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Translation

TRANSPORT DEVELOPMENT

PROBLEMS AND PROSPECTS

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TRANSPORT DEVELOPMENT PROBLEMS AND PROSPECTS

Moscow PROBLEMY I PERSPEKTIVY RAZVITIYA TRANSPORTA (Problems and Prospects in Transport Development) in Russian 1980 signed to press 26 Feb 79 pp 1-125

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CONTENTS

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Annotation

[Text] Subtitled "Economic Development of Siberia and the Far East," the book examines the economic development of eastern regions of the country, existing and projected economic ties and shipment volumes, and describes the transport network of Siberia and the Far East. It shows the role of and prospects for developing individual types of transport, describes railroad equipment and operations in the region and reveals the importance and potential of the Baykal-Amur Railroad. It is intended for engineering-technical workers in various types of transport, for economists in industry and for workers in planning and material-technical supply agencies. It can be used in the economics education system for transport workers.

Introduction

Under the leadership of the Communist Party, the Soviet people have achieved unprecedented successes in building history's first society of developed socialism. This indisputable fact is secured in the new Constitution of the Union of Soviet Socialist Republics.

Powerful productive forces have been created in our country, the economy is characterized by very dynamic development, the well-being of the people is growing constantly, and ever more favorable conditions are being created for developing the well-rounded personality. One of the most important victories of the Soviet people has been the planned development of productive forces as a unified national economic complex encompassing all links of social production, distribution and exchange. The productive forces of the union republics and economic regions are being developed as integral parts of the smoothly developing national economy. The previously lagging national backwaters of Russia about which V. I. Lenin wrote that enormous expanses are ruled by patriarchality, semi-barbarism and actual savagery have been transformed in a historically brief period into highly developed industrial regions with large industrial and cultural centers.

The 25th CPSU Congress outlined ambitious socioeconomic development tasks based on a realistic appraisal of our strengths and opportunities, which are growing with each new five-year plan, with each passing year. In the 10th Five-Year Plan and in the more distant future, the strategy of the Communist Party of the Soviet Union's economic policy anticipates continued strengthening of internal economic ties, increasing the effectiveness of the territorial division of labor and a significant upswing in the economies of all the republics and rayons, equalizing their levels of development.

The country's economy will be developed at even higher rates in the future. CPSU Central Committee General Secretary L. I. Brezhnev noted at the 25th CPSU Congress: "Quite a bit of work remains to be done on concrete long-range figures and assignments, but it follows from the calculations already done that the country will have available to it in 1976-1990 approximately twice the material and financial resources it has had in the previous 15-year period."[1]

The resolution of the CPSU Central Committee Politburo, USSR Supreme Soviet Presidium and USSR Council of Ministers on the results of the trip by CPSU Central Committee General Secretary and USSR Supreme Soviet Presidium Chairman L. I. Brezhnev to Siberia and the Far East notes that Comrade L. I. Brezhnev's trip was of important significance in carrying out the resolutions of the 25th CPSU Congress on the multipurpose utilization of the natural wealth and developing the productive forces of these regions, which play an increasing role in the country's economy.[2]

The Communist Party and the Soviet government have singled out and continue to single out in the plans for developing the unified national economic complex at each stage of building communism those economic regions in which productive forces must be developed at higher rates than for the country as a whole. These are regions whose

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1. "Materialy XXV s"yezda KPSS" [Materials of the 25th CPSU Congress], Moscow, Izdvo Politizdat, 1976, p 40.
2. KOMMUNIST, No 6, 1978, p 11.

economies exert a decisive influence on increasing the effectiveness of all social production and facilitate resolving major socioeconomic tasks. That was the case in the prewar five-year plans when, in carrying out the Leninist concepts of the GOELRO plan, the party and government focused the efforts of the entire Soviet people on creating a powerful coal and metallurgical base in the East. The largest socioeconomic problem, in terms of scope, that of the outstripping development of productive forces in Siberia and the Far East, is being solved along the same lines today.

In connection with the necessity of rapidly drawing natural resources concentrated in eastern regions into economic circulation, the annual rates of growth in industrial production in these regions have considerably exceeded union average rates in recent five-year plans. With a view towards improving the distribution of the country's productive forces, the "Basic Directions of USSR National Economic Development for 1976-1980" anticipated continued growth in the economic potential of the eastern regions and increasing their role in unionwide industrial production. Branches with the natural requisites most favorable for this, especially in fuel industry, are being developed at accelerated rates. All the planned increment in petroleum and gas extraction, all the increment in aluminum production, more than 90 percent of the increment in coal mining, approximately 80 percent of the increment in copper production, 45 percent of the increment in cellulose and about 60 percent of the increment in cardboard production for the country as a whole in the five-year plan must be provided by these regions.

Implementation of the long-range comprehensive program for developing the economy of Siberia and the Far East and accelerated growth in the region's economic potential will create the conditions necessary to provide the European portion of the country and the Urals with fuel and other resources in short supply. Meeting the country's needs for fuel, energy, metal and raw material has always been an important problem in developing the national economy, but as was noted at the 25th CPSU Congress, this problem faces us due not to an actual lack of natural resources, but because reserves of such resources are limited in long-inhabited regions close to industrial centers. We are now going further east and north in search of petroleum, gas and coal.

Problems of the multipurpose utilization of the natural wealth and further accelerating the development of Siberia and the Far East were examined comprehensively during the trip to these regions by Comrade L. I. Brezhnev, CPSU Central Committee General Secretary and USSR Supreme Soviet Presidium Chairman. His meetings with workers and with kray and oblast party and soviet leaders, his instructions and recommendations as expressed during the course of those meetings -- these are a comprehensive program of action encompassing all aspects of the social and economic development of an enormous region. Particular attention was paid to questions of further increasing the extraction of coal, petroleum and gas, to the fuller use of hydroelectric resources to develop such energy-intensive types of production as nonferrous metallurgy, pulp and paper industry, chemistry and petrochemistry here. The instructions and recommendations from Comrade L. I. Brezhnev also broadly reflected problems of carrying out all plan assignments, of increasing organization and discipline in each sector of economic work, of the thrifty, intelligent use of raw and other materials and agricultural output, of eliminating losses in the national economy.

The November (1978) CPSU Central Committee Plenum pointed out that a fundamentally new factor is present in the rapid development of the country's economic potential. That is the creation and development of a number of territorial-production complexes

(TPK), foremost in the East. They include the West Siberian, Bratsk - Ust'-Ilimskiy, Pavlodar-Ekibastuz, Orenburg and others. In this regard, it was characteristic during the first three years of the 10th Five-Year Plan that it was these very complexes which provided the entire increment in petroleum extraction, nearly all the increment in gas extraction, and a significant portion of the increment in electric power production, iron ore and coal mining, and truck and tractor production.

The possibility and economic effectiveness of utilizing the natural resources of the new regions, of creating territorial-production complexes there, generally in zones with harsh climatic conditions, is practically unthinkable without the prompt and in a number of instances leading development of the transport network. This process is inseparably linked to developing all types of transport, and foremost to the construction of new railroads and the creation of a road network, airfields, river and sea ports, communication and electric power transmission lines. Development of the transport system opens up access to deposits of coal, petroleum and gas, nonferrous metals, ores and other minerals and ensures acceleration of their rates of extraction. In this regard, better conditions are created for increasing the effectiveness of all the branches of production now being created, since expenditures on delivering needed building materials, technology, machinery, equipment, foodstuffs and manufactured goods are sharply reduced.

All experience in developing the country's economy, and in particular, in mastering the petroleum and gas deposits of Western Siberia, supports this conclusion convincingly. The Ivdel'-Ob', Ravda-Sotnik, Asino-Belyy Yar, Tyumen'-Tobol'sk-Surgut-Nizhnevartovsk railroads created the conditions necessary to utilize the large petroleum and gas deposits, timber and other resources concentrated here. Without railroads able to operate around the year, geologists and construction workers and large amounts of freight must be delivered here over winter roads and by air. At the same time, expenditures on delivering one ton of freight by winter road are 6-7 times higher than expenditures on rail delivery and expenditures on delivery by air are 9-10 times higher.

And annual shipments of freight into these regions, primarily building materials, are considerable. It must be noted in this regard that deliveries of freight by river transport and by winter road lead to freight damage and losses.

In determining the directions of railroad and highway construction, the long-range development of the regions now being mastered and possible increases in freight flows must be studied comprehensively and rather thorough technical and economic substantiation provided.

In the 10th Five-Year Plan, we began building the Surgut-Urengoy line (which is to begin operating in 1984), but in 1978 a gas main was laid from the Urengoy Gas Deposit to Chelyabinsk and gas began arriving at enterprises in the Southern Urals. Practically all the freight for laying the gas main was delivered by winter road, river transport and air. It costs approximately 500 rubles to deliver one ton of freight to this region by air. In this regard, consideration must be given to the fact that weather conditions in the region enable aviation to operate 7-8 months per year. All this supports once again the conclusion that the construction of railroads and highways must outstrip development of productive forces in the regions now being mastered.

The decision to build the Baykal-Amur Mainline, the largest construction project in the era of developed socialism, is an example of a statewide, comprehensive approach to utilizing these broad new regions. Here, we first are laying the railroad and then, almost simultaneously, are resolving the tasks of building very large industrial complexes. As the mainline is built, we begin mastering and using the unique natural riches concentrated in the region adjacent to the BAM. Installation of the line from Bam Station, located on the Transsiberian Railroad, to Tynda Station and beyond, to the South Yakutsk Coal Basin, has already enabled us to begin utilizing the Neryungrinskiy Coal Deposit and build an enrichment plant and large GRES here. This is the most intelligent, most effective method of utilizing new territory, a method inherent in the planned socialist economic system.

In the future, industry and agriculture will receive significant further development and the extraction of ore, coal, petroleum and gas and the production of pig iron, steel, electric power, automation and computer equipment, resins, plastics and other national economic output will grow rapidly.

Of course, all this can be done only given significant advances in the distribution of social production to the east and given a sharp increase in the use of the enormous natural resources of Siberia and the Far East.

The national economy's demand for shipments will increase correspondingly. At the same time, even now, rail transport in the eastern regions is experiencing difficulties in mastering shipments.

There are also some difficulties associated with imperfections in the system of planning transport and with shortcomings in organizing shipments. Comrade L. I. Brezhnev focused attention on this in his speech at a meeting of Far East kraykom and obkom first secretaries on 6 April 1978. He said that "...difficulties with transport are more than a lack of means of transport. We must improve transport planning, be involved in reducing empty runs, reduce time lost in loading and unloading, provide cars for shipment at the proper times, and put the warehousing system in proper order."[1] These instructions and recommendations by Comrade L. I. Brezhnev are of exceptionally important, fundamental significance to successfully solving many of the problems associated with improving the operation of rail transport nationwide, and especially the roads in Siberia and the Far East.

Carrying out the resolutions of the 25th CPSU Congress and the July and November (1978) Plenums of the CPSU Central Committee, governed by the theses and conclusions stemming from speeches by Comrade L. I. Brezhnev, CPSU Central Committee General Secretary and USSR Supreme Soviet Presidium Chairman, and actualizing the CPSU Central Committee and USSR Council of Ministers Decree "On Steps to Develop Rail Transport in 1976-1980" and other decrees, rail transport workers have been seeking out additional reserves for better meeting the requirements of the national economy and the population for shipments. A great deal of corresponding work is being done by railroad collectives of Siberia and the Far East under the slogan "Outstanding Transport Service for Regions of Siberia and the Far East."

Due to its specifics, transport production is a complex management mechanism which is different from industry. In recent years, it has been considerably improved, but in

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1. KOMMUNIST, No 6, 1978, p 22.

a number of instances it has not fully met the growing demands for improved quality and efficiency in transport services to the population and the national economy. For that reason, workers in rail and other types of transport have greeted with profound satisfaction the CPSU Central Committee Decree "On Further Improving the Economic Mechanism and the Tasks of Party and State Organs," as well as the CPSU Central Committee and USSR Council of Ministers Decree "On Improving Planning and Strengthening the Influence of the Economic Mechanism on Improving Production Effectiveness and Work Quality." With a view towards fundamentally improving the organization of freight and passenger shipments and intensifying the influence of the economic mechanism on the end results of transport enterprise activity, the transport ministries have worked out concrete proposals on improving planning, increasing the effectiveness of capital investments, strengthening the role of cost accounting, economic levers and incentives with consideration of the branch features of transport organization activity. The economic mechanism improved on the basis of these proposals must arouse transport workers to make more active use of intensive growth factors, to accept and carry out taut plans, to better coordinate their work, reduce inefficient shipments, save resources, lower shipment net cost and increase labor productivity in every way possible.

Transport-Economic Ties of the Eastern Regions

Material and Labor Resources and Their Economic Importance

During the years of building socialism, the heroic labor of the Soviet people has transformed Siberia and the Far East, backward outreaches of Russia in the prerevolutionary period, into a region with powerful, modern industry and highly developed agriculture. The largest hydroelectric power plants in the country and centers of tractor, agricultural and other branches of machine building, ferrous and nonferrous metallurgy, chemistry and petrochemistry have been created here. Large new industrial centers have arisen at Novosibirsk, Omsk, Kemerovo, Novokuznetsk, Krasnoyarsk, Irkutsk and Khabarovsk. Large scientific and personnel training centers of statewide importance have been created.

Siberia and the Far East currently include three autonomous soviet socialist republics -- Buryatia, Yakutia and Tuva; they include four krays -- Altayskiy, Krasnoyarskiy, Khabarovskiy and Primorskiy, and 11 oblasts. Siberia and the Far East cover a territory of more than 13 million square kilometers, or slightly more than 60 percent of all the territory in the Soviet Union. Some 26.6 million people, 10.5 percent of the country's population, live here.

Anticipating the enormous role of the natural wealth of Siberia in developing the country's economy, V. I. Lenin and the Soviet government he headed proposed, back in 1918, that a comprehensive project be worked out for uniting the iron ore of the Urals with the anthracite coal of the Kuznetsk Basin. Attention was focused on the necessity of thoroughly studying the hydroelectric resources of this area. "Development of these natural riches using the latest equipment will provide a basis for the unprecedented progress of our productive forces."[1] Later, in the GOELRO plan worked out on the initiative and under the leadership of V. I. Lenin, which was with full justification called the second party program, it was pointed out that the very rich

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1. V. I. Lenin, "Poln. sobr. soch." [Complete Collected Works], Vol 36, p 188.

anthracite coal deposits of the Kuznetsk region and the fortunate combination of coal and iron almost immediately adjacent to one another give us every grounds for describing the Kuznetsk Basin as a region of anthracite coal and iron industry with broad prospects for further development.

In carrying out these concepts of V. I. Lenin's, the Communist Party and Soviet government, in the very first five-year plan, began creating the Urals-Kuznetsk complex, the largest coal-metallurgical base in the country's East. This was the most important industrial complex in the prewar period. The Magnitogorsk and Kuznetsk metallurgical combines were built very quickly. The latter was already smelting 1,536,000 tons of pig in 1940. Coal mining in the Kuzbass increased from 3.6 million tons in 1930 to 21.1 million tons in 1940. In the north, we began building the Noril'sk Mining-Metallurgical Combine. The first machine-building and metalworking enterprises were built in Omsk, Novosibirsk, Krasnoyarsk, Barnaul, Ulan-Ude, Vladivostok and Khabarovsk.

The far-sighted economic policy of the Communist Party was affirmed with particular force during World War II. When Fascist Germany temporarily occupied the Donbass and other regions, the Urals and Siberia became the basic suppliers of coal and metal and the forge of our weapons. During World War II, more than 320 large industrial enterprises were relocated in Siberia from the European regions of the country.

In the post-war years, the productive forces of these regions began a new stage of their development. There was accelerated utilization of new territories, the extensive involvement of coal, petroleum, gas, nonferrous metal and wood resources in economic circulation, very large manufacturing enterprises, railroads and other roads were built, and the entire nonproductive sphere was created. New construction has been done here with the extensive use of the achievements of scientific and technical progress.

The country's largest hydroelectric power plants were built on the Angara, Yenisey, Ob' and other rivers. Energy-intensive branches of industry were developed quickly on a cheap energy base. The Krasnoyarsk Aluminum Complex, Achinskiy Alumina Combine, Krasnoyarsk Metallurgical Plant and many other enterprises were built. A strong base was created for chemical industry, its basis being the production of mineral fertilizers, plastics, synthetic resins, synthetic fibers and tires. Zinc, lead, copper, nickel and other nonferrous metals are smelted at large enterprises with modern equipment. For many branches of industry, Siberia and the Far East have assumed a leading position in the unionwide territorial division of labor in a brief historical period.

The geological surveying work being done with reserves of petroleum, gas and other minerals on a broad front and the study of timber, water and other resources have permitted a new appraisal of the region's resource potential. A new Siberia with the entire gamut of natural resources needed for the long-range development of the country's economy has been opened up for our contemporaries and for future generations.

Providing the country with natural resources is the most important factor in developing social production. The presence of major, highly-effective natural resources creates conditions for rapid growth in economic potential and largely determines the scientific substantiation of long-range plans for developing the country's national economy. Studying more fully the natural resources of Siberia and the Far East and

the opening up here of very large deposits of natural gas, coal, ores, ferrous and nonferrous metals are therefore of enormous importance in determining prospects for developing the economy not just of this region, but of the entire country.

As Chairman of the USSR Gosplan, G. M. Krzhizhanovskiy, one of the organizers of the Soviet economy and national economic planning, said, "It does happen quite often that people do a little bragging when talking about local problems and defending local needs, but when Siberia speaks of its riches, there is no danger of this kind of bias, for the question of Siberia's mineral wealth and of utilizing it is not national, but worldwide in scale. There are no elements of petty bragging whatsoever here."

The regions of Siberia and the Far East have a great future. Whereas during the first five-year plans these regions were known as a zone of endless taiga and mighty rivers where one could produce enormous amounts of hydroelectric power, as regions with large coal basins and agriculture, today they are viewed from promising new national economic positions.

The opening of new deposits of nonferrous metals, petroleum and gas discoveries, the fuller use of timber resources and utilization of the northern territories are radically altering the direction and scope of development of the region's economy in the near, and especially the remote, future. Along with the formation of the country's largest raw material and energy base, branches of processing industry will also be developed at high rates. That is why the statement by the great Russian scientist M. V. Lomonosov that Russian might will be augmented by Siberia has taken on unprecedented topicality.

The present level of development of the country's economy permits allocating capital investments and material-technical means sufficient to solve major, unionwide problems associated with developing the economy of Siberia and the Far East. The country has highly skilled workers, engineers and administrators to do this. The level of scientific and technical progress achieved permits mastering the most remote, hardest to reach regions.

Let us examine several problems of the economic and social development of Siberia and the Far East.

One especially important major interbranch problem is that of fuel and energy. In the era of scientific and technical progress, the demand for fuel resources is growing rapidly.

As was already noted, Siberia and the Far East have a fuel and energy potential. Back in 1932, Academician I. M. Gubkin, anticipating major petroleum discoveries in the eastern regions, asserted that it was time to begin a systematic search for petroleum on the eastern slopes of the Urals. Geological conditions enabled him to assume that searching for petroleum here would not be fruitless, that the prospecting would be crowned with success and that the prospects for and importance of petroleum development in these regions would be enormous. Academician I. M. Gubkin's assumptions were borne out. The first gas deposits were proven in the Berezovo region in 1953 and the first oilfield was opened in September 1959 in the Mulym'inskaya structure, not far from Shaim village. Since that time, we have found dozens of new petroleum, gas and gas-condensate deposits. Natural gas reserves just in Nadym-

Purskaya petroleum and gas-bearing province are estimated at 23.5 trillion cubic meters. In view of the fact that this area is as yet poorly studied, we can assume that there will be new discoveries.

Gas reserves in Leno-Vilyuyskaya gas-bearing province are tentatively estimated at over one trillion cubic meters. Alongside the Leno-Vilyuyskaya, geologists think we will have to delineate the Leno-Aldanskaya and Anabarskaya petroleum-gas bearing provinces and will have to begin studying them in the very near future.

The regions of Siberia and the Far East currently occupy an important place nationally in terms of petroleum and gas reserves. Even now, Western Siberia is one of the country's primary petroleum extraction centers. At the end of the 10th Five-Year Plan, petroleum extraction here will be 300-310 million tons, and Siberia and the Far East will be accounting for 50 percent of the country's total. Gas extraction will reach 125-155 billion cubic meters in 1980 and the region as a whole will account for about 38 percent of the country's total during this period.

The regions of Siberia and the Far East are unique in terms of coal reserves and concentration. Geologists estimate that upwards of 90 percent of the Soviet Union's coal reserves are in Siberia. The bulk of the country's coal basins are situated here.

The mining of power and coking coals has increased rapidly in the Kuznetsk Coal Basin and at open cuts in the Kansko-Achinskiy Basin, at the Neryungrinskiy basin and other coal deposits. The bulk of the union's coal mining will be concentrated here in the future. Heretofore inadequately surveyed coal deposits in the Tungusskiy basin and in the central and northern portions of Krasnoyarskiy Kray will be called upon to play a very significant role in solving the country's fuel and energy problem in the more distant future. Large reserves of high-quality coking coals have been proven near the Baykal-Amur Mainline and in Southern Yakutia. We began mining coal in the Berezovo coal cut in the 10th Five-Year Plan. In this regard, it is to the point to note that in terms of coal reserves, the Kuzbass, for example, has four times the reserves of the Donbass. In terms of coal quality, the Kuznetsk basin is unequalled. One of the largest mines, the "Raspadskaya," is located here.

Deposits of ferrous and nonferrous metals are also concentrated in this region. One characteristic feature is a high concentration of highest-quality ores in large deposits such as the Udokanskoye, Talnakhskoye, Gorevskoye, Ozernoye and others, which ensures that their exploitation will be very efficient. In terms of iron ore reserves, this region equals the Urals and the Ukraine.

Hydroelectric power generation is growing rapidly in Siberia and the Far East. The rivers of Eastern Siberia are especially rich in hydroelectric power resources -- Yenisey, Angara, Aldan, Vitim. The total capacity of the Ob', Krasnoyarsk, Irkutsk, Bratsk, Ust'-Ilimskaya, Ust'-Khantayskaya and Zeyskaya hydroelectric power plants exceeds 15 million kilowatts. We are building the country's largest GES, the Berezovskaya, with a capacity of 6.4 million kilowatts. After that will come construction of several other GES's with a total capacity of up to 20 million kilowatts. In the future, when the Sayano-Shushenskaya GES is at full capacity and the Boguchainskaya, Maynskaya, Central Yenisey, Osinovskaya, Nizhnye-Tungusskaya, Kureyskaya, Bureyskaya and other GES's have been built, the total capacity of the hydroelectric power generating enterprises here will be 45-50 million kilowatts, and average annual electric power generation will be 200 billion kilowatt-hours.

Such a concentration of electric power generation at huge hydro- and thermal electric power plants ensures that their production will be very economical. In turn, that creates conditions favorable to solving another most important problem, that of situating new energy-intensive production in the East. Nonferrous metallurgy, chemistry and petrochemistry are the most energy-intensive branches of the national economy. Suffice it to say that 16,000 to 17,000 kW-hr of electricity is required to produce one ton of aluminum, 60 kW-hr to produce a ton of titanium, and 12,000 kW-hr to produce a ton of synthetic rubber.

It is also known that the proportion of fuel and electricity in the net cost of these types of output reaches 30-50 percent. Therefore, energy-intensive production is generally situated in regions with cheap electricity.

