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No. 761





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# TRANSLATIONS ON USSR RESOURCES

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CONTENTS (Continued)

ENERGY, FUELS, AND RELATED EQUIPMENT

# POWER INDUSTRY PREPARATIONS FOR WINTER

Moscow ENERGETIK in Russian No 9, Sep 77 pp 1-2

[Article: "Exemplary Preparations of Energy Operations for Winter"]

[Text] Supplying the national economy with electricity in the autumn-winter period of 1976-1977 was made difficult by severe winter conditions and the acute shortage of hydraulic power resources at GES's.

Despite efforts made to conserve fuel, electricity, and heat energy, during the period of autumn-winter peak loads in 1976-1977 the power plants experienced difficulties in fuel supply. Only by making timely preparations for the autumn-winter peak load period of 1976-1977, putting new power facilities and power transmission lines into operation in 1976, mobilizing the capacity reserve of thermal power plants, increasing the load on intersystem power transmission lines, conserving on hydraulic resources, fuel, and electricity, and administering the fuel supply to power plants efficiently was it possible to successfully cope with the tasks of supplying energy to the national economy.

At the same time, there were serious shortcomings in the work of some energy enterprises during the autumn-winter period.

The fact that a substantial portion of the new power capacity at the end of the year and in certain facilities went into operation with substantial amounts of uncompleted work made it possible to utilize them fully to cover winter peak loads. There were also serious shortcomings in providing for prompt unloading of incoming freight cars; this created additional difficulties in delivering fuel to the power plants. There were instances of unsatisfactory repairs to equipment.

The upcoming autumn-winter peak load season in 1977-1978 will be no less difficult: again there is an extremely unfavorable situation with regard to hydraulic resources, especially in the Volga-Kama and Angara-Yenisey cascades and the rivers of Central Asia. The spring runoff in 1977 was low, amounting to 85 percent of the average many-year norm.

All energy organizations and their officials will be especially responsible for doing considerable organizational work to prepare power facilities properly for normal, reliable operation in the upcoming autumn-winter period; they will have to take additional steps to speed up the inauguration of new power capacity, including at least six million kilowatts before 1 December, to put a number of vital network facilities into operation, to mobilize unutilized reserves to the maximum, to accomplish the repair campaign on schedule and at a high level of quality, to increase the utilization of existing power equipment, and to eliminate disruptions on power capacity. It is essential to institute regimes of equipment and power system operation which will insure maximum conservation of fuel and hydraulic resources, to build up necessary fuel stocks, and to insure all-round conservation of electricity and heat energy by industrial and communist consumers.

Thorough preparations for energy operations by the autumn-winter peak load season of 1977-1978 take on special importance at a time when the whole country is caught up in a high labor upsurge, and energy workers, along with workers in other sectors of industry and agriculture, are striving to fulfill high socialist obligations, striving to have a worthy greeting for a landmark date in our state's history--the 60th anniversary of the Great October Socialist Revolution.

An extremely vital matter in preparations for the upcoming autumn-winter peak load season is the task of putting power blocks into operation on time in the Chernobyl' AES, the Uglegorsk, Zaporozh'ye, Reftinskiy, Shatur, Surgut, Syrdar'ya, Gusinoozersk, and Cherepovets GRES's, the TETs in the cities of Moscow, Kuybyshev, Saransk, Chapayevsk, Kurgan, Karaganda, and Perm'. In a number of regions it will be of crucial importance to put extremely vital network facilities into operation on time: 500-kilovolt power transmission lines Cheboksary--Gor'kiy, Novolipetsk--Orel, Zeyskaya GES--Svobodnyy, and Novosibirsk--Barnaul; 330-kilovolt lines Zaporozh'ye GRES--Tsentral'naya, Krivoy Rog GRES--Kirov, and others. In the case of a number of the facilities listed, construction is lagging seriously behind. Construction and installation organizations of USSR Ministry of Power and Electrification will have to exert maximum effort to make up this lag.

Work is not going fast enough in the elimination of gaps between installed and available capacity of power plants at the Biyskaya, Novo-Salavatskaya, and Kurgan TETs. It is essential to eliminate the capacity gap at the Troitskaya and Gusinoozersk GRES's, Mosenergo [Moscow Regional Administration of Power System Management] TETs-25, Izhevskaya TETs-12, Bezymyanskaya TETs, Kazan' TETs-11, Novoirkutskaya TETs, and Kostroma TETs-2; these have resulted from delays in work done to eliminate uncompleted portions of construction-installation work.

It is essential to step up the construction of fuel oil storage facilities at the Groznyy, Minsk, Cheboksary, and Izhevskaya TETs, and the Uglegorsk GRES.

It is of vital importance, in exemplary preparations of energy management for the autumn-winter peak load season of 1977-1978, to complete capital equipment repairs on time and on a high level of quality. It is essential to learn from lessons of unsatisfactory preparation and organization, and low quality of repairs, at the Ekibastuz, Tashkent, Voroshilovgrad, and Tripol'skaya GRES's, the causes of excessive delays in repairs to power blocks at the Novocherkassk, Moldavian, and Nazarovskaya GRES's.

This year as well there are instances of failure to meet calendar repair schedules in power systems of the Center, the East, and Gruzglavenergo [Georgian Main Power System]. This is causing delays in sequential repairs to power blocks, and disruptions in the entire repair schedule.

It is essential to comply strictly with repair schedules, allowing no gaps and delays in timetables. A vital role in this is played by precise organization in the matter of supplying necessary spare parts and materials for repair operations.

A decisive factor in successfully coping with the autumn-winter season of 1977-1978 will be strict conservation of all types of fuel and reductions in specific fuel consumption and losses of electricity and heat in the network systems. Above all it is essential to strive to drastically reduce the consumption of furnace fuel oil. It is essential to make maximum use of Ekibastuz, Kansk-Achinsk, Bogoslovskoye, Karaganda, and other local coals. Maximum utilization of the existing funds for fuel must be the personal job of every power administration manager and every power plant director.

It is essential to tighten control on the part of regional power administrations and power marketing organizations over every enterprise's and organization's consumption of electricity and heat.

The power systems and a number of power plants are still not doing enough to reduce accident rates, and the rate is rising in the Kazakh and Turkmen power systems, the Kuybyshev power system, the Kuzbass power system, the Altay power system, and the Khar'kov power system; this indicates that not enough is being done in the power enterprises to eliminate danger spots, to increase labor and production discipline, and to upgrade the qualifications of the operating personnel.

Successful preparation of power facilities for the winter will largely depend on organizing personnel work, on improving the quality of training personnel to prevent accidents--especially the on-duty personnel of large-block power plants, consolidated dispatcher administrations, and power system dispatcher services; it is essential to increase the use of existing electrical network proving grounds existing in power systems to train line personnel.

One especially important task of the operational subunits is that of building up fuel stocks and preparing all fuel transport operations for winter, strengthening regular control over the winter preparations of every power

plant and the electricity and heating networks, and organizing a high-level campaign on the issuance of readiness certificates to power enterprises for the autumn-winter peak load season of 1977-1978.

Wintertime poses a tough test for power engineering workers. Our most vital task is to prepare in exemplary fashion and successfully pass this test.

In preparing a worthy greeting for the 60th anniversary of Great October, Soviet energy industry workers will do everything necessary for successful operation during the upcoming autumn-winter peak load season; they will insure uninterrupted electricity for the country's national economy.



6854
CSO: 1822

ACCOMPLISHMENTS, PLANS IN KIRGIZ POWER INDUSTRY

Moscow ENERGETIK in Russian No 9, Sep 77 pp 3-4

[Article by M. M. Azrilyan, chief of the Main Production Administration of Power and Electrification, Kirgiz SSR: "Achievements of Energy Workers of Soviet Kirgizia"]

[Text] The collectives of enterprises and organizations of the Main Administration of Power and Electrification Kirgiz SSR successfully completed the Ninth Five-Year Plan with respect to all basic indicators; they completed party targets with respect to reliably supplying the national economy with electricity, boosting the republic's energy potential, and electrifying the national economy. During the five-year period, the installed capacity of the power system rose by 2.7 times, reaching 2.146 million kilowatts.

In accordance with the Directives of the 24th CPSU Congress, the Toktogul' GES was brought up to full capacity of 1.2 million kilowatts; the Frunze TETs put turbogenerator units No 8 and No 9, of 220,000 kilowatts capacity, into operation.

The total output of electricity came to 19.5 billion kilowatt hours; some 220 million kilowatt hours were generated above the plan. By the end of 1975, power transmission lines of all voltages in the power system totaled 45,200 km. All rural regions and population centers in the republic were fully electrified. Now, all of the republic's kolkhozes and sovkhozes are using electricity; more than 99 percent of the electricity is being provided from the state power system.

Over the five-year period, the implementation of measures to upgrade the effectiveness of power equipment operation and intensify production made it possible to reduce specific fuel consumption by 54.2 grams per generated kilowatt-hour of electricity and 2.7 kg per generated gigacalorie of heat energy; electricity losses in the networks were reduced by 0.5 percent. Some 70,000 tons of standard fuel were conserved.

Labor productivity rose to 38.2 percent as against a target of 34.5 percent. The specific personnel per 1,000 kilowatts of installed capacity in thermal power plants was reduced by 0.9 workers, and in the electrical networks--by seven workers per 1,000 standard units.

Work is continuing on the adoption of the first phase of an automated control system (ASUP). At present, the power system's ASUP is handling more than 40 tasks of operational-dispatcher and organizational-economic administration.

Kirgizglavenergo [Main Administration of Power and Electrification Kirgiz SSR] power workers have made a worthy contribution in helping the republic's farm workers to fulfill their socialist obligations with respect to deliveries of farm produce to the state.

Under conditions of severe water shortages in recent years and the associated deficiency in power, reliable and continuous electricity was supplied to major pumping stations, and a large number of medium- and small-sized pumping wells for machine irrigation were electrified.

In 1971-1975, the main sector of the republic's agriculture--livestock raising--electrified 2,100 mother sheep pens and 618 installations for processing and making feeds. Agricultural electricity consumption in Kirgizia rose from 159.6 million kilowatt-hours in 1964 to 820 million kilowatt-hours in 1975--five times; electricity consumption for production needs per worker rose from 230 to 1,414 kilowatt hours per year. In other words, the power-to-worker ratio per farm worker in Kirgizia rose by more than six times.

The energy workers of Soviet Kirgizia are heading to greet the 60th anniversary of the Great October Socialist Revolution with new, substantial successes.

Looking back today on what has been done, we can state proudly that the magnitude which Kirgizia's power industry has attained is truly enormous; it constitutes clear proof of the implementation of Lenin's ideas of electrifying the country, of the triumph of our party's Leninist nationalities policy.

These accomplishments constitute a firm foundation for resolving even more difficult and critical tasks in the development of the republic's power industry during the Tenth Five-Year Plan.

As is well known, one of the most important tasks of the Tenth Five-Year Plan, as defined by the 25th CPSU Congress, is that of improving effectiveness and stepping up the pace of productivity increase. In accordance with this principled direction of the party's economic strategy, the republic's power and electrification efforts continue to develop at a fast pace.

Thus, plans call for raising the total volume of electricity output in 1980 to 130.6 million rubles; electricity consumption will rise by 42 percent over 1975: electricity consumption will rise by 35 percent in industry, 65 percent in agriculture, and 30 percent for community and household needs.

Over the five-year period, plans call for building 2,500 km of power transmission lines of 35 kilovolts or higher, including the 211-km 500-kilovolt overhead line Toktogul' GES--Frunze; also 6,400 km of 10-kilovolt rural

lines, and 700 km of community electric networks. This will make it possible to provide centralized electricity supply to the remote mountain regions of the Chatgal'skaya and Alayskaya Valleys, Sarydzhaz and Alayka, to unite the power regions of the north and the south of the republic into an integrated Kirgiz power system, and to provide transmission of up to 2.5 billion kilowatt-hours of electricity to the neighboring republics of Central Asia and Kazakhstan by 1980.

The power potential of Kirgizia in the Tenth Five-Year Plan will rise intensively thanks to the further exploitation of the abundant hydraulic power resources of the Naryn River.

In accordance with the decisions of the 25th CPSU Congress, work is already underway on a broad front in the construction of the Kurpayskaya GES, of 800,000 kilowatts capacity. The builders have pledged to put the first two units into operation in 1978.

In 1978, work will get underway on preparing to build the highly-efficient Kambaratiyskaya GES, of two million kilowatts capacity.

Implementation of the program of construction work on the cascade of hydroelectric power plants on the Naryn, which have been assigned the role of operationally regulatable capacities in the country's unified power system, and the 500-kilovolt power transmission line Toktogul'--Frunze, constitute a vital link in the section in the electrical hookup of the Unified Power Systems of Central Asia and North Kazakhstan in the USSR YeES [Unified Power System] under construction, and will mark a substantial contribution by Soviet Kirgizia in strengthening the economic potential of our homeland.

The Tenth Five-Year Plan is a five-year plan of effectiveness and quality. The task of upgrading the effectiveness and quality of the work of Kirgizia's power industry will be accomplished in accordance with an integrated long-range plan of measures drawn up in accordance with the Basic Provisions for the Development of the National Economy of the USSR for 1976-1980, as approved by the 25th CPSU Congress.

On the threshold of the 60th anniversary of Great October, Kirgizia's power industry workers are working enthusiastically to implement the historic decisions of the 25th CPSU Congress. Last year they fulfilled the electricity and heat output and sale plan ahead of schedule, by 25 December 1976. In 1976, the power system's power plants generated 4.510 billion kilowatt-hours of electricity; this amounted to 101.5 percent of the plan. The increase in output over 1975 came to 10.5 percent. The heat output plan was fulfilled by 104 percent, the sales plan by 101 percent, and the profit plan by 105.9 percent. Above-plan profits totaled more than 1.2 million rubles. New power capacities were put into operation at the Frunze TETs (a 110,000-kilowatt turbogenerator unit and a boiler with a productivity of 220 tons of steam per hour), also 1,727 km of power transmission lines of all voltages, and a number of other facilities.

These successes were achieved largely thanks to the powerful upsurge in socialist competition evoked by the decisions of the 25th CPSU Congress and the October 1976 Plenum of the CC CPSU.

Competition in the power system extends to 49 regions of electrical networks, 189 sections, 43 shops, 82 services, 116 shifts, and 346 crews. Personal creative plans have been taken on by 630 engineering-technical workers. The best indicators with respect to the results of socialist competition were achieved by the collective of the Oshsk electrical network enterprise, which in the second quarter was awarded second class place in all-union socialist competition among enterprises of the USSR Ministry of Power and Electrification, and in the third quarter--the challenge Red Banner of the USSR Ministry of Power and Electrification and the Central Committee of the Trade Union of Workers of Power Plants and Electrical Equipment Industry.

Beacons of socialist competition in the collectives are those production leaders that have successfully completed their socialist obligations. Among them, mention should be made of Dzholdoshbay Turgunbayev, senior electrician of the Kok-Yangak section of the Dzhalal-Abad PES [Mobile or Peak Electric Power Plant]; his crew held first class place for three whole quarters of 1976 in the electrical network region. Mention must be made of D. Turgunbayev, who was awarded the Order of Labor Red Banner on the basis of the results of the Ninth Five-Year Plan; G. V. Shipovskiy, a turbine shop fitter; B. Aryzbayev, a fitter in the fuel-transport shop of the Frunze TETs; I. P. Kozin, crew leader of the electrical insulation crew of the Chuyskaya mechanized column of Kirgizelektroset'stroy [Kirgiz Trust for the Construction of Electrical Networks]; Yu. M. Sysoyev, an electrician in the substation and 35-kilovolt or more overhead line service of the Bystrovka PES, and many others.

All power engineering and construction workers in Soviet Kirgizia are striving to work even better, more effectively, with maximum yield, in order to greet the jubilee of the Land of the Soviets with new labor accomplishments.



