

The system in operation can be seen most clearly at the county level where rural, small-scale industrial enterprises are planned and coordinated. In fact, in China rural, small-scale industrial enterprises are defined as those which are controlled at a county or lower (commune, brigade, etc.) level and are not necessarily that small. These enterprises sell all or most of their output within the county. A few inputs such as iron usually come from outside the county, but a surprisingly high percentage of current inputs come from within the county.

In small-scale cement plants, for example, the limestone and coal are usually from local sources, and the cement itself will be sold entirely within the county in which it is produced. The diseconomies involved in using a small-scale technology are more than offset

Left, model worker exhorts comrades; right, Nanking laborer at work: are material incentives the answer?



by the high transport costs involved in moving limestone and cement to and from a larger-scale plant serving a much bigger market. When China's transport system becomes more developed, transport costs per ton mile will fall, but, at present, moving a bulky item like coal only a few tens of miles can raise its cost by fifty percent and more.

This system of decentralization has readily demonstrable appeal to local level planners. It frees them from having to battle their way to the top of the bureaucracy every time they want permission to change from making plows to manufacturing transplanters. They still must fight for their share of the iron and steel allocation, but they can avoid such a fight whenever they can find the item within their own territory or can make it themselves.

Thus even at the county level most plants have their own foundries for making lathes and the like for use in their own plant. It is not going too far to state that the small-scale industry program would be almost impossible to carry out if it were not for this decentralization. In the fight for needed inputs, large-scale firms have far more clout within the planning bureaucracy and with the supplier enterprises; small-scale firms would have to settle for left-overs much of the time.

Conclusion—Decentralization Makes Sense

Chinese planning, therefore, has gradually been adapted to the requirements of the Chinese economy at that economy's current stage of development. The industrial sector, the main sector planned in this way, is large—roughly as large as that of Japan's in the early 1960's—and it is spread across a large territory. Thus decentralization of as much decision-making as is feasible makes economic sense.

But Chinese industry is still not terribly sophisticated, particularly in the consumer goods sector. Chinese clothing manufacturers do not have to spend any energy keeping up with the latest changes in fashion out of Paris or New York. There is, therefore, less need to tie manufacturers more closely to their market, except in the case of some manufactured items sold in the West—but these make up only a tiny fraction of Chinese industrial output.

China's current methods of planning and control were first introduced in the 1950's and acquired pretty much their present form by the early or mid-1960's. The precise rules followed within any one factory change from time to time because conditions change. There are periodic attacks on the system from political opponents most of whom are outside the planning apparatus itself, but the system itself has always reemerged intact from these attacks because it appears to be well-suited to the needs of China's economy. The system will change but not until China's economy progresses to a level considerably higher than where it is at present. 完

IMPORTING TECHNOLOGY

Winning Time for China

Teng Hsiao-ping is for China's importing technology—but in accordance with the principles of Chou En-lai: "First, use; second, criticize; third, convert; fourth, create." Teng's interest in cooperation arrangements is described on page four. Here, in remarks made in September, 1975, Teng looks at what must be exported (oil and coal) to pay for imports.

- To win time and speed, we must necessarily import some advanced technology and equipment from foreign countries. To import them is for the purpose of learning from them and promoting our own creations instead of using them to replace our own.
- We must study with an open mind all advanced and fine things of foreign countries, import advanced technologies from foreign countries in a planned and appropriate way and turn them into our own in order to accelerate the development of the national economy . . . In regard to the importation of advanced technologies from foreign countries, we must train the necessary technical forces to master them as speedily as possible.
- In accordance with the principle of "first, use; second, criticize; third, convert; and fourth, create," we must, in the course of applying them, know them, transform them and develop them.
- If we are to import more advanced technologies from abroad, we must increase exports and raise the proportion of industrial and mineral products among export commodities. Every industrial department must study the requirements of the international market and energetically increase the output of products which can be exported and have a high exchange value.
- We must use more things to exchange for the latest and the best equipment from foreign countries. If you dismantle a foreign product, you will see that a lot of things are made in other countries than the one which produces it. If we can't obtain certain raw materials for the time being, we must import some of them if necessary.
- To import, we must export a little more . . . The first thing to my mind is oil. We must develop oil production as far as possible and export as much oil as we can. That is the most reliable thing to do. We mustn't export it to Japan alone. We may find outlets in Western Europe, selling it to West Germany and France, and we may obtain in return many good things. West Germany has some good technical equipment.
- The export of coal must also be considered together with policy implications. Exporting ten million tons of coal is equivalent to exporting five million tons of oil, at a value of approximately one billion US dollars.

Source: Investigations into the 'Gang of Four' Affair" by Chai Hsin (in Chinese), Hong Kong, *The Seventies*, 1977. Quoted in SPRCM No. 926 (5/23/77).

CHINA: SELECTED ECONOMIC INDICATORS, AS OF 1977

KEY INDICATORS	1952	1957	1965	1970	1971	1972	1973	1974	1975	1976
GNP (bil 1976 US \$)	87	122	165	231	247	258	292	302	323	324
Population, midyear (mil persons)	570	640	750	840	860	880	899	917	935	951
Per capita GNP (1976 US \$)	153	190	220	275	287	294	325	330	346	340
Industrial production index (1957 = 100)	48	100	199	316	349	385	436	455	502	502
Producer goods index (1957 = 100)	39	100	211	350	407	452	513	536	602	...
AGRICULTURE										
Agricultural production index (1957 = 100)	83	100	104	127	130	126	142	146	148	148
Total grain (mil metric tons)	161	191	194	243	246	240	266	275	284	285
Cotton (mil metric tons)	1.3	1.6	1.9	2.0	2.2	2.2	2.6	2.5	2.3	2.3
Hogs (mil head)	58	115	168	226	251	261	...	261	...	280
INDUSTRY										
Machinery index (1957 = 100)	33	100	257	586	711	795	930	992	1,156	...
Electric generators (mil kW)	Negl.	0.3	0.8	...	3.0	3.5	4.0	4.6	5.4	...
Machine tools (th units)	13.7	28.3	45.0	70.0	75.0	75.0	80.0	80.0	90.0	...
Tractors (th 15-hp units)	0	0	23.9	79.0	114.6	136.0	166.0	150.0	180.0	190.9
Trucks (th units)	0	7.5	30.0	70.0	86.0	100.0	110.0	121.0	133.0	...
Locomotives (units)	20	167	50	435	455	475	495	505	530	...
Freight cars (th units)	5.8	7.3	6.6	12.0	14.0	15.0	16.0	16.8	18.5	...
Merchant ships (th metric tons)	6.1	46.4	50.6	121.5	148.0	164.6	209.4	288.4	313.6	318.8
Other producer goods index (1957 = 100)	41	100	200	294	336	371	415	429	472	...
Electric power (bil kWh)	7.3	19.3	42.0	72.0	86.0	93.0	101.0	108.0	121.0	...
Coal (mil metric tons)	66.5	130.7	220.0	310.0	335.0	356.0	377.0	389.0	427.0	448.0
Crude oil (mil metric tons)	0.4	1.5	11.0	28.2	36.7	43.1	54.8	65.8	74.3	83.6
Crude steel (mil metric tons)	1.3	5.4	12.5	17.8	21.0	23.0	25.5	23.8	26.0	23.0
Chemical fertilizer (mil metric tons)	0.2	0.8	7.6	14.0	16.8	19.8	24.8	24.9	27.9	...
Cement (mil metric tons)	2.9	6.9	16.3	26.6	31.0	38.1	41.0	37.3	47.1	49.3
Timber (mil m³)	11.2	27.9	27.2	29.9	30.7	33.2	34.2	35.2	36.2	...
Paper (mil metric tons)	0.6	1.2	3.6	5.0	5.1	5.6	6.0	6.5	6.9	...
Consumer goods index (1957 = 100)	60	100	183	272	272	295	334	347	368	...
Cotton cloth (bil linear meters)	3.8	5.0	6.4	7.5	7.2	7.3	7.6	7.6	7.6	...
Wool cloth (mil linear meters)	4.2	18.2	...	...	...	...	...	65.2	...	...
Processed sugar (mil metric tons)	0.5	0.9	1.5	1.8	1.9	1.9	2.2	2.2	2.3	...
Bicycles (mil units)	0.1	0.8	1.8	3.6	4.0	4.3	4.9	5.2	5.5	...
FOREIGN TRADE										
Foreign trade¹ (bil current US \$)	1.9	3.0	3.8	4.3	4.7	5.9	10.1	14.0	14.4	12.9
Exports, f.o.b.	0.9	1.6	2.0	2.0	2.4	3.1	5.0	6.6	7.0	6.9
Imports, c.i.f.	1.0	1.4	1.8	2.2	2.3	2.8	5.1	7.4	7.4	6.0

¹ Jetro reports China's total imports in 1976 to be \$5,829 million, exports \$7,166 million, and total trade \$12,995 million.

Source: CIA, Office of Economic Research. Data as of September, 1977.

PREPARING FOR THE CANTON FAIR

For the American businessman seeking his first invitation to the Chinese Export Commodities Fair, the procedure for obtaining the invitation and preparing for a trip to China may loom as an unfathomable maze. But, in fact, Chinese officials have made great efforts to streamline the red tape around the semi-annual trade pilgrimage, which brings some 25,000 foreign buyers to the southern Chinese city every session. The following pages list the basic points that every American fairgoer should consider and attend to as he prepares for his trip to Canton.

The Canton Fair is held twice a year, April 15 through May 15 and October 15 through November 15. Its full name is the Chinese Export Commodities Fair and its main order of business is the negotiation of China's export contracts. It is where you will buy from the Chinese.

Obtaining an Invitation

- Determine with which Foreign Trade Corporation(s) (FTC) you are most interested in doing business. Chinese FTC's have clearly defined product areas, and you should apply for an invitation from the corporation(s) from which you are most likely to import. Specify the appropriate product department in your request.
- Send the corporation a letter of introduction with the following information about your company: type of company (agent, importer, wholesaler, distributor, retailer, or

combination, etc.); length of time company has been in business; principal product lines, distribution range, and volume of sales; and name and address of bank and banker. Also include any annual reports, auditor's reports, Dun and Bradstreet reports, or other company literature. The Fair you wish to attend, along with the products you wish to buy, should be clearly stated.

- Send copies to the PRC Liaison Office in Washington, DC (PRCLO).
- You may also wish to apply for a Fair invitation to the Liaison Office of the PRC through the National Council. Generally, it is best to apply through both an FTC in Peking and the Liaison Office in Washington. If you do both, you should inform the FTC that you have also requested an invitation of the Liaison Office. Similarly, the Liaison Office should be apprised of all correspondence between US firms and Chinese trade organizations.
- Send your request for an invitation two to three months before the opening of the Fair—by late July or early August for the Fall Fair and by late January or early February for the Spring Fair.
- Be sure you mark all correspondence to the Chinese with "People's Republic of China." Your mailing will be returned if you fail to do so.
- Don't expect to hear right away. The Liaison Office usually contacts "old friends" about a month and a half before the beginning of the Fair. Once they know how many of their traditional customers are coming, they can start

An invitation
for the Fall, 1977,
Canton Fair.



中国各对外贸易公司联合主办 一九七七年秋季 中国出口商品交易会 订于一九七七年十月十五日至十一月十五日在广州市举行 请您 来会 此致 中国出口商品交易会 (请带此帖来会)	
CHINESE EXPORT COMMODITIES FAIR (AUTUMN) 1977 jointly sponsored by THE NATIONAL FOREIGN TRADE CORPORATIONS OF CHINA cordially invites National Council for U.S.-China Trade to the Fair, to be held from October 15 to November 15, 1977, in Kwangchow (Please bring this card)	
N ^o 4210247	

sending out invitations to other applicants. If you have not received an invitation in the mail by the beginning of October or the beginning of April, you are probably not going to be invited to the Fair. In the past, neither the FTC's nor the Liaison Office contacted those companies who were not invited to the Fair, but indications are that rejected applicants may be informed in the future. Only in rare cases can invitations to the Fair be obtained after opening day.

Processing the Invitation

- Complete the "Acceptance of Invitation Form" which comes with each invitation, make several copies for reference, and air mail the signed original to the Chinese Export Commodities Fair, Kwangchow, People's Republic of China. Authorities in Canton make your hotel reservations in Canton. Inform the Chinese how many company representatives and their spouses will be traveling to China.
- An invitation entitles the recipient the right to bring three representatives to the Fair. Since the Chinese invite buyers to come to the Fair on the basis of rooms available in Canton, spouses may be brought along with company representatives.
- Send copies of your "Acceptance of Invitation Form" and "Invitation Card" to the Liaison Office of the People's Republic of China, 2300 Connecticut Avenue, NW, Washington, DC 20008, and request two copies of the Chinese visa application form.
- For each person traveling to Canton, send either by registered mail or hand courier two completed and signed visa application forms, two passport-size photographs, a \$6 check made payable to the "Liaison Office of the People's Republic of China," two copies of your "Acceptance of Invitation Form," and your passport to the Commercial Section of the Liaison Office. Be sure your passport has a full page available for the PRC visa. (Allow three to five working days for the processing of visas.)
- You may wish to obtain a special passport for travel to the PRC if your passport has a Taiwan visa. To obtain such a passport, submit a letter from your company explaining the reason for your trip, proof of your invitation to China, and a passport application form to any Passport Office of the Department of State. This special passport should then be sent to the Liaison Office with the completed visa application forms.

Preparation for the Trip

- Make sure you have a smallpox vaccination less than three years old marked on your International Health Card. A cholera vaccination is sometimes required for entry into Hong Kong, and gamma globulin and typhoid inoculations are recommended.
- Prepare a package of material on your company to introduce yourself to the Chinese, including a simple fact sheet. Annual reports, product catalogs, or other publications should also be presented. Each FTC you deal with will require a separate supply of these documents.
- Have a set of bilingual business cards made up to use in China. The National Council's Translation Department can translate and print business cards or recommend other qualified services.
- Determine when and how long you will be in Canton. Normally, six to ten days are sufficient to conclude business.

For quantity, it is best to go early in the Fair; for better prices, go later. Companies interested in the sale of US machinery or technology to China should attend the Fair during the third or fourth week.

- Making appointments with FTC's prior to arriving in Canton is not possible. A company can, however, have its agent make appointments early in the Fair for executives who will arrive in the later weeks.
- Advise your home office approximately when you will be telexing and, if need be, have them ready to respond while your line to the US is open. If the Fair is busy, demand for telex facilities will be heavy. New York standard time is twelve hours *behind* Canton—9 pm in Canton is 9 am on the same day in New York.
- Study up on China. The National Council's "The China Trader's Hong Kong and Kwangchow" (\$5 from the Council) and Far Eastern Trade Press's "Guide to Chinese Export Commodities Fair" (\$2 from the Council) are a good introduction to the Canton Fair. For more general treatment of modern Chinese life, see Ross Terrill's *800,000,000: The Real China* (Little, Brown and Company, Boston, 1972).

Traveling into China

- Most Americans go into Canton through Hong Kong by train, although special arrangements can be made to fly in from Europe and Japan through Shanghai or Peking. Special permission to come in by air can be obtained through the FTC that issued your Fair invitation.
- A day or so before you wish to enter China (except on Sundays), go to one of the China Travel Service offices in Hong Kong with your "Invitation Card," passport, and visa. (CTS offices are at 77 Queen's Road, Central, Hong Kong, and 27 Nathan Road, Kowloon.) There you can purchase a round-trip ticket to Canton (at approximately US\$45). The CTS will also make your hotel reservations in Canton and provide you with baggage stickers for your luggage and coupons for train tickets to and from Hong Kong, lunch, hotel registration, etc.
- The day of your entry into China, you should arrive at the Tsimshatsui (Kowloon) Railway Station in time to catch the train on which the CTS has scheduled you—probably at 8:30 or 9:30 am. CTS personnel will be at the entrance of the railway station to handle fairgoers' luggage and direct them towards the trains.
- After an hour and fifteen minute train ride, you will arrive in Lowu, where you disembark, pass through Hong Kong emigration procedures, and cross the bridge into Shumchun, China.
- On the Chinese side of the border, there will be immigration procedures to check your visa and passport, health inspection, and customs. During the customs check, the Chinese will expect you to record your valuables and all currency to be taken into China. While in China, you will have a copy of your customs declaration card on which all currency exchanges and major purchases will be marked. Upon leaving China, you will be asked to account for the foreign currency you brought into the country, as well as any valuables you carried in or bought while there. In addition to immigration and customs, you will have a chance to buy Renminbi (RMB), the Chinese currency, and will be served a large Chinese lunch.
- Following lunch, a Chinese train will take you on the

hour and forty-five minute trip into Canton, where you will arrive at approximately 3:00 pm.

Arriving in Canton

- A bus will meet Canton Fair attendees at the train station and take you to the Tung Fang Hotel, where you should go directly to the Number One Liaison Office on the fourth floor of the old wing. Upon presentation of your "Invitation to Register Card" and business card, you will receive your room number and a Fair ribbon, which is your official pass to the Fair.
- After registration, go down one flight to the China International Travel Service (CITS) office on the third floor where you should turn in your passport and visa to be stamped by Public Security officials in Canton. You can retrieve your papers from the CITS office after two days.
- If your bags have not reached your room by the time you have completed registration procedures, they probably have been left in the lobby of the new or old wing of the hotel, and you will have to go there to get them and carry them to your room yourself.
- You can begin your first day with a trip to the Exhibition Hall, directly across the street from the hotel, and when you have located the proper FTC stand, make the appointment directly with one of the corporation representatives. Alternatively, you can try to make your initial appointment with the appropriate corporation through the Number One Liaison Office on the fourth floor of the old wing of the hotel.
- If for any reason you still feel you have not yet seen the proper person in an FTC, come to the National Council's office in the Tung Fang Hotel, and one of the staff members will help you make an appointment.

Leaving Canton

- A day or two before you wish to leave, you should visit the CITS office on the third floor of the old wing of the Tung Fang Hotel. They will make your train reservations to Hong Kong. The only differences between leaving and arriving in Canton are that on the return trip money can be exchanged on the train and during emigration procedures at Shumchun, no lunch is served.
- Before 6:30 am on the day of your departure, put your bags in front of your hotel door to be picked up. The bus for the train station leaves at 7:15 am, the train departs at 8:30 am, and you will arrive in Hong Kong by early afternoon.

Communications to and from Canton

Canton is probably the easiest city in China to communicate with from the outside. For the benefit of the many foreign visitors who travel to Canton each year, the Chinese have installed limited telecommunications systems.

Cables can be sent from either the lobby of the Tung Fang Hotel or the Canton Telecommunications Bureau. As of January 1, 1977, the cost of regular cables to the US was US\$0.77 per word, double for express services. Cables being sent into Canton can be sent either to the Tung Fang Hotel, provided the recipient's name and room number are included (e.g., "John Doe KWANGCHOW TF Room #1234), or to a company cable address in Canton, which may be temporarily registered for a few dollars. The National Council cable address in Canton is USCHIN-

TRAD. International cable credit cards may be used to pay for outgoing cables.

Telexes can be sent from the Tung Fang Hotel and the Canton telecommunications office. In 1977, the telex rate to the United States was \$4.47 per minute with a minimum charge of \$13.41 for three minutes. Users are required to punch their own tapes and can do so in the National Council office in the Tung Fang Hotel or the hotel lobby.

Telephone calls can be arranged at the service desk of the Tung Fang Hotel and taken in any hotel room. In January, 1977, the cost per minute for a call to the United States was \$5.11 with a minimum of three minutes. Also, a \$2.13 service charge is billed regardless of whether the call goes through or not.

Cable Addresses in Canton

Many of China's important foreign trade organizations set up shop in Canton for two months out of the year. To facilitate communications, most of these organizations have established permanent Canton cable addresses. The address of the Chinese Export Commodities Fair is CECFA KWANGCHOW.

Foreign Trade Corporations

China National Cereals, Oils and Foodstuffs Import and Export Corporation—COFTRA KWANGCHOW; China National Chemicals Import and Export Corporation—CECF CHEMICALS DELEGATION KWANGCHOW; China National Light Industrial Products Import and Export Corporation—INDUSTRY FAIR KWANGCHOW; China National Machinery Import and Export Corporation—MACHIMPEX FAIR KWANGCHOW; China National Metals and Minerals Import and Export Corporation—MINMETALS FAIR KWANGCHOW; China National Native Produce and Animal By-products Import and Export Corporation—BYPROFAIR KWANGCHOW; China National Textiles Import and Export Corporation—FAIRTEX KWANGCHOW.

Other Organizations

Bank of China—CHUNGKUO KWANGCHOW; China Insurance Company Ltd.—CHINSURCO KWANGCHOW; The People's Insurance Company of China—42001 KWANGCHOW; Tung Fang Hotel—KWANGCHOW TF; The National Council for US-China Trade—USCHIN-TRAD.

Footing the Bill

In Canton, your personal expenses should be minimal. A single room at the Tung Fang costs about \$13 per night, although accommodations are available up to \$80 per day. For most fairgoers, daily expenses in Canton round out to about \$30, plus the cost of telecommunications and any special purchases, such as antiques.

Currency can be brought into China in three forms: cash, travelers checks, and travelers letters of credit.

As of September, 1977, money orders and traveler's checks, issued by Bank of America in San Francisco, Manufacturers Hanover Trust Co. in New York, The First National Bank of Chicago in Chicago and the Chase Manhattan Bank in New York, were acceptable to the Bank of China. Money orders or traveler's checks issued by other third-country banks who maintain correspondent banking

relations with Bank of China are also negotiable with the BOC. Traveler's cheques or money orders issued by other banks with whom the Bank of China does not maintain correspondent banking relations are unacceptable.

The advantage of using traveler's letters of credit is that you will have RMB-denominated funds as an insurance against any unfavorable exchange rate fluctuations during the Fair.

Banking in Canton

A company or individual can open a non-interest-bearing, RMB-denominated account at the Bank of China's Canton branch, about a ten-minute cab ride from the Tung Fang Hotel. The account, which can be opened in a matter of minutes, can receive remittances from any American bank through any of the 600 international banks with correspondence relations with the Bank of China. The transfer of funds from America to Canton usually takes two to three days.

Things to Take

Cameras can be taken into China, except for 16 mm movie cameras, which require special permission. Bring in all the film you plan to use.

Cigarettes may be brought into China, with the first carton duty-free. Chinese brands are available but may not suit Western tastes.

Clothing at the Fair tends to be informal, mostly shirt sleeves. Suits are sometimes worn at the opening and closing ceremonies. Visitors are usually more comfortable avoiding ostentatious clothes. Canton's average daily temperature is between 67° and 77° F in October and 49° and 77° F in April. Sweaters are usually needed in Canton by the end of November and during April.

Coffee in China is not as strong as Western brews and is well supplemented by some American instant. Hot water is available in hotel rooms for making your own.

Electrical appliances will have to be run on Chinese current, 220 volts and 50 cycles. Transformers as well as a stabilizer will be needed for most devices since the voltage varies as much as 20%.

Foods for special dietary requirements (kosher or diabetic) are not widely available in China and should be brought in if needed.

Liquor, except for beer, vodka, and some liqueurs, is not sold in China. Bring your own brands and mixes in; the first two quarts are duty-free.

Medicines, especially patent medicines, should be brought into Canton. Lomotil, aspirin, and insect repellent are considered staples.

Office supplies, such as copiers, typewriters, and telex tape-cutting machines, are available at the National Council's office in the Tung Fang Hotel, but some businessmen find it worthwhile to bring their own typewriters and supplies. Glue is worth bringing since some Chinese stamps have no adhesive.

Radios provide the only media link with the outside world in China. AM receivers will get Hong Kong stations, and short wave can pick up the BBC or Voice of America.

Reading material published outside of the PRC is not available in Canton.

Wrapping material should be brought in if you wish to mail out samples while in Canton.

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CHINESE ORGANIZATIONS INVOLVED IN THE CANTON FAIR

The China Export Commodities Fair (CECF) is, itself, an official Chinese trade organization. Under the direction of the Ministry of Foreign Trade in Peking, the CECF coordinates with local Kwangtung and Canton officials to organize and manage the semi-annual event. With its executive offices in the Kwangtung Foreign Trade Bureau, Hai Chu Square, Canton (Cable: CECFA KWANGCHOW), the CECF is most visible during the Fair through its four liaison offices. The Number One Liaison Office, on the fourth floor of the Tung Fang Hotel, handles American visitors.

The Foreign Trade Corporations are the Chinese state-owned monopolies which handle all PRC foreign trade. Also under the direction of the Ministry of Foreign Trade, seven FTC's act as sponsors of the Canton Fair. The FTC's issue the vast majority of foreigners' invitations to come to the Fair. It is thought that the FTC's begin preparations for the Fair by determining how much material they have available for export. Then they estimate how much of that material will be purchased by "old friends" (i.e., established foreign customers) and by individual countries. Once the corporation has a clear picture of how much residual they will have, they then invite "new friends" to attend the Fair.

The Liaison Office of the People's Republic of China is the PRC's diplomatic mission in Washington, DC. Its commercial section, representing China's Ministry of Foreign Trade, passes information on American companies, both potential importers and exporters, back to the FTC's in Peking. The Liaison Office officials can recommend to the FTC's that certain companies can attend the Canton Fair, and it is thought that the Liaison Office itself is given a limited number of Fair invitations it can issue at its own discretion to American companies. US companies receiving Fair invitations, whether from the Liaison Office or an FTC, should apply to the Liaison Office for visas.

The China Travel Service (HK) Ltd. (CTS) is the Hong Kong agent of the China International Travel Service (CITS), in Peking. The latter is a subordinate of the China Travel and Tourism Administration (CTTA), itself a bureau of the ruling State Council. The CTS arranges for visas to China for Hong Kong residents and also provides fairgoers travel services into Canton. It does not issue invitations to the Fair for US businessmen. All businessmen entering China through Hong Kong should visit the CTS offices in Hong Kong to make the necessary travel arrangements a day or so in advance. CTS offices are at 77 Queen's Road, C, Hong Kong (Telephone: 5-259121; cable: TRAVELBANK) or 27-33 Nathan Road, Kowloon (telephone: 3-667201-10).



Vice President Walter F. Mondale meets with CCPIT delegation at the White House, September, 1977.

Council Activities

Fall activities of the Council were highlighted by the visit from the China Council for the Promotion of International Trade, led by the Chairman of the CCPIT, Wang Yao-ting. The 15-person delegation, which visited the White House and met with senior US government officials, had business talks with Council Directors and investigated several types of technology. Earlier, the Council's Mining Delegation had a productive trip to China in August, hosted by the CCPIT; the members of the delegation each gave at least fifteen hours of presentations while in Peking. The Council also welcomed the arrival of Peng Chin-po, the new commercial counsellor at the PRC Liaison Office, and of Stanley Young, the Council's new vice president.

CCPIT DELEGATION LED BY CHAIRMAN WANG YAO-TING VISITS THE US, INSPECTS PETROCHEMICAL, METALLURGICAL TECHNOLOGY

The highest-ranking trade delegation from the People's Republic of China yet to visit the US arrived in Washington, DC, September 6 for a country-wide technology survey tour. The group—from the China Council for the Promotion of International Trade (CCPIT) and headed by CCPIT Chairman Wang Yao-ting—spent two and a half weeks visiting manufacturing facilities relating to various types of petrochemicals, ferrous and nonferrous metallurgy, agricultural machinery, and other types of technology. Delegation members included representatives of TECHIMPORT, MACHIMPEX, SINOCEM, and China's industrial societies.

The highlight of the tour was a visit to the White House, where Vice President Walter Mondale delivered a message from President Carter. The delegation was hosted at the Capitol by Rep. Thomas P. ("Tip") O'Neill (D-MA), Speaker of the House, and Sen. John A. Durkin (D-NH), Rep. John Brademas (D-IN), Majority Whip Rep. Jonathan B. Bingham

(D-NY) and Rep. Lester L. Wolff (D-NY) also participated in the meeting.

The delegation also met with Secretary of State Cyrus Vance and Secretary of Commerce Juanita Kreps while it was in Washington. The Liaison Office of the PRC in Washington, DC, held a reception for the group, hosted by Ambassador Han Hsu, Deputy Chief of the PRCLO. In New York the group was met by Chen Chu, Permanent Representative at the United Nations, who also attended the Council's reception for the delegation at the Plaza Hotel.

Among the points made by the CCPIT during the visit—

- The purpose of the visit was to "develop trade with the US" and learn about the US market, industry, and technology.
- The visit would bring about "positive results"—there are a "broad future and bright prospects for US-China trade." Lower Sino-US trade in 1975 and 1976 was "normal in doing international business."
- Chinese industrial society members, who formed the nucleus of the delegation, emphasized the role of the societies in deciding what China wants to buy, and, thus, the serious intent of the trip.
- As of September, the CCPIT was planning a program of foreign exhibitions in China for the next few years; these shows will probably include fairs from Japan, but the agricultural equipment exhibition, with products from different countries, may not take place till 1979.
- Reciprocal Sino-US trade exhibitions await resolu-

ALEXANDER ECKSTEIN MEMORIAL FUND

In honor of Alexander Eckstein, leading American China trade scholar and leading figure in the efforts to normalize relations with the People's Republic of China during the past decade, the University of Michigan is planning to establish the Alexander Eckstein Visiting Professorship of Chinese Studies, to which leading scholars will be appointed. As a member of the National Council's academic advisory board, Professor Eckstein spoke at many Council functions and authored many standard texts on China's economy and trade. Mr. Eckstein was the central force behind the establishment of the highly prestigious University of Michigan Center for Chinese Studies and a founder of the National Committee for US-China Relations. The new professorship in his honor will be made possible through funds contributed to the endowment campaign for which Professor Eckstein worked so effectively. Those who wish to contribute to this fund may direct gifts to Professor Albert Feuerwerker, Director, Center for Chinese Studies, Lane Hall, Ann Arbor, Michigan 48104, with the notation that they are for the Alexander Eckstein Memorial.