In Eastern Siberia, with its tremendous, highly efficient energy resources, such large consumers of electricity as aluminum plants, electrochemical combines, artificial fibers plants, ferroalloys plants and pulp-paper combines will be put into operation in the 10th and subsequent five-year plans. For example, the main consumer of electric power from the Sayano-Shushenskaya GES will be the Sayanskiy Aluminum Plant. Putting the Tayshet and Far Eastern metallurgical plants, the Krasnoyarsk Electrometallurgical Combine and other large facilities into operation will significantly increase the proportion of the eastern regions in unionwide production of the main types of nonferrous metallurgy, chemical and petrochemical output. Thus, the amount of energy-intensive production is being introduced in the country's East, towards sources of cheap raw material and fuel. The territorial proportions of the distribution of productive forces are being improved.

At the same time, given all the favorable conditions for developing energy-intensive production in Siberia and the Far East, the most important problem will be transporting power and commercial fuel.

The development of chemical and petrochemical industry in Siberia is ensured by the presence of hydrocarbon raw material resources, cheap fuel, water and convenient enterprise sites. A powerful Siberian petrochemical industry is being created simultaneously with the increase in petroleum and gas extraction. In the central Ob' region, where petroleum extraction is concentrated, gas processing plant construction has been proceeding at a rapid pace in recent years. The first central Ob' plants have already begun operating, processing several billion cubic meters of casing-head gas per year.

By the end of the five-year plan, when several more gas processing plants will have begun operating, the "Sibneftegazpererabotka" production association will have considerably increased its delivery of casing-head gas and unstable gasoline, a very valuable hydrocarbon raw material, to the national economy. All gas processing plants will be provided with domestic equipment and will be highly automated and mechanized.

In 1977, a gas pipeline was laid from the central Ob' area to the Kuzbass. This very efficient fuel began arriving at Kemerovo enterprises of the "Azot" production association and at other manufacturing centers of the industrial Kuzbass. Unstable gasoline will go to the Tobol'sk and Tomsk petrochemical complexes, which will produce synthetic rubber, household chemicals and chemical fibers. The construction and start-up of enterprises of the Tobol'sk, Tomsk, Achinsk and other petrochemical

complexes, as well as enterprises to produce mineral fertilizers and fiberglass, and the renovation and expansion of existing enterprises in this region to supplement the petrochemical combines in operation at Omsk and Angarsk will ensure the rapid development of petrochemistry of unionwide importance.

The production of chlororganic synthesis output, viscose fibers and other output is being expanded in Eastern Siberia. Bringing up the Ziminskiy and Usol'ye-Sibirskiy electrochemical combines and other chemical enterprises to full capacity will ensure accelerated growth in the production of output of this branch. Siberia will become a region with important chemical industry.

One of the most important conditions for developing productive forces in the eastern regions is a high level of provision of them with modern machinery and equipment and continued improvement of the multibranch machine-building complex which has been created here.

Under present conditions in Western Siberia, machine building is a production specialization branch. This complex occupies a considerable proportion of unionwide production in terms of energy, electrical-engineering, tractor and agricultural machine building. Large, specialized enterprises have been created here which are producing up to 50 percent of the d.c. electrical machinery, upwards of 35 percent of the large steam boilers, about eight percent of the tractors, more than 40 percent of the tractor plows and a significant amount of other machine-building industry output.

Along with the Kuznetsk Metallurgical Combine, West Siberia and Novosibirsk metallurgical plants and the metallurgical plant in Komsomol'sk-on-Amur, large machine-building plants have risen up in Novosibirsk, Omsk, Kemerovo, Novokuznetsk, Krasnoyarsk, Irkutsk and Abakan, and transport machine-building plants have arisen in Krasnoyarsk, Altaysk and Vladivostok. Locomotive repair plants in Novosibirsk, Ulan-Ude and Ussuriysk and car-repair plants in Barnaul, Anzhero-Sudzhensk and Bogotol are engaged in repairing rolling stock and producing spare parts. Machine-building enterprises of Siberia and the Far East ship their output to European regions of the country, Central Asia and Kazakhstan. At the same time, large amounts of technology and equipment are being received from the European portion of the country and from the Urals, especially for utilizing the new territories.

Development of the economy of the eastern regions and utilizing the northern territories have required further development of heavy machine-building complexes and growth in capacities to produce equipment for metallurgical and ore-mining industry, lift-transport and loading-unloading work, roadbuilding equipment and drilling equipment.

In view of the labor resources deficit in the eastern regions, energy- and metal-intensive and relatively low labor-intensive branches of machine building are being developed there. Electrical engineering machine building is being expanded -- a large center of enterprises in this branch is being created in Minusinsk. Electrical engineering plants in Novosibirsk, Krasnoyarsk and other cities are being renovated and expanded. Particular attention is being paid to increasing the capacities of machine-building enterprises which supply output to chemical, petrochemical, petroleum and gas industry; we anticipate producing northern modifications of corresponding machinery and equipment.

The timber resources of the eastern regions are enormously valuable to the national economy. The resolutions of the 25th Communist Party Congress on prospects for developing the economy of Siberia and the Far East pay a great deal of attention to the fuller, comprehensive use of timber resources of this zone. The "Basic Directions of Developing the USSR National Economy in 1976-1980" stress the necessity of expanding procurements of wood and processing it in Siberia and the Far East, of improving the use of the wood procured, and accelerating growth in capacities for the chemical and mechanical processing of wood scraps, substandard and deciduous wood.

The timber resources of the eastern regions are more than 61 billion cubic meters, more than 75 percent of unionwide reserves of valuable varieties of mature and overmature wood. Each year, up to 360-370 million cubic meters of wood could be shipped out of here. Thus, with intelligent use of these resources and thorough chemical and mechanical processing of wood, we could meet practically all the demand for timber, wood-processing and pulp-paper industry output in Siberia and the Far East.

The 24th Party Congress set the very important task of considerably increasing the release of timber material, cellulose, paper, cardboard, furniture and sheet wood without substantially expanding the amount of timber procured. As a result, the country has developed a new and very progressive form of organizing timber, wood-processing and pulp-paper industry -- industrial timber complexes. They are concerned with the thorough chemical and mechanical processing of wood and scrap, which permits the comprehensive use of all the wood procured.

Suffice it to say that the amount of wood shipped out in the Ninth Five-Year Plan increased by only 2.6 percent, while plywood production grew by 7.3 percent, cellulose production -- by 33.8 percent, and paper and cardboard production -- by 26.6 percent. Production of splint-slab and wood-fiber sheet has increased even more significantly.

The industrial timber complexes are set up as continuous timber use enterprises. They not only use timber resources thriftily, but also reforest.

This form of industrial timber production organization is of especially important significance for Siberia and the Far East, with their enormous timber resources and cheap fuel and electricity. A very great deal of attention is being paid to creating a system of large timber-industry complexes in these regions. The Bratsk Timber Industry Complex was started up at full capacity in the Ninth Five-Year Plan. Construction of all facilities at the Ust'-Ilimskiy Timber Industry Complex, the new giant of Siberian timber chemistry, is proceeding apace. Thorough chemical and mechanical processing of all wood, including leaves, as well as timber-felling and wood-processing scrap, is being organized at enterprises of the Ust-'Ilimskiy Timber Industry Complex. The cellulose plant in this complex will produce 550,000 tons of cellulose, 1.2 million cubic meters of lumber, 250,000 cubic meters of splint-slab sheet, a considerable amount of glued sheet, light oils, turpentine and other output each year. The hydrolytic-yeast plant in this complex will manufacture several tens of thousands of tons of feed yeasts and more than 10,000 tons of furfural per year.

Such comprehensive use of wood ensures a significant savings of raw material. It is known that each ton of box cardboard, for which substandard raw material and wood processing scrap is generally used, replaces up to 15 cubic meters of commercial wood.

Enterprises of the complex are being provided with the latest technology and equipment. The use of unique highly productive equipment and progressive technological processes ensures high labor productivity, which is especially important for regions experiencing a shortage of labor resources.

Construction of this complex is one of the most important tasks of the 10th Five-Year Plan. During his visit to Irkutsk, Comrade L. I. Brezhnev, CPSU Central Committee General Secretary and USSR Supreme Soviet Presidium Chairman, said in a conversation with leaders of the oblast party organization: "...The Ust'-Ilimskiy complex is to be specialized for timber industry, which will improve the provision of the country with paper, cardboard and other timber-chemistry products. As you know, the country is in great need of such output."[1]

In the future, we plan to create a system of industrial timber complexes in the heavily forested regions of Siberia and the Far East. Some of these complexes (Asinovskiy, Maklakovo-Yeniseyskiy) are already being built and planning documentation is being worked out for others. The start-up of enterprises of these complexes will enable us to sharply increase the production of paper, cardboard and other output of the chemical and mechanical processing of wood. Siberia and the Far East will become very important producers of this output.

The formation of very large centers to ship out and thoroughly process wood chemically and mechanically in this region is characterized by high economic effectiveness. Given output capital intensiveness equal to that in the European regions and the Urals, the net cost of shipping out one cubic meter of wood is 20 percent lower here than on average for the country and expenditures to produce one cubic meter of lumber are 25 percent lower. The organization of thorough chemical-mechanical processing requires very large expenditures of fuel. The fuel component for Siberian timber industry complexes is five-fold lower than for complexes located in the Komi ASSR and six-fold lower than for complexes in Arkhangel'skaya Oblast.

The creation of timber industry complexes also provides an opportunity to reduce imports of raw material in connection with the fact the bulk of it will be processed locally. Unprocessed timber is currently being shipped in significant amounts. Thus, just the regions of Eastern Siberia and the Far East now ship out more than 30 million tons of rough timber. It should be noted that 35-40 percent less rolling stock is required to ship processed wood than to ship rough timber. Consideration must also be given to the fact that in the eastern regions, which are thus far basically raw material regions, there is no surplus of empties, so they must be sent, empty, some 4,000 to 5,000 km, which is very expensive and which ties up the throughput capacity of the lines with the heaviest freight traffic.

In terms of water reserves and catchment area, Siberia and the Far East also lead the country. Such large rivers as the Ob', Yenisey, Angara, Lena and Amur play an especially important role in the water balance of this enormous region. The Irtysh, Tom', Biya, Katun', Abakan, Biryusa, Kiya, Chulym, Zeya, Bureya and other rivers are of great importance in providing the southern portion of the region with water resources.

Lake Baykal plays a very important role among the country's reservoirs, and protecting it from pollution and using it intelligently are of nationwide importance.

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1. KOMMUNIST, No 6, 1978, p 18.

The problem of diverting a portion of the Ob' and Irtysh to Central Asia and Kazakhstan has been discussed for many years now in the press and is being worked out in planning and scientific research organizations. The concept is taking on especially important significance now. But the problem can be solved only after research is complete on the impact it will have on the natural complex of Western Siberia, ice conditions in the Ob' gulf, climatic conditions in the North, and conditions associated with further developing fishing and water transport in the Ob'-Irtysh basin. Researching all the ecological equilibrium problems in this territory will require a certain amount of time.

The problems of developing and improving the agroindustrial complex of Siberia and the Far East are now being solved basically along the lines of meeting the demands of the local population for basic foodstuffs. At the same time, the immense tracts of arable agricultural land here are of great value statewide. The changeover of all branches of agricultural production to industrial methods and technology is one of the most important problems of agricultural development. Given very insignificant expansion of the area sown, grain production could in the very near future be increased by 60-70 percent over the 1975 level and potato and vegetable production could be increased nearly two-fold. Production of meat, milk and eggs will also increase.

At the July (1978) CPSU Central Committee Plenum, Comrade L. I. Brezhnev emphasized the great importance of solving the problem of agricultural production in Siberia and the Far East. He said, "The fact is that this problem has not yet found its proper place in the complex of measures to develop the zone's economy. We will have to spend large sums to import agricultural products to this zone, many of which could be successfully produced locally. I think this must be corrected so that the people's needs for such products as meat, milk, eggs, vegetables, potatoes and certain others are met as much as possible by local production."[1]

Substantial changes have occurred in recent years in agriculture in the region. Powerful dairy stockraising complexes and cattle and hog raising and fattening complexes are being created in all krays and oblasts, and we are also building poultry farms and hothouse-greenhouse farms.

The increase in the amount of agricultural output produced must be achieved basically by increasing the yields of all crops and by growth in stockraising productiveness. Given modern equipment, the extensive use of fertilizers and improvement in plowed field cultivation, this task is already being resolved successfully. The region's agriculture now produces 25-26 million tons of grain, more than one million tons of meat and up to one million tons of potatoes annually. Some 1.9 million northern deer, 82.5 percent of the nation's total, are concentrated here. Finally, Siberia and the Far East in particular play an important role in providing the population with fish and seafood.

One of the most complex problems in developing the economy of Siberia and the Far East is that of labor resources. Although the population of this region's enormous territory more than doubled (from 12.3 to 26.6 million) in the 50 years from 1926 through 1975, the increment in population was 4.1 million from 1959 through 1975,

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1. KOMMUNIST, No 10, 1978, p 30.

and accelerated implementation of the long-range comprehensive program for developing productive forces will require a considerable increase in labor resources.

The basic source for meeting the national economy's demand for labor resources is young people. Their role in reinforcing labor resources is growing steadily. In the Seventh Five-Year Plan (1961-1965), they provided 29.1 percent of the increment in labor resources, in 1966-1970 -- 74.5 percent, and in the Ninth Five-Year Plan -- 92.3 percent. Calculations support the conclusion that the demand for labor resources in all branches of the economy of Siberia and the Far East will continue to be met basically through this source. At the same time, it will continue to be necessary to reinforce the region's population and labor resources from the European part of the country. People are being drawn to these regions by the tremendous scope of the construction, by the broad prospects for developing the economy. But the needs here are not just for labor resources in general, but for skilled workers, engineers and workers for planning and scientific research organizations.

The labor resources reproduction problem is closely linked to meeting people's diverse material and spiritual needs. This feature of labor resources as a factor in social production demands creation of the conditions needed for people to live and work, for steady growth in the well-being of the workers.

During his trip through Siberia and the Far East, Comrade L. I. Brezhnev paid exceptionally close attention to questions of creating conditions which will ensure the securing of labor resources here.

In his speech to members of the Irkutskaya obkom bureau, in his speech to participants in the meeting of Far East kraykom and obkom first secretaries, and in other meetings, questions of creating the conditions necessary to secure labor resources were broadly reflected. Thus, in noting the enormous role of Komsomol members and young people summoned by their hearts to build the Baykal-Amur Mainline and master the natural resources of this area, Comrade L. I. Brezhnev said: "We need to create good living conditions near the construction sites, paying more attention to the construction of housing, clubs and schools, and do this with the necessary scope and at the necessary technical level, with consideration of climatic conditions. This task is thoroughly a party task and it must be resolved at the present stage by party organizations of all the krays and oblasts through which the BAM route passes."[1]

In order to solve the problem of increasing labor resources in Siberia and the Far East, we are already doing a great deal. Thus, we anticipate high rates of housing, cultural- and personal-services construction. Wage supplements have been established for length of employment, as have higher regional wage factors for workers and employees. About 52 million square meters of housing was put into operation here in the Ninth Five-Year Plan and the number of hospital beds increased by nearly 100,000 as compared with 1965. The availability of physicians to the population in Western Siberia and the Far East is higher than on average for the RSFSR.

Main Directions of the Development and Siting of Territorial-Production Complexes

The resolutions of the 25th Party Congress and subsequent CPSU Central Committee Plenums pay a great deal of attention to questions of working out comprehensive

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1. KOMMUNIST, No 6, 1978, p 19.

territorial programs. Comrade L. I. Brezhnev said in the CPSU Central Committee Accountability Report to the 25th Party Congress, "...the question has arisen of improving the methods of comprehensively solving large-scale statewide interbranch and territorial problems. We require unified, centralized programs covering all work stages from planning to practical implementation."[1] Such long-range regional programs encompassing the entire work complex from scientific-technical preparation and utilizing new territory to the release of finished products are being carried out in nearly all regions of the country.

The large-scale long-term comprehensive programs being implemented in Siberia and the Far East now determine in significant measure the rates, levels and effectiveness of developing the economies of both of these regions and of the country as a whole. Comprehensive development of the economy in newly utilized regions with various highly economical minerals signifies first of all the more intelligent use of labor resources, a higher level of capital investment effectiveness and a reduction in operating expenses.

The comprehensive programs must anticipate production specialization, cooperation and consolidation with consideration of interbranch and interregional production ties, as well as minimization of transport outlays. Locating industrial enterprises in large industrial centers ensures an average savings of about 20 percent in capital investments as compared with the construction of isolated enterprises, including a savings of 17-20 percent on power engineering, an 18-20 percent savings on housing, municipal- and personal-services construction, a savings of 8-12 percent on the construction and operation of railroads and local-traffic roads, and a 13-17 percent savings for the complex as a whole. Comprehensive development of the economy also ensures a significant savings in operating outlays thanks to the creation of a power-engineering base common to all branches, the creation of unified utilities and the organization of group services by auxiliary enterprises for all branches of the economy. According to preliminary calculations, this savings will be 14-18 percent. In order to obtain that economic impact, we will require precise organization in the planning, construction and management of each territorial production complex, with consideration of all factors, especially transport. Thus, whereas shipments on interrayon tracks are comparatively short (approximately 300-400 km) in the European portion of the country, they are approximately 1,000 km or more in the eastern regions.

Among the territorial production complexes being formed and those already in operation in various parts of the country, the West Siberia national economic complex has no equal in terms of scope of industrial construction or importance of the socioeconomic problems being solved. This complex is being created in Tyumenskaya and Tomskaya oblasts on an area of upwards of 1,750,000 km^2. Accelerated utilization of the petroleum, gas, timber and other resources on this sparsely inhabited territory, with its harsh climatic conditions, the construction of numerous enterprises of various branches of the national economy, development of agricultural production, and creation of the production and social infrastructure have become possible only under developed socialism.

The powerful economic potential which has been created in the country and the availability of highly skilled workers, engineers and administrators ensure the solution of many very large problems in this region.

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1. "Materialy XXV s"yezda KPSS," Moscow, Izd-vo Politizdat, 1976, p 61.

The most powerful fuel and energy base in the country has been created here in a very brief period (1965-1979). Over that same period, a whole series of railroads and highways were built to serve the population and enterprises of this complex. Large oil and gas pipeline systems were laid and more than 17 million square meters of housing was built.

In the 10th Five-Year Plan, we have begun creating the "second stories" of the complex, the processing industry branches. We are building gas-processing plants to use casing-head gas and the Tobol'sk and Tomsk petrochemical combines. The first line of the Surgutskaya GRES has been put into operation and the second line is being built; capacity will reach 2.5 million kilowatts by 1980.

In view of the labor resources deficit, all branches of the complex are making extensive use of the achievements of scientific and technical progress, which ensures labor expenditure economy. Petroleum and gas deposits are being mastered using the latest achievements of science and engineering. Maximum industrialization of construction and the extensive use of progressive complete-unit installations when putting up many facilities are permitting a sharp improvement in labor productivity.

Major socioeconomic problems of unionwide importance will be solved successfully as a result of the creation of this national economic complex. There will be a substantial equalization of the levels of economic development of the country's western and eastern regions. A new fuel and energy base, the country's largest, is being formed in Western Siberia. The long-range program for developing productive forces at the West Siberia complex which was worked out by the 25th CPSU Congress and which is being successfully implemented ensures high rates of development of the region's productive forces.

The dominant role of the West Siberia national economic complex in shaping the country's long-range fuel and energy balance had been set by the end of the Ninth Five-Year Plan. This region provided 83 percent of the unionwide increment in petroleum extraction in the Ninth Five-Year Plan. Intensive utilization of the petroleum and gas resources of Western Siberia will provide all the unionwide increment in petroleum extraction and more than 80 percent of the increment in gas extraction in the 10th Five-Year Plan. The transfer of gas and petroleum from Tyumenskaya Oblast to European regions of the country is the primary direction in which the deficit in this zone's fuel and energy balance is being covered. Resolution of this task is inseparably connected with strengthening transport ties between the country's western and eastern regions.

We propose to meet the electric and thermal energy needs of the West Siberia complex in an economically effective way (estimating the possible interregional importance of the branch) primarily through the construction of large electric power plants using central Ob' natural and casing-head gas.

The timber zone of Western Siberia, which is located considerably closer to the main consumers of wood than the timber zone of Eastern Siberia and the Far East, will in the future become one of the largest, nationally important centers for thoroughly processing wood chemically and mechanically and shipping it. We plan the construction of several industrial timber complexes here. Creation of these complexes and combines to produce protein-vitamin compounds and individual specialized enterprises will make radical changes in the structure of timber-industry production and will

sharply increase the proportion of thoroughly processed wood products -- cellulose, paper, cardboard, plywood, feed yeast and other output.

According to available estimates, the net output of the West Siberia petroleum and gas complex during the Ninth Five-Year Plan was 26 billion rubles, and the volume of petroleum and natural gas extraction planned for the 10th Five-Year Plan is estimated to be possibly 90 billion rubles in terms of net output.

The new Tyumen' - Surgut railroad has played an enormous role in developing the capacities of this complex. Organizing its temporary operation and its acceptance for full operation ahead of schedule approximated the schedules for utilizing the petroleum and gas deposits by approximately two years. This confirms once again the conclusion that the effectiveness of the new railroads cannot be evaluated in isolation from the effectiveness of the entire complex. The effectiveness of building transport communications as part of a complex's infrastructure should be evaluated in terms of integral impact obtained for the entire territorial production complex as a whole.

A system of Angara-Yenisey territorial production complexes with various directions of economic development is being formed in Eastern Siberia. Among these complexes are the Central-Krasnoyarsk, Nizhne-Angarskiy, Central-Irkutsk, Sayanskiy and Bratsko-Ust'-Ilimskiy. The latter two complexes have been developed rapidly in the Ninth and 10th five-year plans. Other complexes are in the planning stage. The plans for creating these complexes anticipate the development of electric power engineering and coal industry and the creation of new and expansion of existing energy-intensive production and large timber processing enterprises. In this regard, there will be the most effective development of various types of transport, ensuring successful utilization of the growing shipments.

Construction of the large open-pit coal mine in the Kansk-Achinsk basin, as well as the Berezorskaya GRES in its area was expanded during this five-year plan. Geologists have explored huge reserves of lignite coals in a seam estimated to be 25-30 meters wide, 70 and even 100 meters wide in places, along the Transsiberian Railroad from Bogotol and Achinsk to Kansk and Abakan. The coal is 12-16 meters deep, but it does not ship well and has a high ash and moisture content. Therefore, we propose creating several large GRES's with a total capacity of more than 26 million kilowatts here. The first, the Berezovskaya, is already being built. The complex's GRES's will produce 160-170 billion kilowatt-hours of electric power annually. For comparison, note that in 1955 the electric power plants of the Soviet Union produced a total of 170 billion kilowatt-hours of electric power. The power from these GRES's will reach many enterprises of Siberia and meet the needs of the municipal- and personal-services sector. Several open-pit coal mines with a capacity of 55-60 million tons of coal each will begin operating; coal is already being mined at the Irsha-Borodinskiy and Nazarovskiy open-pit mines and the Berezovskiy cut, with a capacity of 55 million tons of coal per year, is being built. Huge amounts of coal will move by conveyor to the Berezovskaya and other GRES's. At the same time, the fuel mined and the energy generated cannot all be used here. Moreover, consideration must be given to the shortage of power fuel in the Urals and the European part of the country. In this connection, the task of transporting large amounts of fuel or transmitting electric power from the Kansko-Achinskiy complex considerable distances will become very pressing. Research is being done now in this area.