6854
CSO: 1822

DEEP DRILLING IN THE CASPIAN--6,026 METERS

Baku VYSHKA in Russian 5 Nov 77 p 2

[Article by N. Khalilov, chief geologist of Maritime MURB and doctor of geological and mineralogical sciences]

[Text] The drilling brigade of foremen Agakerim Zakiyev and Nazim Medzhidov from the Maritime MURB achieved a great work victory in socialist competition in honor of the worthy meeting of the sixtieth anniversary of the October Revolution. For the first time in the Caspian the prospectors of the depths drilled a well in the area of Bulla-more to a record depth of 6,026 meters. Working under complex geographical conditions the drillers were able to finish the drilling 100 days ahead of the scheduled time.

The group from the geophysical party of the Gobustan Geophysical Office headed by Robert Arutyunov also successfully handled the work. The entire set of geophysical measurements was made at a high hydrostatic pressure of the flushing fluid, on the order of 1,400 atmospheres.

It should be said that the plan for the thirtieth drilling was based on the research and recommendations of A. Mirzadzhanzade, academician of the Azerbaydzhan SSR Academy of Sciences. Thus, the drilling on a balanced equilibrium, in which the hydrostatic pressure of the drilling mud equals the reservoir pressure, to a great extent permitted determination of the zone with an abnormally high reservoir pressure in the open section of the cut, as well as visualization of them below the bottom hole.

Despite the fact that the thirtieth drilling did not uncover an oil and gas bearing target, very important data were obtained. It was found, for example, that there is an abnormally low reservoir temperature (97 degrees) which in the future will permit standard flushing solutions and chemical reagents to be used in drilling superdeep sea wells. In addition, x-ray analysis of the bottoms revealed that they contain a large quantity of clay minerals, montmorillonites.

These days the brigade of foremen A. Zakiyev and N. Medzhidov is preparing for the drilling of new superdeep well No. 40 in the area of Bulla-more. Comrade L. I. Brezhnev, general secretary of the Central Committee of the CPSU, chairman of the Presidium of the Supreme Soviet of the USSR at a grand meeting dedicated to the sixtieth anniversary of the Great October Revolution in the appeal of our Communist Party, the USSR Supreme Soviet and the government, "To the Soviet People" obliged the drillers to the end of the anniversary year to drill through 1,800 meters of rock.

9035
CSO: 1822

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# REPORT ON 'ELEKTRO-77' EXHIBITION

Moscow MEKHANIZATSIA I AVTOMATIZATSIYA PROIZVODSTVA in Russian No 9, Sep 77 pp 50-52

[Article by engineer A. P. Kuznetsova: "Soviet Union at the "Elektro-77"]

[Text] In June of this year, the "Elektro-77" International Exhibition was held at the Moscow 'Sokol'niki' park.

Firms and organizations from 23 countries participated in the exhibition.

An important place was held in it by standardized series and individual kinds of products created by the joint efforts of specialists of seven socialist countries: Bulgaria, Hungary, the GDR, Poland, Romania, the USSR and Czechoslovakia.

The broad exhibition of the USSR is convincing proof of how the famous Lenin's GOELRO [State Commission for the Electrification of Russia] plan was brought to life in a short time. In only half a century, the electrical equipment industry of the USSR grew into a powerful sector of the national economy which provides for the electrification of the country.

The electrical equipment industry supplies equipment for electric power transmission lines, powerful turbo and hydraulic generators, electric locomotives, the most complex sets of machinery for automating and mechanizing agriculture, explosion-proof electric equipment for the mining industry and many others. New in principle products, complexes and devices were shown at the exhibition demonstrating continuous progress in this industry. For example, a cryogenic turbogenerator -- a prototype of powerful electric power sources of the future, a thyristor conversion bridge for transmitting 1.5 million DC volts, an automated complex for controlling a nuclear electric power control plant, etc.

Various versions of electric motors were exhibited: such as those with higher starting torques, with higher slipping, multispeed, with built-in temperature protection, specialized for various ambient conditions, narrow-specialized, etc. Among them were shown general purpose AC electric motors with powers of up to 400 kw which are the basic electric drives in many production processes. They determine the level of electrification, mechanization and automation of production at any enterprise. Series 4A electric motors are designed for nominal voltages of up to 660 volts, have a height of 50 to 355mm of the rotation shaft and powers from 0.12 to 400kw at 1500 rpm.

The TVV-1200-2UZ turbogenerator shown at the exhibition is designed for generating electric power when connected directly to a steam turbine. The generator is manufactured with a hermetically sealed enclosed housing; the stator winding is water-cooled, while the core and the winding of the rotor are cooled by hydrogen. Recording and signaling devices are used for the automatic monitoring of the most important units. The resistive power of the generator is 1.2 million kw, its voltage is 24,000 volts, it turns at 3000 rpm, has a 90 percent efficiency, its dimensions are 14975 x 6400 x 5500mm and it weighs 610 tons.

A considerable achievement in the development of experimental research is the creation of a mobile ASI-TG automated complex for testing turbo and hydraulic generators under operating conditions at electric power plants in normal and operating modes, under emergency situations, as well as in transition processes. The measurements of electric, magnetic, heat, vibration and mechanical values that determine the condition of various members of the structure of the machine as a whole, are made in accordance with the indications of sensors located on the generator. The system consists of signal converters, analog and digital converters, computer data input-output devices, and an external magnetic disc memory.

The ASI-TG equipment makes it possible to automate mathematical processing of the test results and obtain them in a form convenient for analysis. The speed of the system is 150,000 operations/second, a permanent memory consisting of 16,384 24-digit words and a working storage consisting of 8192 words.

The hydraulic generator for the Sayano-Shushanskaya GES is a special design electrical machine (640,000 kw). It is equipped with an independent thyristor excitation system with a power source consisting of an auxiliary generator located on the same shaft as the main generator. The central controller of the active load controls the frequency and power of the GES mode of operation automatically.

The controller is a closed automatic system with a feedback, which includes power and frequency regulators. Signals about unplanned changes in the load are processed very rapidly, while the task on the planned power is processed relatively slowly, which evens out the steps in the planned load schedule.

Signals are sent to the controller from the plant control panel or from the automatic emergency system, and over remote communications channels from regulators of the entire power system.

Problems are being solved successfully in the USSR on developing specialized high productivity electric equipment for drilling petroleum and gas wells. New in principle kinds of electric equipment were exhibited -- electric drills, deep-well telemetering systems and electric vibrators. Drilling deep vertical, sloping and horizontal-branched wells is done efficiently by electric drills with a fully automated process in the optimal mode. The data on the drilling process, the geometrical parameters of the well shaft and the technological parameters of the process are obtained from a special deep-well telemetry system. The E-164-8-V5 electric drill for sinking deep vertical and sloping wells consists of a motor and spindle; it is equipped with a current conductor and current collectors. Depending on the technological requirements, the electric drill includes a telemetry system, a curving mechanism and a reducer. The specifications of the electric drill are: 65kw; feed voltage -- 1050 volts; current -- 93 amperes; rpm -- 675; drill diameters 188 and 190mm; dimensions -- 164 x 12,400mm; weight -- 1650kg.

The modern stage of scientific engineering progress is characterized by automation of production on the basis of a wide use of the latest achievements of electrical equipment and computer techniques. An example of this is a V5/40 automated electrical equipment complex of a "2400" hot strip mill. The complex automatically controls the electric motors of the machines and the rolling process. The complex consists of a general purpose computer, sensors of automatic regulation systems, elements of an electronic automatic control system and power thyristor converters. The use of ASU [Automatic Control System] by the mill raises its productivity and improves the quality of the products. The mill productivity is 8 million tons/year, rolling speed is 35 meters/second and the total power of the electric motors is 300 megawatts.

The V5/40 complex may be used efficiently in blast furnace production, at nuclear, thermal and hydroelectric power plants and in many other systems for controlling technological processes or large facilities where continuous operation is required.

A special section of the Soviet exhibit tells about the use of electric power in the processes of melting and processing metals. High productivity electric furnaces of Soviet manufacture are distinguished by high reliability and a high degree of automatic control of the technological processes. The choice of optimal parameters of the designs of various electric furnaces is done by a computer.

The EShP-0.25VG-I1 furnace with a productivity of 0.2 tons/hour is designed to produce high quality ingots and castings of intricate shapes from structural, stainless and heat-resistant steels; the OKB-1556 plasma steel-melting electric furnace melts medium-alloyed and high-alloyed steels with

a carbon content of up to 0.03 percent. Three thyristor power sources and a system of automatic power control provide stable operation of the plasmatrons.

The electrical equipment industry manufactures reliable high efficiency equipment for all known methods of welding any materials. The plasmatrons shown in the exhibit can weld, cut and build-up practically all metals at various pressures.

PVR-402-U4 plasmatron is used for mechanized cutting of metal. Air serves as the working gas. The high speed of cutting in combination with its quality makes it possible to reduce to a minimum the deformation of parts and reduce considerably the productivity of labor. The plasmatron is designed for a nominal current of 400 amperes; the greatest thickness of the cut metal is 160mm; air consumption is 1.1 to 7.8 liters/second and the cooling water consumption is 0.07 liters/second.

The multiarc plasmatron automates the welding process and does it at high speed. This raises the productivity and quality of welding. Inert or active gases are used for forming the plasma. The greatest total power of the three arcs is 110 kw and the total consumption of the plasma forming gas is 0.2 liters per second.

The plasmatron with magnetic control welds metal automatically with an arc deformed by a magnetic field. The arc with an elliptic cross section and with a highly stable spatial position improves the formation and quality of the seam zone and increases the depth of fusion. The highest current strength is 700 amperes; the gas consumption for forming the plasma is 0.1 liters/second; for protection -- 0.5 liters/second; the consumption of cooling water is 0.2 to 0.3 liters per second.

The theme "Electrical Equipment to Transport" was demonstrated at the exhibition with interesting exhibits. Equipment for materials handling and warehouse transportation work was represented by electrical stackers with individual wheel motors to provide the necessary maneuverability of these machines in the narrow aisles of warehouses.

The ETGA-0251 electric tractor with programmed control operates on flexible automatic transport systems in shops and warehouses. It transports various groups over closed branched routes and stops in accordance with a given program. The tractor also has a device for manual control. The chassis has three wheels; the front wheel is driven, while the rear wheels are drive wheels with individual motors. The coupling between the tractor and the trailers is automatic. The basic data of the tractor is: tractive effort -- 100 to 200 kg-force; load weight -- 5000 kg; speed -- 1.8 to 3 km/hour; slope that can be overcome with a 5-ton load (in a length of 12 meters) -- $1.5^{o}$; power of electric motors -- 2 x 1.3 kw; dimensions -- 1980 x 900 x 1310mm; weight -- 900 kg.

EP-1003 and EPK-0805 electric loaders with load capacities of 1000 and 800 kg have a three-wheel chassis with individual motors on the front wheels; the rear driven wheel can be turned 90° to each side. The electric loaders are used for loading and unloading heavy containers and RR cars. They are equipped with a mechanism for shifting forks 140mm to left and right. The maximum load lift is 3 meters. The EP-1008 electric loader with a load capacity of 100 kg with a four-wheel chassis has front drive wheels. This loader (with forks turning 180°) can stack loaded pallets in front, to the right and to the left. The load capacity of the loader can be increased to 1250 kg when loads are handled to the right and left of the loader. Its speed when loaded is 16km/hour and it can overcome a slope of 7° (in a length of 12 meters with a nominal load).

The ESh-186 electric stacker is designed for materials handling, transporting and stacking piece goods on pallets in warehouses with narrow (1.4 m) aisles between racks. The load-lifting mechanism can place the load into the rack cells to the right and left without turning the machine. The specifications of the stacker are: load capacity -- 500 kg; highest lift of load -- 4.5 meters; speed (with load) -- 7km/hour; speed of lifting load -- 0.15 meters/second; time for moving fork 180° -- 10 to 15 seconds; it can overcome a slope of 5° (in a length of 12 meters with a nominal load); power of motors: for travelling -- 2.3 kw, for lifting -- 2 kw; dimensions (with a drawn-in hoist and released forks) -- 2235 x 1200 x 2090mm; weight -- 2300 kg.

Thousands of cranes operate in various sectors of the national economy of the country.

The PSM-80-92 magnetic controller shown at the exhibit makes it possible to regulate the load-lifting capacity of the electromagnetic crane.

It contains a statistically controlled current converter and relay-contact apparatus for controlling the load-lifting electromagnets. The magnetic controller may operate at a height of up to 200 meters above sea level. The nominal feed network voltage is 380 volts, 50 Hz, and the nominal current is 80 amperes; the range of regulation of the rectified current is 1:8; the relative time of connection is 50 percent; the dimensions are 1600 x 700 x 400mm.

In recent years, the Soviet electric equipment industry supplied complete sets of devices for the control and regulation for various sectors of agriculture. These electric devices automate machines and processes comprehensively in grain and fruit warehouses, in hothouses and mixed feed shops, silos and mineral fertilizer warehouses, at animal husbandry and poultry farms and other facilities. The use of complete sets of devices for control and regulation facilitates actively the changeover to an industrial basis of the production of grain, meat, milk and other agricultural products.

A complete set of devices for controlling the electric motors of technological lines for preparing and distributing feeds provides for the mechanization and automation of laborious processes at animal husbandry farms and complexes for meat production.

Complete sets of devices are manufactured in the form of cabinets and control panels with chemical coatings; their dimensions are 4000 x 1800 x 600 mm and they weigh 900 kg.

The 25th party congress set before the electric equipment industry an important problem -- develop at a rapid rate large electric machines, low power electric machines and high voltage electric apparatus. In 1980, it is planned to generate 1340 to 1380 billion kw-hours of electric power. The achieved industrial successes provide the assurance that this problem will be fulfilled successfully.

The exhibits of the socialist cooperation countries were distinguished by their great variety. They are also a graphic demonstration of the high rate of development of the electric equipment industry in these countries.

The Hungarian People's Republic showed equipment for manufacturing cables, devices and units for the R-10 computer, etc.

The German Democratic Republic demonstrated the famous URZAMAT K4000 system used for automation in various industries.

Enterprises of Czechoslovakia exhibited electric motors, transformer substations, welding devices, etc.

The Polish People's Republic showed equipment for automatic regulation and control of production processes and monitoring-metering devices. The "Elektrotekhnika" foreign trade enterprise of Bulgaria exhibited communications facilities, power cables, etc.

Exhibits of Romania, Yugoslavia and other countries were also interesting.

The "Elektro-77" exhibition will facilitate, without doubt, the expansion of trade, the exchange of electrotechnical products and, what is especially important, the exchange of experience and the further progress of electric equipment.



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CONQUEST OF SAMOTLOR PETROLEUM FIELD

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Sep 77 p 2

[Article by F. Arzhanov, chief of the Glavtyumenneftegaz, winner of Lenin Prize (Tyumen')]

[Text] In characterizing the natural conditions of the Samotlor petroleum field, it is sufficient to say that practically all of its territory is swampy. There are over 2000 lakes with an area of several tens of square kilometers. The bottoms of these lakes are unstable and peaty and, therefore, not firm enough for engineering structures.

World and domestic practice had no experience available of industrial assimilation of such territories and only recently no one knew how to build petroleum facilities under such conditions, and how to bring in people and freight. When to this are added low winter temperatures, snowstorms and marshes that do not freeze, and in the summer -- heat, blood-sucking flies and impassable quagmires, a complete absence of cultural and social-personal service facilities, it becomes clear how complex the solution of assimilating Samotlor was. For comparison, it is sufficient to say that at one of the largest petroleum deposits at Prudhoe Bay in Alaska where the natural conditions are similar, and which was discovered at the same time as Samotlor, industrial production of petroleum began only this year.

The combination of difficulties, if the field were assimilated by traditional methods, would require colossal expenditures of labor and money and posed the question of whether the cost was justified?

At present, Samotlor is not only assimilated, but has reached the rated output in unusually short time even for fields with favorable natural conditions. This was achieved due to the development and introduction of large scientific-engineering solutions made possible as a result of creative cooperation between specialists of various industries involved directly in assimilating the deposit. The result of this cooperation was the efficient solution of all primary problems involving the comprehensive planning of all the industrial systems, the development of new design and technological solutions of building facilities and pipelines, and the creation of organizational forms for their fulfillment.