WELCOME TO PENG CHIN-PO, NEW COMMERCIAL COUNSELLOR AT THE PRC LIAISON OFFICE

The National Council welcomes Mr. Peng Chin-po to his new post as Commercial Counsellor at the Liaison Office of the People's Republic of China in Washington, DC. Mr. Peng, 59, and a native of the Peking region, has been with the Ministry of Foreign Trade since the founding of the PRC in 1949. Before coming to Washington, Mr. Peng held the position of Deputy Director of the Third Bureau of the Ministry of Foreign Trade. During his tenure in the Ministry, he visited France, Holland, Germany, Greece, Austria, Romania, Chile, Peru, Venezuela, Canada, and other countries. He was a Commercial Counsellor in Rangoon, Burma, from 1960 to 1965. Prior to the establishment of the PRC, he was a member of the Eighth Route Army. Mr. Peng is married to Li Kuo-chen, who is a graduate of the college of foreign trade. They have three children—two boys and a girl. Mme. Li has accompanied her husband to Washington.

tion of the claims/assets issue and improved diplomatic relations.

- The National Council's program of industry exchanges with the CCPIT will continue; the CCPIT stressed that more specific survey groups will follow this one.

In addition to Washington and New York, the 15-member mission visited Chicago, Cleveland, Los Angeles, Moline, New Orleans, Peoria, San Francisco, and Seattle, departing the US on September 25. The group was escorted by Council President Christopher H. Phillips, Vice President Stanley Young, Interpreter May Li Phipps, and Priscilla Rope, coordinator for the visit.

En route, the delegation was entertained and feted in each region by Council members; almost a thousand representatives of member firms met with the Chinese during their visit. The National Council, which did its best to accommodate all requests from members, thanks all regional coordinators and others who helped to make this trip a success.

Besides Wang Yao-ting, other members of the group were: Chang Yen-ning (Deputy Leader), Council member of CCPIT and Director of Chinese Chemical Industry Society; Liu Ching (Deputy Leader), Managing Director, China National Machinery Import & Export Corporation; Yang Yu-te, Deputy Managing Director, China National Technical Import Corporation; Mai Wen-lan, Deputy Managing Director, China National Chemicals Import & Export Corporation; Ku Hsun-fang, Responsible Person of Shanghai Chemical Industry Society; Hsing An-min, Director of China Mechanical Engineering Society; Chou Hsuan-



CCPIT VISITS US

Clockwise from top left: CCPIT and escorts leaving White House; Wang Yao-ting with US Secretary of Commerce Juanita Kreps; Wang with NCUSCT Chairman of the Board William A. Hewitt and President Christopher H. Phillips; group upon arrival at Dulles International Airport is greeted by Han Hsu, Deputy Chief of PRCLO; from left, Peng Chin-po (PRCLO), Li Kuo-chen (PRCLO), and delegation deputy leader Liu Ching aboard Coke yacht in New York harbor; and delegation members inspecting Textron machinery, Cheshire, Connecticut.

cheng, Director of Chinese Metals Society; Wu Chin-cheng, Deputy Chief Engineer, Chinese Chemical Industry Society; Wang Ke-chung (Secretary-General of the Delegation), Deputy Director of the Liaison Department of CCPIT; Chang Kuo-shen, Deputy Division Chief of the Third Department of the Ministry of Foreign Trade; Wang Chen-hua, Engineer of Chinese Chemical Industry Society; Chen Yung-ting, Engineer of Chinese Metals Society; Kuo Szu-mien (Secretary of the Delegation), Liaison Department of CCPIT; and Wang Ken-liang, Interpreter, the Liaison Department of CCPIT. Peng Chin-po, Commercial Counsellor of the PRCLO in Washington, DC, and Jen Chih-chieh, of the PRCLO Commercial Staff, accompanied the delegation throughout the US.

NATIONAL COUNCIL MINING DELEGATION SEES CHINA'S MODERN METHODS, ASSESSES SALES OPPORTUNITIES

The National Council's Mining Industry Committee's first mission visited the PRC from July 18 to August 2, hosted by the Technical Exchange Department of the China Council for the Promotion of International Trade (CCPIT). The 16-person mission marked the opening of technical exchanges between the two countries' mining industries.

During the 19-day trip, each company representative was asked to give at least 15 hours' worth of technical

presentations. One member of the delegation spoke for 24 hours on his particular specialties. Over 200 personnel from a wide spectrum of China's mines, technical societies, and foreign trade corporations attended the week of seminars in Peking. Their interests included, principally, open pit and underground mining technologies and equipment.

The delegation was hosted at a dinner by Li Chuan, Vice Chairman of the CCPIT, Wang Chih-chung, Deputy Chief of the Liaison Department of the CCPIT, and He Fa-nan of the Technical Exchange Department of the CCPIT. During its stay in Peking, the delegation paid courtesy calls on MACHIMPEX and TECHIMPORT.

From Peking the delegation traveled to Tatung in Shansi Province, Shenyang and Fushun in Liaoning Province, and Shanghai. She Ming-chieh of the CCPIT's Technical Exchange Department accompanied the group. Among the mines and facilities visited were the Mei Yu Kou Mine and Yun Gang #13 Mine of Tatung, the Coal Mining Technology Institute of Tatung, the Fushun West Open Pit Mine, the Lung Feng Mine of Fushun, and the East Fushun Safety Instrument Research Institute.

During its visit, the delegation saw methods used in China's mines comparable to those used around the world. In one example, at the Lung Feng Mine in Fushun where water injection is used to overcome gas

Copy of a Bucyrus-Erie shovel seen by National Council's Mining Industry Committee delegation at the Fushun West Open Pit Mine, Liaoning Province, July, 1977.



problems, the Chinese have designed their own equipment, which the group felt was very modern and impressive.

Most of the machinery in use in China's mines is of domestic origin, but the delegation observed that the PRC does not hesitate to employ foreign equipment if such equipment is suited for a particular job. Discussions revealed that China plans to expand its mines and to use foreign equipment for this expansion when Chinese equipment is not available.

Members of the delegation were William MacDonald, Sales Manager, Mining and Construction Division, Gardner-Denver Company, and Chairman of the Council's Mining Industry Committee and the delegation; William J. Cheronis, Vice President, Harnischfeger International Corporation, and Vice Chairman of the delegation; R. Wayne Adkins, Director of Engineering Drilling Division, Gardner-Denver Company; Charles D. Albright, Research & Development Manager, FMC Corporation; George W. Ciracovitch, The Galigher Co.; James H. Dye, Manager, Big Hole Products, Reed Tool Company; John Fischer, Manager, Tractor and Scraper Marketing, WABCO; Wayne R. Gerdes, Vice President, Marketing, Goodman Equipment Corporation; R. F. German, Vice President of Engineering Construction Machinery Division, Clark Equipment; James Zung Hao Han, Application Engineer, Caterpillar Tractor Company; Charles L. Metzger, Vice President, Rotadrill Divisions, Schramm, Inc.; Harry M. Parker, Mining Geological Specialist, Fluor Utah, Inc.; John D. Spaulding, Project Manager, Coal Project, Kaiser Engineering; Robert W. Volpe, Assistant to the President, Unit Rig and Equipment Company; and Eric T. Kalkhurst, Escort Officer, National Council for US-China Trade.

PHARMACEUTICAL AND MEDICAL DEVICES COMMITTEE LAUNCHED

The National Council's newest export industry committee, the Pharmaceuticals and Medical Devices Committee, was established during a Washington meeting of interested Council members on July 12, 1977. The group was organized to encourage interaction between the Chinese and American pharmaceuticals and medical devices industries. Its first activity will be to propose to the Chinese a series of topics for a technical seminar to be given by the committee in China at some time in the future. Any companies interested in participating in the Pharmaceuticals and Medical Devices Committee's activities or its proposal, should contact the Organizing Chairman, Dr. Albert Free of Ames Company, or Eric T. Kalkhurst, Director of Business Advisory Services, National Council for US-China Trade, 1050 17th Street, NW, Washington, DC 20036; telephone (202) 331-0290.



NEW VICE PRESIDENT FOR NATIONAL COUNCIL

Stanley Young assumed the vice presidency of the National Council on August 1, 1977, following the resignation of Melvin W. Searls, Jr., who has returned to Esso Standard Oil (Hong Kong) Ltd. Mr. Young, also a veteran of Esso, comes to the Council with over 37 years of experience gained at the company, from which he retired in 1973. He was most recently the Executive Director of the American Chamber of Commerce in Hong Kong, in which capacity he had a number of opportunities to visit the People's Republic of China.

While with Esso, Mr. Young spent over 25 years abroad, mostly in Asia. From 1961 to 1972, he was posted in Pakistan, the Philippines, and Southeast Asia. He also worked for seven years in Japan, and for four years in Africa. From 1947 to 1949, he represented Standard Vacuum in Shanghai.

During his tenure as Director of Amchem, Mr. Young had numerous interactions with the PRC's Hong Kong representatives at China Resources and Ng Fung Hong. He attended two Canton Fairs, meeting with officials from all of China's foreign trade corporations, the Bank of China, and the China Council for the Promotion of International Trade.

After an active two years as Council vice president, Mr. Searls has returned to the Far East as Marketing Director for Exxon's Hong Kong-based Asian operations. While with the Council, Mr. Searls was instrumental in the launching of the Council's industry committees and enlarging the scope of the Council's programs. He attended the Canton Fair four times for the Council, and accompanied the Board of Directors delegation to Peking in 1976. Mr. Searls will be missed both by the National Council staff and by the member companies who came to know him. 完

Wuhan Power Bureau electricians doing maintenance work on high-tension transmission line over Yangtze River.



CHINA'S ELECTRIC POWER INDUSTRY

William W. Clarke

Chinese domestic policy is now focused on a sweeping modernization of the economy in order to propel the country into the front ranks of industrialized nations by the year 2000. Rapid development of the electric power base is essential if the goal is to be achieved. In recent years, performance of this power industry, the ninth largest in the world, has been adequate, but major investment and imported plant and technology must be combined effectively to bring about the required expansion to generating capacity. For an industry whose technological level, generally, trails that found in the developed nations by more than fifteen years, this will require a prodigious effort. Even now power shortages persist and demand is not fully met. This article assesses the capability of the Chinese electric power industry to support economic growth and evaluates the manufacturing base necessary to sustain the industry. The technological strengths and weaknesses of the industry are reviewed, but a lack of investment and operating data precludes an analysis of how efficiently the industry is being run.

William W. Clarke is the Director, People's Republic of China Affairs in the Bureau of East-West Trade, US Department of Commerce. Mr. Clarke, a graduate engineer of the Stevens Institute of Technology, is a specialist on East-West trade relations. In 1973 he visited the PRC, consulting with Chinese officials in Peking, touring factories and communes, and attending the Canton Trade Fair. In 1975 he was the government member of the National Machine Tool Builders' Association delegation. Mr. Clarke, who has been Director of the Capital Goods Division in the Office of Export Control, wrote "China's Steel—The Key Link" for an earlier issue of this magazine.

"As regards the national economy as a whole, Chairman Mao characterized grain and steel as the two 'marshals' and electricity and railways as the two 'vanguards.' The 'marshals' must assume command because, having grain and steel, everything else is easier to handle. The 'vanguards' must march first. . . ." *China's State Planning Commission*, September 11, 1977.

"If we did not learn from the advanced experience of foreign countries, then we might as well switch off the electric lights, for electricity was invented by Franklin!" *People's Daily*, Peking, July 3, 1977.

China's energy potential is large, and even today the country is the fifth largest producer of primary energy following the United States, the Soviet Union, Saudi Arabia, and Iran. Coal production and reserves rank third in the world and account for about two thirds of the primary energy supply. Oil, which has been a recent and rapid development, accounts for nearly one quarter, and natural gas just under 10%.

The PRC's hydroelectric potential is huge, but remotely located, and currently contributes only about 1% of the energy. As yet China has no nuclear energy sector. The primary energy base to support electric power and industrial growth needs massive investment for development. That the Chinese intend to embark on such a program seems evident from the recent Taching Conference call to develop ten more Taching oil fields by the end of this century.

Development of China's Power Industry

At the close of the Revolution in 1949, the newly founded People's Republic of China inherited a badly

ABBREVIATIONS USED

kcal/kg	kilocalories/kilogram
kv	kilovolts
kva	kilovolt-amperes
kw	kilowatts (thousand watts)
kwh	kilowatt-hours (thousand watt-hours)
mw	megawatts (million watts)

run-down, obsolete electric power industry that had been ravaged by many years of intermittent war. After World War II, the Soviet Union physically removed over 1,000 megawatts (mw) of generating capacity from the Northeast (Manchuria). Installed electric power generating capacity in all of China on December 31, 1949, stood at 1,800 mw, or less than the current capacity of the Grand Coulee hydroelectric station. The Chinese leadership, quite aware of Lenin's admonition that "communism equals Soviet power (strength) plus electrification," set out to develop the electric power base necessary to support the rapid growth of agriculture and industry.

The PRC's First Five-Year Plan (1953-57) called for the addition of new hydroelectric and thermal stations as well as the expansion of the base for the manufacture of generators and other equipment for the industry. During the Plan substantial assistance was received by China from the Soviet Union, Czechoslovakia, and East Germany. In 1954 alone, the Chinese had 160 power-related projects underway. About 2,900 mw of generating capacity were added during this Plan, of which 600 mw represented new units at the Supung and Tafengman hydroelectric stations in Northeast China to replace those taken by the Russians. At the end of 1957, installed capacity had grown to 4,900 mw; 1,000 mw, or 20%, consisted of hydro units. Table 1 shows China's electric power generating capacity for selected years.

Table 1
ELECTRIC POWER GENERATING CAPACITY*
(thousand mw)

Year**	Capacity	Year	Capacity
1949	1.8	1971	21.1
1952	2.0	1972	23.6
1957	4.9	1973	26.8
1961	10.7	1974	30.0
1965	11.8	1975	34.0
1966	13.8	1976	37.4
1970	19.4	1977 (est.)	43.0

* Power generated is 3-phase, 50 Hertz at main stations; small plants are generally single phase.
** December 31 of the year cited.

The Great Leap Forward

In December 1957, the PRC embarked on the Great Leap Forward, a program designed to move the Chinese economy ahead with great rapidity; power generation was to increase 18% annually during the period 1958-60 as part of the Second Five-Year Plan. The tempo did rise, and, during 1958-59, generating capacity nearly doubled as 4,500 mw were added. The Leap Forward, however, soon began to cause serious dislocations in the economy, and by 1960 a severe slump had set in.

During the Leap Forward, considerable Soviet aid continued, and plans were laid down and construction started on many power plants. Major hydro projects at Yenkuo, Chingtung, Liuchia, Tanchiangkou, and elsewhere got underway in 1958, but construction was soon abandoned with the collapse of the Leap and the withdrawal of all Soviet aid in 1960.

One important measure of the slump may be seen in the sharp reduction in the demand for power with output curtailed from 47 billion kilowatt-hours (kwh) in 1960 to 31 billion kwh in 1961, a decline of 34%. The 1960 production level was not achieved again until 1966. Additions to generating capacity in the six-year period, 1960-65, amounted to only 1,600 mw. With recovery under way by 1966, new disruptions during the Cultural Revolution caused demand to drop in 1967. But the economy then rebounded quickly, however, with power output in China growing at an average annual rate of 17%, 1968-70.

Growth Resumes

The close of the decade marks a turning point in Chinese power development. Earlier difficulties and the sudden withdrawal of Soviet assistance had been overcome. The Chinese electric power industry, to paraphrase Chairman Mao, "had stood up." The first generating units at the two largest hydro projects in China had become operational; other hydros on which construction had halted were active once again. The design of "workhorse" 125-mw steam turbo-generators had been mastered. Technological progress was substantial as can be seen from the "milestones" shown in the accompanying box.

Growth of power generation capacity during the Fourth Five-Year Plan (1971-75) was uneven but averaged about 11% per annum. More noteworthy, perhaps, was China's import of complete power plants from Japan and Western Europe and turbo-generators from the USSR and Czechoslovakia. In the period 1972-75, purchases of foreign plant and equipment added over 4,500 mw to China's power capacity at a cost approaching \$350 million; details are shown in Table 2.

Walking on Two Legs

In developing the power industry, Chinese planners have followed what they term the policy of "walking

Table 2
ELECTRIC POWER GENERATION PLANT
AND EQUIPMENT PURCHASED BY CHINA
1972-1976

Thermal Station Turbo-Generators

USSR—1972	4 units at 75 mw each; \$8.2 million.
USSR—1973	7 units at 100 mw each; \$16.7 million.
USSR—1974	1 unit at 200 mw; \$2.7 million.
USSR—1975	2 units at 200 mw each; \$6.8 million.
USSR—1976	2 units at 200 mw each; about \$7.0 million.
Czechoslovakia—1974	3 units at 100 mw each.
Italy—1972	1 unit at 125 mw; supplied by Gruppa Industrie Elettromeccaniche (GIE)—over \$8 million.
Italy—1974	2 units at 320 mw; oil-fired plant under construction at Tientsin, Dec. 1975; value about \$79 million.
Japan—1972	2 units at 125 mw each; supplied by Hitachi; operation scheduled for 1975; value, \$30 million.
Japan—1973	2 units at 250 mw each; supplied by Hitachi; operation at Tangshan originally scheduled for 1975; value, \$72 million.
France/Switzerland—1974	1 unit at 300 mw; brown coal-fired plant supplied by CEM/France and Sulzer and Brown Boveri/Switzerland; transaction is 70% French; operation scheduled for mid-1976; value, about \$55 million.

Hydro Station Turbo-Generators

France—1972	2 units at 60 mw each; supplied by Alsthom-Neyrpic and Creusot-Loire; delivery scheduled 1975; value \$10 million.
Sweden—	3 units supplied by ASEA; went into operation 1974; value, \$4 million.

Gas Turbines and Generators

United Kingdom—1972	5 units at 20 mw each; supplied by John Brown Ltd. (G.E. licensee); in use for base and peak load service, value \$8.2 million.
United Kingdom—1973	5 units at 20 mw each; supplied by John Brown Ltd.; at least one unit in use for mechanical drive, not power generation; value \$8.2 million.
Belgium/Canada—	3 units at 8.5 mw each; supplied by ACEC/Belgium and Westinghouse/Canada (Model W-101-G); for base load service; delivered 1975; value \$5 million.
Japan—1975	2 units at 25 mw each; supplied by Hitachi (Type F-5); delivered 1976; value \$5.2 million.
Canada—1973	2 rail mobile units at 9 mw each; supplied by Orenda Division of Hawker Siddeley; arrived in PRC 1975; value \$5-6 million.

Total capacity 4,528+ mw 44 units \$331+ million

on two legs"; that is, concomitant with the erection of large, relatively modern central thermal stations and hydroelectric units is the construction of very small, much less mechanized power generating facilities. In a general way, these constitute parallel industries, one controlled by the Ministry of Water Conservancy and Electric Power from Peking and the other locally controlled at the county and commune level. Among the locally controlled plants the most significant developmental feature has been the unparalleled spread of small (less than 1,000 kw) and medium size (less than 30 mw) hydroelectric units (information on these cutoffs is uncertain and they may be 500 kw and 25 mw).

Small hydros form an integral part of the rural electrification program and provide electricity to three-fourths of China's communes. According to official sources, the number of such stations at the beginning of 1977 was nearly 65,000 with some 5,000 being added annually. Around 80% of these units are found in the PRC's eight, water-rich southernmost provinces; Kwangtung leads with over 12,000 installations.

Thermal and Hydroelectric Generating Capacity

China's potential for hydroelectric development—in excess of 500,000 mw—is almost certainly the greatest in the world. Unfortunately, most of the viable dam sites are situated in remote parts of southwest China and in Tibet where little industry exists. Given the long construction times for large hydroelectric projects, however, development of dams across the upper reaches of the Yangtze, for example, should be in the planning or early construction stages even though economic delivery of this power to distant industrial centers depends on the development of 500 to 750-kilovolt (kv) transmission systems.

About two-thirds of all China's hydroelectric capacity is found in the 53 known stations with capacities of 30 mw and higher. The balance resides in the 65,000 or so small and medium size hydros. At the end of 1976, hydroelectric generating capacity accounted for an estimated 36% of all of China's generating capacity. Because of the much lower utilization rate for hydro units, especially the small ones, it should be noted that the share of power actually generated by the installed hydro capacity will be considerably lower, about 25%.

The share of China's generating capacity in hydro units has increased noticeably in recent years owing to the completion of major dams on the Yellow and Han Rivers and because of the addition of large numbers of small and medium size hydros. Fossil-fueled, steam electric power stations, however, while more complex technically, can be constructed more quickly than hydros. Thus, it is expected that the share of total capacity held by these thermal plants will increase in the years immediately ahead. Thermal sta-

Currently, the PRC is the ninth largest power producer in the world, ranking after France and Italy, but the country's per capita output of power in China is very low, comparable to that of India, Zaire, or Bolivia.

tions produced about three-quarters of China's electricity in 1976. On December 31, 1976, thermal plant generating capacity was an estimated 64% of China's total; the major portion of this capacity resides in the 105 known thermal stations of 30 mw and more. Gas turbines contribute only a minute share of the generating capacity in the PRC. China has no nuclear power stations.

Regional Power Capacity

In 1949 most of China's industry was centered in the coastal areas and in the Northeast as were the bulk of the electric power plants. The policy laid down in the First Five-Year Plan to locate industry as close to sources of raw material and fuel supply as to consumption centers led eventually to the dispersion of industry to inland areas. This gave rise to the development of significant power generating capacity in many of China's provinces. Table 3 shows the approximate share of power generating capacity found in each province at the end of 1976.

Table 3
ELECTRIC POWER GENERATING CAPACITY
BY PROVINCE
December 31, 1976

Province	Share (%)	Province	Share (%)
Anhui	4.2	Kweichow	2.6
Chekiang	6.2	Liaoning	9.0
Fukien	2.1	Ningsia	0.8
Heilungkiang	3.3	Peking	4.7
Honan	3.6	Shanghai	4.6
Hopeh	3.4	Shansi	2.8
Hunan	2.5	Shantung	5.3
Hupei	5.9	Shensi	2.7
Inner Mongolia	1.3	Sinkiang	0.5
Kansu	8.2	Szechwan	4.8
Kiangsi	1.2	Tibet	0.2
Kiangsu	3.5	Tientsin	0.9
Kirin	4.8	Tsinghai	0.2
Kwangsi	1.6	Yunnan	2.4
Kwangtung	6.7	Total	100.0

In recent years power capacity in some provinces has undergone rapid expansion. For example, the 940 mw of capacity added in Shantung between 1970 and 1975 vaulted the province from eleventh to sixth position. Similarly, the completion of the Yellow and Han River dams has markedly raised capacity in Kansu and Hupei. The old center in Liaoning remains first, but the power developments around Lanchow to support chemical and nuclear weapons facilities have pushed Kansu province in the north-west to second place.

The major electric power systems in China today, judging from the development of transmission lines and power grids, appear to be: Northeast (Heilungkiang, Kirin, and Liaoning); North (Hopeh, Peking, and Tientsin); Shantung; Hupei; East (Anhui, Shanghai, Kiangsu, and Chekiang); Kwangtung; and Kansu/Shensi/Honan. The Northeast and North power grids are linked, but only by a single 110-Kv transmission line. Lesser systems exist in Szechwan, Shansi, Hunan, Fukien, and Yunnan.

China's Current Situation

Currently, the PRC has the ninth largest electric power industry in the world, ranking after France and Italy; China is also the ninth largest producer of electricity, but per capita output of power in 1976 stood at about 135 kwh, which is very low and which is similar to that of India, Zaire, and Bolivia.

The recent performance of China's electric power industry has been adequate, compared to that of some other sectors of the Chinese economy. China's power output increased an estimated 7% in 1976 and, while this fell below the average annual growth rate of 11%, 1971-75, it was substantially better than industry as a whole in 1976, when growth was less than 2%. Probably the best record was recorded in Shantung province where newly installed units contributed to a 20% increase over 1975. These achievements do not mean that the supply of power in China in 1977 fully meets demand. There are still shortages evident and widespread campaigns preach conservation.

The PRC's generating capacity, as of December 31, 1977, will stand at 43 thousand mw, an increase of 15%, if projected industrial growth is met. Power generated in 1977 will likely show a large jump as the economy rebounds from the difficulties of 1976. Should China's rated generating capacity be operated at 3,600 hours during the year to meet demand, then power produced in 1977 would total about 145 billion kwh.

During the first half of 1977, the Chinese power industry set a new high in electricity output: Official reports state that six of the eleven largest power systems surpassed all previous records. The Peking Power Administration has pledged to add 800 mw of capacity in 1977; Shensi, 500 mw; and all four generators at the new, Japanese-supplied 750 mw Taoho

MILESTONES IN CHINESE ELECTRIC POWER DEVELOPMENT

1952	First 3-mw electric generator		First 225-mw generator for hydro use operational at Liuchia
1953	First 6-mw hydro-generator set		First 330-kv high tension cable
	First 44-kv/20,000-kva transformer		First 260-kv transformer
1954	First 6-mw steam turbo-generator set	1970	First 60,000-kva transformer
	First 154-kv/20,000-kva transformer		First 110-kv aluminum cable current sensor
1955	First 40-ton/hr steam boiler		First 154-kv high tension cable fault detector
	First 10-mw hydro-generator set	1971	First 60-mw hydro-generator set for low-head
	First 120-kv/31,500-kva transformer		First experimental geothermal power generator operational at 86 kw
1956	First 12-mw steam turbo-generator set		First 750-kva, 3-phase, water-cooled transformer
	First 15-mw hydro-generator set		First 15,000-kva water-cooled transformer
	First 3.5-kv high tension cable	1972	First 220-kv/300,000-kva aluminum-wound transformer
1957	First 130-ton/hr steam boiler		Initial construction of 300-mw steam turbo-generator with water-cooled rotor and stator
	First 220-kv/20,000-kva single-phase transformer		First transmission of power at 330kv over short distances
1958	First 110-kv/60,000-kva three-phase transformer	1973	First 300-mw hydro-generator set with water-cooled rotor and stator
	First 220-kv/40,000-kva single-phase transformer		Initial construction of 200-mw steam turbo-generator with water-cooled rotor and stator
	First 220-kv oil filled high-tension cable		First 11-mw pumped storage facility
1959	First 50-mw steam turbo-generator	1974	First power station in China with over 1,000-mw capacity into operation
	First 72.5-mw generator for hydro use		First 330-kv mutual inductance voltage transformer
1960	First 230-ton/hr high temperature and pressure steam boiler		First sodium hexafluoride high voltage standard condensor
	First 50-mw high temperature and pressure steam turbine		First 670-ton/hr super-high pressure boiler for 200-mw steam turbines
	First 100-mw steam turbo-generator with water-cooled motor and stator		First use of gas turbine exhaust heat to pre-heat boiler feedwater
1965	First silicon controlled rectifier	1975	First computer-control of a 100-mw steam turbo-generator
	First 500-kv standard condensor		First 10-mw gas turbine for power generation
	First 6-mw gas turbine		First 200-mw steam turbo-generator operational at the Chinghsi station, Peking
	First 220-kv air circuit breaker		First 330-kv high tension transmission line completed, 534-km long
	First 330-kv rod insulator	1976	First 300-mw steam turbo-generator operational at the Wangting station, Wuhsi
1966	First 72.5-mw hydro-generator set		
	First 100-mw hydro-generator set		
	First 1,000-kv standard condensor		
	First 330-kv suspension type insulator		
	First 1,000-kv standard condensor		
1968	First 150-mw generator for hydro use operational at Tanchiangkou		
	First variable control transformer		
	First 110-kv underwater cable		
1969	First 125-mw steam turbo-generator with water-cooled rotor and stator		

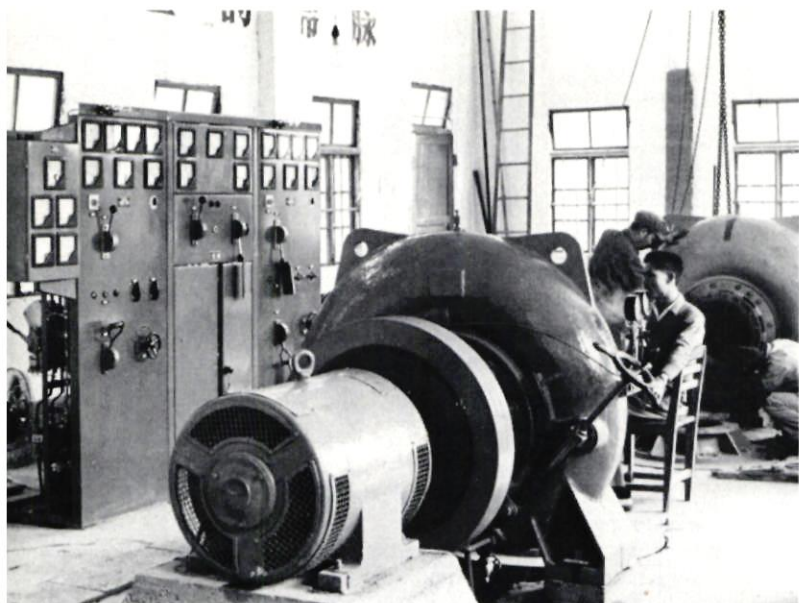
station in Hopeh are promised for completion in 1977. Already this year, a 300-mw turbo-generator has been added at the Wangting station and 200-mw units added at the Hsintien and Chaoyang plants. These additions are about half the capacity required in 1977, if projected growth is to be met.

Electric Power Plants and Related Equipment

By standards characteristic of most industrialized nations, China's electric power facilities are of small to medium size. The largest facility in the country, the Liuchia hydroelectric station in Kansu, has a generating capacity of 1,225 mw. The biggest thermal-electric facility is now probably the Wangting station

at Wuhsi, in Kiangsu, with a capacity in mid-1977 of about 713 mw. In all there are eight Chinese power stations with capacities in excess of 500 mw and 14 more between 300 and 500 mw. Two additional foreign-supplied stations currently under construction, one in Tientsin and one in Tangshan (now probably delayed because of the earthquake), will have capacities of 650 mw or higher when completed. Several more Chinese-designed stations of this size may be under construction.*

* The US has 446 stations of 300 mw capacity and greater with Grand Coulee, the largest hydro at 2,195 mw and Bowen, the largest thermal unit at 3,499 mw; for the Soviet Union the equivalents are 166 stations with the Krasnoyarsk hydro at 6,000 mw and the Krivoy Rog No. 2 thermal plant at 3,000 mw the largest.