In accord with the resolutions of the 25th CPSU Congress, we have basically completed shaping the Bratsk - Ust'-Ilimskiy territorial production complex in the central portion of the Angara's course. Its basis is hydroelectric, timber and iron ore resources. During his trip to Siberia and the Far East, Comrade L. I. Brezhnev pointed out in his speech to members of the Irkutskaya obkom bureau that "Irkutskaya Oblast provides approximately five percent of the country's electric power outout. ...You have a good power base for the comprehensive development of such energy-intensive production as nonferrous metallurgy, pulp and paper industry, and chemistry."[1]

The Bratskaya and Ust'-Ilimskaya GES's, a timber-industry complex and an aluminum plant have already been built and a large construction industry base has been created. One other giant of Siberian timber chemistry, the Ust'-Ilimskiy timber industry complex, is being built at rapid rates. Enterprises of the Bratsk and Ust'-Ilimskiy timber-industry complexes will produce considerable amounts of paper, cardboard, plywood, sheet wood and other output.

The complex's production and social infrastructure is taking shape. In the future, the cities of Bratsk and Ust'-Ilimsk will become the main bases from which utilization of the northern territories will begin. The comparatively high degree of utilization of the region and the availability of cheap electric power create conditions for siting new nonferrous metallurgy and chemical enterprises here.

The Central Krasnoyarsk complex is the largest processing industry center in Siberia, foremost for machine building and metalworking. We propose long-range development of the complex along lines dictated by the availability of major deposits of natural resources here.

The first direction is the creation of a large fuel and energy base using coals from the Kansko-Achinskiy coal basin and construction of large GRES's. The second direction is the development of energy-intensive production, primarily nonferrous metallurgy and chemistry: Achinskiy Petrochemical Combine, aluminum plants, enterprises of energy- and metals-intensive machine building. Third, and finally, development of the production and social infrastructure. Locating construction industry and building materials industry capacities here and creating a strong repair base are necessary both for developing the complex's economy and for the most effective utilization of the new northern territories. Development of the agroindustrial complex is being set up so as to provide the local population with food and ensure deliveries of food to the area's northern regions.

The Krasnoyarsk, Prichulymskiy and Kansk industrial centers are located within this complex. Whereas the Krasnoyarsk center is basically laid out and it remains only to improve its structure, intensive development of the Prichulymskiy and Kansk structures has just begun. The Prichulymskiy center will be specialized as dictated by the Nazarovskiy Open-Pit Coal Mine and by the GRES and alumina plant operating using coal from it. In the future, it will also be possible to create enterprises to produce aluminum. The largest facility at the Kansk center will be the Irsha-Borodinskiy Open-Pit Coal Mine. In the future, we anticipate increasing the amount of coal mined and building a large GRES and nonferrous and chemical industry enterprises. One of the very important problems of developing the economy of these centers is water supply and environmental protection.

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1. KOMMUNIST, No 6, 1978, p 18.

The Sayanskiy complex is taking shape in the southern portion of Krasnoyarskiy Kray in one of the most densely populated regions of Siberia, the Khakassko-Minusinskiy area. The "Basic Directions of USSR National Economic Development for 1976-1980" say about it: "Continue developing the Sayanskiy territorial production complex. Put the first units of the Sayano-Shushenskaya GES into operation and ensure the start-up of the first electrolysis facilities at the Sayanskiy Aluminum Plant and build the first line of the complex of electrical engineering plants at Minusinsk. Continue construction of the Abakan Rail Car-Building Plant."

The complex is situated in a region with very favorable climatic conditions. Fertile soils, a mild climate and a long growing season create conditions for developing agriculture. Forty percent of the arable land in Krasnoyarskiy Kray, 40 percent of its wheat plantings, more than 50 percent of its pasturage, 35 percent of its cattle, 60 percent of its sheep and about 70 percent of its orchards are concentrated here.[1]

Well-developed agricultural production creates conditions for siting food and light industry enterprises at the complex. The Chernogorsk Worsted-Cloth Combine, a wool initial processing factory, packing plants and other enterprises of these branches have been located in the Abakan, Minusinsk and Oznachensk industrial centers.

The Central Irkutsk complex is being laid out in a relatively well-utilized portion of Irkutskaya Oblast. The region's largest industrial enterprises are located here, the transport network is well developed, and a large Irkutsk metropolitan area with a population of about one million has developed here. The primary problems in developing the economy in this region are to complete construction of the chemical combine and other large facilities. Agriculture has been considerably developed at the complex. In the future, the economy of the complex will be dominated by branches of processing industry.

The Ziminskiy and Tayshet industrial centers are taking shape at the complex. Large electrochemical enterprises and a mineral fertilizers plant are being located here, and in the future we propose to build a metallurgical plant and metals-intensive machine-building enterprises.

The basis for the Nizhne-Angarskiy complex is the utilization of hydroelectric, mineral, raw material and timber resources. Construction of the Boguchanskaya and Central Yenisey GES's will permit the production of about 50 billion kilowatt-hours of electric power yearly. Along with further development of the Novo-Yeniseyskiy industrial center, where we anticipate supplementing existing lumbering enterprises with large pulp-paper and hydrolysis facilities, we plan to create new industrial centers.

Very large unutilized timber resources are concentrated near the Angara. The amount of wood shipped out might reach 15 billion cubic meters. The cheap electric power from the GES planned will create conditions favorable to locating timber industry complexes here. The features of the development of each of them will depend on solutions to problems of the sequence and technical resolutions of building a number

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1. N. N. Nekrasov, "Regional'naya ekonomika" [Regional Economics], Moscow, Izd-vo Ekonomika, 1978, p 304.

of hydroelectric power plants. A large industrial center will arise in connection with construction of the Boguchanskaya GES and the siting of a timber-industry complex here. This center might also include aluminum industry: an alumina plant based on Chadobetskiy bauxites and a metallurgical plant.

The creation of a large mining-industry center is associated with utilization of the Gorevskiy lead-zinc deposit. Viscose fiber and other chemical production could be located at the Nizhne-Angarskiy complex.

The main development in the northern portion of Krasnoyarskiy Kray is the Noril'sk industrial region. The most important task of this region is to increase the mining of copper-nickel ores. At the same time, it is necessary to solve the problem of creating efficient transport ties with the southern regions. Construction of the Surgut-Urengoy railroad and its subsequent continuation on to Noril'sk is of great importance to the Noril'sk industrial region.

We have begun shaping the South Yakutsk territorial production complex based on the large reserves of anthracite coal in Southern Yakutsk deposits.

Proven reserves of high-quality power and coking coals in Southern Yakutia have been estimated at 2.6 billion tons. Construction of a railroad to the coal basin is being completed. In the first year of the 10th Five-Year Plan, we began building the Neryungrinskiy Open-Pit Coal Mine, with a planned output of 13 million tons of coal per year. We are building an enriching plant which will be able to process nine million tons of coking coal per year.

A new city of coal miners, power engineers, construction workers and railroaders is being created in the remote, trackless taiga.

Siberian - Far Eastern Transport Network

Description of the Transport System

As is known, the transport system of our country is an aggregate of various types of transport. Its primary task is to meet more fully and promptly the needs of the national economy and the populace for shipments. At the start of 1979, the transport network included upwards of 140,000 km of railroads, about 742,000 km of surfaced roads, 142,600 km of internal navigable waterways, 63,000 km of oil pipelines, 117,600 km of gas pipelines and 908,000 km of air routes.

Given the huge territory of our country and the distribution of industry, raw material and fuel resources which has evolved, the necessity of regularly and relatively quickly transporting enormous amounts of raw material, fuel, materials and finished products, the steady strengthening and development of economic ties among economic regions and international trade, the leading place in the country's unified transport system belongs to rail transport. At present, the main types of large-scale shipments are by rail -- anthracite coal, ores, petroleum, timber and building materials, ferrous metals, grains and other agricultural freight -- and they will continue to be into the foreseeable future. Steel rails link all the country's republics, economic regions and nearly all its krays and oblasts economically and with transport. Railroads account for nearly two-thirds of all internal freight turnover and 40 percent of all passenger shipments.

At the same time, an increasingly big role in developing the economy and in shipping belongs to other types of transport, whose freight turnover is constantly growing.

Motor transport ships a great deal of freight between production sites and consumption sites which do not have other lines of transport; it is extensively involved in intracity shipment, in supplying freight from enterprises, kolkhozes and sovkhozes to and from mainline transport shipping centers.

Along with shipments in regions with no other types of transport and between enterprises located on waterways linking them directly, river transport participates in many mixed transport operations also including rail, maritime or motor transport.

Maritime transport provides primarily intercontinental communications with countries abroad. Moreover, it ships within the country in long and short sea trade, foremost to regions of the Far North, Far East, Kamchatka, Chukotka and Sakhalin.

Air transport ships a number of different types of freight to regions of the North and Far East it is hard for other types of transport to reach. The basic task of this type of transport is to carry passengers long distances.

Pipeline transport thus far has transported only petroleum and gas. It is very promising in the area of transporting free-flowing and certain other types of freight.

Soviet power inherited from Tsarist Russia a poorly developed transport system with a technically backward and in considerable measure worn out and ruined economy. The transport system of prerevolutionary Russia was formed as a component of its productive forces in accordance with the requirements of developing capitalism. Its development naturally reflected the patterns inherent to the capitalist economic system: spontaneity, cyclical growth, uneven distribution. As a result, for example, 85 percent of the rail network available in Russia in 1917 (70,000 km) was accounted for by the European portion of the country. The regions of Siberia and the Far East were served by only the Transsiberian Mainline, which was completed in 1917 after construction of the Amur railroad, built under easier technical conditions.

The locomotive fleet consisted basically of steam locomotives of 550-650 hp, and the freight car fleet consisted almost entirely of two-axle wooden cars, primarily closed cars with load capacities of 10 to 16.5 tons. Cars had helical couplings and manual brakes. The track consisted of lightweight rails, nonimpregnated wooden ties and sand ballast. The trains moved with the help of telegraph, telephone and the staff system.

During the civil war and military intervention, transport in Siberia and the Far East, in addition to being technically backward, was almost completely destroyed. The main Siberian mainline was strewn with mutilated steam locomotives and cars. The water supply was disrupted, many bridges were blown up, including those across such large rivers as the Amur and Biryus, and long stretches of railroad line were taken out of operation.

The Soviet government took immediate, resolute steps to restore the railroads of Siberia and the Far East. In a telegram to the Siberian Revolutionary Committee on 3 March 1920, V. I. Lenin indicated that restoring rail and water transport in Siberia was one of the republic's main tasks. Some 200 million rubles was released to

meet the urgent needs of Siberian transport. In the severe winter cold, with a shortage of food, fuel and clothing, workers and Red Army soldiers, communists and Komsomol members made yeoman efforts to restore transport in Siberia and the Far East. In 1926, the work volume of the railroads had reached the prewar level.

The industrialization policy adopted by the Communist Party and Soviet government, including development of the economy of Siberia and the Far East, has been linked inseparably to railroad construction. New lines were built prior to the start of the 1930's to develop the productive forces of southern Siberia: Yuga - Proyektnaya, Proyektnaya - Novokuznetsk, Inskaya - Proyektnaya, Novokuznetsk - Tashtagol, Achinsk - Abakan. As a consequence, these lines played a large role in creating the country's second coal and metallurgical base.

During the initial five-year plans, the question arose of building the Baykal-Amur Mainline. Planning was done and rails were laid on the Bam - Tynda sector, but in 1942, when the Battle of Stalingrad began, that track was torn up and the rails were quickly sent to build the Saratov - Stalingrad Volga border road.

The Volochayevka - Komsomol'sk line was a most important new construction project which played an enormous role in developing the economy of the Far East. It was built with a view towards comprehensive utilization of the region and building the new city of Komsomol'sk-on-Amur. The line to Sovetskaya Gavan', a new Pacitic Ocean port, was completed by the start of World War II. Raft (summer) and ice (winter) crossings were made across the Amur at Komsomol'sk-on-Amur. Subsequently, the Uglovaya - Nakhodka line also became very important. Right after the war, a new city and the largest port in the Far East, Nakhodka, rose up here.

The Transsiberian Mainline was renovated extensively during the prewar period to develop the throughput and carrying capacities of the railroads of Siberia and the Far East. Additional primary tracks were laid, many sectors were equipped with automatic blocking, the track superstructure was strengthened, stations were developed and other work was done. All this ensured an increase in the amount of traffic and improvement in rolling stock use. At the same time, there were also shortcomings and unsolved problems in developing rail transport in the East. The technical re-equipping of the lines lagged behind the economic development of the region and the growing shipments of passengers and freight were not adequately met. Even then, shortcomings were felt in the development of throughput capacity in the rail network of the Eastern regions.

In the post-war years, radical changes occurred in Siberia and the Far East in the character, structure and distribution of productive forces. The rapid rates of development of the economy of these regions necessitated accelerated railroad construction and the technical renovation of other types of transport.

Development of the rail network of Siberia is at present characterized by the creation of the Central Siberia and South Siberia mainlines. The most important latitudinal mainline is unquestionably the Main Siberian mainline, branching at Omsk to Sverdlovsk and Chelyabinsk. At the same time, the importance of the South Siberian and Central Siberian mainlines is constantly growing. The South Siberia has secured rail communications with the South Urals, northern Kazakhstan, the Kuzbass, the Altay steppes, regions of the Upper Yenisey and the central Angara region. The Central Siberia extends from Novo-Uritskoye Station through Kokchetav - Irtyshskoye - Kamen'-

on-Ob' to near Barnaul after joining the South Siberia. This five-year plan, we are completing construction of a new Kustanay - Uritskoye line; then shipments will be made on the Central Siberia from Altay to the South Urals (ending at Zolotaya Sopka).

There were recently no railroads at all in the huge expanses of northern and central Siberia. The Ivdel' - Ob', Tavda - Ust'ye Akha and Asino - Belyy Yar railroad lines have now been built in these timber industry regions. The Tyumen' - Surgut line has been built to serve the gas regions of Tyumenskaya Oblast and we are completing construction of the Surgut - Nizhnevartovsk line. A new Surgut - Urengoy line is being built at accelerated rates to the very rich new gas deposits of the north.

In the 1960's, the Achinsk - Lesosibirsk line was built in Eastern Siberia, connecting the developing Maklakovsko-Yeniseyskiy industrial region with the existing rail network. In the south, at Abakan, the Barnaul - Novokuznetsk - Abakan sector of the South Siberia was joined to the Achinsk - Abakan meridional line. In 1965, an electrified line was put into operation from Abakan to Tayshet; its installation in mountainous terrain difficult to reach was a real test, a school for the skill of transport construction workers. The experience accumulated when installing this line has subsequently been used extensively at other transport construction projects of Siberia and the Far East.

Installation of the eastern portion of the South Siberia and completion of construction of the Abakan - Tayshet line and the Tayshet - Lena line have provided a direct link between the South Kuzbass and Kazakhstan and Eastern Siberia and the Far East. Kuzbass metallurgy is now reliably linked to a raw material base, the Korshunovskiy Iron Ore Deposit.

The Khrebtovaya - Ust'-Ilimskaya line accepted for operation in the Ninth Five-Year Plan is of great national economic importance.

We are continuing construction of the Reshoty - Boguchany railroad line, the portion to Karabul Station having already been accepted for operation. When its construction is finished development of the Boguchanskiy industrial complex will come. This will operate using electric power from the Boguchanskaya GES now being built.

The Bam - Tynda sector, a link in the Bam - Tynda - Berkakit line, has been released for continuous operation ahead of schedule. This sector ensures a reliable supply of everything needed by many BAM construction workers and is the link connecting the BAM and the Transsiberian Mainline.

Extensive work is presently being done to finish building the Tynda - Berkakit - Ugol'naya sector. At the same time, traffic has been opened on the western portion of the Ust'-Kut - Zvezdnyy mainline, and sectors are also being operated east of the BAM.

In January 1979, a decision was made to disband the West Siberia and East Siberia roads and form two new roads in their stead, the Kemerovo and Krasnoyarsk. The West Siberia now includes the Altay, Barabin, Karasuk, Novosibirsk and Omsk divisions; the Kemerovo includes the Belovskoye, Novokuznetsk and Kayginskoye divisions; the Krasnoyarsk includes the Abakan, Achinsk and Krasnoyarsk divisions, and the East Siberia includes the Bratsk, Irkutsk, Tayshet and Ulan-Ude divisions. This was done with a view towards improving shipment organization on these roads and divisions and improving management of all operations.

In connection with the fact that the organized formation of the new railroads was only recently completed, there is thus far no experience in operating under the new conditions and no reporting data for analysis, so we will subsequently be using all data relating to the four railroads which existed in Siberia and the Far East -- West Siberia, East Siberia, Transbaykal and Far East -- when examining particular questions. This method of presentation will not influence the course of the discussions or the posing of questions.

River transport will be of considerable and ever-increasing importance in ensuring freight shipment in regions of Siberia and the Far East. Its role will be first of all determined by the presence of enormous natural resources reserves in the river basins and by the meridional flow of the main rivers, the Ob' and Irtysh, Yenisey and Lena, which penetrate deep into Siberia and the North where rail and motor transport are inadequately developed. Rivers are the sole means of transport which can ensure utilization of these natural resources, development of the economy and satisfaction of the people's demand for shipments on a large territory.

The Ob'-Irtysh system linking southern Siberia and northeastern Kazakhstan with regions of the North and Far North is of important significance in the region's transport services.

The largest river basins of Siberia are the Angara-Yenisey and the Lena. The Yenisey is the main waterway of Krasnoyarskiy Kray. The remote northern regions of Krasnoyarskiy Kray consume about one-third of all the freight arriving in the zone adjacent to the Yenisey. The bulk of the foreign shipments of the Noril'sk Mining and Metallurgical Combine go by river transport. Large freight-handling ports are located on the central Yenisey.

Timber is hauled in rafts down the Angara for processing at Maklakovo and Krasnoyarsk. Petroleum products and freight to supply timber industry and mining enterprises are shipped up the Angara.

The Lena is very important to development of the economy of Yakutskaya ASSR. It basically ensures the delivery of equipment, machines and machinery, industrial goods and foodstuffs. Some of the shipments are made on Lake Baykal and on the Selenga, Chikoy, Barguzin and Upper Angara. The importance of the Far Eastern river basin formed by the Amur and its tributaries in the region's transport services is growing.

Motor transport is being developed increasingly intensively in Siberia and the Far East and road construction is being increased, but the availability of motor transport in this region is still inadequate.

Pipeline transport plays an important role in mastering petroleum freight flows. There are 2,300 km of oil pipeline in Western Siberia. There are pipelines from Tuymazy to Omsk to Angarsk, from Omsk to Novosibirsk to Irkutsk, from Ust'-Balyk to Omsk, from Aleksandrovskoye to Tomsk to Anzhero-Sudzhensk to Krasnoyarsk to Irkutsk, and a petroleum products pipeline from Ufa to Omsk to Novosibirsk. Komsomol'sk-on-Amur is linked by pipeline to Sakhalin.

The Northern Sea Route is acquiring increasing importance in utilizing the natural resources of the Arctic coast. The nuclear ice-breakers are opening up broad opportunities for using it to conduct ships. Unexampled runs by the "Sibir'," "Arktika" and other nuclear ice-breakers have confirmed these opportunities.

Air transport plays a considerable role, making a sizeable number of shipments, in the transport mastering of freight flows in Siberia and the Far East. At the same time, its importance in ensuring passenger and freight shipment to remote points in regions of the Far North now being mastered is great.

One special question is that of transport ties with the country's northeast. The severe natural conditions -- extremely low winter temperatures, nearly omnipresent permafrost, sparse settlement and huge expanses -- determine the exceptional complexity of the transport problem's solution. Until recently, these factors determined the development here of only such types of industry as did not demand large-scale shipments of raw material and finished products. However, the discovery of fuel and raw material resources in these regions which are in a number of instances unique in scale and quality, as well as the presence of enormous timber reserves, put forward a very important new national economic task under present conditions, that of creating reliable transport ties with the industrially developed regions of the country.

In order to intensify the industrial utilization of the natural wealth available here, which has already become one of the important conditions for developing the country's productive forces, along with further expanding the use of river, maritime, motor and air transport, we are developing new means of transport which meet the specific requirements of work in Siberia and the Far North.

At the same time, broadening new railroad construction in these regions is an urgent requirement. In fact, building a railroad creates a reliable transport network capable of making large-scale shipments of freight throughout the year regularly, reliably and relatively inexpensively. Given the high rates of scientific and technical progress, we can create the necessary track structures, rolling stock and other technical means for these regions.

Role of Different Types of Transport in Developing Economic Ties.

The high rates of economic development and the nature of the specialization and cooperation of enterprises of various branches of the economy of Siberia and the Far East predetermine the far-flung interregional and intraregional transport-economic ties of these regions. Careful analysis of the indicated ties is of important significance to making freight shipments more efficient, in view of the long distances freight must be shipped.

The main freight in the present freight-turnover structure of Siberia and the Far East with other regions of the country is coal, petroleum, timber and metallurgical ore. A considerable portion of the shipments is done within regions and between regions of Western and Eastern Siberia and the Far East. Interregional ties are characterized by a preponderance of exports over imports. The regions being examined have the largest economic ties, in terms of volume, with the European portion of the country, which necessitates making shipments over great distances.

The European portion of the USSR accounts for about half of freight shipped from the east and two-fifths of that imported to the east. In this regard, the amount shipped to European regions exceeds the amount shipped from them by nearly 2.5-fold.

Large amounts of anthracite coal from the Kuzbass, timber, petroleum and gas, ferrous and nonferrous metals, machine-building, agricultural (grain, meat, oil) and

fish output are delivered from the east to the European portion of the country. Petroleum products, ferrous and nonferrous metals, pipe, machines, machinery, equipment, machine tools and a variety of industrial and consumer foodstuffs arrive in Siberia and the Far East from the European regions.

The Urals occupy second place in terms of volume of transport-economic ties between Siberia and the Far East and other regions of the country. Two-fifths of all the freight brought into the eastern regions comes from the Urals. Half the freight shipped out to the Urals is coal, and the Urals basically provide Siberia with metal, alumina, machines and mineral fertilizers.

Freight turnover between Siberia and the Far East and, on the one hand, Kazakhstan and, on the other, Central Asia is somewhat less. Coal and timber predominate in shipments from Siberia and nonferrous metal ores, cotton, fruit and vegetables predominate in shipments to Siberia.

During the 1966-1975 decade, timber shipments from Eastern Siberia grew by more than 20 percent, including three-fold to the Ukrainian SSR and two-fold to the Transcaucasus. Deliveries of timber to Kazakhstan and Central Asia and the Urals increased significantly. In other words, the eastern regions have now become a national supplier of wood to all regions of the country. Timber from Siberia is shipped primarily by rail and in part with the participation of river waterways.

A large amount of coal is shipped within the regions of Siberia and the Far East (especially Eastern Siberia and Far Eastern coals). At the same time, the flows of coal, and foremost Kuznetsk Basin coal, to the west, and foremost to the Urals, the Volga and even the Ukraine, are increasing.

Until recently, the eastern regions were experiencing a shortage of petroleum. Under present conditions, in connection with the increasing industrial development of West-Siberian petroleum deposits, these regions are becoming major suppliers of petroleum and petroleum products. West Siberian petroleum is being shipped to Kazakhstan, Eastern Siberia and the Far East, as well as the Volga area, the Center, and for export through the "Druzhba" oil pipeline.