The expediency of the comprehensive planning of all systems in building up the field was determined by the unprecedented high cost of construction and the complexity of its subsequent operation. Thus, for example, the cost of building a kilometer of road was 15 to 20 times greater than in the middle belt of the country. All of this predetermined a considerable interrelation between the systems and the effects of the special features of the territory of the field on the formation of the systems themselves.

As a result, principles were formulated for the first time in domestic and world practice, and theories and methods were developed for their realization, that made it possible to consider accumulating, transporting petroleum, its industrial preparation, systems for maintaining seam pressure, highways, electric power transmission lines and communications not as independent autonomous systems, but as subsystems in a complex of structures above ground located on the nonhomogeneous territory of the deposit.

Comprehensive planning made it possible to reduce considerably the number of petroleum-field facilities and the length of pipelines, and not only obtain planning solutions close to the optimal, but also create conditions for realizing in further planning such methods as the maximum concentration of structures on one area, the construction of all pipelines in a common "corridor" with the highway, and the creation of conditions for stage by stage development of capacities with a minimum of the expenditures in the early stages.

Raising the rate of building up the field, insuring simultaneously minimum expenditures for its assimilation, was assumed as the criterion in searching for new solutions. The development of new solutions, many of which were inventions, made it possible to raise considerably the rate of assimilation and build up the field facilities all year around by using industrial methods. Among such solutions the following can be mentioned:

differentiated use of methods for building pipeline systems under various natural conditions using the supporting properties of peat in marshes; laying pipe by gravity in lakes and bogs; laying pipe in trenches formed by blasting, etc.;

a complex of measures for building petroleum field roads (which is of major importance for the territory of the field, where natural conditions precluded the possibility of passage of even special four-wheel drive vehicles), consisting of wide utilization of peat as the road base, building up the pavement in stages with prefabricated reinforced concrete, and a number of other solutions which made it possible to accelerate the construction of roads in the petroleum field;

utilizing multistage build-up and above ground methods for laying pipelines on the site, and using weak soil, previously considered unsuitable, reduced considerably the area and volume of work in assimilating the field.

A new in principle approach to building up the petroleum field also required an improvement in the organizational structure of construction subdivisions so that the work could be done in the shortest time.

How can the efficiency of the new engineering solutions introduced in the assimilation of the field be characterized? First of all, it is the unprecedented short time, only 9 years, since the start of the work and reaching the rated petroleum output. We may recall that under more favorable natural conditions in our country it usually took 15 to 20 years to reach the maximum approved production of petroleum in the petroleum fields. This means an additional 130 million tons of petroleum. And, finally, this theory and practice and experience of industrial assimilation of such a complex territory is used widely today at other fields of the country.

All of this placed the paper "Development and introduction of new highly efficient scientific-technical and engineering solutions for assimilating the 'Samotlor' petroleum field in a short time," among the papers worthy of the award of the USSR government bonus.

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TURBINES FOR GAS PIPELINES

Moscow PRAVDA in Russian 16 Sep 77 p 2

[Article by N. Zorev, general director of the TsNIITMASH [Central Scientific Research Institute of Machinery-Manufacturing Technology] Scientific Production Association, corresponding member of the USSR Academy of Sciences (Moscow)]

[Text] Natural gas flows continuously day and night through powerful pipelines. It is needed by cities and settlements, plants and electric power plants, chemical industry enterprises and other industries. By the end of the five-year plan period, the country will obtain over 400 billion cubic meters of gas. The need for gas pipeline mains keeps growing constantly. Their length already exceeds 100,000 kilometers.

For gas to move through the pipes, it must be pushed. Pump stations with gas turbines are used for this purpose.

Vanes are the main working members of a turbine. Being in the very hot gas flow, they are subjected to high centrifugal and aerodynamic forces, vibration, thermal stresses and high temperatures. Therefore, when the problem was posed before power machine builders of creating reliable, long operating life turbines, it was necessary, first of all, to find a material suitable for manufacturing vanes.

Today, materials are available which are strong, can withstand high temperatures, are not oxidized and are not subject to corrosion. But specialists know that there are no materials which could be universal materials suitable for operating under all conditions. Everything must be "paid for." For hardness -- by fragility, for plasticity -- by strength, for heat resistance -- by complexity of machining.

Alloys of many components are selected to obtain metals with the needed properties. Years of labor by researchers pass in searching for solutions. Only materials that are able to withstand high temperatures, speeds and pressures make it possible to create very efficient machines.

After many years of theoretical and experimental research, domestic specialists and scientists developed the basic principles for alloying heat resistant materials. Alloys and steels were created on their basis which have long-term stability in the very hot gas flow -- at high temperatures and stresses. Made by the method of vacuum arc remelting, the metal is almost free from harmful admixtures.

But independently of the chemical composition and the degree of alloying, the structure of metal becomes inhomogeneous when made into forgings and stampings, and a so-called "grain size variation" originates. It reduces the heat resistance and the plasticity of the material sharply. This is one of the main causes for premature destruction of turbine parts.

The structure of alloys deteriorates with time at high temperatures and its nonuniformity interferes with the full utilization of the heat resistance reserve of the metal and raising the life of the products.

Investigations by scientists and specialists of power machine building, the improvement in the technology of plastic deformation and heat treatment made it possible finally to reduce the variation in the grain size. For many years, metallurgists of turbine plants of the Ministry of Power Machine Building jointly with the staff workers of the Central Scientific Research Institute of Ferrous Metallurgy imeni I. P. Bardin and of the TsNIITMASH, have investigated the formation of a uniform structure of heat resistant materials after deformation and heat treatment. As a result, they created a technology for plastic deformation and heat treatment of heat resistant materials which can fully eliminate variations in the grain size of the materials.

Today, there are hundreds of thousands of turbine vanes, made in accordance with the new technology, operating in gas turbines at pumping stations in our country. Power machine builders guarantee the life of the vanes one and a half times greater than before. Mass produced GTK-10 and GT-6 turbines were awarded the government emblem of quality. This fulfills one of the points of the 25th party congress directives -- raise considerably the life of the manufactured gas-pumping machines and increase by 2 to 3 times the period of their operation between repairs.

Progressive technology already in use for a long time saves the national economy 4 million rubles annually for two types of gas-pumping machines alone.

One hundred megawatt gas turbines also passed the test successfully. The creation of turbines with one and a half times greater power than before was made possible by new heat resistant materials, and the development and use of a progressive technology of large-series production of high quality vanes.

The introduction by the creative collective of a new technology for manufacturing vanes for gas turbines with a long service life has merited

presentation for competition for the government bonus of the USSR for 1977 in the field of science and engineering. In our opinion, this work deserves a high evaluation. The novelty and industrial expedience of the investigations are also substantiated by the fact that 10 technical solutions were covered by patents.

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PROBLEMS HAMPER KOMI DEEP-DRILLING

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 20 Sep 77 p 1

[Article by the Deep-Drilling Expedition of the "Komigazprom" Association: "Measure of Demand"]

[Text] It is the property of man to think back over the past and check what he has done today by the experience of yesterday. My yesterday was super-deep well No 38 at Vuktyl. According to geologists, under its rich seams which produce billions of cubic meters of gas today, must be a reserve still richer. And our well No 38 six kilometers deep should have confirmed this. It is hardly necessary to say how much it meant.

Over 5 years of work was spent on drilling the super-deep well. We proved that Vuktyl is the richest "Layered pie." Yet, I have no feeling of satisfaction. Our well (sinking it, by the way, cost 7 million rubles) was hopelessly sick. In other words, the gas workers cannot convert it into an operational well, no matter how much they wish it. The well is "crushed" by too heavy a solution. Besides, 600 meters of pipe remained in it.

Why was the road into the ground so difficult? Why did not the great expenditures of money and time produce the desired results? The answer can be only one -- a lack of responsibility on our part and on the part of engineers who were in charge of drilling. Here is just one example. It is well known that the deeper the well, the heavier the drilling pipes. For considerable depths, so-called light-alloy aluminum pipes are used to reduce this weight. Yet, when the drilling was nearing its end, instructions were issued to lower steel pipes. This meant a "superfluous" 90 tons on the hook. This resulted in a serious accident -- hundreds of meters of pipes fell into the well.

It is said -- if you want to understand a man, put yourself in his place. I am trying to put myself in the place of the engineers of our prospecting expedition who issued such instructions. First of all, I would get the advice of the foreman. But they did not deign to ask either me or other drillers. All of this demonstrates low technological discipline and a poor sense of responsibility.

I am sure that readers of the SOTSIALISTICHESKAYA INDUSTRIYA will understand me correctly. I am not talking about individual cases or shortcomings. It is in the demands that we make of ourselves, the responsibility for the entrusted work, and in how costly the smallest "weakness" in technological and production discipline can be to the government. This is what L. I. Brezhnev had in mind when speaking at the 16th trade union congress: "... today, the harm from each infringement, each disruption of the labor, planning and technological discipline increases incredibly. It is like comparing losses due to the poor work of an earth digger who is equipped with a spade and wheelbarrow, with losses due to the idle time of an excavator."

I can illustrate these precise and profound words with examples from the life of our deep-drilling expedition. Here, for example, is deep well No 1 on the Kapitanskaya site. It was "lost" at a depth of 3400 meters due to poor management of the drilling brigade. The drill was flushed there and the pressure began to fall. "What to do?" inquired the drillers. "Drill!" was the instruction from the expedition, without looking into the situation. The result -- an accident. The pipes remained in the shaft and the well was "liquidated for technical reasons" -- this is what it is called in operation. Yet, it cost the government millions of rubles. And nobody was held responsible for that.

Patrakovskaya is another important well. Here, due to the obvious negligence of the drill brigade itself, a column was "unscrewed" and almost ruined the work. However, as soon as foreman Mikhail Grigor'yevich Zimin came, the work of the collective began suddenly to run smoothly. This man is distinguished by respect for his work, a high sense of duty, a skill in organizing people and leading them. This means that much depends on the leader.

Many other such examples can be cited -- all of them speak about the same thing: our smallest infringements, disrespect for order, not to speak of serious discipline violations, personal, as well as production, cause huge losses to the government. That is why, when our drilling brigade was sent to drill the super-deep well No 41, I said to myself: the history of No 38 shall not be repeated.

I began with sharply raised demands on myself and on subordinates. Some people consider this as scolding and turning the screw. But this is not so. High demands do not mean ignoring others. I think that making people co-authors of one's good motives, one's decisions, is a pledge of conscious discipline. That is what I am trying to do.

The drillers were convinced by their own practice of how very important strict technological discipline is. But to observe it requires the persistence and will of the foreman and of the engineers-technologists. I will cite the work of Vladimir Soldatenko's shift. Once they completed drilling and raised the tool. It was necessary to change the drill. I came up to them and advised them on the new drill to use. I went about my business and

heard knocking. The tool was turned by striking a rotor. Again I run to the well. They are ready to lower the tool.

"How was the drill screwed on?" I asked the driller.

Soldatenko dropped his eyes. "We struck it a little bit," he replied. But nothing happened." Today, it may be all right, but tomorrow the drill will be left in the well. And this is an accident which takes several days to take care of and moral and material harm is unavoidable. Therefore, I issued an immediate order: unscrew and change the tool.

Or say, an adaptor was brought over to the drill rig. This is a device with threads for changing over from one diameter pipe to another. Obviously, at great depth under heavy loads it might fail. It was taken off and sent back to our shop. "What special requirements has Glinskiy?" complained the repairmen. We invited them to the drill rig. They looked around, were convinced of their errors and began to do their work more conscientiously.

Speaking of the better and good days of my brigade, I do not mean to lecture others -- do as we do and not otherwise. Each foreman or brigade leader may have his own methods.

Once, at a meeting of drill workers, diesel operator Petrov from Zagorodniy's brigade reproached us: "There are no violations of labor discipline at Glinskiy's brigade because violators are covered up."

I can understand easily my friends, rivals in the competition. They lose 4 to 5 men a year from the brigade for various reasons. We have not lost even one recently. We have a different approach. They simply try to get rid of undisciplined people, while we try to straighten them out ourselves, working on them collectively, but do not permit even one violation. If every collective would drive out all violators and not retrain them, what would we achieve? These workers will leave us not having learned anything. They will go to others with the same habits and the same baggage.

In a word, one may argue about approaches and methods for training responsibility and discipline. But foreman and brigade leaders to whom I primarily address myself today will understand me, I think the reserves of our successes here are the state of labor discipline and the demands that we make on ourselves and others.

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## BRIEFS

UNDERGROUND OIL PIPELINES--From the starting routes of the Minneftegazstroy [Ministry of Petroleum and Gas Construction] comes comforting news on the eve of the sixtieth anniversary of the Great October Revolution. The traditional torch is just about to flare up to announce the end of work on the 950-kilometer gas pipeline of Nizhnevartovsk-Parabel'-Kuzbass. Filling of the 456-kilometer section of the oil pipeline Ust'-Balyk-Chimkent is being completed in the Omsk-Pavlodar area. A powerful petroleum pumping plant has been put into operation in Kuybyshev. Its operation significantly increased the oil supply along the recently leased 1089-kilometer pipeline Kuybyshev-Lisichansk. At the international CEMA construction, the Orenburg-USSR western border gas pipeline, welding of 2,300 kilometers of pipes has been completed, thus advancing the deadline by three months. There are now over 170,000 kilometers of pipeline in the USSR. Over 80 percent of the cities and major settlements and 70 percent of the villages and countryside have been converted to gas fuel. Over 160 million Soviet people have been provided with the most inexpensive and modern type of fuel. In metallurgy natural gas is used to produce 88 percent of the steel, 86 percent of the pig iron and 25 percent of nonferrous metals, while in the building industries 61 percent of the cement. [Excerpt] [Moscow IZVESTIYA in Russian 6 Nov 77 p 1] 9035

OIL DRILLING IN SIBERIA--Four million tons of oil above the plan have been extracted on the eve of the sixtieth anniversary of the October Revolution in the Turkmenskaya oblast oil fields. The Siberians fulfilled their obligations ahead of schedule. The drillers made a ponderable contribution to the unprecedented success. They constructed over three million meters of operating wells. Derrick assemblers, transport workers, geophysicists and builders help them achieve the rapid pace. The main portion of the oil exceeding the plan is extracted in Samotlor which is being worked by the collectives "Nizhnevartovskneft'" and "Belozerneft'". Here the work is well-organized and the socialist competition is intense. The experience of the people of Samotlor helps all the oil men of western Siberia to successfully solve the worthy tasks. In the anniversary year the country will obtain not less than 210 million tons of "black gold" from the Tyumen' oil fields. The task for two years of the five-year plan will also be completed ahead of schedule by 18 December. Before the end of the year the collective of Glavtyumenneftegaz will extract from the depths of the earth hundreds of thousands of tons more of fuel above the plan. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Nov 77 p 1] 9035

SURGUT-KHOLMOGORODSKIY OIL FIELD--Construction has begun on a new power bridge. This high-voltage line stretches 175 kilometers and is one of the most complex lines which the builders had to construct here. Nevertheless they have been obliged to set up the LEP [electric power transmission line] for industrial loading not at the end of next year as envisaged by the program, but already in April. [Text] [Moscow IZVESTIYA in Russian 11 Nov 77 p 2] 9035

ELECTRIC LINE IN TYAN'-SHAN'--Two months ahead of schedule the 46-kilometer electric power transmission line which has been laid through the steep pass Koko-Meren in the very heart of Tyan'-Shan' was set up for industrial loading. On the eve of the anniversary of the Great October Revolution the current was fed along it to dozens of stock farms, shepherd winter abodes and grain threshing floors of the Dzhumgal'skiy region located over 3,000 meters above sea level. The new LEP will put into operation powerful pumping stations for irrigation of virgin soil areas. With the emergence of the Toktogul'skiy GES onto rated capacity and the start of the first aggregates of the Kurpsayskiy GES the use of electrical energy in the agriculture of the mountainous region will increase almost twofold. [Text] [Baku BAKINSKIY RABOCHIY in Russian 5 Nov 77 p 2] 9035