150-kw hydroelectric power generator at the Rokang Commune near Canton.

A listing of all known Chinese power stations with capacities of 30 mw or greater are shown in Table 4. These facilities may be located on the map accompanying this article by their reference number.

As might be expected, most Western technological assessments conclude that, overall, the Chinese electric power industry is lagging significantly behind developed industrial countries. The lag can be measured in different ways but, in general, is considered to be greater than 15 years. Not only is it evident in scale of plant as indicated above, but it is seen by observers in Chinese equipment design, in boiler operating pressures and temperatures, in centralized control of thermal stations, in power dispatch and load management, and in the absence of nuclear power.

Yet the Chinese undeniably have made substantial technical progress in the process of raising generating capacity from 1.8 thousand mw on December 31, 1949, to 37.4 thousand mw on December 31, 1976. The milestones shown in the box are impressive and serve as a measure of this progress.

Fossil-Fueled Steam Electric Plants

In 1976, roughly 75% of all steam-electric power plants in China were fired with coal ranging from anthracite through bituminous types to lignite. The balance of the fossil-fueled power plants are operated on crude or residual oils. As the Chinese petroleum industry continues to climb from its current output of about 1.7 million barrels of oil daily, however, numbers of power plants have been or are being converted from coal to oil-firing. This will continue. Natural gas has not been utilized to any extent for power plants although some Szechwan units are gas-fired.

Coal reserves in the PRC are extensive, in fact, the

third largest in the world, but the current supply continues to be tight owing to rising demand and to years of neglect in investing in basic mine mechanization and coal preparation facilities. The coal most widely used in power generation is a sub-bituminous type with heating values ranging from 3,000 to 5,000 kilocalories(kcal)/kilogram(kg). There is evidence of increasing efficiency as coal consumption per kwh has been reduced from a national average of 0.594 in 1956; some newer power plants are now under 0.4 kg of coal per kwh based on a standard coal of 7,000 kcal/kg. As larger-scale, more efficient steam generating units are built and more money is spent by Peking on the preparation of coal, this index of efficiency should show further improvement. Lignite will continue to be used as evidenced by the erection of the \$55 million, 300-mw French/Swiss-supplied thermal station, which should be nearing operation.

Details on oil-fired Chinese thermal stations are not well known. At the Wuching station in Shanghai, converted in the early 1970's to the use of oil, Shengli crude with a heating value of 10,000 kcal/kg and a sulfur content ranging from 1.0 to 1.8% is being fired. The Taching crude oil being exported to Japan has found its greatest application in firing thermal stations, because its high paraffin content makes processing difficult in most Japanese refineries; the extent of its use in China is not known.

These Chinese fossil fuels are used to fire boilers which appear to have been standardized to provide steam for 100, 125, 200, and 300-mw turbines. Most of these boilers are once-through units reaching pressures of 165 kilograms per square centimeter (kg/cm²) at 535°C. The largest delivers 935 metric tons of steam per hour and is probably the type recently erected at Wangting to serve China's first domestically manufactured 300-mw steam turbines. No super critical boiler systems are known to have been manufactured in China, possibly reflecting lagging Chinese welding and metallurgical practices.

Steam turbo-generator sets of 25, 50, 75, 100, and 125 mw are serially produced in China. Units of 200 and 300 mw have also been manufactured by the Chinese and are now operational; their numbers, however, are limited. Although at least seven 200-mw units were introduced into service between 1975 and 1977, five of these were probably supplied by the Soviet Union.* Two 300-mw units went into operation in 1976 and 1977, but because of an absence of information on how successful the 200 and 300-mw equipment has been, it is questionable whether these larger turbo-generators should yet be considered in serial production.

A large-scale model of the 300-mw unit at the Shanghai Industrial Exhibition shows this Model QFS-300-2 to consist of a nine-stage high pressure

* This does not include any of the turnkey power plants supplied by Italy, France, or Japan.

turbine, an eleven-stage medium pressure turbine, and two double-expansion, low-pressure turbines, each with two six-stage turbines.

A Typical Thermal Station

Kaoching, 30 km west of the center of Peking and the largest of the three thermal stations comprising the Shihchingshan power complex, appears typical of China's larger fossil-fuelled plants. Construction commenced in 1959 and was completed in 1974 with start-up of the sixth and last generator. Kaoching serves Peking via 110 and 220-kv transmission lines and is said not to be tied into the North power grid.

The six hydrogen-cooled, 100-mw turbo-generator sets at the station were installed in 1961, 1963, 1967, 1970, 1973, and 1974; Nos. 1, 2, and 5 are Soviet-built, the balance being Chinese. There are four Soviet 220 ton/hr boilers for units 1 and 2, while the four boilers for units 3-6 producing steam at 410-430 tons/hr are Chinese-manufactured. Boilers are natural circulation at 100 kg/cm² and 540°C with no reheat. The pulverized coal fired at Kaoching comes from Tatung in Shansi and has the following characteristics: 6,500-kcal/kg heating value; volatiles, 25%; ash, 13-15%; and sulfur, 1.5-1.7%.

The control room at Kaoching for units 3, 4, and 5 has an alarm scanner monitoring 130 points per minute with about 40 parameters recorded automatically in an hourly log. In 1974 this scan and log system was said to be "on-trial." It is similar to equipment found in the US about 1960. The newest control room (for unit 6) has a controller capable of adjusting 30 operating parameters and of starting up or shutting down various pieces of equipment. This Chinese control system is said to have taken three years to develop.

Chinese Development Efforts

The Chinese recognize that the scale of plant and size of units in their thermal power plants need to be increased both for greater efficiency (e.g., cost per kwh generated is reduced about 10% with a doubling of turbine size from 100 to 200 mw) and to meet more effectively the continually rising demands of the Chinese economy. Efforts are now probably centered on perfecting the operation of the relatively new 200 and 300-mw turbo-generators. Design and possibly initial construction of units in the 600-mw class are believed to be underway in China.

To date, purchase of foreign thermal plants has been limited to those with turbo-generators in the 250 to 320-mw size, although the next several years should see contracts let for a thermal station with one or two turbo-generators, each with a capacity of 500 to 600 mw. It is uncertain what constraint the Chinese power grids, with their lack of high-capacity interconnections, place on the introduction of generators of these sizes. Clearly, the scale-up of Chinese-designed thermal

station equipment to 600 mw with commensurately sized switch gear and transmission facilities will continue for some years before proven units are routinely supplying power to Chinese consumers.

The Chinese have invested heavily in developing water-cooled rotors and stators for 125, 200, 300-mw turbo-generators. While this appears to be a notable achievement, permitting size and weight reduction in generator manufacture, it would be more significant if the Chinese also provided data showing operational reliability, especially where seals are concerned. Also, the technological lag in unit size must be kept in perspective with the 1,000-mw and greater, hydrogen-cooled rotors now manufactured in the US.

To increase efficiency, the Chinese are utilizing waste heat from hot flue gases and warm cooling water at power stations to heat other industrial plants. Some 120 facilities in Liaoning are using such residual heat. Although not used much in the US, combined district heat and electric power stations are extensively utilized in Europe, especially in the Soviet Union.

At Tientsin power plant No. 2, where much of a gas turbine's exhaust heat was formerly wasted, 80% is now recovered and used to preheat the feedwater for a steam generating unit. Still, there is no evidence of the more advanced concept of "energy centers" where steam is delivered to industrial process use after passing through a steam turbine in a central power station or where "by-product" electricity is produced from excess industrial process steam using an extraction or back-pressure turbine.

Nor is there evidence of the use of combined cycle plants (where gas turbine exhaust is used to drive a conventional steam turbine) for peaking or intermediate load service. This is the most efficient system for generating electricity from liquid or gaseous fossil fuels but is probably not found in China owing to the relatively undeveloped nature of power gas turbine production and technology.

China's Hydroelectric Plants

Chinese dams are of the concrete, stone masonry, rock fill, or earthen types. In 1974 China had 73 concrete and 438 stone masonry dams 15 meters or more in height. More than 95% of all Chinese dams

The Chinese electric power industry is lagging behind the West by more than 15 years, but, since 1949, the Chinese have raised their power generating capacity from 1.8 to 37.4 thousand megawatts.

TABLE 4. ELECTRIC POWER SYSTEM OF THE PEOPLE'S REPUBLIC OF CHINA*

ANHWEI PROVINCE

1. **Chentsun HEP 150mw**
A 3-unit hydro on the Chinghi River in Chin county started 1958, restarted 1968, and completed 1975. Serves the East grid
2. **Foutzuling HEP 31mw**
On the Pi River near Hoshan
3. **Hofei 68mw**
A 50mw turbo-generator unit into operation 1972—in the Anhwei-Kiangsu regional grid.
4. **Hsianghungtien HEP 40mw**
On the Pi River near Tushan
5. **Huainan 306mw**
Two stations in a complex serving the Anhwei-Kiangsu grid. A 125mw unit, largest turbo-generator in Anhwei, into operation 1976
6. **Huaipai 100mw**
Two 50mw units into operation in 1973
- 6(a). **Linhuaikang 50-100mw**
In the suburbs of Hofei
7. **Maanshan 48mw**
Has four 12mw turbo-generators
8. **Maoshienshan HEP 30mw**
On the Wan River in Yuehsu county, Anching prefecture
9. **Meishan HEP 40mw**
On the Shih River in Luan Prefecture. Has four 10mw turbo-generators
10. **Ssuhoshan 50-75mw**
In the city of Wuhu in the Anhwei-Kiangsu regional grid.

CHEKIANG PROVINCE

11. **Chihlung HEP 420mw**
A 20m high, low-head hydro on the Fuchun River near Tonglu, has six units at 50mw and two at 60mw
12. **Fuchun HEP 180mw**
A 40m high, low-head hydro on the Chientang River, a tributary of the Fuchun, has three turbo-generators at 60mw each
13. **Chakou 30-50mw**
In Hangchow, sometimes referred to as No. 1 station
14. **Hsianan HEP 652.5mw**
A main link in the East grid located on the Hsianan River; nine units at 72.5mw each
15. **Huangtangkou 30mw**
A small, four-unit hydro on the Wuchi River
16. **Meichi HEP 60mw**
South of Tai Lake; a fifth unit at 12mw went into operation in 1975

FUKIEN PROVINCE

17. **Ansha HEP 115mw**
On the Chialung River in Saming Prefecture, has three turbo-generators, one of 75mw and two of 20mw each
18. **Kutien HEP 158mw**
A cascade hydro system of four dams with a fifth planned. Kutien #1 has six generators totalling 62mw while Kutien hydros #2-4 are believed to have a generating capacity of 32mw each
19. **Sanning 35-50mw**
Provides power to a 220kv transmission system
20. **Yungan 50mw**
The largest thermal station in Fukien, has two units at 25mw plus possibly some small, older units

HEILUNGKIANG PROVINCE

21. **Chiamussu 86mw**
Serves nearby coal mines and Chiamussu city; a 100mw unit being added in 1977
22. **Chihsi 87mw**
Probably has three units at 50, 25, and 12mw each
23. **Chingpo HEP 36mw**
A small hydro on the Mutan River in Ningnan County
24. **Fulaerhchi 125mw**
Modifications in 1976 to permit highest boiler operating temperatures in China permitting a 23% boost in generating capacity
25. **Harbin 73mw**
One of two power stations in Harbin
26. **Harbin Heat and Power 200mw**
Has two generating units of 100mw each, the second became operational in 1976
27. **Hsinhua 150mw**
A new facility with a 100mw turbo-generator going into operation in late 1975 or early 1976, 50mw unit into operation in 1973. Location uncertain
28. **Taching #1 35-50mw**
An old power station at Anta now assumed to be Taching #1
29. **Taching #2 100 mw**
A new station to supply expanded refining and petrochemical operations. Units #1-2 into operation in January and September 1973.

HONAN PROVINCE

- 29(a). **Anyang 50-100mw**
Started during the Cultural Revolution

30. **Chengchow 100mw**
In the city of Chengchow
31. **Hsinhsiang 42.5mw**
In Hsinhsiang city, has small units, the largest is 25mw. May have been expanded
32. **Loyang 175mw**
Was expanded from 75mw in 1958 to 175mw currently
33. **Pingdingshan 250mw**
Probably a two-plant complex. Originally at 30mw to be expanded to 250mw
34. **Sanmen HEP 50mw**
Originally a Soviet-aid project later completed by the Chinese but because of silt problems in the Yellow River total generating capacity will be limited to 200mw total
35. **Tangho 200mw**
The largest power plant in Honan. The second of two 100mw units became operational in April 1975. Located in Nanyang Prefecture

HOPEH PROVINCE

36. **Hantan 86mw**
Probably has six 12mw units, but improvements have increased installed capacity by 20%
37. **Hsiamaling HEP 65mw**
On the Yungting River near Peking
38. **Kuangting HEP 30mw**
On the Yungting River near Peking. Dam is 45m high
39. **Luanho 96mw**
In Chengte city
40. **Matou (u.c.)**
A new 100mw unit became operational in February 1977. Output of Matou will boost the south Hopeh grid
41. **Paoting 50mw**
Completed in 1958
42. **Pingshan HEP 40mw**
On the Huto River northwest of Shihchiachuang
43. **Shihchiachuang 150mw**
Revamping of existing units between 1969 and 1973 increased capacity by 30%
44. **Tangshan 275mw**
In Tangshan city. All ten generating units damaged in 1976 earthquake. Supplies the North power grid
45. **Taoho 125mw plan 750mw**
In the northern suburbs of Tangshan. Site of Hitachi (Japan) supplied 125 and 250mw units. Damaged in quake. Started generating from one 125mw unit on July 28, 1977, and Chinese builders pledge to put all four units totalling 750mw into operation by the end of 1977

HUNAN PROVINCE

46. **Chechi HEP 217.5mw**
On the Tzushui River near Anhua. Plans call for expansion to 435mw
47. **Chuchou 60mw**
Into operation 1957, expanded 1972
48. **Hsintushan 125mw**
A new plant with a 125mw unit, the largest in Hunan, installed in July 1967. Located in Shaoyang Prefecture
49. **Shuilumiao HEP 36mw**
On the Lientsui River west of Hsianghsiang

HUPEH PROVINCE

50. **Huanglungtan HEP 150mw**
On the Tu River a tributary of the Han. Construction started 1969, plant operational 1974. Dam is 371m, long by 107m high
51. **Huangshih 128mw**
In Huangshih city southeast of Wuhan
52. **Tanchiangkou HEP 900mw**
China's second largest hydro unit producing over half the power in Hupeh. Dam is 2500m long by 110m high
53. **Wuhan 250mw**
The Chingshan station, under expansion, has at least two 50mw units
54. **Wuhan 30mw**
Wuhan #3 station in the Hankow section

INNER MONGOLIA

55. **Huhohote 50mw**
Probably has two 25mw units
56. **Paotou #1 100mw**
Expansion planned to 200mw
57. **Paotou #2 100mw**
In Paotou city
58. **Urat Mountain 100mw**
At Wulashan, location unknown. A new 100mw unit became operational in early 1976

KANSU PROVINCE

59. **Lanchou 300mw**
The Hsiku station originally planned for 525mw
60. **Liuchia HEP 1.225mw**
China's largest power plant located on the Yellow River west of Lanchou, has five turbo-generator units including China's first 300mw hydraulic unit. Dam is 100m wide by 147m high

61. **Papan HEP 180mw**
Another Yellow River dam, has five units probably at 36mw each. Construction started 1959, fully operational 1975
62. **Yenkuo HEP 300mw**
On the Yellow River 70km from Lanchou. Dam is 321m long by 57m high
63. **Yumen 150mw**
Plans call for 300mw when complete
64. **Yumen Heat and Power 36mw**
Another thermal station located in Yumen
65. **Yungchang 36mw**
Located in Yungchang city

KIANGSI PROVINCE

66. **Chiangkou HEP 32mw**
Near Hsinyu on the Yuanhsui River
67. **Lowan HEP (u.c.)**
The first high-head hydro in Kiangsi under construction since 1970. Location uncertain
68. **Nanchang 51mw**
The Chichieh in Nanchang
69. **Shangyu HEP 60mw**
The first hydro-station designed by the PRC located on the Chang River, a tributary of the Kan River. Has four 15mw units
70. **Talin HEP 100mw**
Believed to be on the Hsiushui River in the vicinity of Tean about 90km north of Nanchang. Planned capacity probably 400mw

KIRIN PROVINCE

71. **Chenchang 224mw**
Probably has four 50mw generators and one at 24mw
72. **Huaiyin 50mw**
A new 25mw unit became operational in November 1972
73. **Nanking 100-150mw**
The Hsiakuan station in Nanking
74. **Nanking 100mw**
The Tachangchen power plant in Nanking
75. **Tienhsengchang 50mw**
One of China's largest thermal stations located in Wuhsu. Station has two units at 300mw, four units at 22mw, and one at 25mw. The second 300mw set became operational in February 1977 raising Wangting's generating capacity above 700mw

KWANGSI CHUANG

83. **Homienshi HEP 68mw**
On the Ho River in Wuchow Prefecture, four generating units. Started 1958, restarted 1970, completed 1976
84. **Hsiching HEP 217.5mw**
On the Yu River in Nanning Prefecture. First unit at 72.5mw installed October 1964
85. **Liuchou 36mw**
Started 1958, completed 1962

KWANGTUNG PROVINCE

86. **Changtu HEP 72mw**
Located 9km southeast of Yingte. Has two 36mw units. Construction started 1970, completed 1974
87. **Chiaoling HEP 60mw**
In Mehsien Prefecture on a tributary of the Han River
88. **Fengshapa HEP 150mw**
Has three 75mw hydraulic units
89. **Hsienfengho HEP 290mw**
Largest station in Kwangtung near Hoyuan. Probably has four turbo-generators at 72.5mw each
90. **Kwangchow 105mw**
An older plant named Hsitsun with as many as eight generators
91. **Liuchiho HEP 42mw**
On the Liuchi River near Liangkou. Has four 10.5mw units
92. **Maoming 200mw**
Largest thermal power plant in the province, the fourth unit at 100mw became operational at the end of 1975

93. **Nanshui HEP 50mw**
Located on a tributary of the Pei River near Juyuan. Has two 25mw units
94. **Tanling HEP 30-50mw**
Located on the Lien River in Lien County, Shaokuan Prefecture
95. **Wushih 193mw**
In Shaokuan Prefecture. A new generator that became operational in October 1972 increased capacity by 40%

KWEICHOW PROVINCE

96. **Chingchen 64mw**
Located in the suburbs of Chingchen. Has four 32mw Hungarian turbo-generators. Expansion by the addition of two 75mw units planned
97. **Kueiyin 124mw**
Became operational in 1958
98. **Maotiao HEP 250mw**
A 6-level cascade system in Chingchen County with generators in or planned for 5 stages. Includes the Hungfeng HEP at 20mw. Not clear whether planned capacity of 250-300mw has been reached
99. **Tsuni 30-50mw**
Original plans call for expansion to 200mw

LIAONING PROVINCE

100. **Anshan 55.5mw**
Part of the Anshan Steel complex. Plans call for expansion to 200mw
101. **Chaoyang 200mw**
A new plant being built in two stages. First 200mw until installed 1976, the second in 1977
102. **Fushin 326mw**
A major unit in the Northeast grid
103. **Fushun 345mw**
The Taikantan station, another major plant in the Northeast power grid
104. **Fushun 100mw**
Part of the #2 shale oil complex
105. **Fushun HEP 32mw**
The Tachuofeng hydro station on the Hun River
106. **Huanjen HEP 145mw**
On the Hun River, expansion to 290mw planned in the Northeast grid system
107. **Liaoning 600mw**
The largest thermal station in northeast China located between Fushun and Shenyang
108. **Dairen #1 52mw**
Located in Dairen, (Luta)
109. **Dairen #2 98mw**
The Kanchingtu station in Dairen
110. **Penchi 86mw**
Part of the Penchi Steel Plant
111. **Shenyang 50mw**
The Tieshi station in Shenyang. Planned expansion calls for a total capacity of 200mw
112. **Supung Dong Sui HEP 700mw**
On the Yalu River. Power is shared approximately 50:50 with North Korea

NINGSIA HUI

113. **Chinglung HEP 225mw**
First generator of 37.5mw operational 1967, the sixth operational 1975, a seventh unit planned will bring capacity to 262.5mw

PEKING MUNICIPALITY

114. **Chingshi 200mw**
A new plant in the western suburbs and one of the three thermal stations comprising the Shichingshan complex. The first 200mw unit became operational in November 1975
115. **Chuwu (u.c.)**
A new thermal station under construction, planned capacity unknown
116. **Kaoching 600mw**
The largest plant in the Shichingshan complex. Has six 100mw turbo-generators, the last installed in 1974
117. **Miyun HEP 93mw**
North of Peking. Has a 90mw and a 3mw generator as well as an 11mw pumped storage system for peak shaving
118. **Peking #1 300mw**
In Peking's eastern suburbs. Has two 25mw, one 50mw, and two 100mw units, the last 100mw unit installed in 1967
119. **Shichingshan 100mw**
The original power station in the 3-plant Shichingshan complex

SHANGHAI MUNICIPALITY

120. **Chapei 275mw**
An early plant expanded by the addition of a 50mw unit in 1973 and a 100mw unit in December 1974
121. **Minhang 300mw**
A new 125mw turbo-generator added in 1973
122. **Nanshih 100mw**
A 50mw unit became operational in December 1972
123. **Wuching 355mw**
A major unit in the East grid. Has six units at 125, 100, 50, 30, and 25mw capacity

124. **Yangshupu 227mw**
Has at least six units—an old pre-1949 station

SHANSI PROVINCE

125. **Huohsien 125mw**
A 100mw unit became operational in 1973 permitting linkage of the north and south Shansi grids
126. **Liangtzuken 100mw**
In the Taihang Mountains east of Yangchuan. The 100mw turbo-generator here became operational in 1972
127. **Taiyuan #1 150mw**
One of three power plants in Taiyuan
128. **Taiyuan #2 250mw**
Is believed to have six units, four at 50mw and two at 25mw
129. **Taiyuan Steel 72mw**
Part of the Taiyuan Steel Plant
130. **Tatung 54mw**
The Pingwang station at Tatung

144 • URUMCHI

SINKIANG UIGHUR

• 143

SHANTUNG PROVINCE

131. **Hanchuang 52mw**
Located in Hanchuang city. Plans call for expansion to 202mw
132. **Hsintai 36mw**
In Hsintai city
133. **Hsintian 400mw**
A new thermal station near the Shengli oil field. Has two 100mw units and one 200mw unit that went into operation in 1976. A second 200mw turbo-generator became operational in early 1977
134. **Laiwu 375mw**
Another new Shantung station begun in 1970. Has three 125mw units, the last becoming operational in 1976
135. **Huantai 475mw**
In Tsinan. In 1976 two 200mw turbo-generators were added to Huantai's capacity
136. **Ssufang 45mw**
Located in Tsingtao, this station has probably been expanded
137. **Tzupo 50-100mw**
The Nanting station in Tzupo. There may be a second thermal plant in Tzupo

SHENSI PROVINCE

138. **Chinfing 250mw**
Location of this new station is not known. A second 125mw unit became operational in September 1974
139. **Paochi 50mw**
Located in the city of Paochi
140. **Shihchuan HEP 135mw**
On the Han River in Shihchuan. Has three units
141. **Sian #2 54mw**
The Pachiao station
142. **Sian #3 250mw**
The Huhsien station

SINKIANG UIGHUR

143. **Kuerhio HEP 50-100mw**
On the Kungchiao River near Kuerhio
144. **Weiuliang 73mw**
In Wulumuchi (Urumschi)

SZECHWAN PROVINCE

145. **Chengtu 250mw**
Completed in 1959
146. **Chungching 112mw**
Thermal station #507
147. **Hsiaoshihzu HEP 90mw**
In the vicinity of Loshan, down the Yangtze from Luchou
148. **Lungchi HEP 108mw**
A cascade system on the Lungchi River near Changshou. System includes Shihztung HEP 48mw, Shantung HEP 11mw, Huiungchai HEP 16mw, and Hsiatung HEP 33mw
149. **Minchiang HEP 360mw**
On the Min River near Ipin
- 149(a). **Molangkou HEP 37.5mw**
On the Chengtu-Kunming RR south of Mienning
150. **Paimamiao 50mw**
A thermal station at Neichiang

TIBET

151. **Chinho HEP 50mw**
Believed to have four 12.5mw units, but may be smaller. In the vicinity of Changtu

ENTSIN MUNICIPALITY

2. Tientsin #1 150mw
Built in the 1950's
3. Tientsin #2 over 100mw
The eastern suburbs at Chinlangchen. Has 5 turbines in a combined cycle with steam its
4. Tientsin (u.c.)
A plant being supplied by GIE-Ansaldo of Italy. It has two 325mw turbo-generators

INGHAI PROVINCE

- i. Chaoyang HEP 30mw
Applies power to a 220kv. transmission line located in the vicinity of Hsining

JNNAN PROVINCE

6. Hsuanwei 50-100mw
Original plan calls for expansion to 600mw. Applies power to Kunming

157. Ili HEP 172mw

A cascade system on the Ili River having 4 dams including Tungchuan 10mw, Shutsaotzu 18mw and Yenshuikuo 144mw. The fourth dam may not be operational, but was originally planned to have 230mw capacity

158. Kaiyuan 64mw

Has two generators at 48 and 16mw

159. Kunming over 30mw

The Pupingsun station in Kunming

160. Kunming 60mw

The Yangtonghai station with 5 units at 12mw located near Kunming

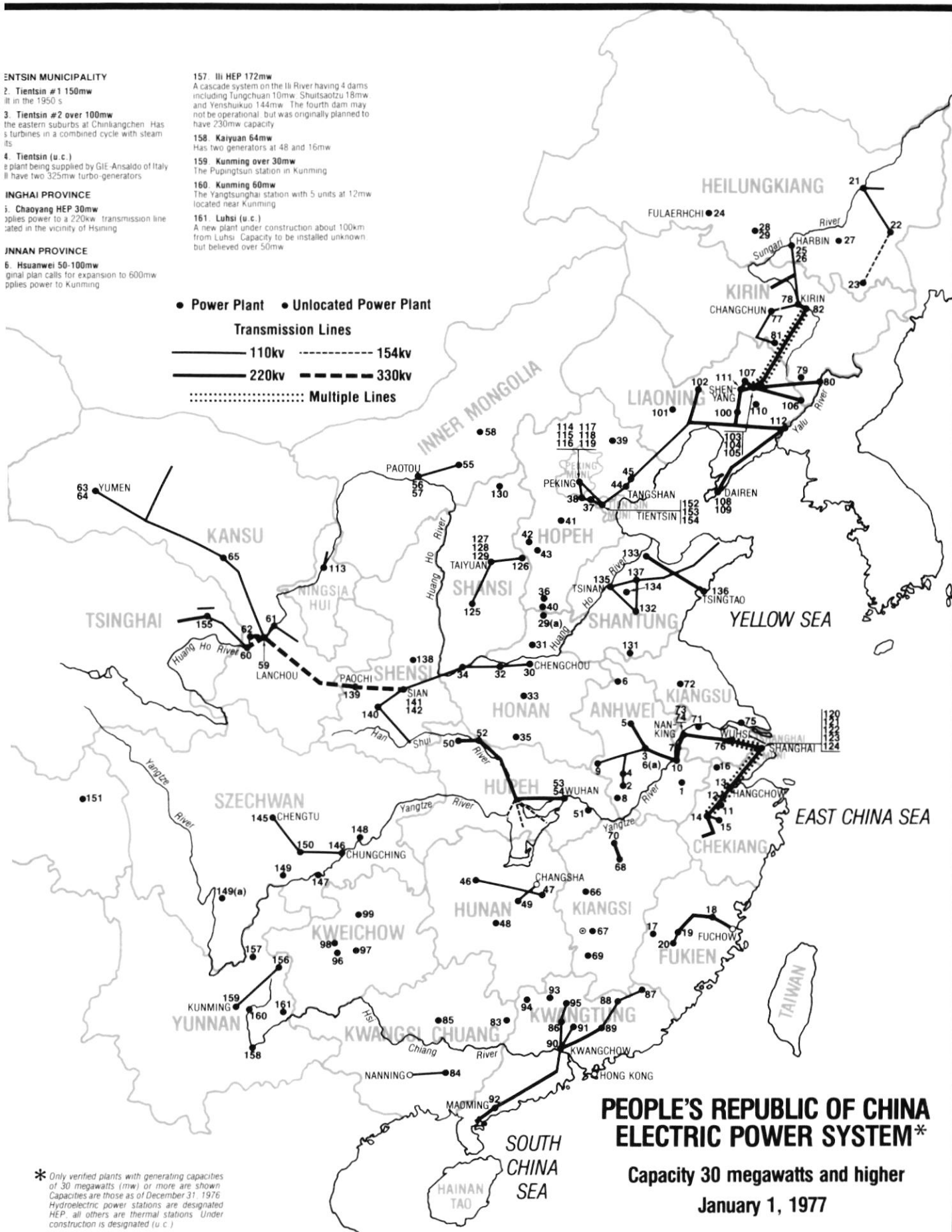
161. Luhsi (u.c.)

A new plant under construction about 100km from Luhsi. Capacity to be installed unknown, but believed over 50mw

- Power Plant
- Unlocated Power Plant

Transmission Lines

- 110kv
- 154kv
- ===== 220kv
- 330kv
- Multiple Lines



are of the "labor-intensive," earth-filled type. Dams may be either "run-of-river" or storage (reservoir), and there may be at least one pumped storage system. The PRC has over 250 large reservoirs, those with storage in excess of 100 million cubic meters. Power houses are found both at the foot of the dam, even under the spillway, and downstream, sometimes at a considerable distance to increase the head.