Industrial utilization of the new regions of Siberia and the Far East has already resulted in the appearance of economic ties whose actualization is being effected with the participation of motor, river and rail transport, with a large number of transshipments from one type of transport to another. The continued involvement of the highly effective fuel-energy and raw material resources of the eastern regions in economic circulation will in the future be accompanied by an increase in shipment volumes, by growth in and the expansion of transport-economic ties. In this regard, they will continue in the years ahead to be effected primarily by rail, although pipeline, maritime, motor and river transport will continue to be developed. Expansion of the transport-economic ties of Siberia and the Far East will continue to occur basically in the freight shipped most -- coal, timber, ores and agricultural freight.

At present, with the exception of crude oil being transported from Tyumenskaya Oblast basically by pipeline, the interregional exchange of Siberia and the Far East with other regions of the country and freight shipments within the region over long distances are being made by three types of transport -- rail, river and maritime.

As was noted, river transport in the shipping work of the transport system of the eastern regions is primarily concerned with shipping freight to interior regions without railroads. Much national economic freight is now being delivered by river to Yakutskaya ASSR, as is the bulk of the freight for the Noril'sk Mining and Metallurgical Combine, nearly all freight for regions near Obsko-Tazovskaya Bay, and a large amount of freight for the petroleum and gas regions of Tyumenskaya Oblast.

This situation will continue to obtain in the near future, which is associated with the accelerated movement of petroleum extracting industry and other branches of the national economy farther and farther north, into remote interior regions. Consideration must be given to the fact that thus far, new railroad construction has not always kept pace with the industrial utilization of the regions, although in principle it must outstrip it. Therefore, given the absence of railroads in these regions in the years ahead, shipments by river transport will increase.

The intensive development of maritime shipments in regions of the Far North and Far East will depend largely on solving the complex problem of extending the navigation period and creating adequate amounts of new means of maritime transport capable of operating reliably in heavy ice.

Pipeline transport is currently being done by pumping crude petroleum basically west and in part to the east. Petroleum is delivered from Western Siberia to oil refineries of the South Urals, Kazakhstan and the Far Wast through the Samotlor - Ufa - Al'met'yevsk, Ust'-Balyk - Omsk, Omsk - Pavlodar and Aleksandrovskoye - Anzhero-Sudzhensk - Irkutsk pipelines. The flow of crude oil is growing rapidly, especially to the west. During the current five-year plan, it has increased approximately 2.5-fold.

Motor transport accounts for a large volume of shipping in the East. In the future, freight shipment by general-use motor transport will grow at high rates.

Railroads serving Siberia and the Far East perform a significant portion of the freight and passenger turnover of the railroad network.

The railroads' proportion is considerably higher in shipments of a number of very important kinds of high-volume freight. Thus, in 1978, it comprised 32 percent of all shipments of anthricite coal and timber on the network.

The railroads of Siberia and the Far East carry on an intensive freight turnover within regions, as well as with the European portion of the country, Kazakhstan and Central Asia.

As extractive and processing industry continue to develop in Siberia and the Far East, they will increasingly provide themselves with everything they need. In this regard, both the amounts of various freight delivered here and the range of shipments on all routes will be reduced.

But as of now, the delivery of freight over great distances leads to a significant increase in the proportion of transport expenses in the price of output consumed in Siberia and the Far East, as well as output shipped from these regions to other regions of the country.

The proportion of transport expenses in the price of ferrous metals and building stone significantly exceeds the corresponding unionwide indicators in the regions being examined here. As concerns timber and anthracite coal (Eastern Siberia) and cement (the Far East), the lower proportion of transport expenses in the price of these types of output in these regions is to be explained by the fact that coal and timber are extracted here and shipped out to other regions of the country.

In order to determine the prospects for developing rail transport, the amounts of shipments facing us must be revealed. Calculations show that shipments of freight by rail will grow faster in Siberia and the Far East in the 11th and 12th five-year plans than in the country as a whole.

Coal will occupy the leading place in Siberian and Far Eastern rail shipments in the future, as it does now. In this regard, it is to the point to note that in recent years, the flow of anthracite coal from eastern regions to the European part of the country has increased significantly. Thus, it had increased by more than 20 million tons in 1978 as compared with 1970, and the total amount of anthracite coal shipped beyond the Urals exceeded 50 million tons per year.

Mineral building materials will also have to be shipped in large amounts. Shipment of this freight will increase significantly.

The proportion of shipments of petroleum, timber and grain freight will decrease somewhat in the future. Shipments of machine-building and metalworking output, chemical output and consumer goods will increase.

The arrival of freight at Siberian and Far Eastern railroads will increase due primarily to coal and petroleum. Shipments of output of processing branches of industry will increase significantly. At the same time, the proportion of timber freight arriving will decrease, although the absolute amounts will increase.

The planned distribution of industry whose output will be shipped by rail and the features of the transport-geographic situation of Siberia are causing changes in the intraregional freight turnover structure. On the whole, flows of raw material and fuel will predominate here, which will lead in the future to an even greater predominance of outgoing over incoming freight. In order to provide the growing shipments of coal and timber, a considerable number of empty rail cars will have to be sent to these regions.

The situation is somewhat different in the Far East. The seaports of Nakhodka, Vostochnyy and others will process considerable foreign-trade freight flows, which is in large measure associated with a predominance of incoming over outgoing freight shipped by rail. The possible considerable increase in exports of coal, timber and metal would require a large number of cars. As a result, surpluses of empty rail cars will be created in the Far East, to again be sent to the railroads of Siberia for loading coal and timber.

The rail freight shipment structure of Siberia and the Far East will continue to be characterized by a slight increase in the proportion of intraregional ties and by a small reduction in the proportion of freight being shipped out, depending on type of transport.

Siberia and the Far East occupy an important place in ensuring the foreign economic ties between the Soviet Union and the Mongolian People's Republic, the Socialist Republic of Vietnam, the Korean People's Democratic Republic, and also the capitalist and developing countries of the Pacific and the Indian Ocean.

The Soviet Union supplies Mongolia, Vietnam and Korea with raw material, fuel, building materials and various types of machinery and equipment. The main article of export by the socialist countries of Asia to the Soviet Union is output of mining, light and food industry and stockraising.

Japan is one of the leading trade partners of the USSR in the Far East. The Soviet Union exports to Japan primarily timber, coal and certain types of machinery. Japan sends the USSR machinery, equipment and materials for building the Baykal-Amur Mainline and Vostochnyy seaport, for utilizing the South Yakutsk coal deposit and for other projects. Freight is brought to seaports by rail. These shipments require strict observance of special conditions for the use of packaging and for regulating the approach of freight and empty rolling stock. Failure to meet these conditions leads to the accumulation of freight at enterprises, in ports and at rail stations and complicates operations. The experience of transport workers in Odessa, Leningrad and the Far East shows that every opportunity is available for organizing precise work with foreign-trade freight. This is all the more possible if one considers that the seaports and border railroad stations of Siberia and the Far East handle shipments of foreign-trade freight which is produced in considerable measure right in those regions (coal, timber, petroleum products, paper). In turn, Siberia and the Far East are the major consumers of imports arriving from Japan, Vietnam, Korea and a number of other countries.

Thus, the role of different types of transport in developing the economic ties of Siberia and the Far East is growing immeasurably, as is the necessity of coordinating plans for their development and organization of the shipment process.

Railroads of Siberia and the Far East

Equipment

In order to successfully utilize the ever-growing shipment volume, major steps are being taken to continue the technical renovation of the railroads of Siberia and the Far East, even though the rail network in these regions is on the whole already at a high technical level. An especially great deal of work was done in the post-war years in the area of the technical development and increase in the capacity of the railroads of the eastern part of the network. A number of additional primary tracks were built, new marshalling yards and sector stations were put into operation, and all the main lines were equipped with automatic blocking and centralized dispatching. Lines with the heaviest freight traffic were electrified.

In recent years, railroad electrification has been done using industrial frequency 25 kV alternating current. In this regard, the capital investments and operating expenses required are approximately 3-5 percent less than for direct current and the productivity of the locomotives and the overall efficiency of the electric traction are increased. Capital expenditures are reduced, especially in the construction of traction substations. With direct current, they must be built every 10-25 kilometers, and with alternating current -- every 30-50 km. Moreover, a.c. traction

substations ensure higher operational reliability and are less expensive. With alternating current, the gage of the contact wires is several times less, and as a result, so is the amount of copper used in them. Losses of electricity in the power-supply installations are also reduced and broader opportunities for automating basic operations are ensured.

Increasing the intensiveness and speed of train traffic and increased rolling stock load on the rails advance new demands on the track system, determining the necessity of increasing its capacity and improving routine maintenance. At present, the track is being strengthened on the basis of the use of stronger individual track elements and more efficient designs, increasing the amount of seamless track and reinforced concrete ties, flexible rail connectors and other improved elements. Heavy R75 and R65 rails are being introduced in a planned manner, foremost on the most heavily traveled sectors. In recent years, transport has been supplied with more and more heat-hardened rails. New railroad track designs using reinforced concrete ties are being developed. Railroad track is being laid now on gravel and asbestos ballast. Much work is being done to replace switch crossovers, obsolete metal bridge spans are being replaced, and tunnels and other artificial structures are being rebuilt.

The complex of work to strengthen the rail capacity of Siberia and the Far East will be done more intensively in the years ahead, in view of the growing demands on and features of track maintenance, repair and operation. It must be borne in mind that a large number of curved track sectors pass through here, that the shape of individual open-line routes is very complex, that there are many chasms, and finally, that temperatures are extremely low in the wintertime.

All this demands greater attention to keeping track in good repair, additional labor expenditures to straighten tracks damaged by frost heaving in the winter, and increased expenditures of materials, and especially rails.

Mainly heavy types of rails are laid on roads in Siberia and the Far East. The proportion of R50 or heavier rails on the main track (in terms of length) is 95 percent on the Western Siberia, 85 percent on the Eastern Siberia, 94 percent on the Transbaykal and 81 percent on the Far Eastern. The average weight of one meter of rails on these roads is above the average network indicator.

Nonetheless, the capacity of the track superstructure does not meet the operating conditions which have evolved on a number of railroad lines or the systematically increasing load. In order to ensure normal operations we have also been implementing a number of important measures to strengthen the capacity of all track elements on existing tracks in view of the fact that the load on them will increase steadily in the foreseeable future.

Serious attention is being paid to strengthening means of train traffic communication. The rail network now operates basically on automatic and semiautomatic blocking, the electric staff-signal system being retained only on certain lines of secondary importance. The availability of modern means of communication and traffic control is higher on the roads of Siberia and the Far East than on average for the network. From 50 to 70 percent of the total length of these roads is equipped with automatic blocking and centralized dispatching, and about 50 percent of all switches are included in the electric interlocking system. This increases considerably the throughput capacity of the lines and creates the conditions necessary for traffic

safety. In view of the increased traffic frequency and speed, the rates at which lines have been equipped with automatic blocking and centralized traffic control facilities and changed over to electric switch and signal control have continued to increase in the 10th Five-Year Plan.

At the same time, the communications between roads of the eastern portion of the network and other roads and also with the Ministry of Railways have been improved. This was also necessary in connection with the introduction of the automated rail transport control system (ASUZhT) on East - Center lines.

One important direction of technical progress in rail transport is further improvement in traction equipment. At present, the country's railroads have available to them a fleet of powerful locomotives being supplied basically by domestic industry. The locomotive fleet is continuously being reinforced by more reliable and more economical diesel and electric locomotives. The capacities and designed speeds of the locomotives are growing and their dynamic characteristics are being improved. Semiconductor devices and a contactless control system are being introduced on the locomotives and various types of automation are being used. The main types of locomotives are eight-axle d.c. 5,200-kW electric locomotives with axle-rails loads of 23-25 tons-force, 6,520-kW a.c. eight-axle electric locomotives, and six-axle 2,000-3,000 hp diesel locomotives in sections with an axle load of 21.5-23 tons-force.

At the same time, the demands of rail transport for new locomotives are still not being fully met, and the technical level of some types does not meet modern demands. The fleet still contains many TE3 diesels and series VL22^{m}, VL23 and VL8 electric freight locomotives with limited designed speed, inadequate power and reliability. Deliveries of diesel engines for diesel locomotives are also inadequate, which creates certain difficulties in operations. The 3,000-hp 2TE116 diesel locomotive sections created several years ago, which were to have been transitional to more powerful locomotives, are being produced with diesels with substantial design shortcomings. The creation of 4,000-hp and 6,000-hp diesel locomotives in sections, which the railroads need very badly, and especially in Siberia and the Far East, is being drawn out. Work on developing more powerful modern electric locomotives is also slow.

In order to continue improving the technical content and improve the reliability of operation of the locomotive fleet, steps are being taken to strengthen the system of planned-preventive maintenance and reduce the incidence of breakdowns of locomotive subassemblies and units, especially in the case of traction electric motors on diesel locomotives.

It is also important to raise the level of traction rolling stock maintenance organization and quality, ensure that all maintenance workers are highly skilled, unswervingly follow basic locomotive equipment operating procedures, increase the responsibility of locomotive brigades for the technical condition of the locomotives they operate, set up the timely supplying of depots with spare parts, subassemblies and equipment, and ensure comprehensive development of the maintenance base.

In 1977-1978, several hundred mainline electric locomotives, mainline and switching diesel locomotives, and units and subassemblies for them were supplied to the Western Siberian, Eastern Siberian, Transbaykal and Far Eastern railroads. In the future, deliveries of new locomotives and spare parts must correspond to the growing freight and passenger shipment volumes.

The country's railroads have available to them a large, structurally diversified car fleet. Domestic freight cars of all types are of welded design, are equipped with automatic brakes and coupling, and a considerable portion of them have roller bearings. The proportion of specialized cars is constantly increasing. The fleet of closed cars is being supplemented with closed hoppers for shipping cement, mineral fertilizers, grain and other freight. The proportion of flatcars specialized for shipping passenger cars and large containers is growing. The fleet of gondolas contains more and more open hoppers for shipping pellets, sinter, coal, coke and peat. The proportion of tank cars specialized for shipping acids, alcohols and a number of chemical products is being increased.

At the same time, in connection with the considerable increase in the production of output by the main freight-generating branches of industry and with expansion of agricultural production, the demand for shipments and correspondingly for freight cars is constantly growing. Moreover, there are still insufficient specialized cars in the fleet and shortcomings are being permitted in its maintenance and use, both by railroad workers and by workers in the industrial enterprises shipping and receiving the freight. In order to ensure shipment of the ever-expanding assortment of freight, the proportion of specialized cars must increase to 35-40 percent.

Analysis shows that the roads of Siberia and the Far East, like other roads, have quite a few reserves for improving the use, routine maintenance and repair of cars, for easing the deficit in them. Car idle time is high in a number of instances at stations and at enterprise sidings. Reducing unnecessary long-distance, repeat and counter shipments is a major reserve for freeing additional loading resources. The railroads do additional work worth up to 150 billion ton-kilometers, costing the national economy 500 million rubles, for this reason alone.

Many enterprises are inadequately concerned about preparing freight for shipment in such a way that the demand for cars will be reduced. Unconcentrated coal and ores, rough, unstripped timber, fertilizers with inadequate nutrient content, and other substandard freight is often submitted for shipment. Round the clock freight work has not been set up at enterprises of a number of branches of the national economy and freight loading and unloading on days off and holidays has dropped sharply. Instances of failure to carry out shipper plans for drawing up unit trains are still frequent, as is underutilization of car load and volume capacity, and containerized and packetized shipments have not been adequately developed everywhere. All this causes additional demand for rolling stock and limits the shipping potential of rail transport.

Freight cars circulate on all railroads in the Soviet Union (with few exceptions). Cars intended, based on their technical specifications, for use generally in zones of moderate climate and normally used there in the winter malfunction considerably more often on Siberian and Far Eastern roads and go in for unplanned repairs. In 1978, car uncouplings from freight trains on roads of the eastern portion of the network comprised nearly 21 percent of malfunctions due to journal box friction and upwards of 16 percent of other technical malfunctions (of the total number of uncouplings for these reasons on the railroad network). The task of continuing to improve car design with consideration of the conditions under which they will be operated in different climatic zones therefore becomes extremely urgent.

The operating conditions of cars on roads of Siberia and the Far East have demanded comprehensive strengthening of the repair base. In recent years, more than 60 such

production facilities have been built or renovated here, including freight car repair depots at Tayshet, Vikhorevka, Sukhovskaya, Shimanovskiy and Barabinsk stations, centers to prepare cars for shipments at Shakhterskaya, Kansk-Yeniseyskiy, Cheprovka, Mezhdurechenskaya and Trudoarmeyskaya stations, Sukhovskaya washing and steam-cleaning station, and others.

Before the end of the 10th Five-Year Plan, several dozen other different car-system facilities will be renovated or built on the indicated roads. At the same time, the freight car repair depot technical base will continue to require substantial development, foremost on the Western Siberia and Transbaykal roads. Also inadequately developed are the freight car plant repair base and the passenger car depot and plant repair bases. Appropriate construction and renovation measures will be outlined in the railroad development plans in the 11th and 12th five-year plans.

Very important significance in improving railroad operation and operations management is attached to introducing computer equipment and creating the automated rail transport control system (ASUZhT). This system must ensure the automated collection, transmission and processing of information, with the subsequent issuance of technological documentation and optimum recommendations on organizing the shipment process.

Railroads, including those of Siberia and the Far East, are already equipped with highly efficient computer equipment and data transmission equipment. More than 100 computers are in use in the network. Some are third-generation machines. The computer centers of the railroads solve more than 800 problems of 65 types. The first line of the automated control systems (ASU) has been introduced on the Western Siberia, Eastern Siberia, Transbaykal and Far Eastern roads based on the road computer centers.

The most important tasks are those whose resolution facilitates improving management of the shipment process. In the railroad computer centers of Siberia and the Far East, computers are used to solve problems associated, for example, with compiling and working out monthly freight shipment plans. Charts of the normal freight-flow directions are put into the computer memory and used to determine inefficient shipments with deviations from the charts. These electronic machines calculate planned car flows to be used in working out plans for the formation of trains, as well as daily, shift and current operations plans for roads, divisions and stations. Computers are used to predict when local freight will reach a road, to analyze car circulation and productivity, to carry out train traffic schedules, and they also record car idle time in numerical terms and solve a number of other recording tasks.

An automated data system has been created on the Far Eastern road for that portion of the car fleet shipping export freight, as has a preliminary consignee data system for that freight. As is known, the Far Eastern road is an endpoint for export freight flows, which are then reloaded onto ships. Therefore, much attention is being paid here to delivering and unloading cars promptly, which is simultaneously the main source of loading resources to meet freight shipment plans. Preliminary data to freight recipients helps reduce car idle time in freight-handling operations by ensuring that unloading fronts, manpower and machinery are readied ahead of time. Informing seaports in advance that cars are approaching ensures that ships will be made available promptly and that empties disposition measures to redistribute cars among ports will be carried out promptly. Developing an automated information

exchange system for participants in the Transsiberian Container Service (TSKS) on the movement and approach of large transit containers based on the tracking system for these containers is a major problem.

In accordance with the program planned, development will continue in the 10th Five-Year Plan of the ASUZhT, which will be an integral part of the statewide automated data system. The second line of the automated control system is being developed and introduced on the network, especially on roads of Siberia and the Far East. In this stage we anticipate changing over to third-generation machines. In this regard, the processing capacity of the computer centers will be increased approximately two-fold. The use of such machines and the accumulation of needed information on rail transport, as well as in various branches of the national economy, will permit changing over from a system of orders to development of territorial transport-economic balances and creation of an interlinked system of long-range, long-term, current and day-to-day shipment planning. This will ensure balance in production and shipment plans, optimizing and making shipments more efficient, and will make it possible to significantly improve operations. The conditions necessary for automating statistical and operational recording and reporting on shipments and on the location and use of rolling stock will be created. The use of computers in all transport economic and engineering calculations will be expanded.

Much attention is paid in the "Basic Directions of USSR National Economic Development for 1976-1980" adopted at the 25th CPSU Congress to the comprehensive mechanization of loading-unloading, transport and warehousing work. In rail transport, the level of loading-unloading mechanization is to be raised to 93 percent. In this regard, one of the basic long-term directions ensuring actualization of these plans is the concentration of freight operations at transport centers and the closing of relatively inactive stations to freight work.

On the Western Siberia, Eastern Siberia, Transbaykal and Far Eastern roads, freight operations are currently being done at more than 900 stations, including at more than 600 stations using railroad equipment in general-purpose areas. In the current five-year plan, about 60 relatively inactive stations will be closed on these roads. In view of the higher manpower demand in eastern regions of the country, the indicated measures, which are aimed at reducing labor expenditures on the basis of extensive mechanization of loading-unloading operations, will be especially effective.

At the same time, given the high rates of economic development in Siberia and the Far East, work on concentrating freight operations will require the comprehensive solution of many interlinked problems. First, we must ensure the provision of freight stations with more promising and more reliable means of mechanization -- 30-ton electric gantry cranes with detachable load-lifting mechanisms for processing medium-weight and large containers, packetized lumber, long and heavy freight, as well as loaders for loading and unloading bulk and unit-packaged freight. As the availability of equipment increases on the loading and unloading fronts, we propose organizing large interregionally important support stations. Second, we need to develop and improve the network of warehouses, especially closed ones, and to mechanize warehousing operations in every way possible.

The proportion of freight shipped from railroad stations of Siberia and the Far East in containers now stands at 18 percent of the network total. Prospects for developing containerized shipments here determine the necessity of expanding the capacities

of container repair enterprises in order to make repairs on the roads of Siberia and the Far East as well, rather than shipping damaged empty containers to the European part of the Soviet Union for repairs. Moreover, in order to develop containerized shipments it is very important to improve the technology of exchanging information on operations at container centers. At present, a great deal of time is still being spent searching for containers to be loaded from a container site to a car or motor vehicle.

One of the most important tasks set rail transport workers is to improve transport services to the population. In 1980, railroads must haul about four billion people. In other words, each resident of our country will make use of the services of rail transport an average of at least 16 times during the course of the year.

Much work will be done in the area of raising passenger service standards, expanding the services offered them, at terminals and on trains of the roads of Siberia and the Far East. Railroad terminals are being provided with more and more means of automation and mechanization. At present, terminals of roads of the eastern portion of the network have about 1,300 ticket selling and printing machines, several tens of thousands of storage lockers and about 200 automatic information facilities. Increasing use is being made of janitorial equipment in transport.

In recent years, the fleet of passenger cars has been up-dated by nearly 50 percent.

The system of centralized seat distribution and ticket sales is being expanded. By the start of the summer passenger shipments in 1978, this system already included an additional 12 stations on the Eastern Siberia, 11 on the Transbaykal and eight on the Far Eastern. This enabled us to increase advance ticket sales by 4.0 percent, reserved seat ticket sales by 6.5 percent and return ticket sales by 10.5 percent. By the end of the five-year plan, we plan to have introduced centralized ticket sales at more than 30 more stations.

Upwards of five million rubles was directed just in 1978, for example, into developing the passenger system of the Siberian and Far Eastern roads. These funds were spent, in particular, on building terminals at Cheremkhovo and Kansk-Yeniseyskiy stations on the Eastern Siberia, Barabinsk, Kiselevsk and Novosibirsk-Glavnyy (suburban) stations on the Western Siberia, and Urul'ga, Shakhterskaya and Svobodnyy stations on the Transbaykal, and Mylki and Korsakov stations on the Far Eastern. At present, plans are being developed for building terminals at Leninsk-Kuznetskiy, Abakan, Irkutsk-Sortirovochnyy, Ulan-Ude, Bogotol and Gimlyuy stations.