OIL DRILLING IN GORYACHEVODSK--The drillers of the Goryachevodsk administration "Grozneft'" have uncovered a deep oil bed. In competing for the completion ahead of time of the second year of the five-year plan the drillers of Goryachevodsk achieved a reduction in the cost of each meter of penetration by 40 rubles and for the year over a million rubles of pure profit were obtained only because of this saving. [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 5 Nov 77 p 2] 9035

REMOTE-CONTROLLED ORE LOADING--At the largest mine, No. 57, industrial tests have been made of a set of radio equipment which helps to implement remote control of ore loading. Deep below the ground there are ore masses which yield rich polymetallic raw materials after agitation and firing. With the new progressive technology of mining ore loading occurs without the presence of people in the extracting hole. This promotes safety in the miners' work and increases their productivity. Today the powerful loading machine "PMB-4" which is controlled by radio from a special portable panel insures more complete and pure extraction of broken ore. [Text] [Moscow IZVESTIYA in Russian 6 Nov 77 p 1] 9035

GAS EXTRACTION--On the eve of the sixtieth anniversary of the Great October Socialist Revolution the groups of workers in the gas and petroleum industries and the builders in the enterprises of these branches have achieved a great victory--two months ahead of schedule they achieved a daily extraction of gas in volume of one billion cubic meters. The gas industry is developing at a rapid rate. In the last ten years gas extraction has increased 2.2 times and in 1977 was 346 billion cubic meters. Gas occupies an important place in the country's fuel balance, increase in production efficiency and improvement in the everyday conditions of the population. The country has built the world's largest gas transport system extending over 100,000 kilometers. In Orenburgskaya oblast a large gas complex is operating to extract and reprocess gas. The extraction of gas in western Siberia, Turkmen and other gas-extracting regions of the country has significantly increased. [Excerpt] [Moscow TRUD in Russian 3 Nov 77 p 4] 9035

TUNNELING WITHOUT BLASTING--Specialists of the All-Union Scientific Research, Planning and Design Institute [VNIPKI] of mining machine construction have created the combine "1KV1" for uphill underground tunneling. The aggregate permits the unproductive blasting method in which the driller is exposed to the action of vibration, noise and dust to be abandoned. Now the operator uses remote control of the machine. The new method will become widespread: the Yasinovatskiy machine construction plant in the Donetskaya oblast will begin serial production of machines for uphill underground tunneling without blasting in 1978. [Excerpt] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 Oct 77 p 2] 9035

REMOTE CONTROL IN GES--A remote control system has been put into operation for the running of the Toktogul'skiy GES. The largest hydroelectric power plant in Kirgizia has been equipped with a set of new apparatus manufactured by the Leningrad plant "Elektropul't". The innovation has significantly increased the stability of voltage, frequency and strength of the current transmitted on the LEP [electric power transmission line]. Control over the supply of electrical energy is being improved in other republics of Central Asia. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 44, Oct 77 p 6] 9035

ELECTROCONTACT WELDING--A unit for electrocontact welding of pipes 1,420 millimeters in diameter, "Sever-1" has begun to operate at the construction of the gas pipeline Urengoy-Surgut-Chelyabinsk. It consists of an automatic welding machine, mobile power plant and auxiliary equipment. The very first day of operation confirmed the high productivity of the mechanisms: the work of two enlarged brigades of welders was accomplished. "Sever-1" will be used in complex areas of gas pipeline construction. [Text] [Moscow PRAVDA in Russian 9 Nov 77 p 2] 9035

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MANPOWER

## LABOR RESOURCES AND RURAL SOCIAL DEVELOPMENT DISCUSSED

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 8, Aug 77 pp 77-81

[Article by P. Feshchenko and Ye. Yakuba, candidates in economic sciences: "Labor Resources and Rural Social Development"]

[Text] Recently there has been a stable tendency in our country toward an upsurge of the productive forces in agriculture which is the result of the realization of the party's agrarian policy which is aimed at "transforming agricultural production into a highly developed sector of the economy."1

Scientific and technological progress, industrialization, and the specialization and concentration of agricultural production not only improve the material and technical base and increase labor productivity, but also lead to important socio-economic changes in the village: to a lifting of the level of the socialization of production, the development of two forms of socialist property, and the elimination of essential differences between agricultural and industrial labor. In this connection, agricultural labor becomes more attractive, the chief productive force -- labor resources -- is improved, and workers become more active in their work. Thus, compared to the years 1966-1970, the number of man-days which were worked by a single able-bodied kolkhoz worker employed in public production on the kolkhozes of the Ukrainian SSR increased during the years of the Ninth Five-Year Plan by 12.1 percent, with a 9 percent increase for men and a 14.4 percent increase for women. There was an appreciable increase in the labor activeness of agricultural mechanization experts. While in 1966-1970 a mechanization expert worked 227 man-days on a kolkhoz annually, in 1971-1975 the figure was 250 man-days.

Parallel with the increased labor activeness of the kolkhoz workers, there is a change in their occupational and skill composition and an improvement of the social structure of the village. With scientific and technological progress and the industrialization of agriculture the change in the occupational and skill structure of agricultural workers is accompanied by an increased proportion of those working with

machinery and a rise in the role of mechanized labor. Nowadays the proportion of tractor operator-mechanics, combine operators, and drivers comes to almost 14 percent, while the proportion of outlays of mechanized labor in the total amount of labor investments in kolkhoz production increased in 1971-1975 by 3.2 points compared to the previous five-year period.

At the same time as the changes are occurring in the structure of the labor resources of the kolkhozes a process of an absolute and relative increase in the number of people employed in agricultural labor on the sovkhozes is taking place. During the last ten years alone the number of workers at the republic's sovkhozes, auxiliary, and other state agricultural enterprises increased by 239,000 people, or by 21.4 percent.[2] The increase in the size of the working class in the village is a progressive socio-economic phenomenon which is promoting the social homogeneity of a socialist community of people, the smoothing over of the differences between town and country, the overcoming of survivals of the past in the consciousness of people, and the establishment of new initiatives in the socio-economic transformations of the Soviet village.

With the development and acceleration of scientific and technological progress in our planned agricultural production there is an ever growing need for highly skilled labor. The use of complex machinery has been increasing on the kolkhozes, sovkhozes, and inter-farm associations, overall mechanization and automation is being introduced, there is an extensive use of chemicalization, land improvement, and industrial technology, and the scope of production has been increasing. As a result of this, the number of skilled engineering and technical and mechanization personnel has been increasing. During the last ten years the number of tractor operator-mechanics, combine operators, and drivers has increased on the kolkhozes by 27.1 percent, while on the sovkhozes there has been an increase in their numbers of more than 1.5 times. However, as a result of the intensive exodus of mechanization experts from the village to the city many of the republic's sovkhozes and kolkhozes are experiencing a shortage of mechanization and skilled worker cadres. Frequently the influx of equipment onto the kolkhozes and sovkhozes outstrips the replenishment of mechanization cadres with young specialists who have finished vocational and technical and agricultural mechanization schools. Young, technically skilled cadres have not yet been made sufficiently permanent on the kolkhozes and sovkhozes. And only every fourth tractor operator-machinist and combine operator has a 1st class qualification.

The efficiency of agricultural production depends to a substantial extent upon supplying it with competent and highly educated specialists and with erudite production leaders. At the present time 65 percent of our kolkhoz chairmen, 90.3 percent of our sovkhoz directors, 47.9 percent of the chief specialists on kolkhozes, and 74.8 percent of the sovkhoz chief specialists have a higher education. However, 39.4 percent

of our engineering, technician, and repair workshop manager jobs and 60.6 percent of the jobs of production team team leader in cropping and animal husbandry on the republic's kolkhozes and sovkhozes are occupied by practical workers. In many areas there are not enough zootechnicians, power engineers, and economic service specialists.

The republic's agriculture possesses definite potentialities for releasing labor resources for other branches of material production and for the service sphere.

The release of workers from kolkhoz-sovkhoz production is occurring basically in two directions: their transfer to non-agricultural branches, inter-farm associations, and agro-industrial complexes without a change in their permanent places of residence; and the migration of the rural population to the cities. With regard to the absolute number of workers who have been released, the former direction yields to the latter; however, its role in the social development of the modern village is immeasurably large. Practice shows that the siting of enterprises of the non-agricultural branches in rural agglomerates and, especially, the development of inter-farm cooperation and agro-industrial integration have a decisive role in solving the problem of the rational and highly effective use of the labor resources of the Soviet village and in the latter's social development.

The development of inter-farm cooperation is fostering an increase in the number of workers and employees in rural areas and is thereby pre-determining profound social transformations in the village -- qualitative changes in the class structure of rural inhabitants in the direction of an increased proportion of the working class, the social homogeneity of rural workers, the creation of a new type of family -- the worker-peasant family, -- and an improvement of social relations in rural areas.

Thus, when the Kalita pork production sovkhoz-combine was put on an industrial basis it became possible to improve the demographic situation in the villages of Kalita and Zavorychi. The rural youth established roots here, the rural population's birth rate increased, and the process of the reproduction of labor resources took on an expanded character. An industry like level of the mechanization and organization of production processes at agricultural complexes of the industrial type and housing, cultural and domestic, and other living conditions which are close to the urban level are important factors which are promoting an increase in the productivity of agricultural labor and its prestige and stimulating the permanent establishment in rural areas of competent young technical cadres, especially mechanization experts. "The training -- and most important -- the permanent establishment of cadres of mechanization experts in the village," L.I. Brezhnev said, "is an important sector in the work of party, government, economic, and trade union organizations."[3]

The development of specialization, concentration, and inter-farm cooperation presupposes an increase in the labor productivity of the workers of agro-industrial complexes and ensures the necessary increase in the volume of agricultural output with substantially smaller expenditures of live labor. K. Marx's assumption that "at a certain stage of development...the productivity of agriculture should increase relatively more rapidly than the productivity of industry"[4] becomes a reality. This becomes possible as a result of the introduction of qualitatively new types of labor which become manifest under the conditions of the synthesis of agricultural and industrial production. In addition, labor cooperation obtains the opportunity of operating on a higher level and with greater intensity, since it operates on a wider field of labor.[5]

Research shows that the replenishment of kolkhozes and sovkhozes with equipment is outstripping the growth of their skilled cadres and, consequently, a disproportion has been arising between these component parts of scientific and technological progress in agriculture. During the Ninth Five-Year Plan the number of tractor operator-mechanics and combine operators increased in the Ukrainian SSR by 12 percent, while the number of tractors increased by 17 percent. This tendency can also be seen in the Tenth Five-Year Plan: the number of tractors and trucks has doubled, while the number of tractor operator-mechanics and drivers has increased by 72.3 percent.[6] The republic's animal husbandry branches are supplied with machine-milking specialists only at the level of 25 percent, while the figure for machine and tractor pool repair specialists is 22 percent. In addition, the proportion of tractor operator mechanics in the total number of skilled agricultural cadres decreased from 52.6 percent in 1966 to 47.7 percent in 1975.[7] Under present conditions the specialist supply coefficient for the machine and tractor pool is 1.41 instead of the estimated 1.65, with the result that on the majority of farms this pool operates in a single shift.

Recently there has developed in the Ukrainian SSR a tendency toward an absolute and relative decrease in the number of rural inhabitants and the number of people employed in agriculture. In addition, the rates at which these processes have been occurring differ in the republic's different zones. Thus, in 1971-1974 the number of migrants per 1,000 rural inhabitants in the Steppe zone was almost twice as great as the corresponding indicator for the Forest Steppe and Forest zones, including 1.5 and 2.5 times, respectively, for departures and 2 and 3 times for arrivals. A high level of intensity in the population's migratory mobility is occurring in the urbanized suburban zones of the oblast and industrially developed centers of the Ukrainian SSR. More than 40 percent of the migration is accounted for by the republic's southern and steppe rayons whose characteristic feature is a growing strain on agricultural labor, and more than 30 percent is accounted for by the Forest Steppe zone with its moderate supply of labor power for

kolkhoz-sovkhoz production. The absolute amount of rural migration in the Forest zone and the Zakarpat'ye, where there are relative surpluses of labor resources, comes to less than 25 percent.

As a result of the fact that there have been more departing migrants than incoming migrants in the republic every year throughout the period which was being studied (1961-1975) there was a negative rural population migration balance which under the conditions of urbanization corresponds to the objective process of a decreasing number of rural inhabitants and the release of workers from the kolkhozes and sovkhozes due to an increase in the productivity of social labor.

However, in a number of regions of the republic the migration processes are insufficiently tied in with the supply level of agricultural labor resources, especially mechanization experts.

One of the reasons for the intensive outflow of rural population in the direction "village-city" is a desire to prolong studies in higher and secondary specialized educational institutions and vocational and technical schools, which is conditioned by the development of scientific and technological progress and the development of the individual under developed socialism. The organization of educational institution branches of a given profile on the basis of large agro-industrial associations, and the creation in the village of the necessary cultural and domestic and children's preschool institutions, public catering enterprises, and so forth can become a factor fostering the permanent establishment of mechanization experts, animal husbandry workers, and other agricultural specialists in rural areas.

The realization of social development plans in a number of the republic's rayons -- Krasnokutskiy Rayon, Khar'kovskaya Oblast, Bashtanskiy Rayon, Nikolayevskaya Oblast, Volnovakhskiy Rayon, Donetskaya Oblast, Goshchanskiy Rayon, Rovenskaya Oblast, Chernobayevskiy Rayon, Cherkasskaya Oblast, and others -- has ensured the achievement of major successes in the permanent establishment of rural youth in kolkhoz and sovkhoz productions. A substantial number of the graduates of the general educational schools of these rayons undergo practical production training on the kolkhozes and sovkhozes, remain on them to work, and, on assignment from agricultural enterprises, acquire the specialties they need in higher and secondary specialized educational institutions. Thanks to this, a tendency has developed here toward a favorable migration balance and toward the permanent establishment in rural areas of specialists in various occupations, and also of skilled workers.

As a result of the development of inter-farm agrarian and agro-industrial enterprises and associations in Ivano-Frankovskaya, Zakarpatskaya, and Krymskaya Oblasts, there has been a substantial decrease in the population outflow from rural areas. On a number of farms -- for example, on the

"Druzhba Narodov" and "Rossiya" kolkhozes in Krasnogvardeyskiy Rayon, Krymskaya Oblast, and others -- there is almost no outflow of the rural youth for the cities and all of the necessary conditions have been created for the work and rest of rural workers. More than 200 health resorts, rest homes, and pensions where rural workers spend their vacations and restore their health have been created in the republic on the basis of inter-farm cooperation and integration.

As in the country as a whole, there is a great dynamism in the development of the republic's productive forces and in the improvement of its production relations. A new type of worker is taking shape. Today's worker not only possesses the right to labor; now, as L.I. Brezhnev said in his report, "On the Draft Constitution of the Union of Soviet Socialist Republics," this right "is supplemented by the right to the choice of an occupation and type of studies and work in keeping with one's calling, abilities, vocational training, and education."

The new type of worker who is employed in agricultural production is characterized by an all-round agro-zootechnical and general economic training which is a necessary condition for the achievement of high production results. The special characteristics of agricultural production give rise to the necessity for a study by cropping and animal husbandry workers not only of the structure of equipment and of the technological specifications for its efficient use, but also of the agro-zootechnical principles of production a knowledge of which makes it possible to carry out a scientifically substantiated complex of methods in land care, crop cultivation, and animal raising.

Studies in the universities of agricultural knowledge which were created on a public basis in all of the rayons is the most widespread form of raising the level of the technical and economic knowledge of rural inhabitants. Along with vocational and technical training, they conduct extensive economic training for workers of all levels. Thus, for example, in Rostovskaya Oblast during the Eighth Five-Year Plan these universities graduated 7,600 farm executives and specialists, 4,000 team leaders and department managers, 5,000 accounting and bookkeeping workers, and 231,000 mechanization, animal husbandry, and field experts.[8] In addition, in order to raise the vocational level of workers with a secondary education 270 agricultural cadre advanced training schools have been created in the oblast at agricultural tekhnikums, scientific research institutes, and experimental and machine testing stations.[9] These schools are the largest mass form of advanced training: every year 75,000 people graduate from them, and there are also a large number of other forms. The positive experience of Rostovskaya Oblast in the training and retraining of agricultural cadres, particularly, mechanization experts, merits dissemination.