Many of China's dams are designed with irrigation, flood control, or navigation in mind, as well as power generation. Fish breeding and water for industrial and municipal use are also factors. Because of higher irrigation demands during dry periods, many Chinese hydroelectric stations are unable to realize their full generating capacity the year round. This is particularly true of the huge number of small hydro stations found in the PRC at which annual hours operated are below 2000; but even at the 900-mw Tanchiangkou hydro in Hupeh, output at low water has fallen below 40% of capacity.

In Honan, according to China's news agency, the capacity of the thousands of small hydros, for example, has reached 102.6 mw, but during 1976 only 200 million kwh were generated, resulting in a very low annual operating rate of 1950 hours or 22%. In water-rich Kwangtung in 1975, the 12,700 small hydros operated at 31% utilization.

Among China's newer hydroelectric stations, Liuchia and Tanchiangkou deserve praise since both are Chinese-designed, constructed, and equipped. Liuchia, on the upper reaches of the Yellow River above Lanchow in Kansu, is situated in a canyon with the crest of the dam 147 meters above the river; effective head is 100 meters. This is China's highest dam, but the width is only 100 meters. Storage behind the 1,225-mw facility is 5.700 million cubic meters. The power house contains China's only 300-mw hydro unit, as well as four 225-mw units, all supplying power to 220-kv transmission lines and to China's only 330-kv line. The station is nominally capable of generating about 5.700 million kwh annually, a 53% rate of operation. The first power was received from Liuchia in April, 1969, and the last generator became operational at the end of 1974.

The Tanchiangkou hydro is on the Han River in Hupeh, 687 kilometers upstream from the Yangtze. It is an extremely important facility for controlling floods on the Han (80,000 people were drowned in 1935), as well as for providing irrigation water in Hupeh and Honan. A 150-ton ship lift, the first in China, permits small vessels to transit the dam and navigate another 150 kilometers upstream. Construction was started in 1958, the first generator was turned over in 1968, and the sixth and last of the 150-mw units at Tanchiangkou became operational in 1973. The station provides well over half the power generated in Hupeh.

The much-publicized, Soviet-designed, Sanmen dam

and power station has never reached its planned capacity of 1,080 mw. The heavy silt load of the Yellow River forced the Chinese to revamp the project and lower its planned capacity to 200 mw. Only one 50-mw turbo-generator is believed to be operational. The size of the large Wuchiangtu hydro under construction in Kweichow is unknown.

The PRC has six hydroelectric stations with capacities in excess of 500 mw and another three between 300 and 500 mw. Two of these nine stations are on the Yalu River where power is shared with North Korea. Table 5 shows all hydroelectric stations of 300 mw or more, systems of dams on major rivers and tributaries, and China's four major cascade systems. The other smaller hydros may be found in Table 4.

The drive to assist the modernization of agriculture and to bring electricity to China's rural communes from small hydroelectric plants saw its greatest surge in the past seven years when the number of small hydros grew from 15,000 to 65,000. Typically these stations average only 50-kw in capacity, and some are as small as several kilowatts. In the mini-turbine range, the Tientsin Electric Gear-Drive Design Institute has designed seven models from 250 watts to 12 kw which can be manufactured on the commune itself. Although inefficient compared to larger units, both in hours of operation and in cost per installed kilowatt of capacity, China's small hydros have a major impact on the local economy, providing flood control, irrigation, and some power without making demands on major production facilities or on the underdeveloped power transmission system.

Other Power Generating Facilities

Although the PRC has run a small nuclear reactor and has shown considerable interest in nuclear power plants, none is in operation, thought to be under construction, or contracted for from a foreign source of supply.

Gas turbine power development in China is not advanced. Although a 6-mw unit was manufactured in 1965, ten years elapsed before the first Chinese-designed 10-mw turbine for power purposes was manufactured. In China gas turbines are used for both base load and peak shaving purposes. The gas turbines purchased from Belgium, the UK, and Japan at 8.5, 20, and 25 mw, respectively, are mostly for power generation, although some are being used as mechanical drives. The two rail mobile units of 9 mw each supplied by Canada can be used for emergency power generation; one wonders whether they found application at Tangshan after the devastating July, 1976, earthquake.

By 1971, the Chinese had an experimental geothermal power generator in operation in Fengshun county in Kwangtung. Design capacity was 86 kw. In 1972 construction of another geothermal station was

Table 5
- MAJOR CHINESE HYDROELECTRIC SYSTEMS

Yellow River (moving upstream)	
Sanmen, Honan	50 mw
Chingtung, Ningsia	225 mw
Papan, Kansu	180 mw
Yenkuo, Kansu	300 mw
Liuchia, Kansu	1,225 mw
Yalu River (moving upstream)	
Supung Dong Sui, Liaoning	700 mw
Hulutao Unbong, Kirin	300 mw
Sungari River	
Tafengman, Kirin	590 mw
Han River and tributaries (moving upstream from the Yangtze River)	
Tanchiangkou, Hupeh	900 mw
Huanglungtan, Hupeh	150 mw
Shihchuan, Shensi	135 mw
Fuchun River and tributaries (moving upstream)	
Fuchun, Chekiang	260 mw
Chililung, Chekiang	420 mw
Hsinan, Chekiang	652.5 mw
Huangtankou, Chekiang	30 mw
Min River	
Min, Szechwan	360 mw
Cascade Systems	
Kutien, Fukien (4 stages)	158 mw
Maotiao, Kweichow (6 stages)	250 mw
Lungchi, Szechwan (4 stages)	108 mw
Ili, Yunnan (4 stages)	172 mw

started in Ninghsiang county in Hunan. After trial operation toward the end of 1975, output of the single generator was stabilized at 300 mw. Another geothermal project got underway in Huailai county near Peking in 1974. Tientsin University has trial projects underway to develop further both geothermal and solar electric power production.

Power Transmission and Distribution

China's three principal power grids are located in the Northeast (centered on Liaoning and Kirin), North (centered on Peking, Tientsin, and Tangshan), and East (centered in the Shanghai area). Newer provincial or regional grids are being gradually expanded and now cover many important consuming centers in Shantung, Hupeh, and Kwangtung.

Also noteworthy is the trunk line running all the way from Chengchou in the east through Loyang, Sian, and Paochi to Lanchou with an extension north-westward to Yumen. Reference to the map provides some idea of China's major power distribution links, those at 110 kv and higher. The links shown are known to exist; but almost certainly there are many other links to known power stations about which data are lacking. Information on which power plants are

linked to regional grids is poor, as are details of grid capacities, interchange capabilities, and load management.

Major transmission lines, carried on both steel and reinforced concrete towers, are 110, 154, and 220-kv with one 330-kv line in operation. Distribution lines are 35, 11, and 6-kv carried predominately on concrete poles in wood-shy China. These distribution systems, plus locally generated hydroelectric power, now bring electricity to over 75% of the communes in the PRC. Domestic consumption is at 380-v and 220-v, 50 hertz.

Experimental work is being done in China on 500-kv transmission systems. Ratings of this magnitude, perhaps of the high voltage direct current (HVDC) type, are necessary if China decides to expand significantly its hydro resources, which are generally substantial distances from major points of consumption. As recently as 1973, HVDC played no part in Chinese planning.

Power Generation and Demand

Electric power generation in China during 1976 is estimated to have been 129 billion kwh compared with 2,036 billion kwh in the United States. Table 6 shows China's generation of electric power for selected years.

Industry consumes the lion's share of Chinese power, about 70%, with about 15% going to agriculture, transport, residential and commercial use, and construction. The remaining 15% is used at the power station or is lost in the transmission process. Other than agriculture, the consuming sectors of the economy probably consume no more than 5% of output. Chinese railroads are mostly steam or diesel powered although the major new rail link between Chengtu and Paochi is electrified.

Consumption of power in agriculture runs about 10% of the total, a major share of this being generated by the 65,000 small hydroelectric stations found in China. In addition to the traditional agricultural

Table 6
GENERATION OF ELECTRIC POWER
IN THE PRC
(billion kwh)

Year	Generation	Year	Generation
1949	4.3	1971	86
1952	7.3	1972	93
1957	19.3	1973	101
1961	31.0	1974	108
1965	42.0	1975	121
1970	72.0	1976	129
		1977 (est.)	145*

* Based on estimated mid-1977 rated capacity being operated 3600 hours.

requirements for power, including widespread pumping for irrigation, China's communes support many repair facilities and small industrial enterprises, all power consumers.

It seems evident from China's continuing calls for power conservation that the supply does not fully meet all demand. There is evidence, for example, that some factories operate on staggered hours or on Sunday to even out load factors. Street and home lighting is at extremely low wattages. Other evidence of power shortages has been seen; for example, the 1976 earthquake damage at Tangshan crippled power supplies to the North grid, at least temporarily. But compared with the Chinese coal and steel industries, the power industry has fewer problems, and considerable satisfaction should be taken in the progress that has been made to meet the economy's demand for power, especially in the 1970's.

Lack of information prevents estimates of the average demand or load on power plants and systems in China; plant factors usually cannot be calculated. The number of hours the PRC's power plants must be operated at rated capacity annually to produce the estimated power generated can be determined, and this figure serves as one measure of the efficiency with which the industry is operated. In China the annual average hours of operation dropped below 2800 in 1962 when lack of demand idled capacity following the Great Leap Forward. After another low during the Cultural Revolution, this indicator has steadily risen, and in some recent years has exceeded 4000 hours, a respectable figure, although the 1976 index was only 3750 hours. Hours of operation differ for thermal and hydro plants. In China, where at times irrigation has priority over power generation or where periods of low water may be extensive, rates of hydro operation are low.

With the acquisition of more modern generating

facilities from abroad, with the continued installation of larger-scale, more modern, domestically manufactured units, with an increasing share of power being generated by thermal plant in the immediate future, and with better management generally, the utilization rate should rise.

Manufacture of Power Generation Equipment

Since the Cultural Revolution, the Chinese have significantly augmented their capability for producing electric power generating equipment. Manufacture of such equipment over the five-year period 1971–1976 was greater than the total amount of power equipment produced in the years 1949–1970. Output in 1975 was seven times that in 1965, an average annual rate of growth of about 21.5%. A further indication of this growing Chinese capability is seen in the decline of large turbo-generator set imports from the USSR and Czechoslovakia and in the export of turbo-generators up to 50 mw. Despite this increased capability, China alone cannot construct sufficient power stations or produce enough equipment to meet demand in the immediate future—generating plant and equipment will continue to be imported.

The Chinese are capable of serially manufacturing an integrated array of thermal generation, transmission, and distribution equipment centered on 400-metric ton/hour (mt/h) steam boilers, 125-mw steam turbines and 72.5-mw hydraulic turbines, and 110/220-kv transmission lines. Boilers of 935 mt/h, steam turbines of 200 and 300 mw, hydro turbines of 150 mw (6 units by 1977), 225 mw (4), and 300 mw (1), and transmission lines of 300 kv are in the first several years of operation. Design of boilers and ancillary equipment to support 600-mw turbo-generators is thought to be underway. Development and production of power gas turbines, nuclear reactors for electric power, and a wide range of process control instrumentation and communications equipment either has not started or is still at a very low level.

Other serially produced units include medium and larger hydraulic turbines of 37.5, 50 and 72.5 mw and steam turbine generator sets of 25, 50, 75, 100 and 125 mw.

While the leading producers of equipment for the power industry are still centered in Shanghai and Harbin, the deliberate policy of geographic dispersion of industry now permits the production of equipment in many areas. The most important new facility is at Teyang which, along with the Chungching factory, now provides inland Szechwan with a capability to produce 200-mw steam and 150-mw hydro units. The ability to manufacture a wide range of equipment in the smaller sizes, up to 15 mw, is widespread. The production of equipment for the many small hydros is now found in many counties of the southern provinces. Table 7 shows the major producers of boilers, turbines, generators, transformers, switchgear, and

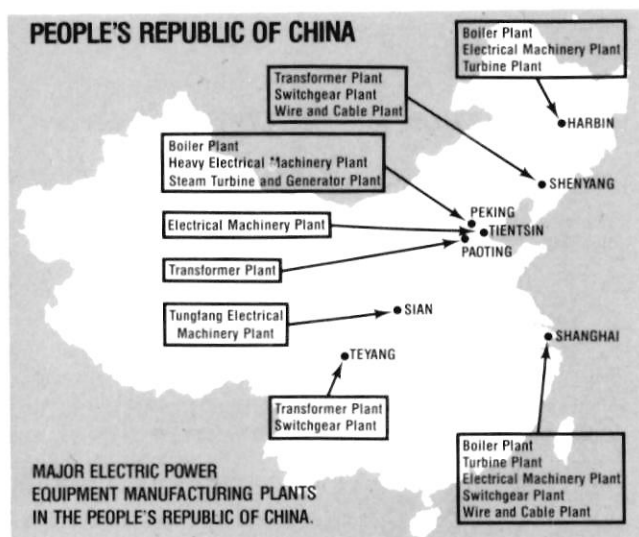
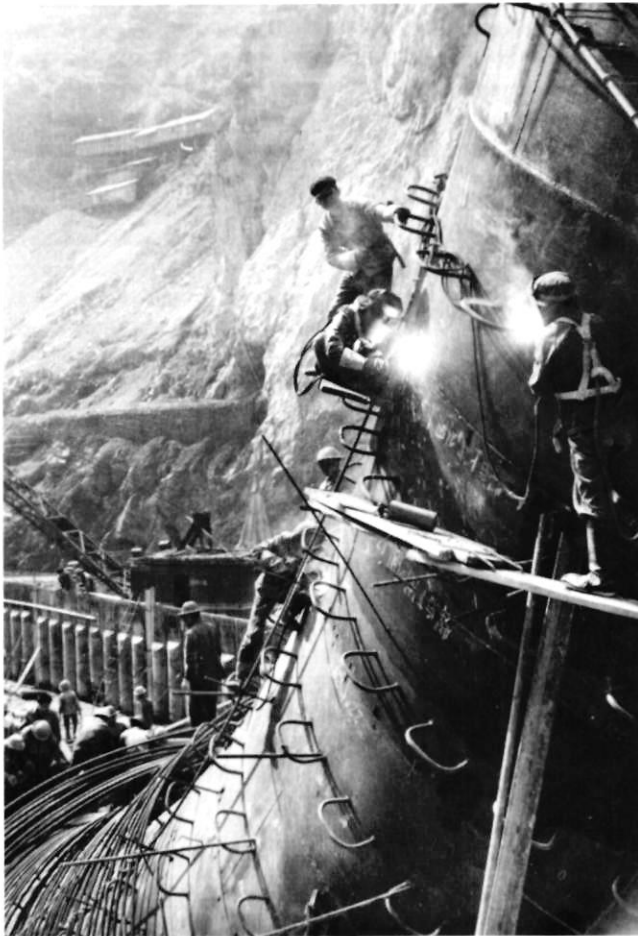


Table 7

ELECTRIC POWER EQUIPMENT MANUFACTURING PLANTS IN THE PRC

Plant and Location	Equipment Produced
Steam Boilers	
Harbin Boiler Plant	One of the PRC's two main boiler manufacturing plants; with a capacity to produce boilers for 1,000 mw of generating capacity; capacity to 3,000 mw by 1980. Since 1970 has produced boilers to 670 mt/h, 140 kg/cm ² , and 570/570°C for 200-mw turbines. Has program-controlled tube bending lines.
Shanghai Boiler Plant	The other chief boiler plant; started with Czech assistance. Boilers are produced to match turbines in the 25 to 125-mw class and possibly to 300-mw.
Peking Boiler Plant	A major facility but less important than Harbin and Shanghai. Works in concert with the two turbine producers in Peking.
Other Boiler Plants	Approximately a dozen plants in Wuhan, Hangchow and elsewhere produce power boilers, mostly drum types in smaller sizes; these plants produce industrial boilers as well. In addition a number of heavy machine building plants manufacturing pressure vessels could produce power boilers.
Turbines and Generators	
Harbin Turbine Plant	Manufactures steam turbines in the 12.5/25/50/100/125/200-mw class. Also produces 72.5-mw, 225-mw, and the first Chinese 300-mw hydro-turbine.
Harbin Electrical Machinery Plant	Produces generators to complement the turbines produced at the Harbin Turbine Plant. Manufactured the 225-mw rated generators for the Liuchia Dam.
Shenyang Blower Plant	Seam turbines up to 50 mw manufactured here under Siemens (West Germany) license will be used to drive compressors, also built here.
Shanghai Turbine Plant	A lead turbine plant serially manufacturing steam turbines in the 25 to 300-mw class. Has apparently produced 6-mw and possibly 10-mw gas turbines.
Shanghai Electrical Machinery Plant	Generators up to 300 mw manufactured here complement turbines produced at the Shanghai Turbine Plant.
Peking Heavy Electrical Machinery Plant	Produced steam turbo-generator sets up to 100 mw.
Peking Steam Turbine and Generator Plant	Does developmental work with Tsinghua University and manufactures some turbines for the Peking Heavy Electrical Machinery Plant.
Tientsin Electrical Machinery Plant	The production of 80-mw turbo-generators planned for 1976.
Tungfang Electrical Machinery Plant, Teyang, Szechwan	A new facility reaching full capacity in 1974. Produces 150-mw hydrogenerators and 200-mw steam turbo-generators. Supplied the turbines and generators for the Tanchiangkou Dam. May produce boilers.
Other Turbine and Generator Plants	Turbines and generators in the size range 1-mw to 50-mw are produced at some 15-20 smaller manufacturing plants, including Wuhan and Chungching. 100-mw steam turbine plant under construction in Hangchow, to start in 1978.
Power Transformers	
Shenyang Transformer Plant	The most important transformer producing plant in the PRC. Manufactures a series of 50 transformers in 650 variations, the largest being 260 mva.
Sian Transformer Plant	China's first 330-mva power transformer built here.
Paoting Transformer Plant	Has manufactured 100-mva transformers.
Other Transformer Plants	Other facilities at Shanghai, Changchow, Lanchow and elsewhere manufacture distribution and other smaller transformers.
Switchgear Plants	
Shenyang Switchgear Plant	A large manufacturer of power circuit breakers and other switchgear.
Sian Switchgear Plant	Manufactures large circuit breakers for power stations.
Shanghai Switchgear Plant	Manufactures oil circuit breakers to 220-kv, 1000-a, 7000-mva. Also produces sodium hexafluoride insulated 35-kv, 400-mva circuit breakers. A high voltage laboratory contains a 2.4 million-volt impulse transformer capable of delivering one million volts. Some switchgear products are exported.
Wire and Cable Plants	
Shenyang Wire and Cable Plant	China's major cable manufacturer. Has produced aluminum and copper wire and cables. Has produced 220/330-kv power cable and researches cable.
Shanghai Wire and Cable Plant	Manufactures 220-kv oil-filled conductors and paper insulated power cable to 300 kv.
Other Wire and Cable Plants	Smaller plants in Tientsin, Chengchow, Chungching, Kunming, Hsiangtan, and elsewhere produce wire and cable for power applications.
Other Power Equipment Plants	
	The many other components needed by the electric power industry are widely produced in China, especially in the smaller sizes for the countryside.



Hsinhua

Wuchiangu Hydroelectric Power Station under construction in Kweichow Province, July, 1977.

power cable. Their location is shown on the accompanying map.

Although hundreds of items of equipment are necessary for power systems, the manufacture of turbine-generator sets is probably the key element in estimating productive capacity. Information permits only a gross assessment, but a review of China's turbine and generator manufacturing facilities suggests the following annual capacities: Shanghai, 1,200-1,400 mw; Harbin, 1,000-1,200 mw; Peking, 500 mw; Teyang, 400-500 mw; and all others, 400 mw. On this rough basis the PRC appears now to have a nominal capacity for turbo-generator sets of 3,500 to 4,000 mw annually.

This capacity does not necessarily permit the net addition to national generating capacity of 3,500 to 4,000 mw annually, however. The capacity is not fixed and varies with the size of unit being manufactured; and, on occasion, productive floor space in these machine-building plants must be allocated to the production of industrial drives, electric motors, and other non-generating equipment. Finally, not all of the output can be figured for net additions since obsolete units must be retired.

The PRC's ability to produce up to 4,000 mw of

turbo-generator capacity annually is noteworthy. It implies a concomitant ability to increase boilers, transformers, substations, and all the ancillary equipment required by the power industry if it is to be developed in balanced fashion. It provides no measure, however, of the very considerable effort that must be devoted to scaling up to 600 mw, to a gas turbine program, to nuclear power, to boiler water treatment and boiler tube metallurgy as pressures and temperatures are increased, to better grain-oriented silicon steel sheet for lower watt loss transformers, to process control computers and associated software, and to a host of other areas.

Future Development

At the Fourth National People's Congress in January, 1975, Chou En-lai laid down China's goal of moving into the front rank of nations by the year 2000. The important Taching Conference of May, 1977, revalidated Chou's goal and added an inspirational call for China to overtake the United States economically by the close of the century or soon thereafter. Current Chinese economic policy seems dedicated to getting the economy back on the track following the difficulties in 1976 and earlier, caused by the "gang of four." China now appears to be laying the groundwork for a sweeping modernization of industry, agriculture, national defense, and science and technology.

Rapid electric power growth is essential to these basic Chinese aims. The enormity of the task facing the Chinese in overtaking the United States, however, may be seen from the fact that the PRC's generating capacity would have to grow by over 12% annually for the next twenty-three years just to reach the 1976 American capacity or by over 17% annually to reach the US capacity projection for the year 2000.

Of course, the ambitious goal of overtaking the United States is not predicated solely on matching electric power output, but increases in power capacity are closely linked with industrial growth. A study of twelve rapidly industrializing countries in the 1960's showed that industrial growth requires power to grow about 1.4 times as rapidly as industry as a whole. The Chinese experience has been similar, with this ratio at 1.6 during the period 1952-1975, but dropping to 1.3 during 1971-1975.

Rates of industrial growth in the immediate years ahead are neither publicly projected by the Chinese, nor easily predicted. In the twenty-three year period, 1952-1975, the PRC's industrial growth averaged an estimated 11% annually, although in 1976 it was probably under 2%. In 1977 growth may be quite high, 10% or more, as the economy rebounds by activation of idle capacity from earthquake damage, by completion and start-up of some foreign-supplied plants, and from improved morale in the country.

At what level China's industrial growth can be sus-

tained during the balance of the Fifth Five-Year Plan (1976–1980) and on through the Sixth to 1985 can only be speculated. There is reason to believe, however, that it could continue at the relatively high level of 12%. Much will depend on the regime's stability, its problem-solving capability, avoidance of further natural calamities, and a willingness to be more flexible. The Taching Conference has already signaled increased priority for investment in the power, coal, and steel industries.

In addition, more disciplined management of the economy at all levels, improved technical leadership now that it is correct to be "red" and "expert," and a willingness to increase the import of foreign plant and technology are all latent factors in growth potential. Should the PRC choose to use more extensively "deferred payment" financing, technical assistance agreements, or exhibit flexibility by permitting "buy back" compensation for purchase of foreign plants, additional growth might be realized. The ability of the Chinese to maximize hard currency earnings from oil exports is likely to be crucial.

If an average 12% industrial growth is realized annually through 1985, then power capacity must advance more rapidly, at least at 15% (1.25 times industrial growth). At 15% yearly growth, generating capacity on December 31, 1980, and 1985, the end of the Fifth and Sixth Five-Year Plans, would be 65.4 and 132 thousand mw, respectively.

The annual increments to generating capacity required by the 1980 and 1985 estimates are extremely onerous, ranging from the addition of 5.6 thousand mw this year to 18 thousand mw in 1985. Since the PRC's generating capacity expanded by an average of only 3.3 thousand mw yearly, 1972–1976, this would place a great strain on Chinese power equipment manufacturing capability but is not out of reach, providing domestic production is coupled with a sustained program of imports such as occurred during 1972–1975.

Some of this capacity is yet to come on line (the foreign power plant projects for the Tangshan and Tientsin areas, in particular, have been delayed) and will swell additions to generating capacity in 1977–1979. The current danger is the long lead time asso-

ciated with getting 500 and 1000-mw fossil-fired steam electric plants on line. China will require plants of this magnitude. Import contracts must be placed now for capacity that will become operative in 1981–1982 at the earliest.

If this analysis is correct and the Chinese hold to their program for modernizing the economy, a clear market exists for foreign-supplied electric power equipment and plant that should be substantially larger than the 1972–75 program when over 4400 mw of capacity was purchased abroad at a cost of almost \$350 million. Expectations should center on purchase by the Chinese of coal and oil-fired steam electric plants with one or two generating units in the 500 to 1000-mw range. In the area of equipment of 125 mw and below, the Chinese are reasonably self-sufficient, except for gas turbines. It would make sense for the Chinese to enter into a technical assistance agreement for the manufacture of gas turbines of 25 mw and higher for both peak shaving and base load service.

With its relatively abundant reserves of oil and coal, the PRC need not be driven into a rapid nuclear power program. Nevertheless, it seems likely that they will want to contract for one or more nuclear stations, if only to keep up with technological development. The Chinese have shown a definite interest in the acquisition of nuclear power technology from abroad, both at home and during visits to nuclear facilities in Japan and Western Europe.

What is not so evident in the crude quantitative analysis of what China may require by 1985 is the changing technological characteristics of the capacity to be added. A major portion of the new capacity will be larger and more complex. Technological problems will require solution as higher operating temperatures and pressures are encountered, as improved process control and environmental equipment are required, and as the plant and equipment size scale-up continues to affect new design in all areas of power generation, transmission, and distribution. These qualitative aspects of the incremental capacity required add another dimension to the problems facing the Chinese electric power industry. 完

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Table 8
PROJECTED GENERATING CAPACITY
FOR THE PRC
(thousand mw)

	Installed	Annual Increment
1975	34.0	4.0
1977	43.0	5.6
1980	65.4	8.5
1985	132.0	18.0

Exporter's Notes

Briefly:

- **China's worldwide technology survey intensifies, includes look at US plants, technology; CCPIT says it expects visit to US will bring "positive results."**
- **US sales mediocre in 1977 so far, but outlook good for later in the year and 1978.**
- **Chinese buy two offshore drilling rigs, one jack-up, one semi-submersible, with total of over \$15 million US equipment.**
- **Ingersoll-Rand, de Havilland, Continental Can make sales; urea and polyester fiber also sold in quantity.**
- **DOD changes export control posture.**
- **Two US electronics groups visit China.**
- **Caltex sending Taching crude to Australia, may buy more for Japan.**

THE RULES OF THE GAME HAVE CHANGED

In the words of one US businessman, it has been "wide-open" in late summer negotiations with the Chinese in Peking, and "the rules of the game have changed completely." As of late September, the Chinese were more flexible in contract talks, required shorter presentations, and generally were making business easier and more efficient. Along with the improved atmosphere, business has been good, too. In one week from mid-July to mid-September, five U.S. companies sold China \$25 million worth of petroleum related equipment, the bulk to be delivered by April. There are indications that the Chinese may buy \$50-100 million worth more from the U.S. and other countries in the next six months. Educated guesses are that these purchases will be in the areas of seismic exploration equipment, offshore equipment, pipelining, transportation equipment, and metering and instrumentation.

GENERAL

Mood of rising anticipation as China's global technology survey

continues, American exports to China flounder, but prospects are strong. The value of US goods sent to China in the first eight months of 1977 was \$81.6 million compared with US imports during the same period of \$136.1 million. However, prospects for export shipments in the last few months of 1977 are surprisingly good. Known orders for cotton, polyester fiber, urea, and some heavy equipment should be substantial enough to push US exports up to the \$160 million mark by the year's end, compared with \$135 million in 1976. Initial readings on the China Council for the Promotion of International Trade (CCPIT) delegation, which toured the US during September, show Chinese buyers interested in several types of US turnkey facilities, including steel smelting, aluminum smelting, synthetic rubber, and several other petrochemical processes. The CCPIT predicted "positive results from the trip." In addition, purchases of US petroleum and mining equipment are expected to begin either late in 1977 or early in 1978. Sales have already been noted of two offshore drilling rigs, a power recovery unit, seismic airplanes, and various commodities. With an apparent relaxation in US export controls, the path to American markets may be simplified for Chinese buyers. **The current mood among China traders is one of rising anticipation.** While CCPIT officials toured American factories, similar metallurgical and petrochemical teams were inspecting similar plants in Japan and in Western Germany. The Chinese Packaging Corporation, as a case in point, is sending delegations to Sweden, Canada, and the United States this September and October. Most experts agree that the Chinese determined their import requirements in the spring and early summer of 1977. Now, through the end of the year, they are inspecting the leading manufacturers of these products across the globe. Finally, after comparing the various types of equipment in Peking, the orders will begin to go out, probably after the first of the year.

TWO OFFSHORE RIGS SOLD

China buys first semi-submersible drilling rig, including \$5-6 million of US equipment, can now explore to edge of continental shelf. Going against the popular wisdom that

China would continue to purchase jack-up drilling platforms, Chinese trade officials this summer purchased the semi-submersible drilling platform *Borgny-Dolphin*, valued at between \$27 and \$40 million. Both more expensive and more difficult to operate than jack-up rigs, the semi-submersible marks China's entry into a new era of offshore petroleum exploration. Previously purchased drilling equipment had given Chinese geologists the capability to drill to 25,000' in up to 300' of water, but with this new purchase their capacity will be expanded to a 600' water depth (possibly over 1,000' with alterations) and 30,000' drilling depth. The new rig will enable the PRC to drill to the 200-meter level, the edge of the continental shelf. Perhaps more important than the expansion in China's exploration horizons is the exposure to a new generation of offshore drilling technology that the *Borgny-Dolphin* brings to China. Completed in February, 1975, in an Oslo, Norway, shipyard, the *Borgny-Dolphin* is an Aker H-3 design rig, equipped primarily with American hardware. (For a list of equipment aboard the *Borgny-Dolphin*, contact the Council.) The rig was designed and operated by Houston-based Dolphin International for Norwegian owner Fred Olsen, who actually completed the deal with the Chinese. Originally designed for use in the North Sea, the *Borgny-Dolphin* has been contracted by Monsanto, Conoco, and Mobil in the past two years. After a training program, stipulated in the contract, is held for the Chinese in Stavanger, Norway—a program in which representatives from the American suppliers will participate—the rig will be towed to China by barge under the command of a skeleton Western crew. The even-

The Borgny-Dolphin.



tual site of the *Borgny-Dolphin* is not yet known.