Thus, we need to do quite a bit more in the area of further strengthening the availability of equipment to railroads of Siberia and the Far East and improving the efficiency and quality of operations there. The harsh climatic conditions, very high freight loads and constantly increasing train speeds make special demands on the technical condition of the multibranch economy of the roads of Siberia and the Far East and on the transport equipment used there. Experience shows that inadequate consideration of regional natural-climatic conditions when developing this equipment and technology causes losses associated with extensive car idle time, additional car repairs, and leads to an increase in labor and materials expenditures.

When developing and creating new transport equipment and materials, we must achieve all manner of increase in unit capacity, higher speed and load capacity, resistance to freezing, insulation, sealing and standardization of subassemblies and parts,

reliability of operation and lower maintenance expenditures. It is important to consider opportunities for using remote control, automation and comprehensive mechanization of all production processes, especially of track work and loading-unloading operations. We must anticipate maximum exclusion of manual and low-skilled labor from all production operations.

Operations. Leading Experience.

The system used to operate the railroads of the Soviet Union, based on the advantages of the planned socialist economy, ensures high efficiency of shipping and creates the requisites necessary for continuing to improve shipping process organization. However, the complex climatic conditions of Siberia and the Far East, high volumes of common freight shipped, large distances traveled by passengers and inadequate development, by today's standards, of transport determine important features of the organization of railroad operations in this range of the network.

Railroad operations in Siberia and the Far East are done under conditions of a "stretched out" configuration of lines which are inadequately developed overall. Moreover, high levels of through shipments are combined with a very great deal of local work here. Finally, the railroads of the eastern portion of the network serve very large enterprises and combines in mining and processing industry which are already forming whole territorial-industrial complexes and they interact with large river and sea ports.

In the region adjacent to the Baykal-Amur Mainline now being built, a large new industrial strip is being created; it will consist basically of large extractive industry enterprises which will ship a significant portion of their output by rail.

All this necessitates creating certain throughput and carrying capacity reserves for sectors and lines, for station freight-handling capacity, for rolling stock, power supply installations and others.

Normal operation of roads of Siberia and the Far East requires precise coordination and balance of the requirements of the enterprises being served and the throughput and carrying capacities of the sectors and the freight-handling capacities of the classification stations in greater measure than in other regions of the network. Large numbers of cars with freight accumulate in some periods on the approaches to certain river and sea ports due to failure to meet these demands, to planning shortcomings, and to shortcomings in regulating the load on individual lines, for example. Much timber is not shipped out for long times from certain Siberian and Far Eastern stations for these same reasons, since there are not enough empties.

Optimum distribution and equipping of classification yards and freight stations is a most important condition for uninterrupted operation of roads of Siberia and the Far East. At present, this region is still inadequately provided with large classification yards.

With a view towards improving operation of the network's eastern range, it is appropriate to work out a general plan for distributing classification yards with consideration of future operating conditions of roads of Siberia and the Far East and BAM construction. It is quite necessary that the largest classification yards of this region be equipped with means for comprehensively automating car classification.

Under the complex conditions of the eastern region, dissemination of leading work methods which ensure improvement in the shipping process takes on top-priority importance. Much experience in progressive organization of operations and of equipment maintenance and repair has been accumulated on railroads of the eastern portion of the network. In particular, steps are being worked out and implemented to improve the technology of delivering local freight, the interaction of sections and sectors and of stations and sidings, on improving the planning of train and switching work and optimizing the train formation plan, on improving traction servicing of sectors and lines, and on increasing the length of sectors on which nonstop train service is guaranteed.

In recent years, the collectives of stations, locomotive and car depots, track districts, signalling and communications districts, power sectors, mechanized loading and unloading districts and repair plants have directed their creative efforts towards using new production reserves in every way possible with a view towards attaining the highest results with the least expenditures. The work indicators of many leading collectives often exceed the level achieved on the rail network as a whole on average several-fold. Thus, the level of labor productivity on railroads of Siberia and the Far East in 1978 reached 2,325,000 ton-kilometers per worker (on average for the entire range), or nearly 32 percent higher than the average network level (see table, following page). On three roads, the Western Siberian, Eastern Siberian and Transbaykal, of the four which comprise this range, the labor productivity level exceeded the network average by 52, 30 and 43 percent, respectively, in 1978. This was in considerable measure a result of the greater availability of equipment on these roads, of the higher density of shipments.

The share of electric traction in utilizing shipments is 20 percent higher on roads of Siberia and the Far East than on average for the network

With the exception of the Far Eastern, the railroads of this range also have a higher level of train traffic-control automation. We can single out the Western Siberia in particular, where this indicator exceeds the network average level 1.5-fold. At the same time, the level of shipping process control automation at this range as a whole cannot be considered adequate in view of the rapidly growing demand for labor resources in the eastern regions of the country. The rates at which means of traffic control automation are being introduced on roads of Siberia and the Far East must be significantly increased.

In addition to the above factors, two other circumstances still have a great influence on the labor productivity level. First, the proportion of passenger shipments, which are more labor-intensive than freight shipments, is considerably lower on roads of Siberia and the Far East. It is less than five percent on average on these roads, but the network average is more than eight percent. Second, the very labor-intensive initial and final operations account for less per unit of output (shipment) than on average for the network. Given a proportion of 20.1 percent of the network freight turnover accounted for by these roads, their proportion of the arrival and departure of freight is only 13.9 percent.

The higher level of technical development of the roads of Siberia and the Far East as compared with the network average has facilitated their achievement of higher operating indicators, which has in turn been reflected positively in labor productivity growth, one of the most important indicators of work efficiency. However, due to the

Labor Productivity Per Worker Employed in Shipments, in 1,000 calculated ton-kilometers

Road	1970		1975		1976		1977		1978	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Network as a whole	1,381	100	1,713	100	1,735	100	1,740	100	1,767	100
Including roads of Siberia and the Far East:										
Eastern Siberia	1,777	129	2,260	132	2,247	130	2,241	129	2,289	130
Western Siberia	2,110	153	2,503	146	2,576	148	2,573	148	2,689	152
Transbaykal	1,832	133	2,396	140	2,450	141	2,445	141	2,526	143
Far Eastern	1,085	79	1,390	81	1,405	81	1,430	82	1,453	82
Total for the four roads	1,785	129	2,217	129	2,250	130	2,252	129	2,325	132

Key:
1. Absolute
2. As a percentage of the average network level

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high traffic density and the inadequate throughput capacity of a number of lines, the passenger train speeds on roads of Siberia and the Far East are somewhat lower (with the exception of the Western Siberia) than on average for the network.

The high level of labor productivity on roads of Siberia and the Far East has ensured utilization of one-fifth of the network shipment volume (in calculated ton-kilometers) with an operations staff equal to only 15 percent of the network-wide value. Per one kilometer of line operated, the staff needed in 1978 was 15 persons for the network as a whole, 18.7 for the Western Siberia, 16.7 for the Eastern Siberia, 16 for the Transbaykal, 11.6 for the Far Eastern, and 15.9 for the four roads on average.

As a whole, labor productivity growth rates on roads of Siberia and the Far East have been higher than the network average both in the Ninth five-year period and in the first three years of the 10th Five-Year Plan. However, in 1978 the labor productivity level dropped somewhat on three roads of the range (excluding the Far Eastern). This led to certain undesirable economic results. Whereas 84.3 percent of the increment in shipments was mastered through labor productivity growth on the range being examined here in the previous five-year period, the figure was only 62.2 percent in the first three years of the 10th Five-Year Plan. In the Ninth five-year period, the operations staff grew by less than five percent, given a 30-percent increase in shipment volume, but during the first three years of the current five-year plan, the staff grew by 3.1 percent, given shipment volume growth of 8.2 percent.

Under these conditions, the most important task is to work out and implement measures ensuring lower shipment labor-intensiveness, foremost by introducing new equipment, improving equipment maintenance and use, improving labor organization, disseminating leading work methods, and developing and increasing the effectiveness of socialist competition. The railroads of Siberia and the Far East are invested with great potential opportunities for successfully utilizing the growing shipment volumes, for improving the efficiency and quality of all their work, for the broad dissemination of leading labor methods. The reference is first of all to the broad dissemination of the experience, approved by the CPSU Central Committee, of collectives at Lyublino-Sortirovochnoye Station on the Moscow Road, of Odessa and Leningrad transport workers, of the Elektrostal' industrial rail transport enterprise, of collectives of enterprises of Chelyabinskaya Oblast and the South Urals road, as well as of the collective at Sol'vychegodsk locomotive depot, whose experience has been evaluated highly in a letter of greeting from Comrade L. I. Brezhnev, CPSU Central Committee General Secretary and USSR Supreme Soviet Presidium Chairman. Using the experience of the Moscow road collective in increasing freight train weight, which was recently approved by the CPSU Central Committee, has provided a great impact.

The distinguishing features of these leading methods is their comprehensive, multi-branch nature. To introduce them widely, we need the joint efforts of railroad workers and workers in other types of transport, of freight shippers and recipients.

The experience of Lyublino-Sortirovochnoye Station of the Moscow road has been disseminated widely at the decisive classification yards of the roads of Siberia and the Far East. Use of the method of dispatcher supervision of make-up and break-up using computers and modern means of communication, reducing intervals between operations, strengthening intraproduction cost accounting and other measures has enabled many stations to improve train processing technology and to significantly reduce car idle time. At the same time, the experience of the Lyublin workers

as a whole and individual elements of that experience are also being used at enterprises of other branches of the railroad system. In developing this experience, traffic workers, track workers, communications workers and workers in the locomotive and car systems of the Eastern Siberia, Western Siberia and Transbaykal roads have organized the accelerated throughput of car flows on entire lines, which provides a great economic impact.

Many dispatchers of the Transbaykal road have been models of skillful operations organization. At the start of the 10th Five-Year Plan, the road collective achieved an increase in freight train traffic sector speed and ensured unimpeded freight train admittance to junctions and strict observance of passenger traffic schedules. Unified dispatcher shifts consisting of a road dispatcher, division duty officers and station duty officers have been created on the road. When he comes on duty, the train dispatcher familiarizes all station duty officers with the work plan, informs them of how many trains will have to be allowed through or shipped out, how many cars to supply for freight operations, how many to ship out, and so forth. In this regard, the reserves available for overfulfilling plan assignments and accelerating train throughput are evaluated and socialist obligations are taken on for the shift.

The experiment conducted on the Eastern Siberia road in organizing super-long range high-speed shipper unit trains deserves attention. A certain system of planning timber shipments using consolidated job authorizations for delivery to consignees was proposed. Instead of having all cars loaded with timber processed at Inskaya Station, this system ensures that they will be sent to roads of the South, Center and Central Asia in direct unit trains. The unit trains formed in the course of the experiment saved the state thousands of car-hours.

As was noted, local work is growing rapidly on roads of Siberia and the Far East. The workers on these roads therefore pay a great deal of attention to the accelerated distribution and collection of cars with local freight. To this end, the Irkursk, Ulan-Ude, Krasnoyarsk and Achinsk divisions of the Eastern Siberia road have set up the delivery of cars with local freight using delivery locomotives following firm schedule threads. On the Tayshet and a number of other divisions, local trains run from sector stations to support stations, where groups of cars are collected according to a shipper unit train plan. As a result of combining these groups, we obtain unit trains which run to dispersing centers without reprocessing. Implementation of these measures has enabled us to significantly reduce car idle time.

The formation of large territorial production complexes has caused the establishment of close technological ties between the major supplier enterprises and consumers of iron ore, coal, timber and other high-volume freight. This has ensured opportunities for improving work with local freight on the Eastern Siberia road by putting such freight through in technological unit trains between high-volume loading and unloading points on two or more divisions.

Organizing high-volume freight shipments in closed technological unit trains yields a whole series of advantages. Cars are delivered for unloading evenly and car idle time waiting for free loading-unloading work fronts is reduced. Rolling stock circulating in closed unit trains is maintained in good technical condition. Unit trains for shipping coal, ores, timber and certain other freight are formed using cars on rocker bearings. As a result, train processing time at sector stations is reduced and the length of sectors through which such trains pass nonstop, without a

technical inspection, is increased significantly. The time gondola cars spend at loading preparation centers is reduced substantially.

In the development of this method on the Western Siberia road, a well-ordered procedure for the planning and operational management of local work was worked out. For the first time in the network, a comprehensive local work technology was created for work on a road scale based on the technological processes of local work.

The so-called contact train traffic schedule was adopted in local work road technology as the basic technological link in transport ties between suppliers and consumers of output, raw and other materials, in particular when organizing unit-train freight shipments. Contact schedule is understood to mean a sequential aggregate of time-coordinated schedules for releasing unit trains from sidings, sending them out from loading stations, running on the sectors of one or several divisions, arrival at the unloading (or transshipment) station and release of unit trains to sidings. This schedule is the sole continuous work plan for mainline and industrial rail transport, as well as rail, motor and river transport. The schedules are selected on the basis of stable freight flows which have evolved.

Coal unit train traffic to enrichment plants, metallurgical plants, electric power plants and river ports is organized on the basis of firm road contact schedule guides, as is traffic in technological circumferential unit trains with agglomerate and ore on the Novokuznetsk division, circumferential unit trains with building materials and petroleum freight on the Belovskiy, Novosibirsk and Omsk divisions, and unit trains consisting of empties for loading coal. Shipping and tracking empty unit trains using specialized schedule guides ensures higher speeds an even, smooth supply of empty cars to the decisive coal-loading stations. The road has developed a system of shift-daily planning and two- or three-day local work forecasting using computers for existing and prospective operating conditions.

Experience has demonstrated the great effectiveness of comprehensive local work technology on the Western Siberia road. Its introduction has ensured an approximately 10-percent speed up in local car circulation and a savings of at least five million rubles per year in operating expenses.

Roads of Siberia and the Far East carry out a large volume of passenger shipment. Each year, these roads haul about 240 million passengers on all routes. In order to meet the demand of the population for shipments on these roads, the traffic schedule anticipates, in particular, that several dozen pairs of long-distance trains will run, including more than 30 pairs in continuous circulation. About 1,400 stations, sidings and stops have been opened for loading and unloading passengers on roads of the eastern portion of the network.

Given the high load on railroads of the eastern region and the short warm period (May to September), it is very important to set up the passage of trains percisely during periods when "windows" are given for track repair. This work coincides with the heavy passenger shipment time, with a period of increased shipments of grain and freight to create winter stocks and transshipment to river ports. Alternate train traffic schedules are worked out on the basis of plans for renovating tracks and for capital construction in advance, using the experience of the preceding year. When necessary, plans are also worked out in advance for equipping crossings on sectors where repair and construction work will be done with two-way portable automatic

blocking installations, temporary traffic control accesses laid between the main tracks, and others. In this regard, temporary changes are made in the warning, interlocking and blocking installations.

Each year, operational groups are organized on each road of the region in the summer from among workers in all services. They examine in detail plans for granting "windows" for the next 10-day period and the next 24-hour period on the basis of the schedules which have been worked out and determine the number of locomotives required for work during the "window" period and the procedure for admitting working (repair) and departmental trains to the crossings. These groups are in charge of track work and analyze the activity of services and subdivisions during the "window" period.

Much "window" preparatory work is also done by the road dispatchers of the traffic service's distribution division, as well as by the division duty officers. All this enables us to ensure the transit of trains at high speed and with minimal intervals, to restore normal train traffic 3-4 hours after the "window." The Krasnoyarsk division of the Eastern Siberia road is an example of the skillful organization of operations on the day a "window" is granted.

In order to ensure steady operations during the winter, much attention is paid to snow control on railroads of Siberia and the Far East. Special technology has been developed for classification and sector yards for clearing the tracks for acceptance and dispatching, for making up and breaking up trains during severe freezing and heavy snowfalls. Alternatives are set up to allow snowplows access to crossings, snow-removal equipment is prepared ahead of time, the procedure for providing snow-removal trains and machinery with locomotives and crews is determined, and the spots for unloading these trains are pinpointed. It is anticipated that various other services and subdivisions will help the classification and other large equipment yards clear the tracks and switches of snow.

Under the conditions in Siberia and the Far East, high operating reliability of the equipment is of definite importance to ensuring uninterrupted shipments. Here, increasing use is being made of the experience of the Sol'vychegodsk locomotive depot collective on the Northern road in improving the quality of locomotive technical service, repair and operation. As is known, this depot's collective has significantly improved the quality and reduced the time of locomotive repair on the basis of improved repair technology, mechanization and automation, and the broad development of socialist competition. In particular, diesel locomotive down time for routine TR-3 maintenance is 2.5 days, given a network average of 5.2 days. The work of the locomotive brigades is organized strictly according to schedule, which has permitted eliminating violations of their working and recreation conditions. The increment in shipment volume is being mastered basically by increasing labor productivity, and the brigades have achieved a considerable savings of diesel fuel and strict observance of traffic safety conditions.

Equalling the Sol'vychegodsk workers, workers at locomotive depots of the roads of Siberia and the Far East are energetically searching out reserves for improving the effectiveness and quality of their own work. The methods of operating and maintaining electric locomotives are constantly being improved at Moskovka locomotive depot of the Western Siberia road, an enterprise of communist labor. A reliability group is working actively here. The locomotive brigades compete for higher traffic speed,

saving electric power and good locomotive routine maintenance. A good impact has been obtained as a result of setting up flow-line locomotive repairs following network schedules. Along with raising the level of work mechanization to 80 percent, this enabled us to double the electric locomotive repair program and to significantly reduce locomotive down time for repairs.

Repair workers and locomotive brigades of Ruzhino depot of the Far Eastern road have also ensured high diesel locomotive repair quality and are maintaining them in good repair. Thanks to this, the technical speed of the trains was increased by 1.5 km per hour here in 1977, average daily diesel locomotive runs exceeded the norm by 5.5 km, and locomotive productivity increased by 1.2 percent. The locomotive brigades saved upwards of 1,100 tons of diesel fuel.

At present, the progressive method of caring for locomotives in operation which was born here back in the 1940's at Novosibirsk depot on the initiative of engineer N. A. Lunin is finding increasing dissemination on the network, including the roads of Siberia and the Far East. Increased locomotive brigade responsibility for the technically competent operation and servicing of locomotives ensures improvement in the condition of the locomotive fleet.

The experience of the Moskovka car depot collective from the Western Siberia road, initiators of the development of mechanized car repair flow lines, is being disseminated everywhere. Restructuring production with the extensive use of comprehensive mechanization has enabled the collective to move to the release of 12,000 tank cars from depot repair each year, given a simultaneous annual plant repair volume of 500 tank cars. The increment in production capacity over the past 10 years has been achieved at the assembly shop, without increasing its size, by expanding the repair-set-procurement shops and by raising the level of overall mechanization and automation of car-repair production.

The Irkutsk-Sortirovochnyy car repair depot of the Eastern Siberia road uses a comprehensively mechanized line to repair trucks, brake beams and journal boxes. With its start-up, the depot's technical-economic work indicators improved significantly. Due to the higher level of mechanization, car down time for depot repairs was reduced by 20 percent from 37-70 percent and labor productivity rose by 28 percent.

The collective of Ussuriysk refrigerator car depot on the Far Eastern road achieved significant results in improving the quality of rolling stock technical servicing and repair. The depot has worked out a well-ordered procedure for planning and management which includes a production management system, a comprehensive repair quality planning and management system, and network planning. Constant attention is paid to improving labor rate-setting and wages.

Technically substantiated norms have been developed for workers on piece-rate and time-rate wages. Time-rate wages are organized as follows. At the start of the month, based on the technical service schedule, the foreman writes out for each worker or brigade a job authorization to make a technical inspection and do planned preventive maintenance on equipment assigned him. The total norm-hours of the job authorization, calculated on the basis of service norms, corresponds to the monthly working hours norm. If maintenance quality does not meet the demands made, the repair is done again by the same person or brigade without recording the time spent as part of meeting the monthly norm. The changeover to technically substantiated

output and service norms is done simultaneously with introduction of a new system for awarding bonuses for meeting quality indicators. The depot provisions on the comprehensive system of refrigerator rolling stock service quality control establish a work results quality coefficient which is worked out for depot subdivisions and engineering-technical workers.

The leading collectives of the track system of roads of the eastern portion of the network are making a large contribution to utilizing the growing shipments. They include the Western Siberia road's Kalachinsk track district collective, which has achieved outstanding routine track maintenance on heavily loaded lines. All track work in the district is done following an annual preventive maintenance plan. Its basis is data from a fall track inspection, used as a base for determining work for the following year, including intermediate and lift track repair, as well as the replacement of ties, switch rods, connectors, signal arms and rails. An approved work plan for each kilometer and information on the materials being allocated are communicated to each worker. In the winter, materials are hauled to the work sectors ahead of time. Progress in carrying out the work is monitored constantly by the district chief and his deputy, and the road foremen submit documents monthly on the work done. Planned preventive routine track maintenance, along with evaluating track quality, are among the basic indicators of track district work.

Repair technology for track on sectors with a difficult shape and plan which is being used on the Eastern Siberia road deserves dissemination. On the Sharbysh-Ingashskaya sector, major repairs were done on 2,400 meters of track in a 4.5-hour "window" (50 percent of the work front was curves, 5-10 percent was grades, and the sector was electrified, two-track and had automatic blocking). It is important to note that all work done in the "window" was done basically following the standard technological routine, with the introduction of operational planning and traffic control. One feature of the operations schedule is limited time per operation to lay the links of the rail-tie grid on curved and straight track sectors.

This same road worked out a system of measures permitting passage of trains with minimum losses of time during track repair on a temporarily one-track sector and effective use of the "window." To this end, alternative train transit schedules for track sectors being repaired on "window" days are drawn up on the basis of an analysis of work the year before.

The leading collectives of communications specialists, power engineers and construction workers have achieved better equipment repair and maintenance quality. On the Western Siberia road, progressive methods of labor organization have been introduced for repairing traction substation equipment using consolidated, specialized brigades. This has permitted a significant improvement in labor productivity among electricians and electrical-equipment machinists and improvement in equipment repair quality.

Particularly interesting is the experience gained in using building materials and means of small-scale mechanization among specialized subdivisions of the road-construction trusts of the Far Eastern and Western Siberia roads. Khabarovsk and Ussuriysk stations on the Far Eastern road have created mechanization administrations and transferred to them all their earth-moving machinery, tower and boom cranes, motor vehicles, portable compressors, and mechanical repair shops. The mechanization administrations of the Dorstroytrest do below-grade (mechanical) work, lay outside utility lines, measure off dirt roadbeds and do other work in the role of

trust construction organization subcontractors. Given the necessary fleet of earthmoving equipment and motor transport, the administrations have ensured comprehensive mechanization of earthmoving work and foundation installation. The Dorstroytrest of the Far Eastern road has developed and approved "Provisions on Interrelationships and Calculations Between Mechanization Administrations and Construction Organizations of the Dorstroytrest."

On the Western Siberia road, the Novosibirsk and Omsk road repair shops have given trust construction organizations vehicles and machinery for construction-installation work and transport shipments, are doing major, intermediate and routine maintenance on machinery and motor transport, and are producing metal and wooden components and articles and nonstandard equipment on order for construction administrations. In accordance with the annual work plans and machinery disposition schedules, the construction administrations and road workshops conclude agreements on giving construction administrations a certain amount of construction machinery and motor transport.

In order to put construction on a flow-line method, improve quality and reduce the time involved in and cost of construction, a specialized work-superintendent center has been created for finishing work in the No 3 construction administration of the Western Siberia road Dorstroytrest. A network schedule has been developed for the entire annual program of construction-installation and repair work, as has a schedule for supplying projects with materials, components and machinery and transporting them. The construction administration is successfully using the brigade contract method, and a large role in improving labor productivity belongs to material incentives for workers.