The worker of the new type who is employed in kolkhoz-sovkhoz production is also distinguished by a high level of political consciousness and

social activeness, devotion to his socialist homeland and to the ideals of communism, by a thrifty and zealous attitude toward our public wealth and an endeavor to constantly increase it, by socialist patriotism and proletarian internationalism, and by a readiness to struggle under the leadership of the Communist Party for the construction of a communist society.

The industrialization of agricultural production and the change in the character and content of the labor of rural workers is being accompanied by an improvement of cultural and domestic conditions in the village, by a process which is bringing them closer to the conditions of city inhabitants. The processes of the equalization of the inter-branch conditions for the reproduction of labor power is leading to a situation in which the levels of individual income from labor are drawing closer together. While in 1970 wages on the kolkhozes came to 52 percent of the wage level of sovkhoz workers and 34 percent of that of industrial workers, in 1975 the corresponding figures were 75 and 60 percent. Compared to the wage level of workers and employees in the economy as a whole, the wage level of kolkhoz workers has increased from 61 percent in 1970 to 65 percent in 1975 and it will rise to 70 percent in 1980.[10]

The equalization of inter-branch individual income levels by means of outstripping growth rates for agricultural workers is a law of the current stage of the social development of our country.

Under these conditions, socialist labor becomes increasingly fruitful and highly productive, gradually develops into an organic need of every person, and is characteristic for the formation of the Soviet way of life. "The Soviet way of life today permeates literally all of our daily work, life, and culture," V.V. Shcherbitskiy observed in his report at the All-Union Scientific and Practical Conference, "The Socialist Way of Life and the Problems of Ideological Work."

A process of the coming together of the social welfare conditions of city and village workers is also taking place. The same may be said about domestic conditions. Thus, in 1965 the level of domestic services per rural inhabitant in the Ukraine was 5.4 times lower than in the city, while in 1975 it was only 2 times lower. There have also been obvious progressive changes in the structure of the increasing consumption of other types of services.

As a result of the successes of socialist construction fundamental changes have occurred in our country which have affected all of the aspects of social life: the economy has changed beyond recognition, socialist property reigns supreme in the country, a single, powerful national economic organism is developing, and during the course of our economic growth the differences between town and country are being overcome.

In view of the fact that we attribute enormous importance to the material well-being of the workers, it is necessary to improve the system of collective material interest in final results and, in particular, to stimulate the quantity and quality of labor. Genuine and complete material stimulation and social development funds can be created through the joint efforts of enterprises; therefore, the social and economic development plans of the collectives of a region have to provide for the creation of funds for the improvement of populated points, gasification, road and cultural and domestic construction, the development of physical culture and sports, and so forth. All of this has to be combined with the planned realization of environmental protection measures, with an improvement of hygienic conditions at work, and with the creation of a wide network of health institutions and work and recreation bases for young people of school age.

An overall approach to the solution of the social problems of the village which is aimed at equalizing the living conditions of the urban and rural populations will optimize the amounts and directions of the rural population's migratory mobility and will guarantee the fulfilment of our program for the construction of a classless communist society.

FOOTNOTES


1. "On the 60th Anniversary of the Great October Socialist Revolution. Decree of the CC CPSU, PRAVDA, 1 February 1977.

2. "Narodne Gospodarstvo Ukrains'koi RSR v 1975 Rotsi, Statisticheskiy Yezhegodnik, Kiev, "Tekhnika," 1976, p 279.

3. PRAVDA, 4 September 1976.

4. K. Marx and F. Engels, "Soch." (Works), Vol 26, Part II, p 115.

5. Ibid., Vol 25, Part II, pp 194-195.

6. According to the data of the Scientific Research Institute of Economics of Gosplan Ukrainian SSR.

7. Ibid.

8. "Sovremennyy Etap v Razvitii Sel'skogo Khozyaystvo v SSSR" (The Current Stage in the Development of Agriculture in the USSR), Moscow, "Kolos," 1975, p 331.

9. Ibid., p 333.

10. Calculated on the basis of the data in the annual reports of the kolkhozes: "Narodnoye Khozyaystvo SSSR v 1972 Godu" (National Economy of the USSR in 1972), Moscow, 1973, pp 388, 516; "Materialov XXV S"yezda KPSS" (Materials of the 25thCongress of the CPSU), Moscow, Politizdat, 1976, pp 41, 114, 121, and 216.



2959
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ROLE OF SOCIAL CONSUMPTION FUNDS IN PUBLIC WELFARE DISCUSSED

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 8, Aug 77 pp 81-84

[Article by V. Kholod, subdivision chief at Gosplan Ukrainian SSR: "The Role of the Social Consumption Funds in Raising the Standard of Living"]

[Excerpts] The improvement of the well-being of the Soviet people is being achieved mainly on the basis of increased wages and the growth of the social consumption funds. Payment for labor is the basic form of the distribution of material and cultural goods. But along with this, an ever growing part of its material goods and services is being provided to the population from the social consumption funds.

The social consumption funds are the totality of the material and cultural goods which are distributed among the members of society free or on a privileged basis independently of their labor contribution (free education, medical care), or in indirect relationship to it (pensions, disability assistance). In this way, distribution from the social consumption funds does not contradict the socialist principles of distribution. It supplements the resources of individual consumption, creating for all of the members of society the conditions for a more equal use of our ever growing material and cultural goods and is a means of equalizing the population's income.

The social consumption funds are used either in the form of monetary payments or of services which are provided free or on a privileged basis. Free services here act as an important factor in the development of collective forms of consumption. An expansion of this form of the use of the social consumption funds has to be carried out in strict accordance with the resources of our economy so as not to undermine the material interest of the workers in the results of their labor and the development of the economy as a whole.

The workers of the Soviet Ukraine in fraternal cooperation with all of the peoples of the Soviet Union have achieved enormous successes in the development of the republic's economy and culture. The high and stable growth rates of social production and national income in the Ukrainian SSR

have made it possible to increase its economic resources for the realization of an extensive social program for satisfying the workers' needs through the social consumption funds.

During the years of the Ninth Five-Year Plan payments and privileges from the social consumption funds increased in the republic by 36.4 percent and in 1975 came to 16.1 billion rubles. In addition, the social consumption funds increased at rates which outstripped the rates of wage resources. Thus, the average monthly monetary wages of workers and employees during this period increased by 16 percent and the average monthly wages received by kolkhoz workers from public farming by 21.3 percent, while the social consumption funds increased per capita by 31.6 percent. This situation is a result of the fact that the state's expenditures for the maintenance of children's preschool institutions, educational institutions, health, scientific, and cultural institutions, and others increase as their numbers increase, as their material and technical base is improved and as there is an expansion of the sections of the population which are maintained in these institutions, receive pensions, and so forth.

While the system of payment for labor is built upon the principle of equal pay for equal labor and more pay for better quality labor, the social funds serve the purpose of equalizing the income of various social groups of the population.

The greater growth of the social consumption funds during the Ninth Five-Year Plan was a result of the realization of the measures to further improve the well-being of our people which were mapped out by the 24th Congress of the CPSU.

In accordance with the decisions of the 24th Congress of the CPSU, state measures were carried out in the republic, as they were in the country as a whole, to increase the minimum old-age pensions for workers, employees, and kolkhoz workers, to increase pensions for the families of fallen soldiers and for people with war and work disabilities, and to increase them for the families of workers and employees and of soldiers who had lost their breadwinner. The number of paid days allowed to care for a sick child was increased and 100 percent paid leaves for pregnancy and childbirth were introduced, regardless of work seniority. Since November 1974 child-support assistance has been paid to families whose average per capita income does not exceed 50 rubles a month. Measures have been carried out to increase stipends for the students of secondary and higher educational institutions and food expenditures have been increased in city vocational and technical schools.

In 1972-1973 wages were increased for doctors, teachers, educators in children's preschool institutions, teachers in secondary specialized educational institutions and vocational and technical training institutions, and certain other workers in educational institutions.

The average amount of vacation pay was increased for all categories of workers and employees. The pension terms established for workers and employees and their families were applied to kolkhoz workers. In addition, on the eve of the 30th anniversary of the Victory privileges and payments from the social consumption funds were introduced in order to further improve the material living conditions of disabled veterans of the Great Patriotic War and the families of fallen soldiers.

As a result of the state measures to further improve the well-being of the people which were carried out during the Ninth Five-Year Plan, annual payments and privileges from the social consumption funds increased in the republic by almost 1.5 billion rubles, while their per capita increase in the republic went from 250 rubles in 1970 to 329 rubles in 1975; that is, the income from the social funds for one family consisting of three people has reached 987 rubles a year, compared to 750 rubles in 1970.

During the Ninth Five-Year Plan substantial resources were allocated from the social consumption funds for the maintenance and education of the younger generation. Compared to 1970, in 1975 state expenditures for these purposes increased by 1.4 times and reached 2.8 billion rubles. The growth of these expenditures is the result of the continuous growth of the network of children's preschool institutions and the number of children in them. As of the end of 1975 more than 2 million children (compared to 1.6 million in 1970) were covered by permanent children's preschool institutions. The coverage level of children's preschool institutions in the republic as a whole came to 40.8 percent, including 51.9 percent in the cities.

A gradual movement toward the maintenance of children at society's expense is one of our important social tasks. Its accomplishment fosters the enlistment of women in socially useful labor, makes it possible for families with many children to bring up their children more easily, and creates favorable conditions for the communist education of children and for the comprehensive development of the individual. The use of the social consumption funds for the education of the younger generation is not limited to the development of public forms of education and the maintenance of children. The state provides material child education assistance to single mothers and those with many children and allocates substantial resources for pregnancy and childbirth assistance, for articles connected with the care and feeding of children, for the maintenance of pediatric medical institutions, for the operation of sanatoriums for the treatment of children, of Pioneer camps, tourism bases, palaces of Pioneers, young technician and naturalist stations, children's athletic schools, and others.

During the Ninth Five-Year Plan the shift to universal secondary education for the youth was basically completed. In 1975 98 percent of the eighth-grade graduates were covered by secondary education in the republic, and

almost 1.9 million pupils in the first through eighth grades were in schools and groups with an extended day. During the Ninth Five-Year Plan 3.1 million people received a secondary education.

Secondary specialized and higher educational institutions are maintained on the basis of the social consumption funds in our country. In 1975 there were 730 secondary specialized and 143 higher educational institutions in the republic. In 1975 alone higher and secondary specialized educations were received by more than 1.6 million people of whom almost four-fifths used stipends or dormitories. Compared to 1970, state expenditures for cadre training increased by 20 percent. As a result of the steady development of secondary specialized and higher educational institutions at the end of 1975 4.4 million specialists were at work in the republic's economy (compared to 3.3 million in 1970), including 1.8 million with a higher education (compared to 1.3 million in 1970).

Health care and physical culture occupy an important place among the measures which are carried out on the basis of the social consumption funds and which are aimed at improving the well-being of the people. The material and technical base of health care is constantly being strengthened in our republic and this is making it possible to improve preventive treatment and hygienic services for our citizens and the hygienic condition of populated points, to bring medical care closer to the population, and to raise the physical culture level of all of the members of our society. Toward this end, during the years of Soviet power in our republic, as in the country as a whole, a wide network of various kinds of medical institutions has been organized, the necessary cadres of health workers have been trained, and a medical and pharmaceutical industry has been created which produces all of the modern medicines.

All of this in interconnection with an improvement of housing conditions and nourishment has made it possible to increase average longevity by more than two times compared to prerevolutionary times. Whereas before the revolution average longevity in the country was 32 years, in 1975 it was 71.

Health care and physical culture institutions have received an important development and their material and technical base has been strengthened. In 1975 21 percent more was spent from the social consumption funds than in 1970 on the needs of health care and recreation. In 1975 the republic's hospital network contained 578,300 beds, compared to 511,000 in 1970. By the end of the Ninth Five-Year Plan there were 117.8 beds per 10,000 people, compared to 107.6 in 1970. The number of doctors in all specializations increased by 25,000 people and came to 156,000 in 1975, while the number of middle-echelon medical personnel increased by 75,000. The number of doctors per 10,000 people increased from 27.6

in 1970 to 31.8 in 1975, while the number of middle-echelon personnel increased from 86.6 to 99.1.

During the Tenth Five-Year Plan the development of the social consumption funds will be the basis for more fully satisfying the needs of the urban and rural populations for all types of highly skilled medical services. The successful accomplishment of this task is being promoted by a further expansion of the network of medical institutions which are equipped with the latest equipment, by an equalization of the levels and quality of medical care for the urban and rural populations, and by a rise in the per capita level of medical personnel. By the end of 1980 the number of hospital beds per 10,000 people in the republic will reach 124.5 compared to 117.8 in 1975, and the number of doctors will increase to 36 from 32 in 1975; that is, will increase by 12.5 percent.

The network of sanatoriums, rest homes, and Pioneer camps plays an important role in the prevention and treatment of the workers' illnesses. By the end of the Ninth Five-Year Plan the number of places in sanatoriums and treatment pensions increased by 8,900 compared to 1970 and came to 122,200 places, while the number of places in rest homes and pensions increased by 27,000 and reached 77,600. During the Ninth Five-Year Plan there was an intensive development of the network of tourist complexes, bases, hotels, motels, and camping grounds in which the number of places reached 33,000 by the end of 1975 compared to 20,000 in 1970. The network of pioneer camps contains 419,000 places compared to 361,000 in 1970.

Our state is showing great concern for the material security of workers who have temporarily or permanently lost their ability to work. Substantial resources are allocated from the social consumption funds for the creation of social insurance and social security funds.

Social insurance provides for all cases of the loss of the ability to work (injuries, illness, old age, disability, and for working women -- pregnancy and childbirth) and is effected on the basis of public resources without any deductions from wages.

The social consumption funds have an especially great role in social security for the population. In 1975 there were 9.6 million pensioners on state and kolkhoz social security.

During the Tenth Five-Year Plan the development of social insurance and social security will be carried out above all through an increase in the minimum old-age pensions with a corresponding increase in the maximum pensions for disability and the loss of a breadwinner, the removal of certain restrictions connected with the assignment of old-age pensions for women, the granting of additional pension privileges to kolkhoz workers, and other measures in this field which were mapped out by the 25th Congress of the CPSU.

An important role is played by the social consumption funds in paying for the use of the socialized housing fund. At the end of 1975 the total socialized urban housing fund in the republic came to 231.6 million square meters of total (useful) space. During the five years of the Ninth Five-Year Plan a total area of 97.7 million square meters of residential housing was built in the republic. Almost 9 million people improved their living conditions. The increase in civil housing construction is being accompanied by an increase in the social consumption funds. Suffice it to say that the state's expenditures for the maintenance and repair of housing comes to approximately 37 kopecks per month per square meter, while rent is an average of 13 kopecks per square meter. Consequently, every month the workers receive a discount of 24 kopecks per square meter of housing space which is compensated for from the social consumption funds. State subsidies for the mainenance of the state housing fund create for all families, regardless of their level of income, equal conditions for the use of good quality and up-to-date housing. In 1975 the part of the expenditures not compensated for by rent for the maintenance of the socialized housing fund came to 681 million rubles in the republic, compared to 475 million rubles in 1970, or increased by 43.4 percent.

Substantial resources are assigned from the social consumption funds for the maintenance of a wide network of libraries, clubs, houses of culture, and other cultural and educational institutions.

A high level of cultural services for the population has been achieved in the republic. During the Ninth Five-Year Plan there was a great improvement in services by cultural institutions and their material and technical base was strengthened. As of the end of 1975 there were 77 theaters in the republic which in 1975 were visited by 18.1 million people; the corresponding figures for movies were 27,800 and 834 million people, and for museums -- 154 and 23.4 million people. The network of public libraries numbered 26,900 with 320 million books in them. In 1975 the state's expenditures for public cultural and domestic services for the population had increased by almost 27 percent compared to 1970.