ROBIN LOH RIGS: ONE BOUGHT, ONE BROKEN, AND ONE UNKNOWN

Singapore's Robin Loh has long enjoyed a special relationship with China's off-shore drilling rig buyers. In July 1977, a third Robray jack-up drilling platform was delivered into Chinese hands, this one from the Japan Hitachi Shipyards. The rig, valued at roughly \$30 million, is the same model as the other two Robin Loh rigs sold to China in May 1975. Designed in 1973 by Houston's ETA Engineering, the rigs were constructed with a patent held by Armco and licensed to Mr. Loh. All built to drill in water up to 300' to depths of 25,000', the only major difference between this latest sale and the two earlier ones is that the last rig was built in Japan rather than in Singapore. All three rigs are loaded with American equipment, estimated between \$10 and \$15 million worth per rig. Major suppliers include Armco's National Supply, Caterpillar, Cameron, Hydril, Cummins, Stewart and Stevenson, LeTourneau, and Armco. (For details of equipment see National Council Special Report No. 16.) **First rig encounters trouble.** Just as the latest Robin Loh rig was arriving in China, apparently the first unit was experiencing substantial difficulties. Having been delivered to China in the latter half of 1976, the first jack-up rig was sent to prospect for oil off the Chinese coast in the Gulf of Tonkin, some observers speculate. One theory suggests that the rig ran into a typhoon while en route to its drilling site and had to put up in a Vietnamese port for repairs; others speculate that Chinese technicians experienced serious difficulties in starting up the rig without the customary training program most buyers of such an advanced piece of equipment attend. As is often the case, the Chinese refused such a program in negotiating the original contract; they did, however, oversee much of the construction of the rig in Singapore and also participated in several unofficial seminars held in Singapore by supplier representatives. Regardless of the origin of their problems, the Chinese were sufficiently distressed over the operation of the rig by early August to request that a delegation from six of the major US contractors come to China to inspect the hapless rig. Ac-

jack-up rig - explor.
cordingly, 14 engineers and technicians from General Electric, Westinghouse, Caterpillar, Ingersoll-Rand, Clark Equipment, and National Supply entered China through Hong Kong on September 4. Prior to their arrival in China, the technicians had no details as to the exact purpose of their trip and expected to stay roughly one week in China. As it turned out, the technicians stayed two weeks, a large part of which was spent waiting for the weather to clear in Nanning, Kwangsi Chuang. The team was eventually taken to the rig, roughly 50 miles offshore from the town of Pakhoi, drilling in approximately 170' of water in the Gulf of Tonkin. The technicians were on the rig for 5 hours and later responded to a variety of Chinese complaints about machinery performance. The Chinese difficulties seemed relatively minor, mostly stemming from inexperience, causing, in one case, improper lubrication and, in another, misalignment. It is unclear who will foot the bill for bringing in the American technicians to China. Although the equipment was guaranteed when sold to Robin Loh, all such warranties have long since expired. It may be that Robin Loh has guaranteed the equipment and will have to finance the emergency "house call," or else, perhaps, the Chinese themselves will pick up the tab. In any event, the rig, once it is in operation, along with its two sister rigs elsewhere in Chinese waters, will play a major role in the development of China's considerable offshore reserves in the coming year.

RECENT SALES

Ingersoll-Rand sells power recovery system to China. After over eight months of communications with the Chinese, New Jersey-based Ingersoll-Rand signed a contract with MACHIMPEX in July, 1977, for the sale of several million dollars worth of equipment designed to recover power wasted in petrochemical cracking facilities. The machinery, which converts waste gases from catalytic crackers into mechanical energy, includes an Ingersoll-Rand power recovery expansion turbine, an axial flow compressor, and auxiliary equipment which will be involved with a fluid catalytic cracking unit. Although the company had approached the Chinese in past years through advertisements and direct mailings on a variety of products, the

first indication that the Chinese might be interested in a power recovery system came with an invitation to the firm to submit a quotation on this type of equipment, late in 1976. Since the invitation was somewhat vague, the company executives responded with a request for detailed information on China's requirements. After some hesitation, a clearer request was made, and Ingersoll-Rand returned its quotation during the early months of 1977. Shortly thereafter, the Chinese invited Ingersoll-Rand to send a team into Peking to discuss the quotation. These discussions lasted roughly six weeks, well into May, as company officials addressed themselves to both MACHIMPEX negotiators and actual end-users. After a short break in discussions, the company returned to Peking in July and signed the final contract. Certain details, such as the training of Chinese personnel and the supply of spare parts, are still under negotiation. The equipment is expected to be delivered in late 1978.

Canadian Seismic Prospecting Aircraft Sold to China. De Havilland Aircraft of Canada, Limited, announced in June, 1977, that it had sold the People's Republic of China three Twin Otter aircraft, valued at roughly \$6 million, to be used for seismic exploration. The cost of the aircraft includes \$1 million of special geophysical survey equipment supplied by Scintrex of Toronto. A STOL aircraft, the Twin Otter has good maneuverability for drape flying and satisfactory single engine performance. Two of the planes, modified for photographic survey equipment, will be delivered to China in early 1978, and the third, adapted for the Scintrex array of geophysical equipment, will be sent to China late in 1978. The aerial geophysical survey equipment includes Scintrex's Tridem, three frequency in-phase/quadrature measuring electromagnetic system for mapping of earth conductivities; the SE-90 VLF electromagnetic system for regional structural mapping; the MRM-1A high sensitivity magnetometer for basic geologic mapping and the GAD-4/GSA-44 gamma ray spectrometer system for mapping the distribution of uranium, thorium and potassium. Auxiliary devices such as continuous tracking camera and radar altimeter are also to be provided. All geophysical data, together with Doppler navigation information, are to be recorded in both



De Havilland aircraft.

analog and digital forms, the latter on magnetic tape each half second. The equipment, reportedly for the China Geological Survey Company of the Bureau of Geology, can be used to prospect for many natural resources including base metals, iron, uranium, ground water, bauxite, sands and gravels, etc. As stipulated in the contract, Chinese airmen and technicians will be trained in Canada to operate and maintain the aircraft and survey equipment. This sale comes as the result of five years of de Havilland marketing efforts in China. Beginning with participation in the Canadian Industrial Exhibition, held in Peking in 1972, de Havilland executives traveled to China on five separate occasions to win the contract over several other international firms.

China Buys Big: Polyester Staple and Urea. As trade relations have warmed between China and the US in 1977, major Chinese purchases of both American polyester staple and urea have been made. During the first half of the year, some \$9.2 million of polyester staple and \$1.8 million of urea had been exported to China, but industrial sources have revealed to the *China Business Review* that these sales are just the tip of the iceberg. Reports indicate that America will export some \$21 million of polyester staple to China in 1977 through contracts with two major US suppliers. In addition, another sale was rumored for \$450,000 of tow rod, to be shipped to the PRC this year. At the same time, almost \$10.5 million of American urea will be sent to Chinese buyers in 1977. According to various sources, the urea is being supplied by the Collier/Mitsubishi jointly owned urea manufacturing facility in Alaska. It has been reported by one account that China has bought roughly \$9 million of the urea through Mitsubishi International, although the amount of

urea is unclear. Collier Carbon and Chemical has sold one shipment of urea, approximately 14,000 tons of it, to China in the second half of 1977, and alternately, the price of this sale is unclear because other factors entered into the negotiation of the contract. At a current market value of roughly \$110 per ton, the Collier part of the sale was probably worth something over \$1.5 million. These two sales combine to make 1977 a year in which the US has sold more agriculturally related material to China (excluding produce) than in any previous years. During the first six years of the 1970's, China imported annually an average of \$112 million of chemical nitrogenous fertilizer. Japan traditionally has been the largest supplier of chemical fertilizers to China. Other sales made in the past few months include a deal made between **Continental Can** and China for 2 million pop-top lids to be used on cans of Chinese nuts for export. The deal came as a direct result of Continental Can's participation in a National Council delegation to China in June of this year. Elsewhere, the Chinese bought between 3 and 4 million dollars of **US tallow**, according to informed sources. The produce is to be delivered to China this year.

DEFENSE DEPARTMENT REVISES EXPORT CONTROLS

In a September 2 news release, Secretary of Defense Harold Brown revealed that his department had prepared "interim internal guidance to control exports of critical US technology and related products." This new directive reflected many aspects of the controversial "Bucy Report" which was prepared for the Defense Department a year ago by Texas Instruments, Inc., President J. Fred Bucy. The Brown memorandum to key Pentagon officials followed the "Bucy Report" in emphasizing control over the export of US high technology production skills rather than actual hardware. Under the new guidelines, US products may be exported to "potential adversaries" as long as the product's inherent performance capabilities, or the quantity sold, do not constitute a significant addition to the recipients' military capabilities which would be detrimental to US security. According to Brown, the department will support export licenses for sales to non-market nations provided, "1) the product's technology

content is either difficult, impractical, or economically unfeasible to extract, 2) the end product in question will not in itself significantly enhance the recipient's military or warmaking capability, either by virtue of its technology content or because of the quantity sold, and 3) the product cannot be so analyzed as to reveal US system characteristics and thereby contribute to the development of countermeasures to equivalent US equipment." **The Chinese Connection.** The issuance of these new regulations was of great interest to PRC officials concerned with Sino-American trade, according to a *New York Times* report. One reason for this might be that China has experienced considerable difficulty with US export approvals in the past five years. Two CDC Cyber computers, requiring a license to be re-exported to China through France, were held up by control officials for over eighteen months and only succeeded in obtaining approval through executive intervention. A contract signed by America's Sunstrand Corporation with Chinese buyers for a \$750,000 five-axis numerical control machine tool (OM-3) was eventually scrapped due to the company's failure to obtain export approval, according to informed sources. This single machine tool, designed to cut, among other things, jet turbines, would probably have only a small effect on PRC defense capacities by itself, and was, furthermore, probably too technologically advanced for the PRC to "reverse engineer." Export control policy at the time, however, stipulated that the level of technology in the Sunstrand machine be restricted from COCOM nations. Under the new regulations, this sale might now be possible. The Defense release, interestingly states that "(e)nd use statements and safeguards are not to be considered a factor in approving exports," except under "Presidential directive." Some observers feel this clause and other features of the memo may actually make obtaining an export approval more difficult in the short term, and, possibly, permanently. This decision follows a summer of closed hearings of the Congressional Joint Economic Committee including testimony by the CIA and DIA analysts on Soviet and Chinese defense capabilities. In a late June session, CIA Director Turner told the Committee that China spends between 8% and 10% of its GNP on defense

compared with between 11% and 13% in the much larger Soviet economy. Furthermore, he noted that the percentage spent on defense in the Chinese economy has declined since 1971 when Sino-Soviet friction began to diminish. Later, Turner, an Admiral himself, speculated that China's defense capacities were 15 to 20 years behind Russia's and that "in general, when it comes to aircrafts, ships, and so on, what they have done is taken the equipment that the Soviets have given them (in the 1950's) and improved upon it, but it is equipment of older Soviet design." In testimony the following week, Lt. Gen. Samuel Wilson, Director of the Defense Intelligence Agency, commented that while China has conducted four nuclear tests in 1976, the general development of the country's defense, both nuclear and conventional, in recent years has been "evolutionary and on-going." According to DIA experts the only equipment China imported with "military applications" in the last year were twelve French Super Frelon helicopters. Neither Admiral Turner nor General Wilson expressed serious concern over a Chinese military threat at the present time.

SINO-AMERICAN EXCHANGES— GRAIN, MACHINE TOOLS, ELECTRONICS

Sino-American exchanges increase.

The summer of 1977 saw a substantial increase in the two-way traffic between Peking and the United States. A five-man delegation from the US Grain Cooperatives Alliance traveled to the PRC on July 25 at the invitation of CEROILS to hold talks with Chinese officials concerning the role of American cooperatives in world grain trade and the possibilities of American cooperative sales to China. Also at the end of July, an eight-company delegation from the **National Machine Tool Builders Association** went to China to hold its second seminar with China's MACHIMPEX (the first, held in November, 1975, yielded \$9 million of US machine tool sales). Companies participating in the seminar were Producto Machine Co.; Textron, Inc.; Raycon Corp.; Sunstrand Corp.; Teledyne Landis Machine; and Warner & Swazey Co. In August, the Ohio Academy of Sciences initiated a two-part exchange with the Chinese Scientific and Technical Association by sending a ten-member dele-

gation of **US geographers** from the academic community to China. The Chinese will respond with a reciprocal delegation to the US in August, 1978. The summer was capped with trips to China by two **American electronics delegations (one industrial, one professional)**. The first delegation, sponsored by the Electronic Industries Association, was in Peking from August 8 to 17. The seven-company industrial group explored the possibilities of satellite communication services with its Chinese host, MACHIMPEX. The Chinese are apparently interested in developing a domestic telecommunications system of their own, but current Chinese technology cannot develop and launch an effective telecommunications satellite. US export controls at the present time bar the sale of US telecommunications satellites to China, but after reviewing the plans for the trip, Carter's White House sanctioned the EIA's going to China for the seminar. The group, while in China, not only met with Chinese officials, but also had a chance to tour the **newly developed 10-meter, Chinese-made earth station** which is in use near Peking. They were the first American group to see the station. For the Chinese to buy an American telecommunications satellite, the export control regulations would have to be revised, and once bought, the Chinese would probably have to use Western (American, French, or Japanese) launching services to position the unit although the Chinese have not discussed any plans for placing such a device in space. The only indication that they harbor such intentions is an application, placed at the International Satellite Union in early 1976, for two satellite positions; this application will serve as a reservation in space until the Chinese can put their own equipment in orbit. Chaired by Sidney Topol, President of Scientific-Atlanta, the group included representatives from California Microwave, Collins Radio Company International, GTE International, Hughes Aircraft, ITT, and RCA. The second electronics delegation, an Institute of Electrical and Electronics Engineers group, arrived in China at the end of September under the sponsorship of the Chinese Scientific and Technical Association. This second group held a seminar in Peking and was composed largely of academic participants with one delegate from Bell Laboratories.

Private companies also visit. In addition to the industrial and professional delegations going in and out of Peking, many US firms have also visited China in recent months to hold substantive trade discussions. **Mining Safety Appliances** held a seminar and visited Chinese mines in late June. **FMC's Packaging Division** gave a seminar in Shanghai in August and FMC's Agricultural Chemical Division gave a technical presentation in Peking in September. **DuPont**, along with several other international firms, is set to present talks on plastic packaging in the fall. In **computers**, Control Data Corporation, National Cash Register, IBM, and Sperry Rand are all known to have been or have plans to be in China this summer and early fall.

TACHING CRUDE FOR CALTEX

Caltex ships Chinese crude to Australia, may buy 100,000 more tons from Taching.

Caltex International sent 45,000 tons of Taching oil from one of its affiliates in Japan to Caltex Australia at Sydney's Kurnell refinery in April of this year, according to August's *Petroleum News*. The shipment, which accounted for less than 0.6% of China's total oil exports in 1977, estimated at between 7,450,000 and 8,450,000 tons, was an experiment to see whether Australian facilities could handle China's Taching crude, heavier and more viscous than Arabian lights. Although Caltex does not appear interested in continuing shipment of Chinese oil to its Australian affiliates, *Petroleum News* further reported that the company is considering an additional 100,000 tons of Taching crude, to be purchased directly by the American company, for consumption in Japan. In 1977, Japan is expected to import between 5.2 and 6.2 million metric tons of Chinese oil through two importing consortia. Company officials in the United States would not comment on reports of a pending deal; Caltex Chairman James M. Voss, however, did make his first visit to the PRC since 1949 earlier in 1977. At the invitation of the Chinese Ministry of Chemical and Petroleum Industries, the American executive met with "key government officials in Peking" and visited Chinese refineries in Peking and Shanghai. The results of the discussions were not announced by the company. 完

Importer's Notes

Briefly:

- **China's selling push still continues.**
- **Another Chinese carpet fair, in Tijuana, Mexico, will attract US buyers.**
- **Light Industry Fair in Peking features antiques, oil paintings, jewelry, and retail-style sales.**
- **National Council's Directory of American Firms Importing from the PRC has over 800 listings, now available.**
- **China's Hong Kong agents busy touring US, while China's regional CCPIT branches make inspection tour of Hong Kong factories.**

CHINA'S EXPORT FAIRS—From Peking to Tijuana

A bamboo and bamboo products mini-fair was held by the Native Produce Corporation in Kwangchow, August 22-27. Details will be available in the next issue of *CBR*. **A Chinese Carpets International Fair will be held in Tijuana, Mexico**, from October 12 to October 24, featuring Chinese woolen carpets and silk carpets. The fair is the result of an agreement between the Chinese Native Produce Corporation and FEBCA, a Mexican "enterprise (whose) objective is to organize and promote both domestic and international fairs and exhibitions." A group from CHINATUHSU will be on hand to conclude contracts for the goods on display and for shipments from the PRC. Some US importers who have purchased large quantities of Chinese carpets in recent months at higher prices are angered by the PRC's decision to offer carpets more cheaply just across the border, where it is easy for other American companies to come and buy at prices below what those who import from China can offer. Available at the fair will be Peking super washed woolen carpets; PM90 woolen carpets; Oriental woolen carpets; Peking antique finished carpets; Peking silk carpets; Peking tussore (tussah) carpets; and a variety of others. **Also on display will be the largest carpet in the world**

presently on the market, measuring 27.83 x 57.99 feet, in a red floral design with a $\frac{5}{8}$ inch pile. Interested parties should contact FEBCA, S.A., 1207 Torre Latinoamericana, Mexico 1, D.F., Mexico; phones 518-32-37, 510-95-64, 521-59-57, 512-07-76; cable BARTER MEXICO CITY; telex 01776299 BARTEME MEXICO. Tijuana has been the site of previous Chinese fairs, including a large light industrial products fair October 30-November 16, 1975. The city, only a 15-mile drive from the US border and a half-hour from downtown San Diego, can easily attract Chinese and American businessmen in southern California, as well as American tourists in Mexico. It is visited by more Americans than any other foreign city. **Antiques were the main item of interest at a July mini-fair held in Peking by the Light Industrial Products Corporation**, according to American traders who attend the event. At least four US buyers made purchases from among the goods offered by the Tientsin, Shantung, Liaoning, Shanghai, and Peking Arts and Crafts branches. These goods included antique jade, porcelain, silk embroideries, scrolls, and jewelry, as well as contemporary silk carpets, oil paintings, scrolls, silk embroideries, cloisonne, lacquerware, and shell and feather pictures. About 200 buyers from around the world reportedly attended the fair, mostly overseas Chinese from Hong Kong and Singapore. There were also a "handful" of Europeans, Japanese, and Canadians, and approximately fifty Chinese-American importers. Reports differed sharply as to **supply of goods available**, with one firm representative asserting that "our buyers were extremely pleased with the range and quality of goods available," but another lamenting that he was only able to procure 10% of the desired quantity. The latter buyer said that only the antique importers, who he estimated made up about 75% of the attendees, went away happy; the buyers interested in contemporary Chinese products found supplies sadly deficient. Most of the purchases were made not in the Fair Exhibition Hall (across from the Mindzu Hotel) itself, but in the antique warehouses around Peking. "We spent most of our time in the warehouse," commented one of the American buyers. Jewelry and porcelain purchases were especially high in the warehouses. **A branch of the**

Bank of China was set up on the ground floor of the exhibition hall to enable importers to buy on the spot, pay in cash retail-style, and take the goods with them when they departed. "We made thousands of dollars worth of cash purchases to bring back with us," reports one trader, "as well as other purchases for shipment." Prices were the same as at the last fair, with special discounts granted in a few instances to bulk purchases (not Americans). **Delivery** on shipped commodities was promised for no later than September, a very prompt schedule on the part of the Chinese, who often lag behind in delivering purchases. One American trader who could not find all he wanted was told by a Light Industry representative to "please contact us at the Canton Fair or early next year." American firms which attended the mini-fair included China Trade Corporation, Chase Pacific Trade Advisors, and Don Altman Associates. One of the interesting additions at this mini-fair was the **first-time availability of original oil paintings** painted in 1976 and 1977. The painters themselves, winners of an art contest at Peking University, were on hand to talk with buyers. The originals are reproduced by committees to sell to buyers. One floor of the exhibition hall featured these additions to the Light Industrial Products Corporation's offerings. **Peasant paintings by the farmers of Huhsien (Hu County) in Shensi Province went on show** in department stores and galleries across America in September, under the auspices of the China Trade Corporation of New York, which began to purchase this widely heralded contemporary style of Chinese art last year after it was written up in the Smithsonian Magazine. In the first part of 1977, the company displayed the peasant paintings in 41 department stores including Kennedy's in Boston, Famous Barr in St. Louis, Joske's in Houston and San Antonio, J.W. Robinson in Los Angeles, D.H. Holmes in New Orleans, and J.L. Hudson in Detroit. Additional exhibition will be held from September, 1977, through the end of 1978, including displays at the Rein Gallery in Edina, Minnesota, and the Baltman Gallery. New China Arts Corporation, the art import arm of China Trade Corporation, sponsored an exhibition of these peasant paintings, as well as needlepoint, oil, and water colors on

silk, in July in conjunction with the Massachusetts Port Authority and the South Terminal Corporation. Details of the company's 1977-78 art programs will be in the next issue of *CBR*.

HONG KONG TO US, CHINA TO HONG KONG

A delegation of Chinese bristles sellers arrived in the US at the end of September, at the invitation of the National Council. The three-man group from the China National Native Produce and Animal By-products Import and Export Corporation visited a number of American companies in three different cities. **A group from Teck Soon Hong, Ltd.,** Hong Kong agent for China's Native Produce and Light Industrial Products Corporations, **has visited the US for the first time.** After its arrival date on July 29, it spent three weeks in New York, a week in Chicago, and the remainder of the trip on the West Coast, mainly in San Francisco. The mission's strongest interest was in selling woolen carpets and rugs, and silk carpets—followed by tea; hog bristles and animal hairs; a wide range of mats, mattings and basketware; spices, essential oils and aromatic chemicals; and industrial raw materials such as gum rosin and gum turpentine. Members of the group were Lee Wen-chih, director and sub-manager of Teck Soon Hong and delegation leader; Lee Yuen-chiu, deputy delegation leader; Yuan Chi-ming; and Ma Man-shan.

Another Hong Kong group, from China Resources, the official agent in this British-administered city for CHINATEX, visited the US from July 3 to August 12. The mission's prime

goal was to seek to improve trade relations with American companies for Chinese garments, particularly in embroidered articles. The members also indicated their willingness to take a more active role in assisting American companies with Hong Kong branches and American-owned companies in Hong Kong. (Previously, they served only Chinese clients.) This will most likely be accomplished by trying to arrange to have Canton Trade Fair invitations issued from China, rather than the Liaison Office in Washington, for Americans residing in Hong Kong; and by interceding on such Americans' behalf in communications with the PRC's foreign trade corporations for requirements special to US customs; e.g., packaging and labeling requirements. In general, the group expressed its desire to work more closely with Americans in Hong Kong in order to improve the PRC's export markets in this country. While traveling in the US, the mission was particularly interested in stimulating business for embroidered articles, which were a strong item in the US market 28 years ago. Their original schedule included Washington, DC; Florida; the Virgin Islands; Chicago; St. Louis; New Orleans; Los Angeles; and San Francisco, but they found that the industry is now centered in New York and that market requirements have changed drastically. No business was conducted on the trip; it was regarded as an exploratory venture. **A mission from the Shanghai Branch of the China Council for the Promotion of International Trade visited Hong Kong in September.** Its activities included inspection of manufacturing plants and nonbanking facilities owned and operated by 28 US firms in that city. The group, which was composed of representatives from central and provincial foreign trade organizations, also visited plants owned by other nationals, including Japanese and Germans. Their visit follows two others made by other branches of the CCPIT earlier this year. All are part of a continuing series of survey tours to Hong Kong planned by the CCPIT.

IMPORTERS DIRECTORY FROM NATIONAL COUNCIL HAS OVER 800 LISTINGS

A concise listing of who imports what from China is now available from the National Council. The **Directory of American Firms Importing from**

the People's Republic of China was compiled in response to inquiries received by the Council over the last several years regarding imports from the PRC. Whether you are a retailer or wholesaler interested in where to go to buy specific products from China, a company just entering China trade with a need to know the marketplace possibilities for Chinese products, or a firm wishing to trade in Chinese products without directly importing, this directory can help you establish the right contacts. Over eight hundred firms are listed in the \$50 volume, both in an alphabetical roster of companies—including full particulars of address, principals, cable and telex addresses, products imported and dollar amounts—and in an alphabetical product index. The index provides a list of product categories, both general and specific, accompanied by the names of the companies known to have imported these products from China during the last several years. The categories have been largely dictated by the information provided by the companies themselves in response to a questionnaire sent out by the National Council. Product categories included: Animal By-Products, Antiques, Apparel, Artworks, Bamboo-ware, Beer and Liquor, Bicycles, Books, Bristles, Cameras, Candles, Carpets, Chemicals, Clocks, Coffee, Food-stuffs, Footwear, Gloves, Handicrafts, Hardware, Machine Tools, Porcelain, Rattanware, Silk, Soybeans, Spices, Sporting Goods, Steel Products, Straw Goods, Tea, Textiles, Tobacco, and many more.

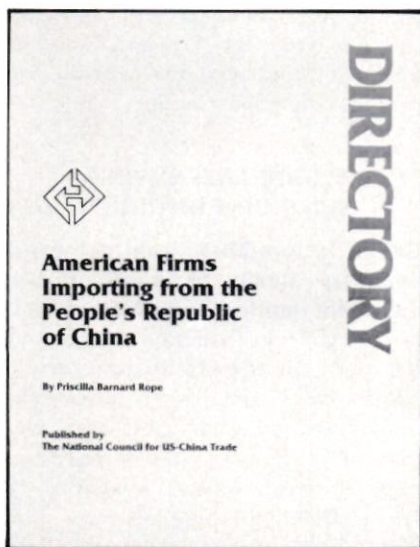
COMMITTEE BUSINESS: NEW IMPORTER'S SUBCOMMITTEE

Please note that the Light Industrial Subcommittee of the Importers' Steering Committee has changed its name to the **Light Industrial Products-Handicrafts Subcommittee**, now including all importers of handicrafts and light industrial products. Importers of carpets and handicrafts who are currently on the Food-stuffs/Native Produce Subcommittee should switch to this new subcommittee in order to receive appropriate materials from the National Council.

NEW CEROILS TELEXES

Please note for your communications to China: CEROILS has two new telex numbers—22281 CEROF and 22111 CEROF.

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Shipping Notes

Briefly:

- Chinese merchant marine build-up continues, but chartering big, too.
- Chinese reportedly readying for direct shipping relations with US.
- Kerr visits Peking, discusses improved communications.
- A port technology exhibition.

KERR STEAMSHIP IN PEKING—CHINESE DISCUSS TERMINOLOGY

The Chinese are eager to trade with the United States, using their own flag vessels, and are preparing for the time when direct shipping relations are established, according to representatives of Kerr Steamship Company, who returned from "profitable" meetings with PRC shipping officials in June. Kerr, agent for China National Chartering Corporation (ZHONGZU) and China Ocean Shipping Company (COSCO) in all East Coast American ports, arranged the eight-day trip to Peking in order to meet with personnel involved in day-to-day affairs affecting Kerr's representation of the two Chinese companies. The meetings were a series of seminars in which, Kerr representatives believe, the Chinese showed they were preparing for eventual normalization by asking for clarification of international shipping terms as they have evolved in Western practice, asking about needs of American exporters, and inquiring into the details of cost factors about which they have been confused in the past. **The issue of interpretation of shipping terminology has caused major problems in Sino-US trade.** "The Chinese take terms very literally and will hold you to the letter of the law," comments Richard Motta, Kerr assistant vice president, "but the American shipper interprets them as they have developed over the years and according to custom, not according to strict definition. What has been written has not been followed in practice." For example, he pointed out, freight rates

now have their basis in the actual operating costs of a vessel. The term FAS, or Free Along Side, formerly meant that a seller's responsibility ended with the unloading of a cargo alongside a ship; but now, according to practice, that responsibility does not end until the goods reach the ramp. But, when the Chinese have sold FAS, they have refused to honor a bill for additional cost of transporting goods to the ramp. **Kerr representatives also discussed the intricacies of the many tariffs on file**, noting that the Chinese try to avoid these entanglements. Although they have a basic understanding of the fact that US costs fluctuate all the time, they nevertheless have difficulty accepting the fact that shipping into the port of New York is more expensive than shipping into, say, the port of Norfolk. "We expect that our meetings in Peking mostly will have a long-range effect in improving shipping relations," says Motta, "but **there are certain changes we hope will occur in the next month**; for instance, we hope that, based on the information we supplied them, the Chinese will alter their method of asking US firms to quote terms of sale including carriage of goods." Prior to its visit to Peking, Kerr communicated with the two Chinese shipping organizations through letter and telex only. At various points, the company had questions about the Chinese requests, so officials suggested face-to-face meetings. The PRC extended them an invitation last April for the June trip. Kerr representatives who made the journey were Richard Motta, Hugh Duncan, and Shayne M. Dillon. They met with seven representatives from COSCO and nine from ZHONGZU. Ranking COSCO delegates to the seminars were Deputy Managing Director Yuan Chih-ping and Deputy Manager Li Chih-jan. From ZHONGZU, the leading figures were Deputy General Director Kao Chu-feng and Manager of the Shipping Department Liu Tsung-che.