In the eastern regions of the country, as elsewhere where various types of transport participate in providing transport services to the population and the national economy, further improvement in their interaction on the basis of the experience of Odessa and Leningrad transport workers, approved by the CPSU Central Committee, opens up broad possibilities. Comprehensive socialist competition has been set up following the initiative of Odessa transport workers in practically all the major transport centers; during the course of it, the efforts of workers in various types of transport are united with a view towards accelerating the movement of national economic freight, improving labor productivity and rolling stock use.

Work to introduce the experience of transport workers of the Leningrad center has been expanded on all mainlines of this region, foremost in centers where railroad workers interact with seamen. As is known, on the initiative of the oblast party organization, the interaction of various types of transport at the Leningrad transport center has been set up on the basis of interlinked continuous plan-schedules based on a unified technological process. These plan-schedules are worked out in the computer center. The plan-schedule permits agreement on the amount of means of transport, times for supplying and processing them, and effective organization of their processing. Following the example of the Leningraders, 10- to 15-day plan-schedules are worked out for the Vladivostok, Nakhodka and other centers. Coordination councils comprised of supervisory workers of enterprises of various types of transport and freight shippers and recipients have been organized to supervise the joint operational actions of the related participants.

Experience in creative production cooperation between railroaders and related transport workers has also been accumulated on the Western Siberia road. Particular

attention is paid to improving the unified technological processes of the operation of stations, river ports and the transport shops of industrial enterprises. Implementation of a comprehensive scientific labor organization plan at the Insk center enabled us to improve car use and save car-hours. In support of the initiative of the collective of Bryansk rail center, workers at stations, the locomotive and car depots, track districts, in signaling, interlocking, blocking and communications, and related transport workers have developed socialist competition under the slogan "High Efficiency and Quality for the Center." In 1977, average car idle time at center stations was reduced by 0.5 hours, saving more than 1.1 million car-hours, which permitted an increase in road loading resources.

Enterprises of different types of transport have organized the cooperative use of equipment belonging to different departments at the centers. In particular, such experience is available in the Novosibirsk and Omsk centers. In the period between navigation seasons, river port means of mechanization are used by the railroad for unloading and warehouses are used to store freight. The station, port and motor transport enterprise conclude an agreement regulating procedures for using machinery, reciprocal calculations and terms for shipping freight by motor transport. Such an agreement is advantageous to all transport enterprises. Port worker time use is improved, machinery idle time during the period between navigation seasons is reduced, freight delivery is speeded up, and rail car and motor vehicle idle time is reduced.

Strengthening labor cooperation among interacting enterprises is a pledge of substantial improvement in the use of rolling stock, installations and machinery, of eliminating losses and increasing work efficiency as a whole. On roads of the eastern portion of the network, many station and industrial enterprise siding collectives have organized precise interaction in their work following the example of collectives of the South Urals road and industrial enterprises of Chelyabinskaya Oblast, which was approved by the CPSU Central Committee. Thus, for a number of years now, Khabarovsk Station I of the Far Eastern road and the transport shop of the largest oil refinery in the Far East, the refinery imeni Sergo Ordzhonikidze, have been operating following a unified technological process. All operations involved in supplying, unloading and preparing cars for shipment, loading and cleaning them are done in accordance with procedures and time norms established by a flow chart. The work of unified shifts is planned and carrying out assignments is monitored jointly. The station informs the plant in advance about supplying loaded and empty cars and the plant informs the station about the readiness of full unit trains. Much attention is paid to ensuring work smoothness through the day and through the week.

The experience of collectives of Zima Station on the Eastern Siberia road and "Zimales" association is also widely known. The joint efforts of these collectives are aimed at successfully carrying out timber shipment plans and reducing car idle time.

Acceptance and transfer workers make a significant contribution to improving rolling stock use. They are following the example of workers on the Transbaykal road, who ship out an average of nearly 500 kg more freight in each car. Among the leading acceptance and transfer workers are T. I. Totok from the Kuzbass, who has been shipping out coal for a quarter of a century now, N. N. Yakovleva from Alzamay Station on the Eastern Siberia road, who ensures that timber is loaded compactly, and A. P. Sologub from the Far Eastern road. These people are creative, searching initiators of labor cooperation with workers of industrial enterprises. On the Western Siberia road alone, about 66,000 cars were freed for other use in 1978 through extensive dissemination of leading methods of loading freight compactly and using roller-tampers for loading coal.

Greatest importance in the overall complex of transport problems in the country's east involves ensuring stable ties between Khabarovskiy and Primorskiy krays and Sakhalinskaya Oblast, separated from the mainland by the sea. Let us examine the organization of transport ties in somewhat greater detail. Transport ties between the mainland and Sakhalin and with the island itself are quite complex. Freight is delivered to and from the island by direct, mixed rail shipment.

This labor-intensive, expensive freight transport system is complicated by the necessity of transshipping the freight in ports, which often causes large amounts of car and ship idle time. Organizing an even supply of cars and ships to transshipment ports is especially complicated. During the period of intensive freight shipment to and from the island, returning to ports of the Far Eastern basin, huge amounts of rolling stock accumulate, there is a critical shortage of warehousing premises, and freight movement often slows. Constant growth in shipment volume and the necessity of using rolling stock better have required that steps be taken which will not only accelerate freight delivery, but will also substantially reduce transport outlays which are considerably above normal, foremost in connection with the high cost of loading and unloading work during transshipment. It was initially decided to use more containers to deliver packed and packaged freight. As a result, transport outlays decreased due to the lower cost of reloading work and the demand for closed warehouse facilities decreased.

However, this was only a partial solution to the problem of shipping freight to Sakhalin and back and could not fully meet the shipment demands of even one of these sectors. In view of the importance of ensuring stable transport ties between the island and the mainland and based on prospects for developing the region's economy and the necessity of further reducing national economic expenditures on delivering freight, it was decided in 1971 to build a ferry crossing.

The plan anticipated construction of coastal installations for the ferry in ports. Transport was freed of the task of reloading freight twice (on the mainland and on the island), and it became possible to deliver freight by ferry in wide-gage cars.

The use of seagoing ferries to ship freight substantially altered the technology of transporting freight through the Tatar Straits. At the same time, this planning decision, anticipating reloading freight on the island from wide-gage cars into "Sakhalin"-gage cars, only partly eliminated difficulties in mastering the growing freight flows to and from Sakhalin with minimal expenditures. Only the problem of reducing reloading operations on the mainland was solved, leaving the equally complex problem of loading and unloading work on the island, which is experiencing a manpower shortage. Moreover, the lower load capacity of the "Sakhalin" cars required breaking up the freight artificially as it arrived from the mainland in typical network wide-gage cars. Finally, given the uneven supplying of freight, cars waiting for reloading would unavoidably accumulate in the ports and at the stations. In connection with the fact that shipments had to be made using both systems (by ferry and by the old method, with two transshipments) when the two ferries initially began running, additional difficulties connected with picking out cars for the ferry arose and station switching work increased.

Thus, using ferries without the transit of wide-gage cars through the entire Sakhalin division did not solve the problem of fundamentally improving transport services to Sakhalin and did not ensure the required economic effectiveness of the ferry

crossing. Moreover, the proposed plan for transporting freight by ferry, with the cars to be reloaded in Kholmsk, limited further increase in the carrying capacity of the entire transport system, due to the exceptional complexity of developing the reloading area of Kholmsk Station.

All the indicated circumstances were carefully analyzed by a group of specialists from the Sakhalin division. Jointly with the Sakhalinskaya obkom, it adopted a fundamentally new resolution based on deliveries to and from Sakhalin without reloading by transposing wide-gage cars to "Sakhalin"-gage trucks. In connection with the fact that there was no experience in transposing 1,520-mm gage cars to 1,067-mm gage cars, this plan was introduced experimentally. Then the technology was developed for transposing cars in temporarily equipped positions and construction of the transposing center was completed. This coincided with the start-up of the Vanino-Kholmsk ferry crossing.

The car transposing center was built at joint wide- and narrow-gage centers and was equipped with the necessary number of electric 30-ton-force winches and four 10-ton gantry cranes. Platforms were also built here for distributing wide- and narrow-gage trucks, as were a routine and depot maintenance shop for the trucks and a department to cast slip bearings.

Initially, when one ferry was being operated, the reinforced car trucks modernized at the South Sakhalin Diesel Locomotive and Car Repair Plant ensured normal operation of the crossing, but then new trucks were required. In this connection, documentation was worked out for reworking the usual network 1,520-mm trucks, withdrawn from operation, to 1,067-mm gage. Calculations and design work demonstrated the possibility of operating the modernized trucks normally. In 1974, they began arriving at Sakhalin. However, the height of the truck [pyatnik] above the rail cap in the modernized truck turned out to be higher than in the reinforced 1,067-mm trucks. Therefore, only flatcars and gondola cars could pass through tunnels in terms of structure clearance, but closed cars with body volumes of 120 cubic meters could not pass through the tunnels.

Transposing the cars enabled us to significantly reduce freight delivery time, ensure that freight could be shipped unpackaged and securely, eliminate expensive stevedore manual labor, and gain an annual economic impact of more than five million rubles.

Our time is a time of ever more remarkable initiative by Soviet people. Under these conditions, it is important to develop socialist competition more widely, to disseminate everywhere the creative initiative of the workers. The efforts of economic leaders and the party, trade-union and Komsomol organizations of enterprises, divisions and railroads must be oriented towards this. The scientific-technical information and propaganda agencies and the scientific-technical libraries are faced with doing much to introduce leading experience.

"Guiding the competition," said Comrade L. I. Brezhnev at the November (1978) CPSU Central Committee Plenum, "and introducing what is new and progressive is a vital matter which will brook no stagnation or conservatism. The experience of the leading collectives and individual innovators are in fact a revolution in the forms and methods of work, in technology, in management organization. Here, we need persistence, selflessness and, if you will, courage."[1]

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1. KOMMUNIST, No 17, 1978, p 15.

Quite a few highly skilled, creative workers and specialistswho approach the work entrusted to them with initiative work on the roads of Siberia and the Far East. More than 130,000 production innovators and leading workers have been awarded the high title of shock worker of communist labor. Twenty-one Heros of Socialist Labor work on these roads and thousands have been awarded orders and medals of the Soviet Union. Railroad workers of the eastern regions have something for others to equal, to take as an example.

Prospects for Rail Development

Problems of Strengthening the Network

The outstripping rates of development of productive forces in Siberia and the Far East and expansion of the country's foreign-trade ties through the ports of the Far East have resulted in significant growth in the shipment volumes in these regions. This necessitates, along with improving use of the throughput and carrying capacity, continued improvement in the technology of the shipping process of the far-flung new railroad construction in Siberia and the Far East and accelerated technical progress on the railroads.

It is necessary to substantially ease the load on the primary Siberian mainline. The increment in the throughput capacity of roads of the eastern range must be ensured through construction of new primary tracks, electrifying a number of lines, equipping them with automatic blocking and centralized traffic control, developing junctions and stations, strengthening the locomotive, car, track and other systems, comprehensive mechanization and automation of the main production processes, and reducing the labor intensiveness of equipment repair.

In the very near future, we will need to build additional primary tracks and new inserts on a number of sectors of the primary Siberian mainline and significantly develop individual transport centers. We must finish electrifying the primary Siberian mainline.

Implementation of a complex of measures to strengthen the technical base of certain sectors will also facilitate increasing the throughput capacity of the mainline.

The most important new construction projects in the near future will be the line from Anzherskaya to Barzas and the exit from the Achinsk area through Kemerovo to the Central Siberian mainline. Installation of these lines will ensure some easing of the load on the primary Siberian mainline and the Kropachevsko-Kuybyshev railroad line, as well as considerable improvement in transport services to the Kuzbass and the Kansko-Achinskiy coal basin.

Installation of the Baykal-Amur Mainline, which will provide a second outlet to the Pacific Ocean, will be accelerated. The BAM will assume a portion of the transit freight flows intended for the Far East, and in this regard, the freight runs on the Tayshet - Skovorodino and Tayshet - Komsomol'sk routes will be reduced by 235 and 485 km, respectively.

In addition to the above lines which, together with existing lines, comprise the rail support network in the country's east, we will need to build a number of dead-end lines to utilize new mineral deposits and timber tracts.

In the foreseeable future, more than half of all new railroad construction will be done in Siberia and the Far East. Therefore, the most important task is to promptly carry out a large complex of planning-surveying and scientific research work, to prepare in advance to utilize the considerable amounts of capital investment associated with developing rail transport in Siberia and the Far East. The harsh natural conditions of Siberia and the Far East, especially in the northern portion, demand careful study of the features of railroad operation at low temperatures and the development of appropriate requirements for structural and other materials used in building and operating the roads. Special rolling stock components, track installations, signaling and communications, and other items must be created.

In connection with utilizing the natural resources on the Arctic coast, the role of the Northern Sea Route will grow. The shipment volume here could be significantly increased.

In the future, the importance of river transport in the shipping process will grow, providing freight delivery to deep interior regions. The task is to extend the navigation period on the trunk rivers of the north.

Long oil and gas pipelines will be built.

Motor transport in these regions will be further developed.

In the future, air transport will play an ever-increasing role, not only in carrying passengers, but also in delivering valuable freight.

Baykal-Amur Mainline

Given a developed socialist society when enormous technical and economic potential has been created in our country, the possibility has appeared of solving epochal tasks such as construction of the 3,200-km Baykal-Amur Mainline. Speaking before BAM construction workers during his trip to Siberia and the Far East, Comrade L. I. Brezhnev, CPSU Central Committee General Secretary and USSR Supreme Soviet Presidium Chairman, said, "In a short while, new industrial complexes will have been created by human labor in these regions as well. The BAM will help use more fully the very rich mineral wealth of this region and solve in a new way the problem of developing productive forces. This is a program of great state importance."[1]

Under present conditions, when the economic potential of the regions adjacent to the road has not yet been adequately studied, it is not possible to give a final appraisal of the long-term role of this mainline now being built. Only one thing is certain, that it is very great and will grow as these regions are utilized. On the other hand, it is precisely construction of the BAM which will be the direct cause of the development here of industry and agriculture, of the development and use of natural resources. The mainline is therefore one of the foremost new construction projects of Siberia and the Far East and it will help solve the problem of transport in the eastern regions of the country and ensure their accelerated development.

In opening up a second outlet to Pacific Ocean seaports, the BAM will be very important as a transit mainline as well. Freight will move on it to Khabarovskiy and Primorskiy krays, Kamchatka and Sakhalin, certain countries abroad, and back.

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1. KOMMUNIST, No 6, 1978, p 20.

The BAM is the largest national economic construction project in the country, exceptional in terms of work volumes and socioeconomic importance. The problem of building the Baykal-Amur Mainline has been solved in a complex manner. It arose long ago and was re-evaluated in accordance with the concrete economic tasks of socialist society, as well as with consideration of the knowledge accumulated about natural-climatic conditions and the raw material potential of the adjacent regions.

The idea of building a railroad mainline through the sparsely settled, nearly unstudied region that Eastern Siberia was goes back to the late 19th century. When the route of the eastern portion of the Transsib through Irkutsk was examined, they also discussed the alternative of building a railroad going north from Lake Baykal. The question of the direction of the Transsiberian Railroad, whose construction was finally completed in 1916, was resolved in favor of the southern variant. At the same time, the problem of building a northern railroad arose again during the first years of Soviet power.

The GOELRO [State Commission for the Electrification of Russia] plan outlined construction of a mainline deep into Siberia. It was noted that a mainline intersecting regions extraordinarily rich in natural resources would permit creating completely new conditions for the future structure of the economy, not just in Russia, but also in world commodity exchange.

Fulfillment of the First Five-Year Plan ahead of schedule enabled us to solve the problem of building a new mainline on a practical level. A decree was adopted on creating a mainline parallel to the primary Siberian route. In 1934, final planning-surveying work began on a 4,500-km stretch of the future route from Tayshet Station to Sovetskaya Gavan'. At that same time, construction work had already begun on a number of sectors of the mainline and connecting lines to the existing Transsiberian Railroad. As a result, the Tayshet - Lena line (720 km), the line from Pivan' (near Komsomol'sk-on-Amur) to Sovetskaya Gavan' (468 km) and the connecting lines from Bam to Tynda (180 km) and Urgal to Izvestkovaya (339 km) were built. However, during World War II, track on the Bam - Tynda and Izvestkovaya - Urgal lines was torn up in connection with the construction needs of the Saratov - Stalingrad Volga belt road. After the war ended, the Izvestkovaya - Urgal, Komsomol'sk-on-Amur - Sovetskaya Gavan' lines were built again and track was laid from Komsomol'sk-on-Amur 300 km west to the settlement of Berezovyy. Since 1967 we have been surveying and planning development of the route again, but now on a qualitatively new basis.

Successful resolution of the Angara-Yenisey problem and creation of a complex of energy- and heat-intensive production in Siberia and the Far East will become the basis for organizing new regions of economic development. In the mid-1950's, the country had already begun economic utilization of a number of new regions, and in particular, those of the near Siberian north (Bratsk-Ilimsk territorial production complex). As a consequence, utilization of the central Ob' area also became part of this region. This was actually the start of formation of a new industrial region. All this put the question of resuming construction of the BAM on the agenda.

The primary route of the Baykal Amur Mainline is 4,333 km long, of which existing lines comprised 1,188 km, and we had to build the central portion of the road from Lena to Komsomol'sk-on-Amur (3,145 km) and the Bam - Tynda - Berkakit sector. Almost the entire BAM route passes through very complex terrain, topographically and in terms of engineering and geological conditions. The route intersects dozens of watersheds and seven mountain ridges. Some 3,200 engineering structures will be

built on it, an average of one per kilometer. Among them are 20 large bridges, with an overall length of 10 km, across the Lena, Upper Angara, Vitim, Selenga, Zeya and Amur. Many BAM structures are unique. A 15-km tunnel will be cut through the Severo-Muyskiy range and a 7.5-km tunnel -- through the Baykal'skiy.

A long stretch of the route is laid out in a permafrost zone with seismicity of nine points or more. In a number of places, we encounter steep slopes (so-called "clamps"), eroded shores, talus, rock slides, ice crusts and mari. On individual sectors of the BAM, it gets to -60° in the winter.

The considerable amounts of shipment and complex operating conditions have determined the strong technical base of the mainline.

The mainline receives the latest designs of rolling stock intended for operation in a harsh climate. Mainline locomotives will be equipped with automatic signaling. Electric locomotives equipped with a system of continuous contactless speed control recovery braking using thyristor transformers will operate on the Ust'-Kut - Nizhneangarsk - Uoyan electrified sector.

The most progressive means of traffic control will be used on the new mainline. We plan to control signals and switches at all stations within a certain sector from a single point. Remote control devices will be used to help the dispatcher. Builders are laying high-frequency trunk cables along the BAM. Telephone and telegraph communications will be fully automated. The Baykal-Amur Mainline will have about 200 stations and sidings, the largest of which will be the Ust'-Kut, Nizhneangarsk, Chara, Tynda and Urgal. Sector and classification yards will be equipped with the latest devices for making up and breaking up trains.

Construction of the so-called little BAM, from Bam to Tynda to Berkakit, is proceeding apace. The line totals about 400 km in length and provides the Southern Yakutsk industrial region, and foremost the largest coal basin in the country's east, with reliable transport services. In 1978, the first train with Yakutsk coal ran on the Berkakit - Tynda line on the first anniversary of the adoption of the new USSR Constitution. As a result, the foundation was laid for regular shipments of Southern Yakutsk basin coals. These coals have been mined to meet local needs for more than 10 years. However, the lack of reliable railways delayed their development on a large scale. In the years ahead, coal mining at the Neryungrinskiy Open-Pit Coal Mine will be increased to 13 million tons per year, and it might reach 40 million tons in the future.

Thus, the Baykal-Amur Mainline has already begun serving the peaceful labor and noble aims of the Soviet people. About 1,500 km of rails has been installed, upwards of 3,000 km of motor vehicle road has been built adjacent to the route, new timber management and construction industry enterprises have been put into operation, and about 50 mainline construction worker settlements have appeared. Well-equipped housing, schools, children's preschool institutions, commercial centers, polyclinics and paramedic centers have been built.

The mainline is creating entirely new resolutions in minerals mining, in developing large territorial production complexes, in settling new regions, and in shipping through freight. The state is concentrating large amounts of materials and manpower here.

As was noted, the BAM not only accelerates the delivery of freight from Tayshet to Komsomol'sk-on-Amur, but will also do much to ease the load on the Transsiberian mainline and increase the maneuverability of the railroads of Siberia and the Far East. Strengthening the interregional ties of Siberia and the Far East will in turn facilitate increasing their role in the interregional division of labor. The mainline will be of important significance in making through shipments and expanding USSR foreign-trade ties, in creating a large export base in the country's east. But its special importance lies in involving the mineral and raw material resources of the new regions in national economic circulation.

According to geological science data, the BAM zone is one of the most promosing regions. In light of the instructions and recommendations expressed by Comrade L. I. Brezhnev during his trip to Siberia and the Far East, large and important tasks must be resolved by geological services working in the mainline area.

In addition to the coal deposits already being utilized, the iron ore resources of Southern Yakutia are very important. The iron ore deposits of the Aldansk basin are situated comparatively near the Yakutsk coals. The combination of coking coals and iron ores in one region makes creating a metallurgical base here promising. In a taiga deposit, it is possible to mine iron ores by the open-pit method, and the ores themselves have high iron contents. The amounts of ore to be mined in the Tayezhnyy deposit must be determined on the basis of the region's long-range ferrous metals and rolled metal products requirements, with consideration of possible exports.

In recent years, we have worked out several alternative sites for a metallurgical combine. In particular, ones have been proposed for Chul'man in Southern Yakutia, Svobodnyy in Amurskaya Oblast, Komsomol'sk-on-Amur in Khabarovskiy Kray, and Tayshet in Irkutskaya Oblast. Resolution of this question must take into account the transport factor on the basis of the principle of optimum aggregate expenditures on producing output and delivering it to points of consumption.

The Baykal-Amur Mainline also helps put large amounts of nonferrous and rare metals at the service of the country's economy. A number of deposits of zinc-lead ores, molybdenum and nickel have been discovered north of Lake Baykal whose mining can be begun when the mainline begins operating. The Udokan copper deposit is located in Kalarskiy Rayon in northern Chitinskaya Oblast, in the immediate vicinity of the future railroad. In terms of ore copper content and reserves, it stands out sharply from other known deposits. We propose working it by the open-pit method. In the nature of its raw material, the Udokan deposit is similar to the Dzhezkazgan, although the ore copper content here is somewhat lower. We plan to build an ore enrichment combine here to mine the ore and prepare the concentrate. The transport factor must also be carefully researched and considered when determining the site of the copper-smelting plant.

Timber tracts are an invaluable asset of the regions through which the BAM passes, covering upwards of 20 million hectares. Mature wood reserves are estimated to be more than 1.5 billion cubic meters here. Timber industry will in the future be one of the main directions of production specialization of the national economy in these regions. Wood-chemical and pulp-paper production will appear here. We plan to develop large new timber industry along the route. In the first years of operation of the mainline, we can procure more than six million cubic meters of wood annually in the regions adjacent to it. At present, the annual volume of timber procurement is 2.5 million cubic meters.

The enumerated deposits alone provide grounds for expecting the development of important branches of industry in the BAM zone in the immediate future. The diverse raw material resources enable us to create territorial production complexes, each of which will have its own production structure. Both multiple-branch and specialized territorial production complexes will enter increasingly widely into planning practice and territorial organization of the economy.