Despite this, in many cities, especially in small workers' settlements and rural areas, the population's cultural needs are not yet being fully satisfied. The allocation of additional resources and, consequently, a corresponding increase in the social consumption funds will make it possible to eliminate these shortcomings.

It should be noted that in 1975 54 percent of the social consumption funds was made up of monetary payments -- pensions, assistance, stipends, paid vacations, and so forth, -- and 46 percent was used by the population in the form of free services (health care and education services, some consumer goods through children's preschool institutions, sanatoriums, rest homes, housing, and so forth).

The fourth session, ninth convocation, of the Supreme Soviet USSR and the Supreme Soviet Ukrainian SSR approved the broad social program for 1976-1980 which had been mapped out by the 25th Party Congress. Real per capita income in the republic will increase during the five-year period by 19 percent. As during the previous five-year period, the increase in the population's real income will occur chiefly on the basis of an increase in wages -- the basic source for satisfying the population's material and cultural needs. As a result of the outstripping growth of the wages of kolkhoz workers during the Tenth Five-Year Plan, there will be a further coming together of the wage levels of the basic social groups in the population -- workers, employees, and kolkhoz workers.

During the Tenth Five-Year Plan the social consumption funds will increase by 25 percent. Their development will occur not only by means of an increase in their amount, but also of an improvement of the system of distribution, which will undoubtedly foster a greater role for them in the system of the distribution of material and cultural goods, a further diminishment of the differences in the standards of living of the basic social groups of the population and of families of different sizes, and a fuller realization of the principle of material interest. In this way, the social consumption funds will have a greater role in the development of Soviet society.



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PREPARATIONS UNDER WAY FOR INTRODUCTION OF NEW LABOR REMUNERATION TERMS

Moscow ZHILISHCHNOYE I KOMMUNAL'NOYE KHOZYAYSTVO in Russian No 6, 1977
pp 10-11

/Article by Yu. I. Pavlov, deputy chief of the Administration of Labor Organization and Wages of the RSFSR Ministry of Housing and Municipal Services: "Careful Preparations for New Remuneration Terms"/

/Text/ A further improvement in the wellbeing of the soviet people is the goal of the decree of the CPSU CC and the USSR Council of Ministers on increasing the minimum wages of workers and employees while raising the rates and fixed salaries of the average-payed categories of employees employed in the national economic sectors. According to this document, the wages of the workers and employees of the following enterprises and organizations are being raised: Housing, hotels, gas, bath and wash houses and nurseries, public services and amenities, equipment inventory, municipal enterprise combines, scientific research institutions, design, technologic, planning, and prospecting organizations, computation centers, mechanical computing stations, centers (laboratories) for the scientific organization of labor and production management, ministry and agency staffs, and other organizations.

At the same time the previously unshifted employees of municipal dumps and septic tanks and the communal living quarters of rescue stations, yardmen, watchmen, street and public-toilet cleaners, and dining-room and snack-bar employees will be transferred to the new labor remuneration terms, in accordance with the previous stage of wage systematization in industry.

In all, over 790,000 employees of the nonproduction sectors of RSFSR housing and municipal services will by the end of the five-year plan obtain new wage rates and fixed salaries.

The realization of this most important socio-economic measure (for which over 200 million rubles will be spent in 1977 in the ministry's enterprises as a whole) will raise the wages of the system's employees an average of 19 to 20 percent. At the same time, they will increase more significantly -- 28 to 36 percent -- for some categories, especially engineering and technical personnel and employees.

For instance, whereas a director of a bath-wash house combine (third group) previously obtained a monthly salary of 120-140 rubles and the head of a bath 130-140 rubles, now these earnings will increase to 185 to 200 rubles. Senior engineers of all specialties at the enterprises and in the organizations of the bath-wash house sector will obtain 120 to 140 rubles instead of 95 to 110, engineers 95 to 130 rubles instead of 80-100, and technicians of all specialties 80 to 100 rubles instead of 70-80.

For the chiefs or the directors (the comparison is again effected in line with the third group of remuneration) of housing, hotels, nurseries, and municipal enterprise combines, fixed salaries of 185 to 200 rubles are envisioned; for the foremen of these places, 95 to 130 rubles.

It should also be noted that the hourly wage rates for workers (piece and time) employed in the repair and servicing of machinery, equipment, and other gear have been set so that they are analogous to those extant in industry.

With the introduction of the new remuneration terms, the relationship between the wage rates of unskilled and skilled workers is changed. High skills obtain merited reward.

The hourly wage rates at jobs with difficult and harmful working conditions have become higher than the rates for jobs with normal conditions: The increase ranges from 10 to 12 percent; for especially difficult and harmful conditions, 16 to 24 percent.

Serious mass explanatory and preparatory work should precede organized and systematic transfer to the new remuneration terms. The RSFSR Ministry of Housing and Municipal Services has long been doing this work.

The indicators for relegating enterprises and organizations to groups for the labor remuneration of managerial and engineering and technical employees have been specified; official obligations and skill demands have been determined for managerial employees, specialists, and technical executives; and the titles of their positions have been made to accord with the list of positions envisioned in the schemes for fixed salaries. A collection of printed extracts from the unified wage rates and qualifications guide (YeTKS) of workers' jobs and occupations has been prepared and sent to the localities. Recommendations have been drawn up for transferring to the new remuneration terms. In January the ministry along with the trade union Central Committee held in Irkutsk a conference-seminar with employees of the labor and wages divisions and economic planning services of 22 ministries of the autonomous soviet socialist republics and municipal services administrations of the kray (oblast) executive committees located in the regions of the Far North, Far East, Siberia, and the north European USSR, where new remuneration terms were introduced from December 1976 to February 1977. At the conference, explanations were provided for rerating jobs and establishing grades and for reconsidering extant output (service) norms, which are being raised at enterprises and in organizations of housing and municipal services by no less

than 10 percent and in scientific-research institutions, planning institutions, and other scientific organizations by 15 percent.

Organizational work in the localities is directed at revealing internal reserves -- sources of funds for transferring to the new rates and fixed salaries. These funds are in addition to the means being allocated from the state budget. In this situation the funds for raising wages must be found through internal reserves in scientific-research institutions, design, planning, and prospecting organizations, computation centers, mechanical computing stations, centers (laboratories) for the scientific organization of labor and production management, and other organizations of science.

Empowering heads to introduce additional payments amounting to as much as 30 percent of the rate or the fixed salary of the workers, engineers and technicians, of employees, and junior service personnel for multiple job and position holding, the expansion of maintenance zones, or an increase in the amount of work will largely contribute to success in the search. These additional payments will be effected through wage fund economies obtained by reducing staff below intersectoral, sectoral, and other labor input standards, in accordance with occupation and position lists approved by the RSFSR Ministry of Housing and Municipal Services and the trade union Central Committee.

The expediency of such measures is evidenced by the experience of the enterprises of the production sectors of municipal services. There, thanks to the practice of multiple position holding, over 10,200 employees have been released. This has insured the growth of production efficiency.

The new schemes for the post salaries of managerial and engineering and technical employees created with due regard for the progressive model structures of management also lead, in case of correct application, to reducing the management staff. The path of improving management runs through production concentration and specialization. This being the case, it is necessary to eliminate at a large part of the medium- and small-sized enterprises a number of the structural subunits whose functions can be performed by adjacent divisions or the appropriate senior specialists. To this end, minimum volumetric indicators have been set for designating the production unit an enterprise, a shop, or a section.

During the preparations for introducing the new labor remuneration terms, special attention should be paid to improving the bonus system. The amounts of bonuses must be better differentiated in relation to specific production conditions, as well as to the significance of structural subunits. A reconsideration of bonus regulations must insure promoting the fulfillment of both the basic indicators and the obligatory terms for rewards. It is necessary to insure the more effective stimulation of such an indicator as labor productivity growth.

Preparations for computations must become the concluding state of the preparations for shifting to the new remuneration terms. These are computations

to determine changes in the average skill categories of jobs and workers, in the wage fund of workers and in the post salary fund of engineering and technical personnel, of employees, and junior service personnel, as well as the total funds necessary to introduce the new rates and salaries. Such computations are being made on the basis of forms established by the RSFSR Ministry of Housing and Municipal Services.

The preparatory work demands great efforts from the heads of enterprises and organizations, economic services, standards and research stations and laboratories for the scientific organization of labor, as well as the trade union aktiv. It is precisely they who must direct collectives at finding reserves for raising labor remuneration and for increasing production effectiveness, develop employee initiative, and support all valuable proposals and initiatives.



7094
CSO: 1822

IMPROVED MATERIAL WELL-BEING OF WORKERS TOUTED

Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 77 p 10

[Article: "Concern for the Welfare of the Soviet People"]

[Text] Comrade L. I. Brezhnev said at the festive meeting of the CPSU Central Committee, USSR Supreme Soviet and RSFSR Supreme Soviet devoted to the 60th anniversary of the Great October Socialist Revolution that not one society which has ever existed on earth has done or could have done so much for the masses, for the workers, as socialism has done.

The scope of social production under developed socialism provides an opportunity to place increasing the well-being of the Soviet people in the center of practical party policy.

The real fruits of this policy are graphically evident in national income growth, which is paramount in determining the level of well-being of the people. In the first year of the Tenth Five-Year Plan, it was 382 billion rubles. Of that amount, 279.8 billion was used for consumption and 100.1 billion for accumulation and other expenses.

About three-fourths of the national income used is accounted for by the consumption fund. If, however, expenditures on housing and sociocultural construction are taken into account, then approximately four-fifths of the national income is directed directly into improving the well-being of the people.

Every year, the Soviet state allocates increasing amounts to increasing wages, as the primary source of people's incomes. During the Ninth Five-Year Plan alone, the wages of over 75 million persons were increased. Whereas in 1940, for example, the average monthly monetary wage for workers and employees was 33.1 rubles, last year it was 151.4 rubles, and taking into account payments and benefits -- 206 rubles. Per capita payments and benefits from social funds have increased from 21 rubles in 1936 to 382 rubles in 1977.

The most important social measure of the Tenth Five-Year Plan, which is being carried out in accordance with resolutions of the 25th CPSU Congress, will be increasing the minimum wage of workers and employees and simultaneously

increasing the rates and salaries of average-paid categories of workers employed in nonproductive branches of the national economy. This will encompass 31 million persons. The five-year plan allocates upwards of seven billion rubles per year for this measure.

One other convincing testament to the constant improvement in the well-being of our people is the growth in real incomes. They have increased 5.1-fold, per capita, from 1940 to 1976. During that same period, the real incomes of workers and employees, calculated per worker, increased 3.6-fold, and those of kolkhoz members -- six-fold. Between 1913 and 1976, the real incomes of industry and construction workers increased 9.7-fold, and those of peasants -- 14.1-fold.

Characteristically, under modern conditions, incomes increase faster in less well-off families. In 1965, only four percent of the population had an income of over 100 rubles per family member per month, and last year the figure was 38 percent; by the end of the five-year plan, it will be about 50 percent.

The USSR Constitution guarantees workers the right to health protection and education, to recreation and old-age security. These rights, like others, are ensured by the economic system of socialism, and in particular, through the social consumption funds. In 1976, payments and benefits from them were 95 billion rubles (4.6 billion in 1940). These funds are spent on free training and skill improvement, free medical assistance, grants, pensions, scholarships, paid vacations, child support in preschool institutions. More than half the total amount of payments and benefits paid last year were monetary payments.

In the Tenth Five-Year Plan, payments and benefits will increase 30 percent. In the final year [1980], they will be 117 billion rubles.

The right of Soviet citizens to health protection is ensured by a broad network of preventive treatment facilities. Medical assistance is provided by 24,000 hospitals (with more than three million beds) and 35,700 outpatient polyclinics. Upwards of 5.5 million persons, including 865,000 physicians, work in public health. In terms of medical personnel available to the population, our country is first in the world.

The recent CPSU Central Committee and USSR Council of Ministers Decree "On Steps To Further Improve Public Health" is a new manifestation of the concern the party and government have for the Soviet person.

The USSR Constitution secures the right of the country's citizens to housing. This right is ensured by the historically unprecedented scope of housing construction. Just in the last two years, Soviet people have received more housing than all the urban housing that existed in prerevolutionary Russia (180 million square meters). During the years of Soviet power, about 3.2 billion square meters of housing has been built.

Let us add that apartment payments have not changed in nearly half a century in the USSR. It averages less than three percent of worker family income. This amount covers less than a third of the upkeep expenses and municipal services. Two-thirds (about five billion rubles annually) is covered by the state.

Indisputable testimony to the increased well-being of the Soviet people is the constant increase in state and cooperative retail trade turnover. It has increased nearly nine-fold between 1940 and the first year of the Tenth Five-Year Plan. Sales to the population of foodstuffs have increased 6.7-fold, and of nonfood items -- 13.3-fold. Significant structural changes are occurring in trade turnover. The acquisition of cultural and personal-services items is increasing, a manifestation of the constantly growing spiritual demands of the population.

Provision of the Urban and Rural Population With Cultural and Personal-Services Durables (at the end of the year, in units per 100 families)

| type of item | 1965 | 1976 |
|---|---|---|
| watches of all types | 319 | 470 |
| radios and radio-phonographs | 59 | 81 |
| television sets | 24 | 77 |
| cameras | 24 | 27 |
| refrigerators | 11 | 67 |
| washing machines | 21 | 67 |
| valuum cleaners | 7 | 20 |
| motorcycles and motor scooters | 6 | 9 |
| bicycles and mopeds | 48 | 53 |
| sewing machines | 52 | 62 |

The October Revolution gave Soviet people broad access to knowledge, to science, to the treasure-house of spiritual culture.

There were a total of 12 universities in prerevolutionary Russia. In the anniversary year, the doors of 65 universities, 859 VUZ's and 4,303 secondary special academic institutions were opened to students (total enrollment -- about 10 million persons); training is free. Those with a higher or secondary (full or incomplete) education increased from 290,000 persons in 1913 to 15.9 million in 1939 to 126.1 million in 1976.

The tremendous achievements of the socialist state in developing art are today famous throughout the world. Along with the renowned theaters of Moscow and Leningrad, professional theaters are operating successfully in all Union republics. They now number 573. The country has more than 154,000 (movie) projecting machines in the country, of which about 128,000 are in rural areas.

Some 1,323 state museums with about 50 million exhibits help the Soviet people understand their cultural legacy.

An important new stage in the fullest possible satisfaction of the growing material and spiritual needs of our people is the Tenth Five-Year Plan. The highest goal of social production under socialism is being implemented through the efforts of each and every person, by enormous creative work in which labor and prosperity, prosperity and labor are interwoven in the closest possible way.