CHARTERING AROUND THE WORLD

Chinese chartering has been the only bright spot in a very slow world market. Although the PRC has been quite firm that it is only forced temporarily to depend on chartered shipping to transport its goods, it has taken advantage of the

current severe lull. Most of the recent hiring of tramp steamers has been for the delivery of wheat; the Australian Wheat Board announced in July that it had sold three million tons of wheat to China for delivery between August, 1977, and August, 1978, the largest single sale in the Board's 38-year history. The enormous contract comes right on the heels of two others—two million tons in March, 1977, and 500,000 tons in October, 1976. Over the last several months, Chinese principals have booked ships out of North America, Australia, South America, and the Balkans to move—in addition to wheat—sugar, sulfur, potash, and pig iron. They have engaged ships both on a single-voyage and on a time-charter basis. **Time charters normally run 5-10 years, but China prefers 6-18 months, after which it renews.** Reports are that two vessels were time-chartered in July for 12-15 month time periods, and that five other decked ships and bulk carriers were booked for individual trips, including two 30,000-ton vessels and two 33,000-ton vessels. Reports vary as to the size of the time charters; one of them is about 15,000 tons. Shipowners believe that China's need for increased imports of grain will continue to benefit them until at least the first half of 1978. **The number of Chinese-chartered vessels docking in the US remains almost negligible.** From February 1 to September 1 of this year, none berthed in the Great Lakes or on the East Coast. Only two vessels entered Gulf of Mexico ports. The *London Statesman* and the *Neptune Supreme* both loaded linerboard at Lake Charles, La., on August 31, the former bound for Whampoa and Shanghai and the latter for Tsingtao. Another ship was reportedly due later in the fall, also to Lake Charles.

SECONDHAND BUYING—BUILD-UP CONTINUES

China is profiting from a world shipping slump to build up its merchant marine. About 30 million deadweight tons are laid up around the world, allowing China to enter the market at a time when prices for secondhand ships have hit rock bottom. Since January, it has purchased over 30 used vessels, according to Hong Kong shipping sources. The PRC has reportedly bought ten bulk

carriers of 20,000-39,000 DWT, and over 20 smaller tweendeckers and liner vessels of 5,000-20,000 DWT. At least 13 of these ships have been purchased just since June. (A more cautious report comes from Irwin Heine in the National Council's Special Report on *China's Maritime Agreements*. He writes that since January, Chinese-owned and -controlled shipping companies are reported to have bought at least eight general cargo ships totaling 89,350 DWT and nine self-sustaining dry bulk carriers aggregating 281,933 DWT.) All sources agree that most of the purchases are from Norway and Britain, and that they total between \$70 and \$80 million. Specifically, **the PRC has purchased at least nine British vessels and at least four Norwegian vessels.** The nine British ships include three bulk carriers, three liner vessels and three freighters. China paid \$3.4 million for one bulk carrier, a 20,000-ton vessel built in 1967. A 26,000-ton carrier built in 1974 cost it \$6.25 million, and a third, 38,000 tons constructed in 1971, was between \$6.3 and \$6.5 million. China further paid about \$6.75 million for the three 7,700-ton freighters, which were built in 1964. Sources say the ships are bargains, except for the third bulk carrier which was sold at nearly a full market price. Apparently, China's major purchase interests are in liner-type ships which are good for the export of packed products, especially of the 5-10,000-ton size, and in smaller-sized tankers for transporting oil to Hong Kong, Japan, and possibly Vietnam.

EXHIBITIONS

A port technology exhibition—the first single-technology, multi-national trade exhibition ever to be held in China—will be held in Peking in the summer of 1978. Dutch, British, West German, Japanese, and South Korean firms will participate. (See International Notes.) **Containers and container-related equipment—**areas China has recently expressed great interest in developing—will be among the items displayed at the **1977 Japanese Shipbuilding Industry Exhibition**, in the Shanghai Exhibition Hall October 20-November 3. The bulk of the equipment to be shown will be in model form, except vessel engineer and measuring and telecommunications equipment. Display items

include port cranes, tankers welding water separation equipment, LNG transport vessels, refrigerator vessels, mine detector vessels, chemical fire extinguishing vessels, fish detectors, digital receivers, ship-related equipment, radar and speed measuring equipment, and shipbuilding technology. Eighty companies will be represented. The top ten are Hitachi, Niigata, Sumitomo, Sasebo, Fuji Electric, Kobe Steel, Daihatsu, Nippon Kokan, Mitsui, Tokyo Keiki, and Mitsubishi. Sponsor of the exhibition is the Association for the Promotion of International Trade.

SHORT TAKES

Among China's recent orders for new ships are vessels from Pakistan, Japan, and Yugoslavia. The Treci Maj shipyard in Rijeka, Yugoslavia, signed an agreement August 15 with MACHIMPEX for the construction of four 12,000-hp marine diesel engines, which will be fitted to two 45,000-DWT ships now being completed for the Chinese merchant marine. The diesel engines are of the Treci Maj SU-34 type with 14,000-hp rating. In July, Mitsubishi Industries was reported to be holding talks with MACHIMPEX regarding the export of a work ship. Recently China has ordered a cargo ship and floating dock (11,500 metric tons) from the Hakodate Dock and two crane ships from Shikoku Kenki. The two, to be delivered in January and February, have a lifting capacity of 200 tons and cost ¥1,000 million. Karachi Shipyard and Engineering Works reports that a 30,500-ton vessel it is building for the PRC is expected to be ready by the close of 1977. The order is worth over \$19 million. A recent Peking broadcast proudly noted that **"China's oceangoing transport fleet has become an important force in transporting China's import and export goods and materials in aid of foreign countries.** Since the establishment of the China Ocean Transportation Company in 1961, this fleet of freighters, oil tankers, and passenger liners has called at 339 ports in some 90 countries and regions." Following a government-to-government agreement reached in August, 1976, between China and Japan, subsequently reported in this column, the **China Ocean Shipping Company (COSCO) and the newly formed, Tokyo-based Japan-China Marine Transportation Coun-**

cil opened offices in each other's capitals in June. The purposes of the Tokyo and Peking offices are to allow general liaison on shipping matters, to handle ship accidents, and to deal with cargo problems. The Japanese Council, which is made up of 47 Japanese shipping companies, and COSCO held their first conference in Peking in September on cargo transportation shares, freight rates, and the expected inauguration of cargo liner services between the two countries. **China and Argentina signed a shipping agreement in late June in Buenos Aires.** The document was initiated by Yuan Keng, leader of the Chinese government delegation, and Victor C. Babino, national director of policy of the Maritime Interests Secretariat of the Argentine Ministry of Economy. **Norway and China concluded a ship-classifying treaty in July.** Det Norske Veritas (DNV), the Norwegian ship-classifying agency, and the Register of Shipping of the People's Republic of China, the Chinese classifying institution, laid down regulations which permit the two agencies to receive assistance from each other in connection with inspection work in areas where only the one agency is represented. DNV can utilize the Chinese agency's services on the Chinese coast including the PRC's inspection stations and, in fact, has already done so. **The Chinese Register of Shipping also met with Lloyd's Register of Shipping** from the United Kingdom during May. The two sides held talks on an agreement on cooperation in technical surveys of ships and reportedly "have achieved good results." **Direct shipping services were opened between China and Bangladesh in July,** according to the Bangladesh Shipping Corporation. The Corporation sent a delegation to Peking to negotiate the agreement. After a gap of 15 years, **the way is now open for a resumption of shipping contacts between India and China.** Recently a vessel from the Indian-owned shipping company Apeejay Lines was chartered to the Chinese, and Indian Government approval was obtained for her eventual call at a PRC port. **In June, Japan won two contracts for supply of Western-designed marine equipment to China.** Supply of parts and services for Swedish Gotaverken engines will be handled by Sasebo Heavy Industries.

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China Economic Notes

Briefly:

- **State Planning Commission reveals plan for China's growth, encourages nationwide emulation campaigns.**
- **Crops in 1977 appear mediocre; conference sets goal for farmland construction in China through 1980.**
- **Consumer goods show best growth in economy during first six months of 1977.**
- **Geology conference and new oil fields reported.**
- **Scientific research receives official support from government; reorganization seems likely for approval at National Science Conference to be held in spring 1978.**

GENERAL—EMULATION CAMPAIGNS UNDERWAY

State Planning Commission outlines economic production. With the recovery from the tumultuous year of 1976 well underway (industrial production was 22.4% higher in July, 1977, than a year ago), the Peking-based State Planning Commission issued a long article in the second week of September outlining its vision for China's economic development. Removing production from politics, the article stated, "We must use revolution to command, promote, and push up production, but we can never substitute revolution for production. Revolution has its own laws and so does production." In an effort to emphasize centralization for the immediate future, the Commission called for rational and deliberate policies, orchestrated out of Peking through six administrative units, in the coming years. The piece clearly delineated eight areas of decision-making that could not be decided locally. **The most striking feature of Peking's recent economic policy initiatives has been the methodical manner in which the**

problems of development have been approached. As part of the new policy, this August, the Ministry of Posts and Telecommunications held its National Conference in Peking to set its own priorities for the rest of the Five-Year Plan. One by one, since the beginning of the year, each Ministry has held a similar planning session. **A new wrinkle.** Without its offering substantially improved standards of living, the Chinese government has had to devise various ploys to encourage workers. Their solution for the moment appears to be emulation campaigns. According to a Chinese participant at last spring's Taching Conference, who spoke with the *China Business Review*, the policy began when the Shantung delegation to the conference challenged any other province to a "friendly emulation campaign," in which competing provinces would vie for better production records. In what was reportedly an electric atmosphere, the Szechwan legation accepted the challenge. Since then, a variety of provinces and municipalities with comparable industrial levels have embarked upon similar campaigns. Hunan and Kiangsi; Liaoning, Kirin, and Heilungkiang; and even Peking and Shanghai are known to be conducting friendly competitions. Even at the ministerial level, the Ministry of Light Industry and the First Machine Building Ministry are involved in an emulation campaign. Furthermore, the Ministry of Petroleum and Chemical Industries, the proud mother organization of the Taching oil fields, is being held up as a source of inspiration to all other Chinese ministries.

AGRICULTURE—CONFERENCE SETS PLAN TARGET

Grain production stagnates in 1976, outlook for 1977 little better. A recently released US government report indicates that China's total grain output in 1976 was 285 million metric tons, less than half a percent higher than 1975's total crop. At the same time, the Chinese population increased by 16 million or 1.7% to 951 million persons. The returns on crops planted last winter and this spring generally appear to have been somewhat lower than last year's crop, and the Chinese media are now urging the masses "to use autumn to remedy summer"; i.e., to make up for poor early harvests with bumper crops this fall. Judging

from provincial reports, most experts feel that this year's winter wheat along with barley in Kiangsu and Anhwei is well below last year's crops. On the other hand, early rice harvests were somewhat better than in 1976, and the spring wheat crop seems to have been good. Looking toward the late crops, analysts are predicting that since the late rice was planted on schedule, total rice production should be up; miscellaneous grain, however, may suffer—especially in the north China plain where localized flooding may have damaged crops in some areas. **Unless these late crops, both rice and miscellaneous grains, show unexpectedly good yields, China's agricultural production will show little improvement in 1977, and, perhaps, for the second year in a row, China's population growth will outstrip the nation's capacity to develop its agriculture.** Northeast China's soybean sowing, which was delayed somewhat by weather conditions, could return normal yields provided the crop can be taken in before early frosts set in. In the north China plain, the nation's cotton crop appears to be in trouble owing to heavy rains. China's cotton output, which has declined continually from a record in 1973 of 2.6 million metric tons to 2.3 million metric tons in 1977, was not aided by any additional acres sown in this year's crop. Rather, China's leaders seem to be **relying on improved production techniques and economies to eke out their cotton harvest.** To this end, two national conferences were held this summer—one in Hupeh during June to encourage cotton production and one in Szechwan in August to popularize more efficient and economical cotton textile production techniques. During the first conference, Kiangsu and Hupeh, being China's leading cotton-producing provinces, entered a socialist emulation drive to increase their cotton production. In 1977, Kiangsu plans to produce 475,000 tons of cotton (probably ginned tons) on 585,000 hectares, roughly a per-hectare yield of 0.81 tons. Meanwhile, Hupeh hopes to produce between 480,000 and 500,000 tons on 600,000 hectares, a yield between 0.80 and 0.83 tons per hectare. Together the two provinces should account for more than 40% of China's cotton output in 1977. **At other national conferences, China's**

responsible agricultural cadres came together to discuss farm machine training, in Kweilin, at the beginning of August **and seed standardization**, in Canton, at the beginning of July. Both conferences set goals to be met by the end of the Fifth Five-Year Plan, in 1980. A National Farmland Conference was also held this summer, this one in Peking from July 6 to August 5 under the sponsorship of a myriad of powerful Chinese agencies: the State Planning Commission, the State Capital Construction Commission, the Ministry of Agriculture and Forestry, the Ministry of Water Conservancy and Power, the First Ministry of Machine Building, the Ministry of Commerce, the Ministry of Finance, the Ministry of Petroleum and Chemical Industries, the Fifth Ministry of Machine Building, the State Supplies Bureau, and the General Supply and Marketing Cooperatives. The 1,140 attendees, including what must have been a "Who's Who" in Chinese planning, outlined the program for farmland construction in China through 1980. Their stated

goals for each of the three seasons of construction time between now and 1980 are to improve 667,000 hectares of terraced land and to irrigate an additional 1,600,000 hectares. By 1980, every person in China's countryside is supposed to have his own *mou* (0.067 hectare) of "farmland giving stable, high yields irrespective of drought or waterlogging." Western observers now think that **Peking planners, faced with disappointing harvests in recent years owing to unpredictable weather patterns, will try to solve their agricultural dilemma by improving the quality of the land itself and their capacity for water control**, rather than by simply increasing both chemical and mechanical inputs. Recent press accounts in China have, nevertheless, heralded some technical improvements in China's farm machinery production. Shantung's Chimo Farm Machinery Plant has designed a **4-wheel drive tractor** which can plow a hectare in one hour and pull a 9-ton cart at 32 kilometers per hour. In Heilungkiang, the Sunghua-chiang Tractor Plant is now trial-producing a **100-hp tractor** in addition to the 1,000 harvesters it hopes to manufacture in 1977, according to an NCNA account.

CENTRAL CONTROL

"Centralization must be exercised wherever possible and necessary," said the State Commission in its September 12 article describing the future of China's socialist construction. The following are the eight functions which "should be concentrated (in) the central authorities":

- Formation of principles and policies for the development of the national economy.
- Setting major industrial and agricultural production quotas.
- Making investments in capital construction and setting up major projects.
- Distribution of important materials.
- The purchase and allocation of major commodities.
- Setting the state budget and issuing currency.
- Fixing the number of new workers.
- Setting the sum for wages and the prices of major industrial and agricultural products.

Source: NCNA 9/11/77.

INDUSTRY—CONSUMER GOODS ADVANCE

China's "New Leap" takes off. By mid-year 1977, initial successes were being declared in Chairman Hua's program for renewed industrial development. According to one source, "most of the 80 major" industrial items saw production increased in the second quarter of 1977. Petroleum industry equipment, hoisting equipment, bulldozers, machine tools, motor vehicles, water pumps, walking tractors, other tractors, and internal combustion engines have been variously cited as enjoying "fairly good" production in the first six months of 1977, probably under a 9% annual growth rate. In addition, coal, electric power, and chemical fertilizers (up 13% in the first half of the year) have been mentioned in China's press as having seen expanded output. **Consumer goods emphasized, production up.** As promised in early post-"Gang of Four" rhetoric, light industrial production in China is receiving more attention than it did in recent years. When output of consumer goods increased 8% in May over

April, a new national output record was achieved. Total light industrial production in the first half of 1977 was 9.5% higher than the same period in 1976. Various NCNA accounts, heralding production records in cotton cloth, cigarettes, sewing machines, bicycles, wrist watches, and even pots and pans, suggest that **production growth in China's consumer goods is outstripping advances made in heavy industry this year.** This reversal may represent a move on Chairman Hua's part to gain the support of China's population for the difficult economic push that lies ahead. Recent reports out of Japan indicate that **a 15 to 20% wage hike may be in store for Chinese workers.** (Apparently, lowest-grade workers will get a monthly pay raise from \$17.00 to \$20.50, and second-grade workers will be promoted from \$20.00 to \$24.50.) If this reported increase becomes a reality, the Chinese economy will see a large increase in disposable income and, concurrently, a jump in consumer spending. It will, therefore, be necessary to supply more of the coveted household goods—notably cloth and appliances. If the regime increased wages without increasing the production of consumer goods, discontent could develop out of the frustration of having personal funds but no goods to buy, a situation already present in the PRC.

EXTRACTION—TWO NEW OIL FIELDS

National Conference reports 140 minerals in China. As part of a drive to encourage local cadres to develop mineral extraction, the State Geological Conference was held in Peking in early July. The conference attendees learned that, of the 140 minerals known to exist in China, some 132 are of sufficient quantity and quality to be exploitable. China's coal, iron, petroleum, copper, tungsten, antimony, molybdenum, tin, and phosphorus reserves were mentioned as "among the world's foremost." There are now 170 colleges across China that train workers in geological methods; in addition, under the Academy of Geological Research there are 16 institutes of geology, each with its own research staff. Western observers hypothesize that **at the July conference China's geologists established programs through the end of the decade, and possi-**

bly through 1985, outlining which provincial bureaus will concentrate on which mineral resources. Szechwan, it is known, has pledged to double its "established iron reserves" by 1985. A series of emulation campaigns have reportedly begun between local and provincial bureaus to encourage the various units to compete for better production and efficiency.

Oil production in China, up 10.6% during the first six months of 1977, is probably at an annual production rate of 92.5 million metric tons, based on recent US government statistics, but some observers are predicting that PRC petroleum output will pass 100 million metric tons in 1977. Asian sources reported that **China may be developing a new oil field somewhere between Tsingtao and Dairen**, called Huapei (literally, "North China"). This new field is said to be comparable to Taching, which produced roughly 25 million metric tons of oil in 1976. Another oil field is known to exist south of Canton, in the Nanhai area. (Chinese leaders have pledged to build "ten new oil fields, equivalent to Taching, by the end of the century.") Elsewhere, in Szechwan, the Provincial Petroleum Administration Bureau has broken the **record for the deepest oil well in China**, with a 7,058-meter hole sunk by the Number 7002 drilling team; the previous record, also set by the 7002 team, was 6,001 meters. Outside of China, Houston's *Pipe Line Industry* has reported that **the PRC is planning two new pipelines** to be completed by 1980: one a 1,660-mile oil trunk line and the other a 1,200-mile gas transmission line. Details on the location of the new lines were not available.

SCIENCE AND TECHNOLOGY— SCIENCE TO SURPASS WORLD LEVELS

As China's ministries and foreign trade organizations gear up to complete the final three years of the Fifth Five-Year Plan (1976-1980), **the Chinese scientific community is embarking upon a new era in its development**, which may have the most far-reaching sort of effect on the nation's economic growth. After a decade of stagnation, Chinese science and technology is being recalled to a position of importance in the national planning process. Under Chairman Hua's recent instruction, "May science flourish and advance,"

China's leading scientists have met in Peking and throughout the countryside to coordinate an unprecedented series of long-range research programs. The Chinese Academy of Sciences (CAS), the most prestigious Chinese research organization with ministerial rank, held a working conference in Peking from June 20 to July 7 at which Chairman Hua, himself, made an appearance to support the work of the nation's once embattled scientists. During the CAS session, plans were laid for "a number of major scientific research projects to catch up with and surpass advanced world levels." Meanwhile, the New China News Agency reported that the Chinese Scientific and Technical Association, the organization charged with coordinating research work throughout China, had held six scientific seminars, attended by more than 6,000 Chinese scientists, within one month. Since the beginning of the year, in Peking alone, there have been 59 symposia, 80 technical study courses, and 21 exhibitions sponsored by the Peking Institute of Scientific and Technical Information. The July 6 issue of *Red Flag*, the Chinese Communist Party's theoretical mouthpiece, signaled the beginning of a new party policy on intellectuals by advo-

cating the return of the "professional contingent" to the field of science and technology. Further, a four-step program of scientific research was outlined: "The first one is the compilation of information and data. The second one is that we must develop and promote the use of scientific instruments in China. The third is to carry out quantitative analysis and standardization of work. The last one is to pay attention to editing and publishing books for scientific and technological work." So, as China passes the first anniversary of the death of Chairman Mao, the country is alive with scientific activity. From Shanghai's municipal conference on the modernization of science and technology to a national conference on goiter prevention, the PRC seems prepared to approach the problems of nationwide scientific research pragmatically—one report urged the nation to approach scientific research as if "in a chess game." **A National Conference on Science is scheduled to be held sometime in the spring of 1978.** At that time, a comprehensive outline for China's long-range research in coming years will probably be approved and, perhaps, a complete reorganization of the structure of China's scientific community will be unveiled.

RMB: DOLLAR RATES AS OF SEPTEMBER 1977

Date		RMB/US\$	US\$/RMB	RMB/US\$ % Change
May 5	Bid	1.8812	53.1576	
	Offer	1.8718	53.4245	
	Median	1.8765	53.2907	-0.40
July 12	Bid	1.8605	53.7490	
	Offer	1.8513	54.0073	
	Median	1.8559	53.8822	-1.10
July 19	Bid	1.8531	53.9636	
	Offer	1.8439	54.2329	
	Median	1.8585	54.0979	-0.40
July 21	Bid	1.8457	54.1800	
	Offer	1.8365	54.4514	
	Median	1.8411	54.3154	-0.40
July 26	Bid	1.8365	54.4514	
	Offer	1.8273	54.7256	
	Median	1.8319	54.5881	-0.50
July 30	Bid	1.8457	54.1800	
	Offer	1.8365	54.4514	
	Median	1.8411	54.3154	+0.50
August 9	Bid	1.8531	53.9636	
	Offer	1.8439	54.2329	
	Median	1.8485	54.0979	+0.40

Source: Standard Chartered Bank, Ltd.

RECENT INNOVATIONS IN CHINA

The following technical and scientific advances were noted in recent Chinese press accounts:

Atmospheric Sulfur Dioxide Analyzer: The Tientsin Weihsing Semiconductor Parts Plant developed this unit. (*Scientific Experiment (SE)* 1/77)

Automatic Rope Winding Machine: Developed by the Tientsin Plastic Packing Machinery Plant. (*SE* 1/77)

Bulldozers: The Kwangtung Tractor Works trial-produced the province's first 120-hp bulldozer, after starting manufacture last summer. (Kwangtung Provincial Service 7/6/77)

Capacitance-type Thickness Measuring Instrument: A Chinese steel mill developed this instrument. (*SE* 1/77)

Catalytic and Cracking Technology: China's Petrochemical Industry Institute, along with the Yumen and Lanchou refineries, has installed a new catalytic and cracking unit for the molecular sieve catalyst transfer line. Besides reducing catalyst consumption, the new technique increases the production rate of gasoline and light diesel oil by 6%. (NCNA 5/31/77)

Diesel Engine: An Anshan factory produced China's first 2,500-hp diesel engine on July 2. It will be used in mining applications. (Liaoning Provincial Service 8/6/77)

Electron Microscope: Scientists in Shanghai have turned out an electron microscope with magnification of 800,000 times, the first of its kind in China. It has a resolving power of 2 Angstrom units, an acceleration voltage of 120 kilovolts and a magnification from 300 to 800,000 times. (NCNA 7/21/77)

Furnaces: Hopeh workers have developed a 150-kilowatt glow ion nitriding furnace. (NCNA 7/25/77)

Furnace Reheating Formula: The Peking Institute of Scientific and Technical Information has developed a mathematical model for the automatic control of reheating furnaces in continuous hotrolling. (NCNA 7/8/77)

Hormones: The Yunnan Institute of Botany has discovered a type of grass containing an entomological molting hormone, which can be fed to silkworms to regulate the insects' growth and development. (NCNA 6/5/77)

Inertial Super Charger: The Hopeh Diesel Engine Plant has developed an inertial super charger for increasing the pressure of small high-speed diesel

engines by increasing the gas intake and reducing the number of cylinders. The device increases engine efficiency by 10-15% and lowers oil consumption by 5%. (NCNA 5/31/77)

Machine Tools: Hopeh workers have developed a numerically controlled cutting machine with wire electrodes. (NCNA 7/25/77)

Machine Tools: The Chinghai No. 1 Machine Tools Works recently trial-produced a model XFM-5030 two-coordinate precision profiling machine. It is now in serial production. (NCNA 8/11/77)

Mining Truck: The Peking No. 3 General Purpose Machinery Works trial-produced a 20-ton, heavy-duty mining truck, with automatic unloading. It is scheduled to go into serial production "soon." (NCNA 7/3/77)

Orthopedic Device: The Tientsin No. 6985 Hospital, along with the Orthopedic Department of the Tientsin People's Hospital, the Academy of Traditional Chinese Medicine, and the Peking People's Surgical Apparatus Factory, has developed a reduction immobilizer for fractures of lower extremities. It combines traction, reduction, immobilization, and compression in the treatment of severe fractures. (NCNA 7/12/77)

Plate Glass: The Shanghai No. 4 Industrial Glass Plant with help from the Chinghuangtao Glass Research Institute and the Shanghai Industrial Chemical College trial-produced a variety of plate glass hitherto not manufactured in China. It will be used for meters, industrial instruments, panels of integrated circuits, and optical applications. (NCNA 7/14/77)

Portable Silicon-controlled Battery Charger: The Seventh Anhwei Hofei Element Plant developed this tool. (*SE* 1/77)

Spectrocolorimeter: The Tientsin Municipal Textile Industry Research Institute has made an automatic spectrocolorimeter for determining shades of color. With Chinese components, the instrument will be used in textile dyeing and printing. (NCNA 7/10/77)

Synthetic Oil Replacement: The Peking Institute of Scientific and Technical Information has devised a method to use low-molecular polyethylene, a waste product of chemical works, to replace synthetic oil in the foundry industry. (NCNA 7/8/77)

Textile Machinery: Workers in Hopeh have developed an electronic counter

for weaving lines. (NCNA 7/25/77)

Water Detection Device: A Kwangsi Chuang worker has developed a water detection device which finds underground water by observing the electric pulse caused by that water. (NCNA 5/31/77)

Water Pump: The Chaoyang Heavy Machinery Works in Liaoning has produced China's first 616-type, 320-hp water pump for mining enterprises. (Liaoning Provincial Service 8/6/77)

Woolshearing Method: The Heilungkiang Woolen Goods Plant has developed a subcutaneous injection method to remove wool from sheep. (Heilungkiang Provincial Service 7/26/77)

BOOKS ON CHINA'S PETROLEUM

Two more studies have been released on China's petroleum industry. The first, *China, Oil and Asia: Conflict Ahead?*, by Selig S. Harrison (a study from the Carnegie Endowment for International Peace, Columbia University Press, New York, 1977, 317 pages), is a fascinating political and historical assessment of possible US policy opportunities related to China's claims in the East China Sea. Harrison predicts that China has an even chance of reaching a 400 million ton oil output level by 1990, compared with roughly 85 million metric tons in 1976. To meet this production target, China will have to exploit effectively its offshore oil reserves, according to the study; but, in any event, most of the production will be utilized by domestic consumers. One of the key topics discussed in *China, Oil and Asia* is the tension that may develop between China and its neighbors in the Far East as the PRC expands its offshore production and begins to infringe upon territorial claims of other regional powers. The second book on China's petroleum is *Oil in the People's Republic of China: Industry Structure, Production, Exports*, by Wolfgang Bartke (a publication of the Institute of Asian Affairs, Hamburg, C. Hurst & Company, London, 1977, 125 pages). Translated from a German version, which was released in 1975, Bartke's investigation into Chinese petroleum is now somewhat dated, owing to information that has surfaced in the past two years. *Oil in the People's Republic of China* is, nevertheless, well researched and interesting in retrospect.

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China International Notes

Briefly:

- **No "closed door" policy: July Foreign Trade Conference sets the stage for increased imports of advanced technology from the West.**
- **Japan and EEC continue negotiations for long-term trade agreements with PRC; will cooperation arrangements figure in China's future?**
- **China looking at foreign steel, synthetic rubber, energy, auto, aluminum technology.**
- **China now in agricultural machinery market: Massey-Ferguson sells 3,000 tractors.**
- **European petrochemical and steel works host TECHIMPORT.**
- **Will China adopt East European enterprise system? Spectacular fete of Yugoslavia's Tito in Peking.**
- **China's first single-technology, multi-national trade exhibition for world port technology, is scheduled for summer of 1978 in Peking; a similar agricultural machinery exhibition also slated.**

CHINA'S FOREIGN SHOPPING LIST

The following items appear to be on China's shopping list as of fall 1977, based on China's market survey activities of various kinds:

- Integrated steel mills and smelting facilities to be located at Chinese ports, reportedly to facilitate the use of high-grade imported iron ores. PRC delegations have toured US (9/77), UK (7-8/77), and Japanese (9/77) steel works.
- Port technology.
- Auto manufacturing plants.
- Petrochemical plants, including synthetic rubber facilities and some heavy gas oil cracking units to process China's own crude to provide petrochemical feedstocks. Chinese teams have surveyed American and European petrochemical works this summer.
- China's aluminum industry, in exist-

ence for about twenty years, may now be set for a new stage of development.

- Chemical fertilizer plants, a major component of the Fourth Five-Year Plan's purchases, are once again under consideration. A Chinese chemical fertilizer delegation was in Germany, France, Norway, and The Netherlands this summer to survey recent technological developments.
- Mining and petroleum exploration equipment may figure in up-coming purchases. A coal delegation toured Japan (7-8/77) and Germany (5-6/77). The Chinese have been looking at petroleum equipment in the US (6-7/77) and Japan (8/77) this summer, and three mining-related scientific delegations have studied hematite ore, mine drilling, and tunnel boring technology in the US.
- Packaging equipment, the subject of three foreign seminars in China this summer and fall, will be bought. The Chinese Packaging Corporation has scheduled delegations to Sweden, Canada, and the US for the second half of this year.
- Nuclear power equipment, though not explicitly mentioned, may be in the Chinese cards. A French technical mission visited China in 1976, and previously at least two nuclear delegations from China have visited Europe and Japan to study international techniques. China has been talking with Australia about importing uranium. The PRC currently has no nuclear power generation capability.
- Telecommunications equipment has been investigated by a PRC delegation to France (9/77) to study space technology, and a French telecommunications delegation (6/77) went to China. Two US electronics associations held seminars in China (8-9/77) this summer, as well.