As applicable to the BAM zone, we can cite the following territorial production complexes and industrial centers:

Verkhnye-Lenskiy -- timber, timber processing and cellulose industry;

Severo-Baykal'skiy -- mining industry, nonferrous metallurgy;

Udokanskiy industrial center -- nonferrous metals mining;

Yuzhno-Yakutskiy -- coal and iron ore mining, mica mining industry, and possibly the development of ferrous metallurgy;

Zapadno-Amurskiy -- nonferrous metals mining, timber and timber processing industry;

Zeysko-Svobodnenskiy -- timber, timber processing and cellulose industry, machine building, and possibly the development of ferrous metallurgy;

Urgal'skiy industrial center -- coal, timber and timber processing industry;

Komsomol'skiy -- ferrous and nonferrous metallurgy, timber, timber processing, pulp and paper industry, petrochemical industry and machine building.

The involvement of the large resources of the complexes in economic circulation demands the coordinated efforts of a number of ministries and carrying out interbranch target programs, and the outstripping development of a unified infrastructure, a most important part of which will be transport.

The economic development of this new zone and creation of a powerful new industrial complex along the BAM route must be done on the basis of a systematic target-program approach. The program for economic utilization of the BAM zone is an interlinked interbranch system of tasks, among which the primary is construction of the mainline itself, shaping the complex of branches of material production, ensuring normal living conditions for the population, and preparing the scientific and planning development which must precede this. Long-range development of the zone adjacent to the BAM anticipates high rates of growth in industrial production and development of the social infrastructure, efficient distribution of productive forces, and increased capital investment effectiveness.

In order to increase the effectiveness of BAM zone utilization, resolving the program in stages is of important significance. We propose to put individual BAM sectors, industrial projects and complexes into operation in stages. This will enable us to involve new resources in economic circulation without waiting for completion of construction of the entire mainline, to produce the output needed by the national economy, to recover stage by stage the funds being invested and, in so doing, to increase the overall return on capital investment as a whole.

Calculations made for the region adjacent to the Tayshet - Lena line, which is the lead sector of the Baykal-Amur Mainline, have shown capital investments in construction of this line and in creating the industrial complex to be highly effective. The Bratskaya GES, Korshunovskiy iron ore deposit, Bratsk Aluminum Plant, Bratsk timber industry complex, timber combines uniting more than 30 timber management enterprises engaged in procuring commercial wood and producing lumber will be located in the

adjacent region. In the 10th year of operation of the Tayshet - Lena line, the profitability of capital investemtns in the production-transport complex has reached 16 percent. The profit obtained has exceeded overall capital investments in creating corresponding production and transport assets in the 13th year of operation of the line.

In order to increase the return on funds invested in the BAM zone, we need to precisely coordinate the schedules for starting up individual railroad sectors of the mainline with the start-up of industrial facilities they must serve. The sequence in which enterprises and projects are to be put into operation gives the entire process of utilizing the region a complex, dynamic character. Therefore, the BAM utilization program must encompass a number of problems associated with the sequence and synchronization of the planning, construction and start-up of individual elements of the complex. Within the framework of the overall mainline construction schedules, we establish the most appropriate sequence for building the sectors with a view towards accelerating the involvement of natural resources in economic circulation.

This strategic line is reflected in the long-range program for developing these regions, which takes into account a certain delay in obtaining an economic impact from capital investments in the country's east, with subsequent rapid growth in that impact as the regions are utilized and the production infrastructure is developed, with a large total (integral) impact for the zone as a whole over the entire calculation period. This strategy is also expressed in a special technical policy which anticipates maximum economy of the labor resources in very short supply here and the creation of a normative base which takes into account the specific features of the BAM zone (accelerated equipment wear, higher expenditures of fuel, electric power and materials, high level of transport outlays, and so on).

A great deal of powerful, modern equipment is being used in construction of the Baykal-Amur Mainline. Such equipment has never been used before in transport construction in our country. This has enabled us to achieve high labor productivity, which is especially important given the deficit in labor resources. Given the high cost of housing and the services sphere and the high wages, the policy of using labor resources thriftily should be considered one of the primary ways of increasing the effectiveness of the economic utilization of the BAM zone. Use of highly efficient modern equipment in these regions will continue to be a most important condition for successful administration. We must soon solve a number of socioeconomic problems with a view towards securing personnel in the BAM zone.

Speaking before members of the Irkutskaya obkom bureau on 2 April 1978, Comrade L. I. Brezhnev noted that "the Baykal-Amur Mainline is the construction project of the era of developed socialism, and it is important to do it so that the people creating this mainline have from the start opportunities to study, master occupations needed both for the construction project and for the future large enterprises of this area. We must also prepare ourselves to begin using the unique natural riches available along the mainline being built here."[1]

Eastern Siberia and the Far East are situated very favorably in terms of transport and geographically relative to many countries, and foremost to those of the Pacific

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1. KOMMUNIST, No 6, 1978, p 19.

Basin. Reliable sea routes objectively facilitate development of economic ties between the Soviet Union and states of the Pacific Basin. And with construction of the Baykal-Amur Mainline, the number of transport approaches to the country's far-eastern ports will increase and it will become possible to improve their development. The seaports of Vladivostok and Nakhodka have in recent years already been developed correspondingly and are able to considerably increase freight transshipment. Vostochnyy port is being built with a timber wharf, a complex to reload wood chips, a terminal to process several tens of thousands of international-standard containers per year, and a large coal reloading complex. In the future, the transport and loading and unloading systems of a number of other ports can also be strengthened.

The Baykal-Amur Mainline's role in shipping transit freight across the USSR is also important and promising. The reference is foremost to shipments of large containers from Europe to the Far East. During 1971-1977, the volume of such shipments was increased 45-fold, and in the near future, Soviet railroads will be delivering up to several hundred thousand containers per year on a transit basis. In connection with the growth in the freight flow on the primary Siberian mainline, we have organized special container trains whose unit-train speed is 900 to 1,000 km per day. With the start-up of the BAM, the effectiveness of delivering containers from Europe to countries of the Pacific Basic and back will increase even more and new opportunities will be opened up for accelerating the development of this type of traffic. In this regard, it must be noted that extension to the BAM zone of small-scale trade which has been developed in the coastal and border regions of the Far East, has also caused a certain increase in the activeness of foreign trade ties. It involves additional resources in export, in particular, the gifts of nature--berries, tree seed and medicinal herbs.

Thus, the potential of the Baykal-Amur Mainline for shipping foreign-trade freight is very considerable and will grow even more in the course of utilizing the adjacent zone and in the course of operating the mainline. The BAM will be able to resolve quite a few complex tasks connected with transporting foreign-trade freight.

Long-Range Transport Equipment Requirements

As was already noted, the natural conditions of Siberia and the Far East make special demands on the structures and equipment of railroads, as well as on their operating conditions. Consideration of these demands is necessary in determining the directions in which branches of the national economy supplying rail transport with new equipment are to be developed. This enables us to avoid considerable material and monetary losses, both in the process of construction and in subsequent operation of the new lines. In this regard, it should be noted that calculations must use, for example, not the average temperature in the regions being examined, but the upper and lower limits. As is known, in Siberia the temperature and other climatic factors (precipitation, wind and others) fluctuate widely. The climate in a large portion of Siberia is harsh and sharply continental. The temperature in the warmest (July) and coldest (January) months ranges from +35 to -60°C. The average yearly air temperature is below 0°C nearly everywhere. Winter is long and cold, and in the West Siberian lowlands the average January temperature is -40 to -48°C, while in Yakutskaya ASSR the temperature reaches -70°C. Summer is relatively warm in Siberia. The average July temperature varies from 5°C (on the northern coast) to 23°C (in the steppes of Western Siberia. The bulk of the precipitation (up to 75-80 percent of the yearly norm) is accounted for by the warm season, so the winter snow cover is ordinarily

slight (averaging 30-40 cm). The harsh climate of Siberia facilitates deep frost penetration into the ground and the formation of perennial permafrost.

As research and practical operations have shown, metal tends to become brittle under the harsh climatic conditions of Siberia and the Far East. This leads to increased danger of fracturing in rails, in the main elements of car and locomotive components and in the elements of other railroad installations. Considerable difficulties also arise in repairing and inspecting railroad equipment.

Thus, the metal used in manufacturing important load-bearing elements of railroad technology and equipment must possess above-average strength and resistance to cold. This applies equally to rails, wheels, axles, automatic coupling devices, truck elements, car column beams and other equipment. Raising the cold-resistance limit while simultaneously increasing strength is attainable both by alloying steels appropriately and by heat-treating metal. It is appropriate to take both these steps in parallel.

Scientific research and planning organizations of the Ministry of Railways, Ministry of Transport Construction and a number of other departments are working hard in connection with construction of the Baykal-Amur Mainline on studying the features of railroad operation at low temperatures, on developing specifications for structural and other materials used in building and operating the lines, on creating special rolling stock components, and on working out new shipping technology. This research and the operating experience already accumulated in operating railroads in Siberia and the East have enabled us to formulate the basic specifications for line equipment, rolling stock and operating conditions.

Locomotives. Locomotives for railroads of Siberia and the Far East must be designed and built in a northern variant of the highest reliability.

The basic demand of such locomotives is that they ensure dependable operation of all units at outside air temperatures of +40 to -60°C. Units operating in the open air must correspond to GOST [All-Union State Standard] modification KhL. The KhL specifications take into account the features of the BAM route and other railroads which will be built in similar conditions: complex track plan and profile, steep slopes, large number of curves, tunnels and track sections on permafrost, and heavy trains.

Load-bearing rolling stock components must be manufactured using cold-resistant low-alloy steel with higher specifications than is being used presently. In particular, cast automatic coupling components must be made of such steel. Rubber items used in the crew portion of the locomotives, in brake equipment and to insulate electrical conductors must be manufactured using freeze-resistant types of rubber which ensure dependable operation at temperatures to -60°C.

As is known, given low temperatures and complex meteorological conditions (snowstorms and blizzards), the coefficient of cohesion of locomotive wheels to the rails drops sharply. In view of this and in order to reduce slipping, the contactless power circuit of electric locomotives must permit planned traction force and electric braking control. Moreover, electric locomotives should be equipped with electric cohesion boosters, which demand a certain power reserve in equipment elements in terms of heating and other loads.

The number of traction engine failures in electric locomotives increases during operation in the winter. In order to increase their reliability of operation, it is

necessary to reduce the dynamic action on traction engines, so the suspension must be of the frame-support type. With a view towards preventing traction engine overheating, such engines must be equipped with heating level monitoring sensors.

Experience shows that VL60^{k}, VL10 and other series of electric locomotives often malfunction in the harsh climatic conditions of Siberia and the Far East due to the susceptibility of electric-traction equipment unsatisfactorily protected against moisture, dust and snow to damage. The contact filters used for such protection are ineffective, require frequent cleaning and, when extremely dirty, sharply reduce air intake, causing the electric traction equipment to overheat and malfunction. Therefore, the cooling systems being developed for future electric locomotives must be equipped with highly effective, multiple-stage self-cleaning devices.

The most important overall requirement of future electric freight locomotives, both a.c. and d.c., is the change-over from obsolete axle-suspension traction engine support to frame-support suspension. We need to speed up our testing of prototype electric locomotives with individual and group drive and frame-support traction engine suspension, as well as the selection and development of components and their introduction into production. For d.c. electric locomotives, changing over to the promising traction drive system is the basic direction in which they will be improved technically.

The most immediate task in technical development of the electric locomotive fleet for the railroads of Siberia and the Far East is to finish improving the reliability of the VL80^{r} a.c. electric freight locomotive and organize their series production. The VL80^{r} electric locomotives are the first domestically-produced locomotive with a promising system of thyristor transformers, floating contactless control and recovery braking, with a modern electronic control system. Unfortunately, it has not yet realized those advantages which might be obtained from modern power electronics -- thyristor transformers and electronic control systems.

Based on this technology, in order to further improve the VL80^{r} electric locomotive, it is appropriate that electrical engineering industry first of all introduce a system of independent engine excitation in the traction mode with an automated electronic load equalization system, which is the most effective means of protecting against wheel slipping, reducing rim wear and sand expenditure, as well as wear on the rails. This system will simultaneously permit considerable simplification of recovery equipment and will increase energy return by 15-20 percent. For the conditions under which railroads of Siberia and the Far East are operated, it is important to expand automation of control processes, and first of all the introduction of automatic traction force (braking) control and speed control in response to wheel slippage, so-called dynamic control.

The electrical equipment of the VL80^{r} electric locomotive must be the basis of the special modification of the electric locomotive for the Baykal-Amur Mainline on which recovery braking will be used to meet its special needs. On BAM electric locomotives, promising electrical equipment must be combined with traction engine frame-support suspension. It is important that the electric locomotives correspond to the climatic conditions of the BAM.

The complex climatic conditions on the roads of Siberia and the Far East, as well as the projected continued growth in the load on them and the necessity of increasing

train weight, makes it urgent that we develop electric locomotives with higher axle loads and power. In terms of ensuring good reliability and economy of operation on such electric locomotives (reducing technical maintenance and repair expenditures), it is appropriate to use commutatorless traction engines, which problem this country is currently solving.

The climatic conditions of Siberia and the Far East place high demands on operating parameters, technical maintenance and repair of electric rolling stock. Increasing track rigidity in the winter also increases the vulnerability of equipment not on springs to damage, foremost traction engines. Locomotives must be heated up (by heat-drying traction engines) before cold rolling stock is brought into depots. The flow-line method of repairing electric rolling stock is the most progressive, as it facilitates considerable labor productivity growth in the depots (approximately two-fold).

The specifications for diesel locomotives intended for operation on roads of Siberia and the Far East are aimed at ensuring reliability of operation, safe movement, improved traction properties, as well as at retaining heat and creating normal working conditions for locomotive brigades. An improved system of air drying and electrodynamic braking, as well as improved freeze-resistant rubber items, will be used to improve the reliability of automation of automatic brakes. Diesel locomotives must have remote control when operated as part of a system of many units (four sections with one control board). A much improved system of revealing and stopping slippage will be used.

Several sectors of the BAM and other northern lines are far above sea level. At such elevations, the power of a diesel engine is reduced by 18-20 percent due to the lower barometric pressure. In this connection, we plan to install on diesel locomotives for the Baykal-Amur Mainline special diesel engines which must develop the necessary power at those elevations and with sharp fluctuations in outside air temperatures.

Automatic diesel engine oil and water system heaters supplied with electric power from one of the working sections while traveling and from an outside source when standing must be installed on diesel locomotives built to operate in Siberia. Batteries must be located in compartments with heaters. We need to anticipate forced lubrication of motor-axle bearings, a reliable axle reducing gear housing design and special steps to prevent snow from getting into electric traction engines when diesel engines are not being operated.

Special steps must be anticipated for retaining heat in diesel locomotives and keeping various systems from freezing when locomotives are stopped. In particular, we must ensure a regular supply of heated air from the heating chamber of the ventilator to the diesel area and of cooling air for the electrical equipment.

Additional demands are also made on electrical equipment, the automatic locomotive signaling system, and other equipment. For example, better insulation and engineer's cab heating, as well as insulation of all water, oil, fuel and air system elements which tend to freeze must be anticipated for the diesel locomotives.

The problem of using gas turbine traction on roads of Siberia and the Far East is of interest. Self-contained locomotives intended for operation on the Baykal-Amur Mainline and other northern routes must have considerable section power, good economy and

reliability of operation, and the least possible labor intensiveness of preventive maintenance and repair. These conditions are met by gas turbine locomotives, with section power reaching 12,000 hp. Many problems still need special study, but it will be possible in the next few five-year plans to solve the problem of using gas turbine traction in Siberia and the Far East.

Cars and the Car System. Given the operating conditions which have evolved on USSR railroads, freight cars are used network-wide, with very few exceptions, and this system of car fleet operation will be retained.

Operation of the northern sectors of the railroads has shown that the present freight car fleet can be used under Siberian and Far Eastern conditions. At the same time, load-bearing welded freight car components (column and pivot beams, body carrier elements, welded truck frames and others) and stressed cast parts (spring support beams, automatic coupling parts and mechanisms, shock absorber housings) are 2-3 times as susceptible to damage during the cold part of the year. In a number of instances, this leads to serious complications in railroad operation and requires considerable additional expenditures on car repairs.

In connection with the fact that even now a considerable portion of the freight shipments are made in regions where the winter air temperature drops to -40 to -60°C or lower and with the fact that shipments under such conditions will increase in the future, it has been decided to use low-alloy steels cold resistant to -60°C when building new cars (all multipurpose cars and the bulk of the specialized cars) and also when producing replacement subassemblies and spare parts for all domestically-produced car subassemblies and structural elements.

As research has shown, the increase in the cost of producing cars due to this change-over to low-temperature body load-bearing subassemblies, frames and brake parts and to higher welding technology demands (in the KhL modification) average 105-110 rubles per car, or 1.5 percent of the cost. However, these additional expenditures are recompensed within 3-4 years. The change-over to building freight cars in a KhL modification will improve their reliability and railroad operating conditions, will facilitate improving traffic safety, and will increase time between car repairs and car service life. It is assumed that car-building industry will begin series production of freight cars in the KhL modification early in the 11th Five-Year Plan and that the car fleet will have more and more such cars in it.

On railroads of Siberia which are very heavily traveled, increasing the carrying capacity of the lines is of very important significance. This can be achieved by increasing train weight by making up trains with large eight-axle cars. Based on research done at the All-Union Scientific Research Institute of Rail Transport and the Moscow Institute of Rail Transport Engineers, we are recommending the use of a larger Tpr for new gondola cars, which will not require expensive, complicated work on widening track spacing. The basic specifications and operating parameters have been worked out for eight-axle multipurpose Tpr-size gondolas with 22-ton axle loads.

As is known, one of the most important problems in transport machine building is to master the release of eight-axle gondola and tank cars with load capacities of up to 125 tons. Their series production must begin early in the 11th Five-Year Plan. It is first of all appropriate to introduce eight-axle gondola cars on closed ranges to ship coal in peripheral unit trains. The railroads of Western and Eastern Siberia

are in these ranges. Introducing the eight-axle Tpr-size gondola cars increases the weight of coal unit trains by 40 percent or more, reduces the amount of traffic required and facilitates increasing freight train sector speed and labor productivity growth.

We will evidently have to create special refrigerator cars for the Baykal-Amur Mainline, inasmuch as existing refrigerator cars are only minimally suitable for use under harsh climatic conditions. In this regard, all units, subassemblies, systems, devices, assembly components and materials must correspond to section operating conditions with sharp temperature fluctuations.

We are also faced with developing the design of and producing the necessary number of passenger cars in a KhL modification.

Additional steps are being taken on the roads of Siberia and the Far East to improve the quality of car preparation at technical service centers and car shipment preparation centers, and the car system is being strengthened. It should be borne in mind that car disrepair increases sharply on these roads in the wintertime. In this connection, routine uncoupled car repair must be organized in closed shops (hangers) in a number of instances. At present, there are still no such hangers, and they must be created.

Mechanized car preparation centers must be situated with consideration of prospective car flows and centers for transferring cars from one road to another. They should be equipped with more "Donbass"-type car repair facilities and type RU4 mobile installations. The roads of Siberia and the Far East currently have too few "Donbass"-type vehicles.

In order to ensure uninterrupted mainline operation, the car depot repair technical base capacities on railroads of the Far East and Siberia must correspond fully to the amounts of shipping and to the operating fleet of cars. At present, these roads do approximately 20 percent of all shipping and have only 15 percent of the network total number of car depots and repair bays. In view of the growth in shipments, the car repair base will obviously have to be developed at accelerated rates in the future. Technical renovation and use of the production premises in car depots of the roads of Siberia and the Far East must also be higher than on average for the network.

In view of the ever-increasing freight shipment volume and the forthcoming operation of the BAM in the eastern range, it is necessary to build a new car repair plant and to strengthen and renovate existing plants. The technical base for repairing passenger cars is somewhat better developed here, although the average production capacity of passenger car depots and car removal per repair position are lower than on average for the network. It is therefore necessary to develop and strengthen the passenger car depots of these roads and to develop the passenger car factory repair base.

The rolling stock automatic braking equipment currently in use basically ensures reliable locomotive and car operation under all climatic conditions, including those on the railroads of Siberia and the Far East.

At the same time, experience shows that there are cases of the condition of braking equipment deteriorating while trains are being run in the harsh climatic conditions

of these regions. Braking efficiency decreases at low temperatures and in blizzards. This occurs as a result of the icing of composition brake shoes and snow being pressed into the gaps between the shoes and the wheels, of increased losses of compressed air from the main brake line. The increased loss of compressed air from the car brake system in turn increases the load on the locomotive compressors, which reduces the operating reliability of the compressor installations, leads to higher humidity in the air fed to the brake equipment, and in the end leads to freezing of the moisture which has condensed in individual pneumatic brake equipment elements and to difficulty in operating rolling stock brakes. The mechanical properties of metals change at low temperatures, and linkages and suspensions sometimes break. The working surfaces of brake cylinders and chambers are more likely to rust and the elasticity of brake hose rubber decreases. All this increases the labor intensiveness and time involved in preparing brake equipment at technical service centers.

Research is now being done on improving the quality of industrial rubber brake devices in order to increase their durability and reliability of operation in regions with low temperatures; new oils and lubricants are being developed which can be used successfully at low temperatures; technology is being improved and the quality of rolling stock inspection and repair is improving. We are studying the possibility of using welded brake lines on freight cars, hoses with self-release tips, brake shoe deflectors, and others. The brake control methods and procedures being worked out must naturally be refined for the specific operating conditions of the railroads of Siberia and the Far East.

Track and Track Systems of Railroads of Siberia and the Far East. Maintaining the track system and ensuring the reliable operation of all railroad track facilities and installations is complicated here by the harsh climate and unfavorable physical-geological conditions. The presence of permafrost, swamps and mari makes dirt roadbeds unstable and disturbs the stable position of the rails.

When moving, rolling stock subjects track to considerable dynamic forces, which accelerate the development of defects in rails. In mountainous regions, routes have a great many small-radius curves. In connection with the intensified and more complex forces rolling stock exerts on the rails in the curves, their susceptibility to damage increases. Sharp changes in temperature cause changing and very significant temperature differentials in the rails. Extremely low winter air temperatures cause increased cold brittleness (lowered resistance of rail steel to fracturing due to brittleness).

Climatic factors have a substantial influence on the operating durability of switch crossings, bridge superstructures and other metal elements of railroad track installations.

The strength and wear resistance of rails for railroads of Siberia and the Far East must be improved by using better quality steel in their manufacture and by significantly reducing concentrations of nonmetallic impurities. To reduce nonmetallic impurities, rail steel must be smelted using special technology (killing without using aluminum). We are now mastering the industrial production of such steel. We will soon put into operation a new heat department at one of the metallurgical combines which will enable us to provide the roads of Siberia and the Far East with rails tempered along their entire length, with increased operating resistance to contact-fatigue defects and wear, including secondary track on curved sectors.

Rail steel quality is very important in improving track reliability of operation, especially at low temperatures. It must possess increased resistance to various kinds of failure due to brittleness caused by unfavorable dynamic forces, change in longitudinal temperature forces in the rail fibers, thermomechanical damages associated with locomotive slipping and rolling stock wheel "slippage" movement. It should be noted that instances of sliding and "slippage" are significantly greater on railroads in places with a harsh climate than on roads in other regions of the country.

Not just rails, but also couplings and the metal elements of switch crossovers must be manufactured from high-quality steel in a "northern modification."

The experience of the Eastern Siberia, Transbaykal and Far Eastern roads demonstrates that the most common failure of artificial structures is bridge support deformation and pipe foundation deformation, and also ice deformation, which occur when frost and hydrologic ground conditions are disturbed. In this connection, a whole series of demands arise as to the components of Siberian and northern railroad structures.