11052
CSO: 1822

STATISTICS ON STUDENT ENROLLMENT, GRADUATION

Moscow VESTNIK STATISTIKI in Russian No 10, 1977 pp 83-89

[Article: "Public Education and Culture in the USSR]

[Excerpts]

Table 1. Enrollment According to Type of Education/Training (in thousands at beginning of school year)

| | 1914/15 | 1940/41 | 1965/66 | 1970/71 | 1975/76 | 1976/77 |
|---|---|---|---|---|---|---|
| Total enrollment | 10 588 | 47 547 | 71 857 | 79 634 | 92 605 | 93 708 |
| Of which: | | | | | | |
| in general education schools..... | 9 656 | 35 552 | 48 255 | 49 193 | 47 594 | 46 468 |
| including: | | | | | | |
| elementary, incomplete-secondary and secondary schools | 9 656 | 34 784 | 43 410 | 45 448 | 42 611 | 41 551 |
| evening (shift) general education schools (incl. corr. studies) | — | 768 | 4 845 | 3 745 | 4 983 | 4 917 |
| vocational-technical training schools, branch voc. schools, and factory schools | 106 | 717 | 1 701 | 2 591 | 3 381 | 3 552 |
| sec. specialized training schools | 54 | 975 | 3 659 | 4 388 | 4 525 | 4 623 |
| VUZ's..... | 127 | 812 | 3 861 | 4 581 | 4 854 | 4 950 |
| number of persons receiving training in new occupations, upgrading skills at enterprises, in institutions, in organizations, and on kolkhozes or receiving other kinds of training (excluding political education network) | 645 | 9 491 | 14 381 | 18 881 | 32 251 | 34 115 |

Table 2. Number of Persons Receiving Secondary (General and Specialized) Education During the Years of Soviet Power (in thousands)

| Years | Total | Annual average |
|---|---|---|
| 1918—1928 | 738 | 67,1 |
| 1929—1932 | 577 | 144,3 |
| 1933—1937 | 1 109 | 221,8 |
| 1938—1940 | 1 405 | 468,4 |
| 1941—1945 | 1 320 | 264,0 |
| 1946—1950 | 2 332 | 466,4 |
| 1951—1955 | 5 097 | 1019,3 |
| 1956—1960 | 8 641 | 1728,1 |
| 1961—1965 | 6 710 | 1342,0 |
| 1966—1970 | 16 143 | 3228,7 |
| 1971—1975 | 18 994 | 3799,0 |
| 1976 | 4 751 | |

Between 1918 and 1976, 67.8 million persons received secondary (general and specialized) education. Of this number, 52.3 million completed secondary general education schools; 14.7 million completed technikums or other secondary specialized educational institutions (following graduation from incomplete-secondary school); and 0.8 million completed secondary vocational-technical schools.

The transition to universal secondary education was essentially completed in the Ninth Five-Year Plan. Between 1966 and 1976 alone, 39.9 million boys and girls acquired secondary (general and specialized) education, i. e., more than during all preceding years of Soviet power combined.

Table 3. General Education Schools (at beginning of school year)

| | 1914/15 | 1940/41 | 1965/66 | 1970/71 | 1975/76 | 1976/77 |
|---|---|---|---|---|---|---|
| Number of general education schools (thousands) | 124 | 199 | 214 | 190 | 164 | 159 |
| Enrollment (millions) | 9,7 | 35,6 | 48,3 | 49,2 | 47,6 | 46,5 |
| Of which: | | | | | | |
| grades 1-3..... | 8,1 | 16,1 | 15,4 | 15,3 | 12,7 | 12,5 |
| grades 4-8..... | 1,5 | 18,2 | 24,9 | 26,3 | 24,1 | 23,1 |
| of which: | | | | | | |
| 4th grade | 1,0 | 5,6 | 5,0 | 5,3 | 4,3 | 4,3 |
| 8th grade | 0,1 | 1,3 | 4,7 | 5,1 | 5,4 | 5,0 |
| grades 9-10 (11) | 0,1 | 1,3 | 8,0 | 7,6 | 10,8 | 10,9 |
| Number of teachers (thous.) | 280 | 1 238 | 2 497 | 2 618 | 2 703 | 2 671 |

Extended-day schools and groups underwent further development. At the beginning of the 1976/77 school year extended-day schools and groups and school-boarding hostels had an enrollment of 8.7 million pupils.

Table 4. Pupil Enrollment in General Education Schools in Union Republics (in millions of pupils at beginning of school year)

| | 1914/15 | 1940/41 | 1965/66 | 1970/71 | 1975/76 | 1976/77 |
|---|---|---|---|---|---|---|
| USSR | 9,7 | 35,6 | 48,3 | 49,2 | 47,6 | 46,5 |
| RSFSR | 5,7 | 20,6 | 26,4 | 25,3 | 22,9 | 22,1 |
| Ukrainian SSR | 2,6 | 6,8 | 8,7 | 8,4 | 8,1 | 7,9 |
| Belorussian SSR | 0,5 | 1,7 | 1,8 | 1,8 | 1,7 | 1,7 |
| Uzbek SSR | 0,0 | 1,3 | 2,4 | 3,3 | 3,8 | 3,8 |
| Kazakh SSR | 0,1 | 1,2 | 2,9 | 3,2 | 3,3 | 3,3 |
| Georgian SSR | 0,2 | 0,8 | 0,9 | 1,0 | 1,0 | 1,0 |
| Azerbaydzhan SSR | 0,1 | 0,7 | 1,2 | 1,4 | 1,6 | 1,6 |
| Lithuanian SSR | 0,1 | 0,4 | 0,6 | 0,6 | 0,6 | 0,6 |
| Moldavian SSR | 0,1 | 0,5 | 0,8 | 0,8 | 0,8 | 0,8 |
| Latvian SSR | 0,2 | 0,3 | 0,3 | 0,3 | 0,4 | 0,4 |
| Kirgiz SSR | 0,0 | 0,3 | 0,6 | 0,8 | 0,9 | 0,8 |
| Tadzhik SSR | 0,0 | 0,3 | 0,6 | 0,8 | 0,9 | 0,9 |
| Armenian SSR | 0,0 | 0,3 | 0,5 | 0,7 | 0,7 | 0,7 |
| Turkmen SSR | 0,0 | 0,3 | 0,4 | 0,6 | 0,7 | 0,7 |
| Estonian SSR | 0,1 | 0,1 | 0,2 | 0,2 | 0,2 | 0,2 |

Table 5. Number of Pupils Graduated from General Education Schools (thousands)

| Year | Graduates from incomplete secondary school | | | Graduates from complete secondary school | | |
|---|---|---|---|---|---|---|
| | Total | of which: | | Total | of which: | |
| | | day | evening | | day | evening |
| 1940 | 1 860 | 1 794 | 66 | 303 | 277 | 26 |
| 1950 | 1 491 | 1 360 | 131 | 284 | 228 | 56 |
| 1955 | 3 582 | 3 332 | 250 | 1 247 | 1 068 | 179 |
| 1960 | 2 383 | 2 124 | 259 | 1 055 | 709 | 346 |
| 1965 | 4 270 | 3 682 | 588 | 1 340 | 913 | 427 |
| 1970 | 4 661 | 4 251 | 410 | 2 581 | 1 968 | 613 |
| 1971 | 4 701 | 4 343 | 358 | 2 690 | 2 091 | 599 |
| 1972 | 4 821 | 4 483 | 338 | 2 833 | 2 222 | 611 |
| 1973 | 5 055 | 4 726 | 329 | 2 989 | 2 331 | 658 |
| 1974 | 5 303 | 5 003 | 300 | 3 235 | 2 510 | 725 |
| 1975 | 5 201 | 4 951 | 250 | 3 564 | 2 716 | 848 |
| 1976 | 5 213 | 4 991 | 222 | 3 867 | 2 900 | 967 |

In 1976 over 97 percent of the eighth grade graduates continued their studies in secondary school or in other educational institutions offering a secondary education.

Table 6. Number of Grade Repeaters in Daytime General Education Schools (in thousands at end of school year)

| Grade | 1970/71 | 1975/76 |
|---|---|---|
| 1 | 88 | 32 |
| 2 | 57 | 17 |
| 3 | 59 | 17 |
| 4 | 92 | 22 |
| 5 | 113 | 21 |
| 6 | 156 | 27 |
| 7 | 115 | 26 |
| 8 | 85 | 21 |
| 9 | 59 | 29 |
| 10 | 6 | 3 |
| 11 | 0,1 | 0,1 |
| 1—10 (11) | 830 | 215 |

Table 7. Higher and Secondary Specialized Educational Institutions (at beginning of school year)

| | 1914/15 | 1940/41 | 1965/66 | 1970/71 | 1975/76 | 1976/77 |
|---|---|---|---|---|---|---|
| All higher educ. institutions | 105 | 817 | 756 | 805 | 856 | 859 |
| Their enrollment (thousands) | 127 | 812 | 3 861 | 4 581 | 4 854 | 4 950 |
| Of which, enrollment in: | | | | | | |
| daytime divisions | 127 | 558 | 1 584 | 2 241 | 2 628 | 2 711 |
| evening divisions | — | 27 | 569 | 658 | 644 | 650 |
| correspondence divisions | — | 227 | 1 708 | 1 682 | 1 582 | 1 589 |
| All secondary specialized educational institutions | 450 | 3 773 | 3 820 | 4 223 | 4 302 | 4 303 |
| Their enrollment (thousands) | 54 | 975 | 3 659 | 4 388 | 4 525 | 4 623 |
| Of which, enrollment in: | | | | | | |
| daytime divisions | 54 | 787 | 1 835 | 2 558 | 2 817 | 2 867 |
| evening divisions | — | 32 | 628 | 645 | 516 | 554 |
| correspondence divisions | — | 156 | 1 196 | 1 185 | 1 192 | 1 202 |

Tuition is gratis in USSR higher and secondary specialized educational institutions. Moreover, 77 percent of the students in daytime divisions of VUZ's and 72 percent of the pupils in secondary specialized educational institutions receive scholarships.

University education is a leading form of higher education in the USSR. Universities became major educational and research centers during the years of Soviet power. In the 1914/15 school year there were only 12 universities with a combined enrollment of 41,000 students; in the 1976/77 school year our country numbered 65 universities with an enrollment of 580,000 persons. Today every union republic and many autonomous republics have their own universities.

Table 8. Higher Education Institutions in Union Republics (at beginning of school year)

| | 1914/15 | 1940/41 | 1965/66 | 1970/71 | 1975/76 | 1976/77 |
|---|---|---|---|---|---|---|
| USSR | | | | | | |
| No. of educational inst-ions | 105 | 817 | 756 | 805 | 856 | 859 |
| Student enrollment (thousands) | 127,4 | 811,7 | 3860,6 | 4580,6 | 4854,0 | 4950,2 |
| RSFSR | | | | | | |
| No. of educational inst-ions | 72 | 481 | 432 | 457 | 483 | 484 |
| Student enrollment (thousands) | 86,5 | 478,1 | 2353,9 | 2671,7 | 2856,9 | 2905,7 |
| Ukrainian SSR | | | | | | |
| No. of educational inst-ions | 27 | 173 | 132 | 138 | 142 | 143 |
| Student enrollment (thousands) | 35,2 | 196,8 | 690,1 | 806,6 | 831,3 | 844,4 |
| Belorussian SSR | | | | | | |
| No. of educational inst-ions | — | 25 | 27 | 28 | 31 | 31 |
| Student enrollment (thousands) | — | 21,5 | 104,0 | 140,0 | 159,9 | 164,6 |
| Uzbek SSR | | | | | | |
| No. of educational inst-ions | — | 30 | 32 | 38 | 42 | 42 |
| Student enrollment (thousands) | — | 19,1 | 165,8 | 232,9 | 246,6 | 254,5 |
| Kazakh SSR | | | | | | |
| No. of educational inst-ions | — | 20 | 39 | 44 | 49 | 50 |
| Student enrollment (thousands) | — | 10,4 | 144,7 | 198,9 | 216,1 | 225,0 |
| Georgian SSR | | | | | | |
| No. of educational inst-ions | 1 | 21 | 18 | 18 | 19 | 19 |
| Student enrollment (thousands) | 0,3 | 28,5 | 76,6 | 89,3 | 82,8 | 84,2 |
| Azerbaydzhan SSR | | | | | | |
| No. of educational inst-ions | — | 16 | 11 | 13 | 17 | 17 |
| Student enrollment (thousands) | — | 14,6 | 67,0 | 100,1 | 99,0 | 100,2 |
| Lithuanian SSR | | | | | | |
| No. of educational inst-ions | — | 7 | 11 | 12 | 12 | 12 |
| Student enrollment (thousands) | — | 6,0 | 46,4 | 57,0 | 62,6 | 64,9 |
| Moldavian SSR | | | | | | |
| No. of educational inst-ions | — | 6 | 7 | 8 | 8 | 8 |
| Student enrollment (thousands) | — | 2,5 | 36,3 | 44,8 | 44,4 | 45,3 |
| Latvian SSR | | | | | | |
| No. of educational inst-ions | 1 | 7 | 10 | 10 | 10 | 10 |
| Student enrollment (thousands) | 2,1 | 9,9 | 33,1 | 40,8 | 45,3 | 46,3 |
| Kirgiz SSR | | | | | | |
| No. of educational inst-ions | — | 6 | 8 | 9 | 9 | 9 |
| Student enrollment (thousands) | — | 3,1 | 32,2 | 48,4 | 50,1 | 51,5 |
| Tadzhik SSR | | | | | | |
| No. of educational inst-ions | — | 6 | 7 | 7 | 9 | 9 |
| Student enrollment (thousands) | — | 2,3 | 30,4 | 44,5 | 50,4 | 51,9 |
| Armenian SSR | | | | | | |
| No. of educational inst-ions | — | 9 | 11 | 12 | 13 | 13 |
| Student enrollment (thousands) | — | 11,1 | 38,9 | 54,4 | 54,1 | 55,5 |
| Turkmen SSR | | | | | | |
| No. of educational inst-ions | — | 5 | 5 | 5 | 6 | 6 |
| Student enrollment (thousands) | — | 3,0 | 19,8 | 29,1 | 31,1 | 32,1 |
| Estonian SSR | | | | | | |
| No. of educational inst-ions | 4 | 5 | 6 | 6 | 6 | 6 |
| Student enrollment (thousands) | 3,3 | 4,8 | 21,4 | 22,1 | 23,4 | 24,1 |

Table 9. Secondary Specialized Educational Institutions in Union Republics (at beginning of school year)

| | 1914/15 | 1940/41 | 1965/66 | 1970/71 | 1975/76 | 1976/77 |
|---|---|---|---|---|---|---|
| USSR | | | | | | |
| No. of educational inst-ions. . | 450 | 3 773 | 3 820 | 4 223 | 4 302 | 4 303 |
| Pupil enrollment (thousands). . | 54,3 | 974,8 | 3659,3 | 4388,0 | 4524,8 | 4622,8 |
| RSFSR | | | | | | |
| No. of educational inst-ions. . | 297 | 2 188 | 2 229 | 2 423 | 2 483 | 2 482 |
| Pupil enrollment (thousands). . | 35,4 | 594,0 | 2259,3 | 2606,2 | 2693,1 | 2732,3 |
| Ukrainian SSR | | | | | | |
| No. of educational inst-ions. . | 88 | 693 | 697 | 760 | 730 | 724 |
| Pupil enrollment (thousands). . | 12,5 | 196,2 | 645,9 | 797,9 | 783,8 | 805,6 |
| Belorussian SSR | | | | | | |
| No. of educational inst-ions. . | 15 | 128 | 122 | 128 | 133 | 133 |
| Pupil enrollment (thousands). . | 1,4 | 35,0 | 122,1 | 146,1 | 154,7 | 159,2 |
| Uzbek SSR | | | | | | |
| No. of educational inst-ions. . | 1 | 98 | 104 | 163 | 187 | 189 |
| Pupil enrollment (thousands). . | 0,1 | 25,1 | 102,6 | 163,3 | 185,2 | 196,6 |
| Kazakh SSR | | | | | | |
| No. of educational inst-ions. . | 7 | 118 | 169 | 192 | 210 | 216 |
| Pupil enrollment (thousands). . | 0,3 | 30,3 | 171,2 | 217,9 | 233,2 | 240,8 |
| Georgian SSR | | | | | | |
| No. of educational inst-ions. . | 5 | 192 | 89 | 100 | 97 | 95 |
| Pupil enrollment (thousands). . | 0,5 | 26,1 | 37,8 | 53,1 | 49,4 | 50,9 |
| Azerbaydzhan SSR | | | | | | |
| No. of educational inst-ions. . | 3 | 91 | 71 | 79 | 78 | 78 |
| Pupil enrollment (thousands). . | 0,5 | 17,4 | 55,8 | 70,8 | 72,3 | 76,3 |
| Lithuanian SSR | | | | | | |
| No. of educational inst-ions. . | 13 | 24 | 76 | 81 | 77 | 76 |
| Pupil enrollment (thousands). . | 1,5 | 6,4 | 57,5 | 65,3 | 68,3 | 69,6 |
| Moldavian SSR | | | | | | |
| No. of educational inst-ions. . | 5 | 22 | 38 | 46 | 46 | 48 |
| Pupil enrollment (thousands). . | 0,5 | 4,1 | 33,1 | 51,7 | 55,0 | 56,6 |
| Latvian SSR | | | | | | |
| No. of educational inst-ions. . | 11 | 41 | 52 | 54 | 54 | 54 |
| Pupil enrollment (thousands). . | 1,3 | 9,6 | 38,3 | 38,8 | 42,0 | 42,2 |
| Kirgiz SSR | | | | | | |
| No. of educational inst-ions. . | — | 33 | 36 | 36 | 38 | 39 |
| Pupil enrollment (thousands). . | — | 6,0 | 31,8 | 41,7 | 44,3 | 45,4 |
| Tadzhik SSR | | | | | | |
| No. of educational inst-ions. . | — | 30 | 30 | 36 | 38 | 38 |
| Pupil enrollment (thousands). . | — | 5,9 | 23,0 | 35,3 | 38,1 | 38,5 |
| Armenian SSR | | | | | | |
| No. of educational inst-ions. . | 1 | 62 | 45 | 59 | 63 | 63 |
| Pupil enrollment (thousands). . | 0,1 | 8,9 | 31,4 | 47,1 | 51,2 | 53,7 |
| Turkmen SSR | | | | | | |
| No. of educational inst-ions. . | — | 36 | 27 | 29 | 31 | 31 |
| Pupil enrollment (thousands). . | — | 7,7 | 21,9 | 28,7 | 29,4 | 30,5 |
| Estonian SSR | | | | | | |
| No of educational inst-ions . . | 4 | 17 | 35 | 37 | 37 | 37 |
| Pupil enrollment (thousands). . | 0,2 | 2,1 | 27,6 | 24,1 | 24,8 | 24,6 |