China's Ministry of Foreign Trade has been speeding preparations to initiate a major program of buying advanced technology from the West. In the first months of the summer, the Ministry sent major delegations to a number of developed nations and took further steps toward the conclusion of long-term trade agreements with Japan and the European Economic Community, indicating China's interest in stabilizing future trade relations. Yu Chiu-li, Vice Premier of the State Council, sketched the new import program in outline at a conference on foreign trade held in Peking from July

14 to 28. The largest conference on China's external trade in the 28-year history of the PRC brought together 1,400 members of key Foreign Ministry bureaus and branches to hear a major statement of new policy and assist in planning of specifics: **"Self-reliance has nothing in common with a 'closed-door' policy. It does not mean refusing to learn good things from other countries."** Yu stressed, too, the need for improved market research and increasing the "export ratio" of industrial goods and mining products. **"We should pay attention to improving the quality of products and doing a better job in packing in order to meet the demands of foreign markets in a better way."** The outline of a schedule of foreign trade priorities resembles the "product payback" scheme for which the "Gang of Four" criticized Teng Hsiao-ping, in which technology sales are tied to supply of industrial products and raw materials. Teng's scheme applied to contracts with individual firms, but the policy enunciated by Yu is more on a national scale. **Technology import plans will target export industries that can develop funds to finance, in turn, technological improvement of other sectors of the economy.** Japanese business reacted to the unfolding of China's technology import program with unreserved enthusiasm. Business associations and individual firms sent off delegations to survey market prospects for Japanese **steel, automobile parts and manufacturing processes, TV set manufacturing plants, and bank computer systems. China responded by sending delegations to court Japanese coal mining technology, petroleum drilling and refinery interests, and rolling stock and signal systems.** Under the terms of the prospective long-term trade agreement, Japan will become the major market for China's Taching crude; delegations from Japanese petroleum refinery associations spent weeks in China seeking to work out price and volume guidelines in July, August, and September. The trade agreement may be signed before the end of the year, according to latest reports. Liu Hsi-wen, China's Vice Minister of Foreign Trade, flew into Tokyo on September 13 to confer with business leaders on the agreement. Shortly thereafter, a special committee was convened in Tokyo to write out

the plans for new institutions that will administer the treaty and work out final price and import quota schedules to bring to the bargaining table. The committee disclosed to the press that goals had been set for a seven-to-ten year time period and expansion of Sino-Japanese trade to four times the present level. If the agreement is realized according to plan, Japan will trade steel, construction machinery, and petrochemical equipment and plants for industrial and raw materials from China, primarily oil and coal. **Up to now, major obstacles in the path of agreement have been the Chinese demand for an oil price higher than the going rate and the resistance of Japanese industry to developing the special refinery facilities needed to process Chinese crude.** In the favorable atmosphere of the summer, breakthroughs on both issues were achieved. In July, a delegation of the Japan International Petroleum Trading Company gave China the five cents per barrel price rise that had been requested for oil exports in the second half of the year with the result that China now has a firm bargaining position in negotiations on long-range exports. In August, the Japanese Ministry of International Trade and Industry (MITI) responded to the refinery problem by issuing a directive making it mandatory for domestic oil refiners to accept and process low-grade crude oil such as Taching crude (8/23/77). The governmental Japan Petroleum Development Corporation and various refining companies announced a plan to set up a joint corporation to invest in construction of residual oil cracking facilities to process low grade crude oil into gasoline, naphtha, fuel oil and other oil products. Government funds will be made available to cover a part of construction costs. **With the refinery hurdle out of the way, Chinese oil will have smooth access to the Japanese market.** In negotiations to determine price for steel imports from Japan in the first half of the year, the Japanese asking price was forced down only to be followed in subsequent negotiations by a dramatic increase in Chinese orders. Steel orders from China for the first half of the year increased 57.1% over the same period last year, making China Japan's second-ranking steel customer after the United States. Negotiations presently

underway for steel shipments for the six-month period beginning in October are expected to meet the same fate. The second half of Liu Hsi-wen's Japan tour was completely devoted to study of Japanese steel works and production facilities. In view of the major purpose of Liu's mission, to seek working terms for the long-range agreement, it seems likely that the rising trend of Japanese steel exports to the PRC will be written into the bargain. **Agreement between China and the European Economic Community (EEC) made in principle, will be formally signed in 1978.** The possibility of an agreement has been open since 1974, when the EEC first laid a proposal before state trading countries for bilateral determination of import quotas for goods marketed in the European Community; this proposal was to take the place of tariff schedules set by the General Agreement on Tariffs and Trade (GATT). First signs that China might take an initiative toward the proposal came in June when Pu Ming, leader of a Bank of China delegation touring Europe, remarked in the course of conversations with Francis Ortili, Vice President of the European Commission, that China was interested in a long-term agreement to stabilize the growing trade with European countries. **Pu Ming also expressed confidence that Sino-European trade would exceed the level of trade between China and Japan via such an agreement.** Quick to take up the offer half held out to them, the EEC deputized a high-level team to begin talks with Foreign Ministry counterparts in Peking. The team, led by the EEC's deputy director of the Bureau of External Trade, Robert de Kergolay, arrived in Peking on the fourth of July. Six days were spent thrashing out basic issues. In particular, China and the EEC are divided on two points. The Chinese resist the inclusion of safeguard clauses to reimpose or tighten quotas in the event of "import penetration"—a sudden influx of imports in sensitive areas or at prices far below the market median. This is a standard feature of EEC agreements with non-member countries, but the Chinese are unhappy over it. For their part, the Chinese want guarantees for balancing of trade which the EEC cannot give. The balance of trade, perennially falling in Europe's favor, is a source of irri-

tation to the Chinese; last year the Community sold \$1.24 billion of goods to China while only \$907 million worth went the other way. But arithmetical balancing of trade is beyond the European Commission's powers. In spite of the difficulty of these issues, de Kergolay returned confident in the guidelines he and his team had developed. These guidelines, which will be reviewed by the Commission's Council of Ministers at the end of September, may form the basis for formal talks with the Chinese later in the year; de Kergolay expects them to pass the review without complications and return in the form of a mandate for negotiations. **The trading relationship that will be institutionalized by the Sino-EEC agreement is similar in many respects to that of the Sino-Japanese agreement, technology in exchange for fuel products.** China will gain a steady market for its fuel and manufacturing industries and a reliable source for technology. Competition for Chinese contracts is very great, and there are already signs of struggle in the ranks. France has raised its own bid for the China trade, without consulting other EEC members. In August, it was announced that a high ministerial delegation will travel to Peking to offer the Chinese a special export financing arrangement. Meanwhile, a two-month European tour, by a large delegation from China National Technical Import and Export Corporation, began in August. **The group traveled to four European countries, Germany, France, Norway and the Netherlands, inspecting chemical fertilizer plants.** Another TECHIMPORT delegation visited steel smelting installations in northwestern England in July and August. The delegation was especially interested in the giant blast furnaces under construction at the Redcar Steel Complex, which will have a capacity of 10,000 metric tons of iron daily when it begins production next year. The furnace is being built by Davy Ashmore International with Japanese know-how. Regarding exporting financing, Louis Saubolle, Bank of America official in Hong Kong, in June described the framework of an overdraft plan presented to the Chinese by a group of Japanese banks. The plan was drafted at the request of the Chinese. It offers overdraft facilities of up to several hundred mil-

lion yen per bank and a repayment period of up to six months. There is no indication that the Chinese have adopted the plan. **The Bank of China, the organ responsible for financing China's foreign trade, had profit returns of \$54.4 million in calendar 1976, a 56% increase over the previous year,** in the most recent set of accounts filed with the Hong Kong Registry of Companies. The accounts represent Bank of China earnings in its major international branches, Hong Kong, Singapore and London. **Will China follow East European economic policies?** Upon his arrival in Peking on August 30, President Tito was given a hero's welcome in honor of his country's determined resistance of Soviet domination. Tito was once called an "incurable" renegade by the late Chairman Mao, and the circumstances of his return to Peking give rise to speculation that China's political rapprochement with Communist Europe is a symptom of deeper change on the PRC's social and economic levels. Tito's visit was accompanied by reports that China is sending technicians to study the Yugoslavian system of worker self-management, in which workers share with appointed managers responsibility for running an enterprise and distributing its profits. China is interested in the system apparently as an alternative to increasing wage levels, which would present a serious drain on scarce investment resources, or to using moral incentives to spur worker morale and efficiency.

BUYING REPORTS

The Japanese have been making a strong push all summer, not only to catch promised export contracts but also to force up a declining volume of trade. **Total Sino-Japanese trade in the January to June period was down 10.8% from the same period of 1976,** according to figures published by the Japanese Association for Promotion of International Trade (Kokubosoku). A sharp decrease in exports of industrial plants and transportation machinery and decreased exports of steel were largely responsible for the slump in trade. Total figure for exports was \$792,234,000, down 26.6% from the corresponding period in 1976. Japanese traders are confident of better performance by the end of the year. Steel exports have turned in a poor

showing for the first half, but **large orders placed this spring by the Chinese have already begun to have an impact. There are reports of swollen inventories as stockpiles are built up for shipment to China.** Orders for rolled steel have already reached two million metric tons (see CBR 4:4); by the end of the year total steel sales are expected to climb to five million metric tons. Since steel sales usually make up 50 to 60% of Japan's exports to China, shipments following recent orders should make a big difference. Prospects for the year have already improved since the first quarter, when total Sino-Japanese trade fell a drastic 30.2%; much of the improvement is attributed to a record \$370 million of contracts signed at the Kwangchow Fair in May. In recent months, Japanese sales of specialty steel, fertilizers, and electronics equipment have further brightened the scene. In June, specialty steel manufacturers announced sales of 55,000 tons of their products for delivery in the first half of 1977; together with contracts for 100,000 tons of spring and carbon steel with Nippon Steel Corporation for delivery in the first half of the year, this brings the **mid-year total in specialty steel sales to over 150,000 tons.** Companies involved in the recent sales include Daido Steel Co. (17,000 tons), Aichi Steel Works Ltd. (15,000 tons), Sanyo, and Mitsubishi Steel Manufacturing Co. Second-half sales of steel products are picking up. MACHIMPEX signed contracts in June with Japanese firms for 15,000 tons of **steel wire and cable** at ¥160-170,000 per ton (lower than the domestic price) and with Japan Iron-Sand Steel Co., Ltd., and Daitetsu for 30,000 tons of light rail for loading in June-September. Negotiations were reported underway in June for another **30,000 tons of light rail** and for **100,000 tons of small diameter steel bars** from Japanese open hearth steel makers. Japanese exporters intend to up the price of small diameter steel bars from ¥160-180,000 per ton FOB. A Chinese order for **two plants for drying and heat-treating rubber** was announced by Inoue Metal Industry in late July. The deal was written at about ¥500 million (US \$1.8 million). **TECHIMPORT is again investigating the possibility of importing color TV tube and TV set plants,**

according to July reports of spokesmen of Matsushita Electric Co. and Tokyo Shibansa Electric Co. (Toshiba). The Chinese want plants with output capacity of ten to twenty thousand sets per month that will operate on the standard phase alternation byline (PAL) telecasting system used in **Europe and North America.** The decision to expand the industry suggests a renewed commitment on the part of the leadership to consumer preferences. More media news: **China is importing its first Japanese movie in ten years.** The export contract was signed with Shochiko Motion Picture Co. on June 24. The 1972 film, called *Furusato* (Native Place), portrays the troubles of poor workers under capitalism, a theme which is hardly likely to cause a sensation, but foreign-made movies have been taboo since the Cultural Revolution. **The conclusion of the semi-annual Sino-Japanese fertilizer trade talks (6/12 to 7/14) was disappointing to the Japanese producers,** many of whom are facing large operating deficits and factory shutdowns as a result of production over-capacity. Higher prices asked for by the Japanese caused the Chinese to lower their original offer, and they came away with only 500,000 tons of urea and 150,000 tons of ammonium sulphate for loading in the second half of the year, rather than the 800,000 tons of urea and 200,000 tons of ammonium sulphate they had planned to buy. Total value of the sale was \$84 million; purchase price of the urea was reported to be \$130 per ton, \$10 per ton higher than the international market rate. China also bought 270,000 tons of ammonium chloride valued at \$17 million at the same time. Negotiations on a long-term fertilizer trade agreement were deferred to the next round of talks owing to lack of time. **Severe price-cutting by large-scale international manufacturers in bulk sales of polyester fibers to China** and other countries has led to the formation of an export cartel by Japan's ten major synthetic fiber producers. The cartel will control the export of six types of fibers and spun yarn to nine countries, including China. Vice president of Teijin Ltd. Tomoo Tokosue told a press conference in July that the unfavorable international environment for Japanese synthetic fibers made necessary the formation of a "recession cartel." Export

contracts initiated at the Spring Canton Trade Fair, however, were finally concluded in July with contracts for 38,820 metric tons of polyester fibers for delivery in the second-half of the year. Major contracts went to Teijin (13,200 tons), Toray (7,300 tons), and Kuraray (4,200 tons). In other negotiations, tying up loose ends from the Canton Trade Fair, China bought 2,212 tons of **PVC** for delivery in the June-to-August period in addition to the 9,000 tons ordered this spring at the Fair. The **largest contract ever for paperboard exports to China with a Japanese paper mill** was signed by Honshu Paper Co. in August. The contract calls for export to China of 33,000 tons of paperboard worth ¥2,300 million, for shipment in August to November this year. The delivery includes 18,000 tons of kraft liners, 8,000 tons of corrugating mediums, and 7,000 tons of white paperboard. Sumitomo Heavy Industries has signed a contract to introduce **technology to manufacture a West German high-speed offset rotary press** called the K-Bau Compacta to China. The press, by Koeing & Bauer AG, is expected to raise productivity in the printing industry significantly. The contract signature was announced June 6. In a sale of which only the main details have been announced, **Kinmon Denki Co. has won a contract from MACHIMPEX for a metal laser oscillator**, via Sanyu Tsusho trading company. The news was released in late May. Romania signed contracts in August with VFW-Fokker of Bremen for license rights to assemble VFW 614's; a joint company has been established to supervise production of the first hundred. China is considered the most promising of possible markets for the aircraft. **The West German firm of Siemens has signed a contract to supply technical assistance in the construction of a hydro-electric plant**, according to a May 30 report in *Moci*, the French journal. **The Chinese have asked for another high-speed dynamometer from Great Britain.** Coming on the heels of the Vickers contract in May for an aircraft tire, wheel, and brake test dynamometer, the sale presents added confirmation of the trend in buying plant equipment of high technical quality. The present contract, placed with Froude Engineering, is valued at \$171,000; the dynamom-

PanAm's World

Inaugural Tour to the People's Republic of China

December 1977

First trip of its kind: 120 American tourists will have an opportunity to visit Peking, Shanghai, Hangchow and Canton on a first-time Pan Am tour to China. Pan Am will fly the group to Hong Kong on November 30, from which point they will go by train to Canton. The trip was sold out immediately after it was announced.

eter is one designed for testing gas and steam turbines and is capable of accurately measuring outputs up to 37,500 hp. The Lancashire-based TBA Industrial Products Ltd. (Turner and Newall) has **completed and dispatched the largest-ever consignment of British-made gasket material for China.** The contract, valued at \$32,490, was signed between TBA and TECHIMPORT. It was described as a "corporate requirement" from a number of principal industries in the PRC. In the UK, a stir was caused by strikes at the Rolls Royce factory in Hillington, Glasgow, where 15 Chinese technicians are undergoing training under terms of the \$190 million Spey engine contract. The workers responsible for the training program joined the walkout, and it was feared that the break in classes would anger the Chinese and preclude future orders, but the strike ended without further event. **The French appear to have obtained the latest plum in China's airsystem development: a turnkey contract for a civil air traffic control system.** The sale was disclosed by a representative of Thomson-CSF at the Paris Air Show in early June; he would not reveal details of the contract because the Chinese requested privacy but it is likely to be very similar to Thomson-CSF's Brazil project, a nationwide network which was billed at \$70 million. According to latest reports in Peking, **Massey-Ferguson of Canada has just sold the PRC 3,000 55-hp tractors.** The French source that released the news said the sale was made on August 20 and involved machinery made in Massey-Ferguson's plants in

France. The sale is China's first major foreign purchase relating to its grand plan for agricultural modernization; other major sales are likely to follow the study of chemical fertilizer plants by the TECHIMPORT delegation now underway in Europe. Nitrex, a Swiss agency representing nine major West European fertilizer manufacturers, announced the sale of **500,000 metric tons of single-nutrient fertilizers to China** in early June, following shortly upon the Japanese sale of similar size. The Australians are hopeful of consolidating the commodity trade in sugar with China but at present are unable to offer a price attractive to the Chinese; the Australian government as a rule requires fixed price provisions for sugar sold under contract, and world sugar prices are now too low to drop Australian prices for the sake of offering the Chinese a good bargain. In June, Thailand sold China 300,000 metric tons of sugar valued at \$75 million. The several transactions involved were negotiated through Japanese trading companies over the past year. **Japanese sources predict a record high of Chinese sugar purchases this year of perhaps 1.5 million tons**, for the same reason as the high wheat purchases, a shortage due to natural disasters, drought, and disruption of production. Other sources, however, attribute the large purchases of sugar in the past year to increases in domestic demand and to re-exports of refined sugar. Figures for 1975 show that about a quarter of sugar imports were re-exported as refined sugar. The Philippines will supply China 75,000 to 150,000 metric

tons of sugar as part of an agreement concluded on June 2 to expand bilateral trade. Madame Imelda Marcos, wife of the president, returned from Peking earlier in the year with promises that China would buy 450,000 metric tons of raw cane sugar, but neither delivery dates nor contract specifics have been revealed. **The Philippine International Trading Corporation announced sales of 5,000 long tons of crude coconut oil** for shipment to China in July and August. The Chinese have shown interest in the fruit and vegetable produce of Bangladesh and have signed contracts for large amounts of cashew nuts and cowhides over recent months. S. B. Choudhury, leader of a Bangladesh government trade mission to Peking in June to review the status of bilateral trade, came back with the message of plans to expand trade on both sides. **The Chinese will use their own ships to carry cargoes of bananas, pineapples, and other tropical fruit from Bangladesh.** The sizable contract for cashew nuts, a hundred metric tons worth \$600,000, was signed with the China National Native Produce and Animal By-Products Corporation and followed shortly upon the sale of twenty thousand pieces of wet-blue cowhides worth \$5 million. **Neighboring India concluded negotiations in July for sales of shellac to China** which began at the Spring Trade Fair in Canton. An announcement by the Ministry of Commerce stated that 600 tons of shellac would be shipped imminently. **Reports in July of large Chinese purchases of soybean oil have recently intrigued market specialists.** China, the world's third largest producer of soybean and soybean products, rarely goes abroad to look for supplies; now its buying activities are very much on the quiet. According to one trader, "They buy a small amount here and there so they won't attract attention," and figures for their total purchases are hard to come by. The best estimate for soybean oil purchases is 90,000 tons; Brazil is the principal supplier. China is also buying fertilizer in South America; the Chilean Mining and Chemical Company signed a contract with SINOCHEN earlier this year for shipment of 15,000 tons of sodium saltpeter fertilizer in August. A contract for the same amount was signed in August for immediate shipment. In

the minerals and metals trade, China has signed major contracts with Middle Eastern suppliers. **Bahrein will supply Peking with ten to twenty thousand tons of aluminum a year,** according to the terms of an agreement signed in July, and has already shipped 4,000 tons as a pre-contract consignment. **Iraq will send China 100,000 tons of sulphur under the terms of another July agreement.** According to a Reuters report of August 30, **Iran has sold China 300,000 metric tons of Iranian crude oil at OPEC prices.** Payment will be on a cash basis, the National Iranian Oil Company disclosed. In May, **China finalized contracts to buy \$12 million of copper concentrates from the Philippines.** The sales will bring total value of copper concentrates China has bought from the Philippines since 1974 to \$36 million. Delivery of the present order of 40,000 metric tons is to be before September, 1977. In the West, reports that the Chinese will buy 4,000 metric tons of lead have been driving up prices on the London Metal Exchange.

CHINA SELLING REPORTS

Following a July trip to Peking, the Japan International Petroleum Trading Company (Kokusai Sekiyu) announced that **agreement had been reached with the PRC to raise the FOB price of Taching crude by 5 cents to \$13.20 per barrel for imports in the latter half of the year.** The Japan-China Petroleum Import Council backed up the hike, which still leaves Chinese crude 35 cents cheaper per ton than its main competitor, Minas crude of Indonesia. **Agreement was also reached to increase the import volume by 350,000 tons,** bringing total Japanese import shipments for the year to 6.53 million metric tons. The Chinese asked for the price increase to reduce the discrepancy between the price of Minas and their product. Interest is keen in the settlement of terms for oil and coal purchases from China that will be written into the long-term agreement. The *Mainichi Shimbun* of July 25, reporting that Japanese business leaders had agreed in spring talks with the Chinese to an import level of 30 million metric tons of oil and 5 million metric tons of coal per year by 1985, aroused excitement in business circles. The report was subsequently dis-

credited by the results of a survey conducted by the Japanese Natural Resources and Energy Agency in conjunction with the oil refining industry. The study showed that **Japan's twenty refineries' projected requirements for Chinese crude in 1987 would amount to only 20 million metric tons annually** and warned against overestimating industry needs in order to improve prospects for the bilateral trade accord. More accurate information on the proposed policy toward coal imports was supplied by the head of the Electric Power Development Company, Yoshihiko Morozumi. **He proposed imports of 120,000 tons of Chinese steam coal this year,** a modest increase over last year's trial contract. By 1980, however, he predicted, Japan's requirement will rise to at least a million tons per year. Morozumi added that talks have already begun toward the realization of this goal. **Steel industry sources report China ore sales.** Kawasaki Steel Corporation contracted in June to buy 7,000 tons of ferro-manganese ore at FOB ¥6,512 per ton; an additional 5,000 tons has been ordered by Nisshin Steel Company. The two companies plan to continue to use Chinese ores; up to now they have obtained supplies mainly from South Africa and India. **The Japanese textile industry continues its lobbying efforts against imports of Chinese silk.** The latest move this July has been the application of a "prior approval" system for Chinese silk exported via Hong Kong. Japanese government sources charged that 10% of Chinese silk exports last year were routed through Hong Kong and that the continuation of the practice voided the quota system established this May. In the future, **silk importers will be required to obtain prior government approval before accepting shipments of silk of Chinese origin from Hong Kong.** The Chinese fear that the Japanese action may stir up protectionist instincts in other silk-producing countries. In Europe, however, rising Chinese prices, rather than protectionist policy, are endangering Chinese silk sales. **The Italian silk importers are in arms against further restrictions on imports of Chinese silk;** it is rumored that silk importers had already exhausted the annual import quota in late March. Canada has imposed an import permit

system for cotton terry cloth towels similar to the Japanese "prior approval" system for silks. Permits are being issued to importers based on their "historical" performance. **Britons are complaining about shortage in supplies of Chinese cashmere, camel hair, and angora;** some firms will be severely hit by failure of the Chinese to fulfill export contracts. The present shortage is probably an effect of the recent drought, which has done further damage to stocks that were already crippled by the Tangshan disaster. Another longer-term problem is development of a Chinese processing industry for fine fabrics and clothing, which will appropriate the major share of luxury fiber supplies. China's **Hong Kong** market has also suffered the effects of the drought; imports rose for the first five months of the year by a mere 0.5%. Cereals and cereal products were especially hard hit, down 14.3% from the same period last year. Sales to Hong Kong of fish and fish products and non-metallic mineral manufactures also did poorly, dropping 16% and 13.4% respectively from sales levels of the January-to-May period in 1976. As usual, **out of the total trade a large chunk was ticketed for re-export; of \$3.03 billion worth of goods bought from the PRC, \$982.5 million were re-exported.** Among the areas in which Chinese sales were strong, the rise in sales of crude and animal vegetable materials is most striking with a 65% increase over the same period last year. Clothing exports also rose by 48%, seeming to corroborate traders' reports of expansion in the textile industry. **Hong Kong's petroleum imports from the PRC went up by 29% over the January-to-May period last year.** Sales are expected to exceed the \$13 million level they reached by the end of 1976 with the opening this year of three oil storage facilities in the New Territories. **The big news of the summer in Hong Kong was the inauguration of the first of the new oil storage depots at Fo Tan, near Shatin, in July.** The new depot, operated by the Peking-owned China Resources Company, is connected by rail with the PRC and has a **storage capacity of 10,000 tons.** Reports noted purchases of almost **\$1.7 million of road-building machinery by Pakistan.** The equipment is probably destined for the

Korakoram Highway project, which has received abundant assistance from China in the past four years in the form of labor and technicians. Typically, China finances its foreign aid projects at least partially through sales of Chinese products within the host country. Such deals are not just a one-way street; China offers the developing country better prices than available on the world market and, in sales of machinery and equipment, technology better-suited to the local environment.

DELEGATIONS TO CHINA

ALBANIA, 7/3-16/77, Broadcasting and television delegation met with Chang Hsiang-shan, director of the Central Broadcasting Administration.

ALBANIA, 7/31-8/12/77, Members of the Albania-China Friendship Agricultural Co-op led by Enver Naska, on the invitation of the Peking Municipal Revolutionary Committee, visited Peking; Tachai, Mao's birthplace; and their counterpart China-Albania friendship co-op. They were received by Vice-Premier Chen Yung-kuei.

AUSTRALIA, 5/27/77, Trade mission from New South Wales arrived at the invitation of the China Council for Promotion of International Trade.

AUSTRALIA, 6/12-26/77, An Australian livestock group led by D. S. Keyser presented technical seminars and conducted business talks in Peking, Inner Mongolia, and Shanghai. The ten-member delegation was organized by the Australian Department of Overseas Trade to promote sales of Australian breedstock to China and included representatives of the Australian sheep industry, beef breed societies, and stock and station agents. **Highlight of the mission was a rare ten-day tour of Inner Mongolian livestock farms and veterinary research institutes.**

AUSTRALIA, 8/22-9/7/77, Nineteen-member Australian trade mission including representatives of major companies visited Peking, Nanking, Wusih, Shanghai, Hangchow, and Canton.

BOLIVIA, 6/15-19/77, A group of Bolivian businessmen led by Carlos Iturralde, head of the Association of Tungsten Producers and leading member of the International Tin Company of Bolivia, visited Peking under CCPIT auspices.

BRAZIL, 6/77, Compenhia Vale do

Rio Doce, Brazil's mining and natural resources company, announced plans to send a mission to China to sell **iron ore and negotiate imports of petroleum and copper.**

CANADA, 7/5/77, Delegation of the National Farmers Union arrived in Peking.

CHILE, 10/77, Government trade mission will be sent to Peking in October to buy **medical and agricultural equipment.**

CONGO, 6/16-21/77, Prime Minister Louis-Sylvain Goma and entourage toured China.

EUROPEAN ECONOMIC COMMUNITY, 7/4-13/77, Six-man delegation of the EEC led by Robert de Kergolay visited Peking for talks on the **legal form of a trade agreement to be negotiated later in the fall.**

FRANCE, 6/8-16/77, Fifteen-member telecommunications delegation visited Peking under charge of M. Thery, head of the Directorate-General of Telecommunications of France.

FRANCE, 7/17/77, Reports surfaced of a favorable export finance scheme that France is planning to offer China during a visit of French ministers to Peking in August. The plan, details of which were not disclosed, was prepared by a consortium of French banks and has already received government approval.

GERMANY (FRG), 5/30/77, Delegation of the Technical Association of Super-Power Associations arrived in Peking for a round of technical discussions.

GREAT BRITAIN, 8/1/77, Dr. M. Sweeting headed a **geomorphology delegation** to China for talks with colleagues at the Chinese Academy of Sciences.

GREAT BRITAIN, 8/3/77, Conservative Party group led by Reginald Eyre arrived in Peking.

GREAT BRITAIN, 8/77, The China Trade Newsletter #261 (July 1977) reported that **Froude Engineering** had been invited to Peking to give **technical presentations of its new machine for automated testing of gas and diesel engines and small turbines.**

GREAT BRITAIN, 9/77, Coventry Chamber of Commerce announced plans for a **two-week trade mission to China in September;** the **Sino-British Trade Council** is planning a **delegation of high-level industrialists,** led by trade council chairman



Leader of National Council-sponsored CCPIT visit to US, Wang Yao-ting, has discussion with Speaker of the House "Tip" O'Neill (D-MA), September, 1977.

Lord Nelson, for the same month. The mission will focus on the iron and steel industry, and include top-level executives of British Steel and Davy International.

GREAT BRITAIN, 11/77, An all-inclusive package tour to Peking leaves London on November 5, sponsored by Thomson Holidays following five years of negotiations with the Chinese. A spokesman of Thomson Holidays stressed that the tour "will be a cultural visit, not a holiday" and will enlist "serious visitors."

IRAQ, 6/29/77, Ahmad Danhash Mansur, head of the Mining Department of Iraq, arrived for talks on the sulphur trade at the invitation of the China National Chemicals Import and Export Corporation.

IRAQ, 7/31/77, Delegation of the Iraqi Date Administration.

ITALY, 6/12-16/77, A visit by Italian Foreign Minister Arnaldo Forlani demonstrated Italian support of the prospective Sino-EEC trade accord. At a dinner in Peking on June 12, Forlani voiced support of the negotiations and confidence in the prospects for Sino-Italian trade, based on exchange of technology for raw materials.

JAPAN, 6/3/77, Friendship delegation of the Japan-China Agricultural Technique Exchange Association arrived in Peking as guests of the Chinese Society of Agronomy.

JAPAN, 6/7/77, Goodwill delegation of the Japan Journalists' League led by Shizuma Kai, chairman of the league, arrived in Peking.

JAPAN, 6/23-7/5/77, Delegation of the Association for the Promotion of International Trade (Kokubosoku) under the leadership of managing director Teiji Hagiwara spent two weeks in Peking discussing means of expanding trade and economic cooperation between the two countries. The delegation met with Wang Yao-ting, CCPIT chairman, and officials of the Foreign Trade Ministry and foreign trade corporations.