Components in harsh climate zones develop defects considerably faster than usual, so it is necessary to use components which give full consideration to the conditions under which they will be operated in order to ensure normal structure service life.

Centralized automatic blocking, which has been developed and tested under operating conditions, should be considered the most promising system of signaling and communications for moving trains. In this system, all the devices are in the stations. Only impedance-matching track transformers are located right by the tracks. The system has no insulation seams or light signals. Train traffic is regulated by automatic locomotive warning signals (ALS).

Capital expenditures on building this system are approximately two-fold lower than for other existing standard systems. Operating expenditures on maintenance of the installations are reduced approximately three-fold and the number of servicing personnel is reduced three- to four-fold. Working and living conditions are improved significantly and installation reliability increases. With the use of modular signals, which comprise the basis of centralized automatic blocking, seamless rail circuits are reliably protected from the traction current and the centralized power supply current of passenger trains.

Use of centralized traffic control decreases the need for line workers and ensures a reduction in operating expenses as a result of improvement in the use of cars, locomotives and train brigades (about 0.5 million rubles per 100 km of line). In this regard, sector speed is increased by approximately 15 percent.

Electric signal centralization is basically of the relay type, although many signal switches are still equipped with obsolete mechano-electric and electric-latch systems. In order to reduce the number of switchmen, it is appropriate to speed up the equipping of stations with block-type electric interlocking which uses a.c. electric drive rather than batteries, as it is the most reliable in operation and the easiest to repair.

We need to anticipate automatic switch electric heating with a draft of warm air, which makes it considerably easier to operate electric interlocking installations.

A number of very important technological centers of the roads of Siberia and the Far East will receive automated control systems (ASU) in the years ahead to detail production activity in real time.

In the first stage, Tynda UVTs [a computer center] will enable us to gradually increase the number of problems being solved by Tynda Station ASU and junction enterprises, to set up information on the approach of freight for the construction, and to solve problems of managing construction of the mainline.

In the future, much work must be done on the roads of Siberia and the Far East in the area of improving the mechanization of loading and unloading work, strengthening the freight system, and developing containerized and packetized shipments.

At low temperatures, preventing freight from freezing and restoring its ability to flow freely take on special significance. In order to keep freight from freezing it is appropriate to make more extensive use of methods of dehydrating and heat-drying freight, refreezing bulk freight before loading, and oiling freight. In cold periods, and especially in transitional periods with significant temperature drops, more extensive use should be made of bulk freight thawing in special garages or facilities with infrared radiators and various types of stirring devices must be used.

In view of the harsh climatic conditions, means of mechanizing loading and unloading work must be manufactured in a "northern" modification. The basic means and facilities for unloading bulk freight from gondola cars should be car dumpers, elevated tracks and trestles, S-492's, drill stirrers, thawing devices and crane mechanisms with grab buckets.

When bulk freight is shipped in closed unit trains, it is generally unloaded by car dumpers, and free flow is restored by heating in special garages if the freight has frozen. These highly productive mechanisms are concentrated at enterprises of the Ministry of Power and Electrification, Ministry of Ferrous Metallurgy and Ministry of Coal Industry. The bulk of the car dumpers are of the three-support rotor type, which permits unloading four- and six-axle gondola cars with load capacities of 63 to 93 tons. At present, industry is producing four-support car dumpers for unloading existing four-, six- and eight-axle gondola cars with load capacities of 63-93 and 125 tons. With the planned extensive introduction of eight-axle Tpr gondola cars on roads in Siberia and the Far East, all three-support car dumpers will be replaced, and the available four-support car dumpers must be modernized.

Special attention should be paid to building warehouse facilities. We should correctly calculate the time freight is to be stored at stations and passageway and thoroughfare coefficients when determining the amount of space needed, average load per unit of warehouse area and other storage conditions. For freight requiring storage in closed warehouses, these facilities must be equipped with a heating system. The large container centers on the roads of Siberia and the Far East should be given preference over other roads in getting inductive radio communications equipment of the "Strop" system.

Providing the railroads of Siberia and the Far East with progressive equipment which corresponds to the operating conditions in these regions will facilitate their reliable operation.

Immediate Tasks

Recently, rail transport, including the roads of Siberia and the Far East, has been working under great strain. This situation results primarily from lag in the technical development of the system, shortfalls in the delivery of rolling stock and other transport equipment over a number of years, shortcomings in long-range and current planning of transport operation and development, and incomplete mobilization of available reserves. Moreover, exactingness as to level of maintenance and use of equipment both at stations and at enterprise sidings has lessened.

Proceeding from the resolutions of the 25th Party Congress, the December (1977), July and November (1978) Central Committee Plenums, the CPSU Central Committee and USSR Council of Ministers Decree "On Steps to Develop Rail Transport in 1976-1980" and the speeches and instructions given by Comrade L. I. Brezhnev, CPSU Central Committee General Secretary and USSR Supreme Soviet Presidium Chairman, during his trip to Siberia and the Far East, rail transport work on increasing operations activity, on revealing and using existing production reserves, and ensuring that trains run reliably and precisely, that freight and passengers are shipped and delivered on time, has been increased. Steps are being taken to continue improving the system of car flow organization, raise the level of schedule meeting, improve station work, make better use of freight cars and improve the quality of maintenance and repairs on various types of equipment.

With the help of local party and Soviet organs, interaction in the work of collectives in various types of transport and freight shippers and recipients is being developed and strengthened everywhere.

Rail transport has been rendered much assistance and allocated above-plan capital investments, including capital for strengthening the material and technical base of the roads of Siberia and the Far East. Under these conditions, particular attention is being paid in transport to the fullest and fastest utilization of these funds, to accelerating and improving the quality of construction.

New rolling stock, powerful track and loading-unloading machinery, vehicles and other equipment is being supplied the railroads of Siberia and the Far East.

Much attention has been paid to eliminating existing difficulties in shipping freight from eastern regions to the European part of the country.

Shipper use of unit trains is being developed to increase car transit flows and accelerate delivery of freight to consumers. Currently, only slightly more than half of all freight on the West Siberian and East Siberian mainlines is being shipped in shipper-organized unit trains, although the loading basis is large-scale freight which can easily be shipped in unit trains -- coal, timber, petroleum products and building materials. The task is therefore set of considerably raising the level of unit train use and the range of unit train runs without additional processing.

The speeches by Comrade L. I. Brezhnev during his trip to Siberia and the Far East noted difficulties in shipping timber. Timber shipment from the eastern regions has been increased and the amount of timber at storage areas and in shipping stations has been sharply reduced as a result of improvement in shipment planning, prompt provision of loading roads with rolling stock, a higher level of local work organization, carrying out empties disposition assignments and a number of other measures.

Strict supervision of the prompt shipment of timber from these regions has been instituted on the roads, in supply-planning and marketing agencies and among timber procurers.

Ministry of Railways Order No 30Ts of 10 May 1978 indicates concrete steps to improve the technology of the shipping process, shipment planning, equipment maintenance and repair, on improving the efficiency and quality of all railroad work.

In shipment planning, priority attention is paid to shipping and delivering the basic freight shipped in high volume: anthracite coal, ores, petroleum, petroleum products, timber and mineral fertilizers. Higher shipment plans are now being set the Western Siberia, Eastern Siberia, Transbaykal and Far Eastern railroads for the most important freight.

Very important significance is being attached to creating and introducing a system of steadily feeding high-volume freight loading roads loading resources. Network roads are obligated to include fully in the shipment plan and to ship that freight which must be delivered in the direction in which empty cars are running on railroads of the east, and when a demand arises for additional shipments in the indicated categories, to solve these problems efficiently and flexibly.

Concrete steps are being taken to improve the reliability and routine maintenance of locomotives, cars, track installations and the repair centers for rolling stock and the production of spare parts, automation, remote-control and communications equipment, electrification facilities and power supplies. The container repair base is being strengthened, especially on roads of Siberia and the Far East.

It is assumed that passenger shipments, both suburban and long-distance, will grow on roads of the eastern portion of the network. In this connection, direct rail connections with the central regions and the country's southern resorts will be developed further and new trains linking the BAM with the European part of the USSR will be introduced. The number of local trains will be increased. The use of modern-design motor-van electric trains in suburban service in the large industrial centers of Siberia and the Far East will be expanded, as will the use of diesel trains with maximum speeds of up to 120-130 km/hr or more on sectors with diesel locomotive traction.

A number of major economic and social measures aimed at reducing transport expenditures in the national economy, at securing railroad personnel and improving their working and living conditions, will be implemented with a view towards further improving operation of the roads of Siberia and the Far East.

All these are pivotal problems in uplifting the operation of railroads of the eastern portion of the network.

Reducing transport expenditures both in bringing output into and in shipping output out of regions of Siberia and the Far East can be ensured on the basis of continued improvement in the efficiency of shipment, construction and location of new shops and production facilities, expanding capacities at existing enterprises, improving the transportability of the output being shipped, improving the use of rolling stock load capacity, reducing freight losses in transit, improving the system of price formation in the national economy and in transport, and by other measures.

According to the CPSU Central Committee and USSR Council of Ministers Decree "On Steps to Develop Rail Transport in 1976-1980," the ministries and departments are instructed to ensure implementation of measures to reduce inefficient shipments, switch over economically inefficient short-run freight shipments from the railroads to other types of transport, and to significantly reduce extremely long-distance and counter interregional shipments.

Reducing transport expenditures will be facilitated by the development of optimum freight flow plans which take into account the best use of each type of transport, increased responsibility on the part of transport organizations, freight shippers and supply and marketing agencies for carrying out shipment plans and using rail transport equipment efficiently. For example, stopping shipments of Chermkhovo coal to Omskaya and Novosibirskaya oblasts at the expense of delivering Kuznetsk and Kansko-Achinskiy coals is very important in reducing inefficient shipments. With a view towards eliminating counter shipments of Kuznetsk and Donetsk coals, the fuel procedures at Bezymyanskaya, Igumnovskaya and Yaroslavskaya TETs are basically being switched over to the use of Kuznetsk coal. Maximum adaptation of fuel use at Partizanskaya GRES to the use of local coals will enable us to reduce imports of coal to this electric power plant from other more distant deposits on heavily loaded sectors of the Far Eastern road's Vladivistok Division.

Delivering conversion cast iron for export to the west, primarily from enterprises of the center and the Ukrainian SSR, will enable us to stop shipping this iron west from Kuznetsk Metallurgical Plant.

The July (1978) CPSU Central Committee Plenum set the task of ensuring mixed feed production in every Union republic and every major economic region up to the needed requirements. Implementation of the Plenum resolutions will facilitate stopping unnecessary long-distance mixed feed shipments from eastern regions to the European part of the country.

The construction of new shops and enterprises, expansion of capacities at existing enterprises and construction of petroleum and petroleum products pipelines in Siberia and the Far East will also lead to a reduction in unnecessary long-distance shipments and a reduction in transport expenditures in delivery of a whole range of freight. Oil refining capacities at the Komsomol'sk-on-Amur Oil Refinery must be increased significantly. That will provide an opportunity to reduce imports of petroleum products great distances from other regions of the country by the amount those capacities are increased. Start-up of the oil pipeline on the Uyar - Angarsk sector will reduce crude petroleum shipping distance by rail for the Khabarovsk Oil Refinery and for export, since it will then come from Sukhovskaya Station on the East Siberian Road (new site) instead of from Uyar Station.

Start-up of the enrichment plant at Karaganda Metallurgical Combine and the delivery of coking coals to this plant from Karaganda Basin will enable us to stop shipping Kuznetsk coals to that combine. With construction of the oxygen-convertor shop and the continuous steel pouring facility at Zhdanovsk Metallurgical Plant, unnecessary long-distance shipments of blanks for rolled metal products and slabs from the West Siberian Metallurgical Plant to metallurgical plants of the Ukrainian SSR can be reduced considerably.

Organizing band steel production at Cherepovets Metallurgical Plant provides an opportunity to reduce the importation of hot-rolled strip steel into the Ukrainian SSR from Western Siberia Metallurgical Plant. At the same time, the importation of various kinds of wire from Cherepovets Steel Rolling Plant into Siberia and the Far East could be reduced, since this output will be produced at Western Siberia Metallurgical Plant.

Until recently, packaged carbamide was imported great distances from the European portion of the country to Kamchatskaya, Magadanskaya and Sakhalinskaya oblasts. Increasing special carbamide packaging capacities at Angarsk Petrochemical Plant also creates conditions for a significant reduction in unnecessary long-distance shipments of this freight.

Tie impregnating capacities are being increased at Krasnoyarsk Tie-Impregnating Plant, as are post-impregnating capacities at Krasnoyarsk Post-Impregnating Plant, and the Amursk Tie-Impregnating Plant is being created. As a result, it will become possible to sharply reduce the importation of unfinished ties and posts for impregnation from Siberia and the Far East to the European part of the country and the counter flow of impregnated output.

One important problem is to reduce and then stop all unnecessary long-distance shipments of furniture from enterprises of the Baltic, Belorussia, the Ukraine and the Northern Caucasus to the eastern regions. Its solution will be facilitated by growth in furniture production capacities in Siberia by 78 million rubles and in the Far East by 40 million rubles in the 10th Five-Year Plan.

There are still unnecessary long-distance shipments of cement from cement plants of Western and Eastern Siberia to Primorskiy Kray and from the Novospasskiy plant to Petropavlovsk-Kamchatskiy Kray. These shipments must be significantly reduced by putting a new flow line into operation at Novospasskiy Cement Plant and a new clinker crushing facility at Petropavlovsk-Kamchatskiy Cement Plant.

With the start-up of plants to produce soft roofing in Chermkhovo, Pavlodar and Uchaly in the 10th Five-Year Plan, shipments of soft roofing from the Ukrainian SSR into Siberia will stop. The importation of flour from the European part of the country will be reduced as a result of increasing the production capacities of existing mills in Novokuznetsk, Anzhero-Sudzhensk, Tobol'sk, Bratsk and Spassk-Dal'nyy. Finally, the importation of salt into Eastern Siberia will be reduced with the start-up of Tyret'skiy Salt Mine in Eastern Siberia.

One of the most important reserves for reducing transport expenditures and increasing shipping resources on the railroads of Siberia and the Far East is to improve freight transportability, foremost by reducing shipments of unprocessed timber. At present, approximately 15-16 million tons of rough logs which need to be processed in the consuming regions is shipped out from Eastern Siberia and the Far East just to the west. If timber sawing is set up in the procurement regions and lumber is shipped, the demand for rolling stock could be significantly reduced. An even greater impact could be obtained if, instead of unprocessed wood, we were to ship plywood, splint slab, laminated wood and pulp. The production of lumber, splint slab, laminated wood, plywood and pulp in Siberia and the Far East will be considerably increased in the 10th Five-Year Plan. This will enable us to reduce long-distance shipments by 6.5 million cubic meters, or 5.2 million tons of rough logs.

Unfortunately, current wholesale prices do not always stimulate organizing timber sawing and wood processing where commercial timber is procured. Thus, in terms of price free-on-station of coniferous timber output designation, Krasnoyarskiy, Primorskiy and Khabarovskiy krays and Amurskaya, Irkutskaya, Tomskaya and Chitinskaya oblasts are in belt I and transport expenditures are set at 4.8 rubles per cubic meter. When coniferous timber output is delivered to the customer using his own means, except for mainline transport, a free-on-station of designation price is also used, but with reimbursement to the consumer of a discount of 2.5 rubles per cubic meter, not 4.8 rubles. This type of delivery is anticipated, for example, for timber-sawing enterprises situated where timber is procured in Siberia and the Far East.

Steps taken to prevent freight losses due to blow-off and spillage in transport are an important reserve for reducing transport expenditures on shipping coal and ores in pulverized fractions. To this end, shipping enterprises for Kuznetsk, Kansk-Achinsk, Cheremkhovo and trans-Baykal coals and of ores from Gornaya Shoriya and the Altay must tamp down the coal after loading into gondola cars by using leveler-rollers and tampers and must put protective plastic sheet over the surface of the loaded freight and use other means to protect bulk freight in every way they can from being lost in transport.

Transport tariffs must have a more substantial influence on making rail shipments more efficient, on the more efficient distribution of shipments by type of transport in regions of Siberia and the Far East, and on the results of the economic activity of the transport enterprises and organizations of these regions.

The existing system of railroad freight tariffs sets a number of lower tariffs to stimulate the use of cars running in the empty direction to ship incidental freight. For example, a 50-percent lower tariff is used when ballast is shipped from Asbest, Izumrud and Iset' stations on the Sverdlovsk road in the direction in which empties move to stations of the West Siberian road. A 30-percent lower tariff is used when fruit and vegetables are shipped (from 1 November through 1 July) in isothermic cars in the direction of their empty runs (from the West Siberian, East Siberian and Transbaykal roads to stations of the Far Eastern road, from the West Siberian road to stations of the Kazakh and Central Asian roads and west to stations of the Azerbaijan, Transcaucasian, North Kazakh, Odessa-Kishinev, Dnepr' and Volga roads).

Lower incentive tariffs have been set for shipping carload freight in multipurpose containers supplied to replace closed cars in those directions where there is a steady flow of empty containers (from railroads of Siberia and the Far East to the west). In this regard, empty runs are reduced for both the cars and the containers.

During his trip to Siberia and the Far East, Comrade L. I. Brezhnev noted the necessity of reducing empty runs as one of the reserves for increasing the loading resources of the railroads. Research done by the Institute of Comprehensive Transport Problems attached to the USSR Gosplan and the All-Union Scientific Research Institute of Rail Transport has revealed stable empty directions for railroad cars of Siberia and the Far East. For gondola cars, these directions are: Tyumen' - Omsk, Issyk-Kul' - Omsk, Omsk - Novosibirsk - Proyektnaya, Novosibirsk - Tayshet - Bratsk, Khabarovsk - Karymskaya - Cheremkhovo, Lokot' - Altayskaya and Kzyl-Tu - Altayskaya; for closed cars -- Khabarovsk - Chita - Krasnoyarsk.

It is appropriate to examine and resolve the question of the possible use of preferential tariffs in these directions. At the same time, we should carefully analyze the necessity of continuing to use an exclusively lower tariff for shipments of a number of different kinds of freight to the Far East. At present, a preferential tariff is set for the shipment of vegetables, potatoes, fresh fruit and berries, butter and vegetable oil, nonferrous metals, agricultural machinery, motor vehicles, canned goods, wines and champagne. The preferential rate is differentiated, from 10 to 50 percent of the total tariff. This tariff was established in 1929, when the economy of these regions was poorly developed. Now, they have developed their own vegetable base, machine-building industry, and it hardly makes sense to use a lower tariff for shipments of such freight. In this regard, it is appropriate to note that use of a preferential tariff only stimulates long-distance ties and has a negative effect on the cost accounting of roads of the Far East, whose level of profitability must be raised in every way possible.

As has been noted, implementing a long-range comprehensive program of development of the productive forces of Siberia and the Far East requires a significant increase in and improvement in the use of labor resources in these regions.

The special working conditions of the bulk of the railroaders -- around-the-clock work basically in the open air, considerable responsibility associated with the need to ensure safe train movement, hazardous work, some living far from cities and settlements -- all this demands constant, unremitting attention to securing personnel in rail transport, and improving their working and living conditions.

A number of important steps have been taken recently to continue improving labor organization in all links of the rail system, develop creative initiative, improve working and living conditions for railroaders, and improve their material well-being. A shining new example of the tremendous concern the party and government have for rail transport and its workers is the CPSU Central Committee and USSR Council of Ministers Decree "On Steps to Develop Rail Transport in 1976-1980." A series of important steps aimed at attracting personnel to rail transport and securing them in it, including on the roads of Siberia and the Far East, have been taken just in accordance with this decree.

Since 1 January 1977, wage supplements for night work have been increased more than two-fold (from 14.3 to 35 percent of the wage rate). In this connection, 1.3 million people have received wage increases, including 187,500 people on the roads of Siberia and the Far East. Wage rates (salaries) for workers at technical service centers and centers which ready cars for loading, for electricians and electrical equipment machinists in the contact network, for track and artificial structures repair workers have been increased 8-12 percent for work in between trains (in the "windows"). As a result, about 155,000 people have received wage increases, including 32,000 on the roads of Siberia and the Far East.

Railroads have instituted the titles of "Car Inspector 1st Class," "Passenger Car Conductor 1st Class" and "Brigade Leader 1st Class." These titles have been awarded to more than 6,600 workers, with monthly wage supplements of 15 rubles; of these, more than 1,000 are highly skilled specialists working on the roads of Siberia and the Far East.

One-time bonuses to railroaders based on length of continuous employment will be instituted. The first payments, beginning in 1979, will be made to railroad workers of the Far Eastern, Transbaykal, East Siberian, Alma-Ata, Virgin Lands and Western Kazakhstan roads. This will permit raising the wages of more than 400,000 workers on railroads of Siberia and the Far East by an average of 114 rubles for the year. Regional wage factors have been raised for workers at rail transport enterprises located in Siberia on the Tobol'sk - Surgut - Urengoy and Surgut - Nizhnevartovsk lines (13,000 people) and the Bam - Tynda line (1,400 people).

The maximum bonus has been increased to 60 percent of the piece-work wage of workers employed in foundry, forging and pressing jobs at the Novosibirsk Electric Locomotive Repair Plant, Novosibirsk Switch Plant and Ulan-Ude Locomotive and Car Repair Plant. Higher wage payments have been set for workers at car technical service centers at 140 stations of railroads of Siberia and the Far East; wage rates for especially hazardous working conditions are being used.

In 1977, new sanitation and personal-services facilities were built using state capital investments to protect labor on these roads, including ones at Kemerovo Station and the experimental track machinery station of the West Siberian road, at Irkutsk-Sortirovochnyy car depot and the mechanized loading and unloading work district at Ungut Station on the Far Eastern road, and so on. Illumunation has been increased and improved at many stations, warming stations have been built for workers who work outside, and other steps have been taken to improve working conditions.

In 1978, capital investments in labor protection on roads of the eastern portion of the network were increased by 26 percent. The norms for issuing and the quality of work clothing are constantly being improved.

The Ministry of Railways has recommended the more extensive use of up to 20 percent higher rates in order to strengthen the material interest in working on the basis of technically substantiated norms, higher labor productivity and better work quality. At present, the number of piece-rate workers working on the basis of higher rates of this kind is 42 percent at enterprises of the locomotive system and 61 percent at enterprises of the car system.

As of 1 February 1977, the wages of workers employed in nonproductive branches of the railroads of Siberia and the Far East were raised. On the whole, 82,200 people were transferred to new wage conditions here. As a result, the average monthly wage of workers in public health, for example, increased by 20.1 percent.

The Ministry of Railways pays a great deal of attention to providing the roads of Siberia and the Far East with specialists. In the years ahead, large number of young specialists with higher and secondary special educations will be sent to rail transport enterprises and organizations in the country's east.

In an historically brief period, Siberia and the Far East will, through the efforts of the Soviet people, under the leadership of the Communist Party, be transformed into an area of highly developed industry, science, culture and social progress. The objective necessity of accelerated utilization of their natural resources and growth in the economic potential of these regions, which have been reflected in the resolutions of the 24th and 25th CPSU Congresses, determine the outstripping rates of development of the transport system, and foremost rail transport, here. Inspired

by the resolutions of the party congresses, by the enormous concern of the CPSU Central Committee, the Soviet government, and Comrade L. I. Brezhnev personally, as CPSU Central Committee General Secretary and USSR Supreme Soviet Presidium Chairman, on transport and its workers, railway workers will make a worthy contribution to resolving the most important tasks of today, the transformation of Siberia and the Far East into a blossoming part of our great homeland.

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