JAPAN, 7/1/77, Bank of Tokai delegation arrived for talks with Bank of China officials on adoption of an "on-line" bank data-processing system. The mission, headed by President Shinichi Tani, also broached the possibility of supplying technical aid for the development of bank management programs. China has shown great interest in the computer system utilized by the Japanese bank for instant retrieval of finance and deposit data, according to bank spokesmen.

JAPAN, 7/6/77, Japanese printing and publications delegation arrived in Peking.

JAPAN, 7/18-8/2/77, Delegation of three television and broadcasting corporations from Osaka arrived on the invitation of the Central Broadcasting Administration, for "friendly talks."

JAPAN, 7/25/77, Delegation of the Japan International Petroleum Trading Company visited Peking at the invitation of China National Chemicals Import and Export Corporation. The mission returned with an agreement to raise the price of Chinese

oil by 5 cents per barrel (see China Selling Notes).

JAPAN, 7/27/77, Matsushita Electric Industrial Co. received the go-ahead for a mission to discuss contract terms for sales of TV sets and a TV manufacturing plant to China. Initial inquiries on the purchase of a TV plant were received prior to the start of the anti-"Gang of Four" campaign in October of last year, company spokesmen said.

JAPAN, 8/1/77, Goodwill delegation of magnetic materials experts arrived in Peking.

JAPAN, 8/2/77, 400-strong delegation of the Japan-China Friendship Association visited China in an effort to promote early conclusion of the Japan-China peace and friendship treaty and were received by Vice Premier Li Hsien-nien. The trip was launched in the Japanese press with a barrage of articles favoring the conclusion of the treaty, but the chances are slim with Prime Minister Takeo Fukuda's assertion that he is "too busy" at present to deal with the treaty. Recent developments in Japanese-Soviet relations, as well as the Tokyo-Seoul agreement on joint development of territorial waters and Fukuda's pro-Taiwan stance, are practical causes of the downturn in political relations.

JAPAN, 8/77, Federation of Economic Organizations (Keidanren) announced intention to send a high-level mission in late August to finalize terms of the Japan-China long-term trade agreement, specifically to seek settlement on price and volume of oil imports. The plans for the mission were set in a July 25 session between Wang Yao-ting, CCPIT Chairman, and Toshiwo Doko, president of Keidanren. Observers predict that the substance of the negotiations will concern settlement of the price of oil imports on which there exist serious differences. Toshio Komoto, chairman of the Liberal Democratic Party's Policy Affairs Research Council, has already signified willingness to set import volume at the 15 million ton level.

JAPAN, 9/7-22/77, The Japan Automobile Parts Manufacturers Association is sending a fifteen-member research mission to visit automobile parts works in manufacturing plants in Peking, Changchun, Nanking, and Shanghai. Representatives of 11 firms

are included in the mission which will try to establish "independent contact" with Chinese automobile makers, according to the *Japan East-West Trade News* (Aug 4, 1977).

JAPAN, 9/15-29/77. A long-delayed mission of the **Japan Automobile Manufacturers Association (JAMA)** was announced August 1 for mid-September. The fourteen-man delegation will discuss Japanese technical aid in auto production and levels of future Japanese auto exports to China (which presently stand at about 2,000 vehicles annually). The Chinese decision to revive the mission, originally planned for March of this year, was taken as a sign that the new leadership favors rapid modernization and expansion of the automobile industry during the current Five-Year-Plan. The mission will be led by Tomio Kubo, president of Mitsubishi Motors Co., and will include high-level executives of nine other firms.

JAPAN, 8/77. Under terms of a technical cooperation agreement signed with Peking in 1974, a **Nippon Steel Corporation technical mission** visited hot stripping and electrical sheet manufacturing facilities at the Wuhan Steel Works in August to give assistance on electric and computer systems of the facilities. Nippon Steel also disclosed plans to sell the Chinese 80,000 tons of hot rolled steel and 60,000 tons of steel slabs. Since the hot strip mill at Wuhan has not yet been completed, Chinese producers are facing shortages in these supplies which Nippon hopes to fill, over and above export quotas set by the Japanese steel industry as a whole.

JAPAN, 8/29-9/5/77. Five of Japan's largest steel companies will send a mission to Peking to try to persuade the Chinese to accept a higher price for Japanese steel. Up to now, Japan has been selling steel products to China at prices 15 to 20% lower than international market prices, mainly because the Chinese refuse to negotiate volume of import contracts before arriving at favorable price settlements. Now Japanese manufacturers claim they are unable to continue exports on an expanding basis unless they can obtain an improved rate structure. The mission is crucial to the medium-term level of Japanese steel exports, according to a *Financial Times* report of July 29. Only steel

prices will come under review; the question of volume will be raised in a later October mission. Yuzuru Abe, president of Nippon Steel, is leader of the delegation, which includes vice presidents from Kokan, Sumitomo Metal Industries, and Kawasaki Steel Corporation.

JAPAN, 9/77. Major Japanese Oil companies—Idemitsu Kosan, Kyodo Oil, and Maruzen Oil—announced plans to send an inspection team to Taching oil field. The team will study Chinese crude oil production, preparatory to drafting an import program.

JAPAN, 10/77. Bank of Tokyo mission announced for October.

MALAYSIA, 8/11-14/77. Vice-minister of Finance Richard Ho Ung Hun met with Li Chiang, Chinese Minister of Foreign Trade.

MAURITANIA, 7/26. Economic delegation led by the Minister of Economy, Planning, and Development arrived in Peking.

MOZAMBIQUE, 7/4-10/77. Government trade delegation visited China for business talks.

NETHERLANDS, 6/29/77. Twelve-man Dutch harbor construction and dredging equipment mission under the leadership of J. H. Wijsman arrived in China for three weeks of talks with port officials and engineers. The delegation, which included representatives of Rijn Schelde (RSV), IHC/Holland, Conrad/Stork, and the Rotterdam Port Authority toured the ports of Shanghai, Whampoa, Dairen, and Tsingtao. Chinese are presently reviewing foreign construction equipment and know-how preparatory to launching a major building program to develop deepwater port facilities; bidding will culminate in a port technology exhibition planned for the summer of 1978 (see Exhibitions). The Dutch are considered to have a leading edge in the competition because of the applicability of their technology to Chinese conditions.

PAKISTAN, 7/29-8/5/77. Trade delegation visited China to renew the border trade agreement between the two countries. Letters on trade were signed and exchanged August 2.

PHILIPPINES, 6/2/77. Delegation to the first meeting of the Joint China-Philippines trade committee led by Dakila Fonacier, director of the Bureau of Foreign Trade of the Philippines, arrived in Peking.

PHILIPPINES, 7/25/77. Goodwill mis-

sion of insurance companies visited Peking at the invitation of the People's Insurance Company.

ROMANIA, 7/4-13/77. Government trade delegation led by Ian Stoian, Vice Minister of Foreign Trade and International Economic Cooperation, visited Peking to attend meetings of the China-Romania Mixed Trade Committee.

ROMANIA, 7/18/77. Scientific and technical delegation arrived in Peking to attend 18th session of the joint commission on scientific and technical cooperation between China and Romania.

ROMANIA, 7/25/77. Hosted by the China Film Corporation, a Romanian film distribution delegation led by Rachita Vasile, deputy director of the center of Romanian Films, arrived in Peking for a brief stay.

RWANDA, 7/6-16/77. Health delegation led by the Minister of Health, Ildephonse Musafili, toured Peking and Nanking.

SENEGAL, 6/15-28/77. Government trade delegation visited Peking and Shanghai.

SOMALIA, 7/20-29/77. Government delegation led by Vice President Ismail Ali Abokar arrived for high-level talks.

SUDAN, 6/6-16/77. President Nimeri of the Sudan led government delegation to pay official visit to China. President Nimeri met with Chairman Hua Kuo-feng to discuss "relations of friendship and cooperation" between China and Sudan.

TANZANIA, 7/77. Meteorological delegation in Peking for talks with Central Meteorological Bureau.

UNITED NATIONS, 8/4-11/77. UN Secretary General Kurt Waldheim paid a courtesy call on Chinese leaders following his recent reappointment as UN chief. China is a member of the UN Security Council.

YUGOSLAVIA, 6/3-6/77. Government trade delegation visited Peking for talks on expansion of the trade and economic cooperation.

YUGOSLAVIA, 6/4-6/77. Scientific and technical cooperation delegation under the leadership of academician Ivan Jurkovic on goodwill trip.

YUGOSLAVIA, 8/30/77. President Tito, one-time "arch-revisionist" of Peking press diatribes, arrived in Peking in a dramatic demonstration of improved relations between the two countries. He became the first for-

eigner to visit Mao's newly-opened mausoleum. **Yugoslav government sources said that the Chinese had offered support of Yugoslavia's nonaligned policies in the course of talks in Peking.**

ZAIRE, 6/1-15/77, Government trade delegation visited Peking.

DELEGATIONS FROM CHINA

ARGENTINA, 6/17-26/77, Four-man government shipping delegation visited Buenos Aires to negotiate a government shipping agreement.

AUSTRALIA, 6/9-30/77, Goodwill delegation of the Chinese Academy of Sciences led by Professor Chien San-chiang, deputy secretary-general of the Academy. Exchange of "academic items" were among the topics discussed at meetings between the Chinese and their counterparts of the Australian Academy of Sciences. **The presence of Professor Chien, one of China's foremost nuclear physicists, gave rise to rumors that the purpose of the mission was to weigh the chances for long-term supplies of Australian uranium for the Chinese nuclear industry.**

AUSTRALIA, 8/13/77, Vice Minister of Foreign Trade Chai Shu-fan left Peking for a visit to Australia and New Zealand.

BANGLADESH, 7/15/77, Machinery trade delegation arrived in Dacca for talks with the Ministry of Commerce and Agricultural Development Corporation. The main purpose of the mission was to **assess the market for Chinese agricultural machinery.**

CANADA, 6/12/77, Delegation of the Institute of Foreign Affairs under the leadership of Hao Te-ching, president of the Institute, arrived in Ottawa.

DENMARK, 6/18-28/77, Delegation to the third meeting of the China-Denmark mixed trade committee in Copenhagen.

FRANCE, 6/7-15/77, Hsing Yung-ning, deputy chief of staff of the Chinese Air Force, and party attended the 32nd International Air Show in Paris.

FRANCE, 9/77, Technical mission from the PRC scheduled to meet with European Space Agency officials for extensive briefings on Western space technology and space programs. The Chinese mission, consisting of about ten members, will spend forty days viewing European space activities with space agency officials and repre-

sentatives of European manufacturers active in space programs. The visit was requested by the Chinese. The European Space Agency is organizing industry visits, as well as the presentations in its own facilities.

GERMANY (FRG), 5/30-6/15/77, Coal technology delegation visited West Germany to inspect lignite mines in the Rhine and coal mines in Ruhr and Saarland, as well as research institutes, at the invitation of the Federal Ministry of Research and Technology. **GERMANY (FRG), 6/5-19/77, Goodwill delegation of Chinese institutions of higher education** arrived for a tour of universities and research institutes.

GERMANY (FRG), 7/3/77, A large delegation of the National Technical Import Corporation under the leadership of General Director Tsui Chun left Peking for a **two and a half month tour of chemical fertilizer plant facilities in West Germany, France, the Netherlands, and Norway.** The delegation includes nine petrochemical engineers who specialize in chemical fertilizers and is scheduled to meet with companies that make complete fertilizer-manufacturing plants as well as production units. The delegation is being hosted in West Germany by Uhde Co. and in France by the Societe Chimique de la Grande Paroisse. **Experts believe that China is shopping for plant and equipment to produce nitric acid and nitrates.**

GREAT BRITAIN, 6/22-7/77, TECH-IMPORT delegation headed by Yeh Cheng-ta toured industrial plants in the Northeast. The Phillips-Norway oil complex, Seal Sands, the Redcar steel complex, Whessoe, and Head Wrightson were among the firms visited. **British firms were excited by the display of Chinese interest in British iron and steel technology, particularly Davy Ashmore International, which is engaged in building the £200 million blast furnace at Redcar and hopes for similar contracts from the Chinese.**

IRAN, 5/25-6/9/77, Insurance delegation headed by Sung Kuo-hua attended the conference of the 13th executive committee of the Afro-Asian Insurance and Reinsurance Association and its plenary session on June 4 in Teheran.

JAPAN, 6/21-7/12/77, Chinese railway workers delegation on a goodwill visit at the invitation of the Japa-

nese National Railway Engine Drivers' Union.

JAPAN, 7/12/77, Goodwill delegation of the China Fishery Association left for Japan.

JAPAN, 7/12-8/12/77, Ten-member coal inspection team toured Japan for a month **inspecting coal mining machinery and mine safety equipment in coal mines, and machinery plants from Kyushu to Hokkaido.** The main purpose of the mission is to look over what Japan has to offer in the way of coal mining machinery in pursuance of the long-term Sino-Japanese trade agreement.

JAPAN, 7/15-8/1/77, Wang Yao-ting, CCPIT chairman, arrived at the head of a CCPIT Friendship Mission to participate in the opening of the Chinese exhibition being held in Sapporo through August 8. After attending opening ceremonies at the fair on July 17, **the team flew to Tokyo for talks with leaders of the Federation of Economic Organizations (Keidanren).**

JAPAN, 7/25-8/16/77, Following its US tour, a ten-member MACHIMPEX delegation under the leadership of Chao Sheng-chen visited Japan **to inspect offshore drilling technology and equipment and conduct preliminary research for purchases of oil drilling and related equipment from Japan.** Industry sources say the focus of the present shopping expedition is on ocean research ships, platforms, drilling equipment, and special purpose valves. Like the coal technology inspection mission, the oil group is an offshoot of the Keidanren talks in March on the establishment of a long-term Japan-China trade agreement under which China will export coal and oil and import steel and equipment from Japan. In order to live up to the high export levels promised, China must first increase its output capacity through opening of new coal mines and oil fields and plant improvements.

JAPAN, 8/5/77, High energy physics delegation left on goodwill visit.

JAPAN, 9/13/77, Foreign Trade Vice Minister Liu Hsi-wen arrived at the head of a thirteen-man delegation to discuss the long-term trade agreement with Japanese business leaders. Talks were held between Liu and Yoshihiro Inayama, president of Kokubosoku (Japan Association for the Promotion of International Trade);

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afterwards Liu visited the Yamata Works of Nippon Steel Corporation and the Kashima and Kohura Works of Sumitomo Metal Industries.

JAPAN, 10/77, China will send a mission to Japan in October to inspect Japanese rolling stock and signal systems, reportedly in connection with **Chinese plans to construct a large-scale marshaling yard outside of Peking.** Technical discussions are currently being held with Japanese railway signal makers.

MOROCCO, 6/14/77, Government trade delegation left Peking to attend a meeting of the Joint China-Morocco Trade Committee.

NEW ZEALAND, 5/21/77, Delegation to the third meeting of the China-New Zealand Joint Trade Committee left for home. The delegation, led by Cheng To-pin, of the Ministry of Foreign Trade, sought expansion of trade, especially textiles, and increased technical cooperation between the two countries.

NORWAY, 6/10-18/77, Government trade delegation attended third meetings of the China-Norway Mixed Trade Committee.

PAKISTAN, 5/30/77, Three-man delegation of the People's Insurance Company visited Pakistan to hold discussions with the Pakistan Insurance Corporation. The state of existing ties was reviewed and possibility of further collaboration discussed.

PAKISTAN, 7/77, Kuan Hsueh-chung, Deputy General Manager of the Tientsin Gas Company, led a five-man **gas exploration and distribution delegation** on a one-month study tour of gas distribution systems. Gas installations in Lahore and Lyallpur were visited, as well as compressor stations, regulation stations, and special pipelines over riverbeds in Multan.

ROMANIA, 7/5-16/77, Geological delegation led by Hsu Chieh, leading member of the State Geological Bureau, spent ten days touring field sites and holding discussions with their Romanian counterparts.

TANZANIA, 6/17-7/3/77, Chinese shipping delegation visited Dar es Salaam to attend the 11th board of directors meeting of the Chinese-Tanzanian Joint Shipping Company.

VIETNAM, 8/3/77, Five-member biological study group arrived for a study tour under terms of the scientific and technological cooperation agreement between the Chinese Academy of Sciences and the State Commission for Science and Technology of Vietnam.

YEMEN, 8/5/77, Government trade delegation arrived for talks.

EXHIBITIONS

FRANCE, 11/78, A French exhibition of leading **petroleum and gas equipment** is reported scheduled for 1978.

GABON, 6/29-7/14/77, Exhibition in Libreville ran concurrently with 14th conference of the Organization of African Unity. Displays on industry and agriculture attracted over 80,000 visitors; centerpieces were the miniature models of Tachai production brigade and Taching oil field.

HONG KONG, 6/14-7/14/77, Trade show of Chinese machine tools and motors won more than HK \$3 million worth of orders for Cosmo Machinery Trading Co., the sole distributor of Chinese machine tools and electric motors in Hong Kong, the Philippines, and Thailand. The fifth fair of its kind, with attendance of about 30,000, included representatives of Krupp, the German steel firm, and other overseas companies. **Computer-operated machine tools caught the attention of Hong Kong manufacturers; their cost is about half that of the Western models.** So far, however, the computer-run tools are for looks only, not for sale.

JAPAN, 6/10/77, Exchange exhibi-

tion of contemporary Japanese calligraphy opened in Chungshan Park, Peking. Sponsored by the China People's Association for Friendship with Foreign Countries, it drew noted calligraphers as well as those concerned with Sino-Japanese affairs.

JAPAN, 7/15-8/8/77, Sino-Japanese Friendship exhibition in Sapporo drew more than 640,000 people during its 22-day show, 12% of the Hokkaido population, according to the NCNA report. Wang Yao-ting, CCPIT chairman, was on hand to cut the ribbon for the opening of the exhibition, and Toshio Doko, president of Keidanren, held talks with the exhibition manager during its course.

KENYA, 8/1/77, Economic and trade exhibition opened in Nairobi; over 1,600 kinds of exhibits are included in the display, with an emphasis on **agricultural products and machinery.**

PEKING, summer 1978, Port technology exhibition announced. This will be the first single-technology, multinational trade exhibition ever to be held in China, a portent for the future. Participants will include Dutch, British, West German, Japanese and South Korean firms. China's few ports that can take ships up to 100,000 deadweight tons are badly overcrowded, and the exhibition will culminate a year of searching for the best in foreign construction equipment and techniques prior to launching a major program to build new deepwater ports and expand existing facilities.

POLAND, 6/12-22/77, China, after a year's absence, put in a hand again in the annual East-West trade fair in Posnan, Eastern Europe's biggest annual trade fair, with a **variegated display ranging from carpets to table tennis paddles.**

SWEDEN, 8/20-28/77, Chinese pavilion opened at the 59th Malmo International Fair. China, which has never entered the fair before, now occupies the largest pavilion.

SWITZERLAND, 6/24/77, Photo exhibition on China's agriculture sponsored by the Swiss-Chinese Friendship Association of Berne. Theme of the exhibition was the campaign on learning from Tachai and farm mechanization in China.

ZAIRE, 7/11/77, Chinese Pavilion Day at the Fifth Kinshasa International Fair. Reception marking the day was attended by 300 guests from

Zairian business and diplomatic circles. China sent an exhibit to the Kinshasa International Fair for the third time since 1973; most of the displays were on agricultural products and light industry, including textile machinery and textile products.

AGREEMENTS

BARBADOS, 5/30/77. Joint communiqué issued on the **establishment of diplomatic relations** between China and Barbados.

CAPE VERDE, 8/12/77. **Agreement on economic and technical cooperation** signed at Praia.

CONGO, 6/18/77. **Economic and technical agreement signed** in Peking; in attendance at the signing ceremony were both Hua Kuo-feng, Chinese head of state, and Louis-Sylvain Goma, Congolese prime minister.

EQUATORIAL GUINEA, 5/31/77. In Malabo, China and Equatorial Guinea signed **protocol for dispatch of a new Chinese medical team** to Equatorial Guinea.

ETHIOPIA, 6/18/77. Minutes of talks signed in Addis Ababa for **opening of air routes via Addis Ababa to Africa**. Civil Aviation Administration of China (CAAC) has never used rights obtained in 1972 under terms of the bilateral trade agreement for service into Addis Ababa; **now that beyond rights have been obtained, China has direct access to all the countries of Africa**. Next stops on the route will be in Nigeria and Tanzania.

ETHIOPIA, 6/30/77. **Trade protocol for 1977/1978 signed** in Addis Ababa. China will buy **coffee, oil seeds, pulses, semiprocessed hides and skins, gum, and cotton**. In exchange, Ethiopia is to import Chinese textiles and clothing, consumer goods, tea, canned food, stationery, chemicals, pharmaceuticals and medical supplies, building materials, metals and steel, machinery, tools, and agricultural equipment. The protocol implements an agreement signed a year ago in Peking.

MALAWI, 7/77. **Technical cooperation agreement** signed to continue Chinese assistance for another two years.

MONGOLIA, 6/17/77. **Protocol on mutual goods supply for 1977** signed in Ulan Bator; Chen Chieh, Vice Minister of Foreign Trade, signed for China as head of the Chinese government trade delegation.

MOROCCO, 6/24/77. **Minutes on trade signed** in Rabat following meeting of the joint trade committee of the two countries.

NEPAL, 7/77. Chinese authorities **have decided to terminate by the end of 1980 an agreement permitting Nepalese living along the Tibet frontier to graze their cattle in Chinese territory**; Nepalese have irritated the Chinese by refusing to build up adequate pasture systems on their side of the border. In the past, three five-year extensions have been granted on the bilateral agreement.

NORWAY, 6/9/77. **Agreement signed between Chinese Register of Shipping and Det Norske Veritas (DNV), the Norwegian ship classification agency**, providing for mutual assistance in connection with inspection work in areas where only one agency is represented.

PAKISTAN, 6/30/77. A **"letter of understanding"** was signed in Karachi for **opening of an air route to Africa via Addis Ababa**. Parties to the agreement were the Civil Aviation Administration of China (CAAC) and the Civil Aviation Department of Pakistan.

PAKISTAN, 8/2/77. **Letters exchanged in Urumchi on border trade** for 1977/1978.

PHILIPPINES, 6/5/77. Following the first meeting of the China-Philippines Joint Trade Committee, the Philippines signed an **exchange of goods agreement setting targets for trade between the two countries in 1977**. According to the terms of the agreement, **China will buy between 40 and 60 thousand metric tons of copper concentrates, 15 to 30 thousand tons of coconut oil, 150,000 metric tons of sugar, and 20 to 40 thousand cubic meters of logs and lumber**. Terms of sale were not disclosed. In addition, China may import from the Philippines quantities of chemicals and chemical products, construction materials, and other goods "according to the needs of China and the Philippines' capacity to supply," according to a press statement by the Philippine embassy in Peking. The Philippines, for its part, **has committed itself to buy some 900 thousand metric tons of crude oil, machinery and equipment such as small hydraulic turbine generator units, chemicals and chemical products, canned food and fruits**. Philippine government representatives

have expressed confidence that the agreement will lead to trade well above the \$77.6 million level of 1976.

SOMALIA, 6/23/77. **Protocol on the agreement of economic and technical cooperation** signed in Peking.

SPAIN, 6/10/77. China and Spain have reached an **accord on a trade mark registration and protection agreement**. Instruments on the accord were exchanged in Peking between Li Chiang, Minister of Foreign Trade, and the Spanish ambassador to China, Jose Ramon Sobredo.

SUDAN, 6/9/77. Expansion of development aid achieved with the signing of an **agreement on technical cooperation**. Previous agreements have included loan commitments; details of the present one have not yet been revealed. The agreement was signed during the two-week China tour of Sudan's President Nimeri.

USSR, 7/21/77. **Trade and payments**

CHINA GOES METRIC

The State Council has promulgated a new decree to improve the administration of metrological work entitled "Regulations for Administration of Measurements in the People's Republic of China (tentative)." The regulations, according to a July 24 NCNA report, include the following points:

- China's basic system of measurements is the metric system, and the international system of units will be adopted gradually.
- The domestic system now still in use will be phased out step by step.
- The British imperial system may no longer be used except in special cases approved by provincial, municipal, autonomous regional, or higher metrological departments.
- Imported measuring instruments must be examined and approved by the metrological departments before they are put on sale or put to use.
- It is strictly forbidden to import measuring instruments which are not in conformity with China's system of measurements or which do not meet the requirements for usage.

agreement for 1977 signed in Moscow. The agreement allows for two-way trade at the same level as that in 1976—\$423 million. China imported \$242 million of goods in 1976, consisting exclusively of Soviet industrial products and short-range "Atonov 24" aircraft, and sold goods worth \$181 million, mainly clothing and fruits.

USSR, 8/13/77. Sino-Soviet meetings on navigation problems on the border rivers; the Chinese hope to obtain improved passage for their vessels at the junction of the Amur and Ussuri Rivers.

VIETNAM, 6/11/77. Protocol on the 19th railway conference between China and Vietnam signed in Hanoi.

YUGOSLAVIA, 6/4/77. Scientific and technical cooperation agreement signed in Peking.

FOREIGN AID

AFGHANISTAN, 6/29/77. Contract signed for the **purchase of equipment from China destined for the Parwan irrigation project** now in its second stage. The equipment, worth £810,000, will be purchased with a loan supplied by China.

ALGERIA, 6/12/77. Hospital built with Chinese assistance was inaugurated in Saida, capital of Saida Department in Western Algeria.

BANGLADESH, 6/27/77. The Bangladesh Times reported that President Ziaur Rahman **asked for Chinese aid in setting up a fertilizer factory, textile mill, and water conservancy projects** during his recent trip to China. Rahman said that Bangladesh was preparing projects in such a way that it could ask for the "necessary help" from China.

BURUNDI, 6/23/77. NCNA reported the construction of a **textile complex supported by Chinese aid** underway in Bujumbura.

CHILE, 6/29/77. China has extended aid to Chile in the construction of a ball-bearing plant, in the form of loans equalling \$52 million. The loans will be repaid in copper and nitrate.

EGYPT, 6/25/77. Cairo newspapers gave prominent place to an announcement of **a shipment of military spare parts from China.** The shipment (consisting of Chinese-made engines for Egypt's Soviet MIG-17's and MIG-21's), announcement, and Sadat's message were taken by analysts as signs that Egypt would not change its anti-Soviet policy, in spite of recent overtures to Moscow for arms supply.

GUINEA, 6/7/77. Chinese agrotechnical group left for home after having completed its mission.

GUINEA-BISSAU, 6/10/77. Minutes signed of a meeting on **Chinese assistance for a water conservancy project on the River Udunduma.**

MADAGASCAR, 6/25/77. The inauguration of Tely state farm machine repair and assembly plant at Andranomena in Southern Madagascar, which was built with Chinese aid. The plant will produce plows, hoes, and harrows for local peasants and eventually will include facilities for making spare parts for tractors and trucks.

MALI, 7/27/77. Chinese medical team left and new group of medics arrived.

MAURITANIA, 6/28/77. China and Mauritania will build a port in Nouakchott, according to minutes of a meeting signed by the two governments.

MOZAMBIQUE, 6/20/77. New China News Agency reported the progress of a **Chinese agrotechnical team working on the establishment of the Moamba state farm.** In six months, 230 hectares of land were cleared, 50 hectares of vegetables and 50 of maize put under cultivation, and 600 tons of vegetables harvested.

NIGER, 6/23/77. New China News Agency reported that a party of **Chinese medical technicians** is working at the central hospital of Maradi Province.

PAKISTAN, 6/2/77. China has promised to supply a complete plant for a big textile mill at Tarbela. The mill has 25,000 spindles and will cost more than 60 million rupees.

PAKISTAN, 6/28/77. According to a statement of the Pakistan Minister of Production, a mini steel mill will be set up in Baluchistan with Chinese collaboration.

RWANDA, 7/7/77. The 160-kilometer Kigali-Rusumo highway was opened to traffic. The highway, built with Chinese assistance, links Rwanda with Tanzania and provides Rwanda with an access route to the sea.

RWANDA, 6/11/77. China and Rwanda signed minutes of a meeting on **cooperation in developing a rice cultivation project** in Rubindi, according to a report from Kigali.

SENEGAL, 7/9/77. Chinese assistance in growing 240 hectares of paddy-rice and in building a pump-

ing station at Guede agricultural village were noted by NCNA.

SENEGAL, 7/25/77. Chinese medical team leaving for home met with its replacements in fete at the Chinese embassy in Dakar.

SOMALIA, 8/16/77. China extended an offer of military supplies to Somalia.

SUDAN, 6/19/77. In the wake of the ten-day visit of President Nimeri, China offered to step up arms supplies to the Sudan, according to the Sudanese daily. *Al Sahafa.* Nimeri's visit followed less than three weeks upon the expulsion of Soviet military advisors from the country.

VIETNAM, 6/28/77. First of its kind, the Bac Ha insecticide sprayer factory, which was built with Chinese aid, opened in Son Binh Province, Vietnam. It will produce 100,000 Friendship brand sprayers annually.

YEMEN, 6/14/77. China lent aid in the construction of the Sanaa-Sada highway, newly opened to traffic. The highway links the capital city of Sanaa with the north; it is 244 kilometers long and took eleven years to complete.

ZAIRE, 6/1/77. Minutes of a meeting between the two countries were signed on the joint construction of a station for popularizing rice cultivation techniques. China will provide farm machinery for opening up 600 hectares of rice fields and will help build water conservancy projects for the paddy fields. Located in the Mbanza-Ngungu region, the station will follow up efforts of a Chinese agricultural team in residence since 1973 to promote rice production in Zaire.

ZAIRE, 7/21/77. NCNA reported an inspection mission of the Zairian State Commissioner for Agriculture to the **joint project of China and Zaire for construction of a farm tool factory in Kinshasa.** The project, begun in November, 1976, and due for completion in July of next year, will produce 1 million small farm tools a year.

ZAMBIA, 5/28/77. Lands and Agriculture Minister Alexander Chikwanda praised **progress made by the Chinese agricultural team in its Kafushi Rice Scheme project.**

CORRECTION

GBR 4:3, p. 28, col. 1: In the third paragraph the fourth animal of the zodiac is the "ox" and not the "fox." 完

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