Table 10. Graduation of Specialists from Higher and Secondary Specialized Educational Institutions According to Type of Instruction (thousands of persons)

| | 1940 | 1965 | 1970 | 1975 | 1976 |
|---|---|---|---|---|---|
| No. graduated from higher educational institutions | 126,1 | 403,9 | 630,8 | 713,4 | 734,6 |
| of which, from: | | | | | |
| daytime divisions | 97,8 | 224,8 | 334,8 | 433,3 | 448,2 |
| evening divisions | 4,4 | 43,5 | 82,1 | 79,7 | 82,0 |
| correspondence divisions | 23,9 | 135,6 | 213,9 | 200,4 | 204,4 |
| No. graduated from secondary specialized educ. inst-ions | 236,8 | 621,5 | 1033,3 | 1157,0 | 1109,1 |
| of which, from: | | | | | |
| daytime divisions | 205,3 | 332,8 | 602,7 | 752,2 | 758,9 |
| evening divisions | 2,5 | 104,7 | 161,5 | 125,4 | 60,3 |
| correspondence divisions | 29,0 | 184,0 | 269,1 | 279,4 | 289,9 |

Higher and secondary specialized educational institutions trained 34.8 millions specialists between 1918 and 1976, including 13.3 million with higher education and 21.5 million with secondary specialized education.

Table 11. Number of Pupils and Grade Repeaters in Technikums and Other Secondary Specialized Educational Institutions (in thousands at end of school year)

| | 1970/71 r. | 1975/76 r. |
|---|---|---|
| Enrollment in technikums and other secondary specialized educ. inst-ions (total) | 3680,7 | 4070,5 |
| of which, grade repeaters | 184,6 | 129,1 |
| Out of total enrollment, no. attending teacher training schools | 229,8 | 281,1 |
| of which, grade repeaters | 3,6 | 1,5 |



5013
CSO: 1822

IMPROVING ENGINEERING-ADMINISTRATIVE EFFICIENCY

Minsk SOVETSKAYA BELORUSSIYA in Russian 28 Oct 77 p 3

[Text] Successful implementation of Tenth Five-Year Plan tasks on improving social production efficiency, as defined by the 25th CPSU Congress, depends largely on the precise, well-ordered organization of engineering-administrative labor on a scientific basis. The creative activeness of leaders and specialists along these lines substantially accelerates rates of scientific and technical progress, which is the primary factor in improving labor productivity and product quality.

Upwards of 160,000 specialists with degrees work at republic industrial enterprises. They contribute significantly to the technical re-equipping and organizational improvement of production, labor and management. More than a thousand shops and sectors have been comprehensively mechanized, upwards of 2,000 automated and flow lines have been installed, and hundreds of progressive types of machinery, equipment, apparatus and instruments have been developed under the leadership of and with the direct participation of engineering and technical workers. This has enabled us to significantly increase the production of industrial output and to significantly improve labor productivity and product quality.

Workers in republic research institutions and VUZ's contribute greatly to increasing the effectiveness of production subdivision specialists' labor. For example, systems of automated technological process planning are being introduced at the Institute of Technical Cybernetics of the Belorussian SSR Academy of Sciences. The special-problem research laboratory of scientific labor organization of the Belorussian State Institute of the National Economy imeni V. V. Kuybyshev is doing a great deal of work, together with industrial enterprises, on regulating the labor of specialists. Recommendations on evaluating the quality of their work are being developed by associates of the Belorussian Branch of the Labor Research Institute. Much work along these lines is also being done by the Belorussian Polytechnical Institute, the Minsk Radio Engineering Institute, and other academic and research institutes.

However, there are shortcomings at a number of enterprises in working out methods of evaluating the work of enterprise leaders and specialists, of

evaluating their contribution to overall collective work results. The effectiveness of the work of specialists with degrees is not always at the required level, and their work areas are not always adequately equipped.

A scientific-technical conference held on 25-26 October in Minsk, on "Ways of Increasing Engineering-Administrative Labor Effectiveness in Republic Industry," was devoted to problems of improving the activity of this important link of workers.

Its participants heard a number of talks and reports on methods of improving the effectiveness of the labor of engineering-administration personnel and forms of evaluating its quality, and experience was shared. Recommendations outlining specific measures for overall improvement in labor organization, improving skills and creative activeness among engineering-technical workers and employees of republic industrial enterprises, were worked out and adopted at the conference.

I. M. Glazkov, Deputy Chairman of the Belorussian SSR Council of Ministers, participated in the work of the conference.

11052
CSO: 1822

POPULATION SHIFTS EXAMINED IN NEW BOOK

Moscow VESTNIK STATISTIKI in Russian No 10, 1977 pp 78-80

[Review by S. Gayazova of the book "Sdvigi v razmeshchenii naseleniya SSSR" (Shifts in USSR Population Distribution), by B. S. Khorev and V. M. Moiseyenko, Izdatel'stvo Statistika, Moscow, 1976, 102 pages]

[Text] Modern cities.... Sixty percent of our population lives in them. Each year, upwards of nine million persons come to the cities. Where do they come from? From rural areas? From other cities? What forces people to change their place of residence? How and why does the national settlement picture change? B. Khorev and V. Moiseyenko attempt to answer all these questions in an easily understandable way.

The authors begin the book with a general description of USSR population distribution, noting that our country is the third largest in the world in terms of population (after China and India). In this regard, whereas the annual rates of population increase in 1950-1960 were at approximately the average world level, in the 1960's there was a significant gap, which widened in the 1970's and which (they estimate) will continue to the year 2000.

The authors note that the average annual rates of growth in the urban population, which were high in the pre-war years, decreased somewhat in the 1960's and 1970's and will evidently be even slower as a high level of urbanization is approached (they estimate that the USSR is among those countries with an average level of urbanization). By early 1976, however, 61 percent of the country's population lived in cities.

The reduction in urban population growth rates is a result of the lower birth rate; the second component of this growth -- population migration from rural areas to the cities -- remains, as before, significant.

Our country is a multinational state consisting of more than 100 nations and nationalities. The book's authors emphasize the current comprehensive development and rapprochement of the peoples of our country and the development of a new historical community -- a Soviet people, demonstrating that the Russian language plays a large role in the rapprochement of these nations.

According to the 1970 population census, 11.6 percent of those of non-Russian nationalities recognize Russian as their native language; moreover, 37.4 percent of those of non-Russian nationalities are fluent in Russian as a second language. In other words, about half the total non-Russian population speaks Russian fluently, which is of very important significance in a multinational community (p 14).

In examining regional differences in natural population movement, the authors point out two basic types of natural population reproduction for the modern world: high mortality - high birth rate, and low mortality - low birth rate. Whereas the first type of population reproduction was characteristic of prerevolutionary Russia, at the stage of developed socialism and given universal reduction in and subsequent stabilization of mortality in the USSR, there has been a transition to a new type of population reproduction based on the other type of generation replacement with a high average lifespan level. In this regard, in some Union republics (with a high birth rate) a transitional type of reproduction [the first type] predominates, and in others -- the industrially most well-developed (with a low birth rate) -- the second type predominates. With reference to B. S. Yastremskiy, who computed the relationship between population reproduction indicators chiefly for the 1930-1940 period, the book divides all the Union republics into groups as a function of the birth-rate levels in 1940, 1960, 1970 and 1974. Average USSR birth-rate coefficients for these years, as well as that birth-rate indicator which, if exceeded, indicates expanded reproduction, are taken as conventional limits. In this regard, an overall birth-rate factor of 21 per thousand, which ensures a net reproduction factor of 1.0, serves at such a limit. In our view, this limit has not been an entirely successful choice. The interconnection of population reproduction indicators which existed in 1930-1940 has been disrupted, and it would be incorrect to extend it to the 1960-1970 period without correction. During this period, the mortality indicators, population structure, and so on, changed substantially, and a new relationship between population reproduction indicators was established. In the USSR in 1969-1970, the net population reproduction coefficient was 1.126, alternatively calculated at 1.007, and the overall birth-rate coefficient during those years was 17.0 or 17.4 per thousand, respectively, that is, the net population reproduction factor was close to 1.0, which corresponded to an overall birth-rate factor of approximately 17.2 per thousand, and not the 21 per thousand it was in 1930-1940. One thing is beyond question: these questions must be researched.

In examining changes in settlement linked to urbanization, the book illuminates the most important trends, which are growth and the gradual equalization and reduction in differences between the country's economic regions in terms of urbanization level.

Using 1970 census materials and current migrant record data, the patterns and features of urban and rural migration and pendulum migration (routine labor relationships) are analyzed.

The book criticizes the concept of some "large," "enormous" or even "colossal" levels of migration in the USSR, which are not supported by statistical data. A comparison the book's authors made of various countries showed that the factor reflecting the ratio of total annual arrivals and departures for the entire population were only 5-7 percent in the USSR, while it was 9-10 percent in Poland and 17-19 percent in the USA, for example.

While agreeing with the authors, on the whole, about revealing the dynamics of the population's migratory mobility and the necessity of studying it separately on a broad historical background, we cannot go along with their thesis on migration intensity growth in all its forms (p 93).

The authors have studied absolute migration indicators in detail. However, in shifting to relative indicators, they have limited themselves to such indicators as urban population increment intensity, that is, to analyzing a result-producing indicator. It should be noted that this indicator is rarely used in the economic literature to evaluate migration intensity. It is difficult to agree with their opinion that "the intensiveness of population increment due to migration is growing stronger" (p 61). In 1961-1973, this indicator fluctuated noticeably from year to year. However, the selection of 1961 as the data base (p 58) is not entirely successful, since the mechanical increment per 1,000 persons in the urban population in that year was the lowest in the last 25 years (1950-1974). True, the book does make an adjustment: the data for a longer time period show that the basic direction of change in this indicator is towards reduction in the intensiveness of urban population increment due to migration. This trend, along with others, indirectly reflects an absolute increase in the natural urban population increment as a reflection of growth in that population.

In our view, the assertions that the intensiveness of migration has increased recently and that the nature of this process provides grounds for viewing migration intensity growth as both [a reflection of] population mobility in general and as a long-term trend are not very convincing.

Data such as the following are offered as proof of the increasing intensiveness of migration processes: the average annual total resettlement into urban areas increased 11.5 percent in 1966-1970 as compared with 1959-1965. Inasmuch as the population as a whole increased only 5 percent during that time, the authors conclude that the intensiveness of resettlement processes also evidently increased (relative to the total population) (p 93). And here, by concluding that migration intensiveness is increasing, the authors are, in our view, making a mistake. Arrivals and departures do not, as we know, apply to the entire population, but only to urban areas (population movement from village to village is not considered here); population growth is characterized, meanwhile, for the country's entire population. As is known, the intensiveness of population movement is calculated by statistical organs per 1,000 urban residents, and deliberately so.

Without examining the question of the migrant structure in terms of where the migrants come from, that is, from urban or rural areas, the authors

assert that the proportion of migrants from village to city in the total number of resettlements has decreased and that the proportion of inter-urban migrants has increased (p 97). However, this is a very debatable position. They speak on p 60 of a growing influx of rural residents into the cities and note that the influence of rural residents on the increment in the urban population has increased. This thesis is supported by data on the absolute increase in average annual migration increment and growth in the relative magnitude of the mechanical influx in the country's urban population increment.

However, here we need to note the following: in the period between the 1959 and 1970 censuses and in the 1959-1964 and 1965-1969 intervals data on migration increment were calculated by the authors by deducting from the total urban population increment that number by which it had increased due to natural increment and administrative-territorial reorganization, while for the 1970-1973 period they used current migration records -- to be precise, the difference between those arriving and those leaving. In our view, such a comparison is hardly proper.

On pp 60-61, they promote the thesis that there is a certain dependence between migration intensiveness and the number of young people reaching working age. However, this thought does not receive further development and support, unfortunately.

The book's authors examine population from the year 1000, urban and rural population from 1897 (the year of the first census), the national composition and ethnic processes from materials of the 1959 and 1970 censuses, and natural USSR population movement in 1940, 1960, 1970 and 1974. The book contains no explanations of the reason for this. Evidently, it is to be explained, in part, by a lack of initial statistical data. Nonetheless, the establishment of a chronological framework would have helped provide the research with depth, in our view.



11052
CSO: 1822

# GEOLOGICAL PROSPECTING WORK IN THE UKRAINE

Moscow RAZVEDKA I OKHRANA NEDR in Russian No 9, Sep 77 pp 1-4

[Article by P. F. Shpak, Minister of Geology of the Ukrainian SSR]

[Text] The might and prosperity of our great socialist Fatherland are determined to a great extent by the riches of its mineral resources. A great increase in mineral resources and a rise in the rate of the mining of minerals are of exceptional importance in developing the productive forces of the country.

The Ukraine SSR has made a considerable contribution to the expansion of the raw materials -- mineral base of the country for a long time. The Ukraine has been considered an industrially developed region of the country. Based on geological discoveries, mining industries were especially prominent in the economy of the republic. Geological studies of the Donetsk and Krivoy Rog basins were carried out even in prerevolutionary times. However, broad development of geological exploration occurred only during the years of Soviet power. New ore regions and provinces were discovered and explored. Among them are the Dneprovsko-Donetsk petroleum-gas region, regions of the Great Donbass, the Lvov'-Volyn' coal and the Dneprovsk lignite basins; the Kremenchug, Belozerskiy and Priazovskiy iron ore regions; the large Tokmakskoye manganese deposit; deposits of potassium salts, nickel and rare metals; rich deposits of kaolin and facing stones. About 80 kinds of minerals are mined in the republic and it is in first place in the country in having a number of them.

Geological charting of the territory of the republic was made, geological surveying was completed on a medium scale and a number of areas were photographed on a scale of 1:50,000 and larger. Prospecting of minerals has been proceeding at a high rate in recent years. In particular, in the Ninth Five-Year Plan period, the raw materials base of a number of minerals has expanded considerably. As a result of an analysis and reinterpretation of geological-geophysical data, a review of scientific concepts on the conditions for forming petroleum and gas fields and patterns of their locations, the expediency of their exploration was substantiated, the most promising zones of petroleum and gas were outlined and methods proposed for geological-geophysical explorations.

Exploration and prospecting for solid minerals were concentrated in new areas, the depth of geological studies was increased and a reevaluation of the prospects of known regions and ore zones was made. These measures made it possible to concentrate the basic work in directions that would provide the best results. A number of deposits were discovered and explored: 28 -- petroleum and gas; 24 -- iron and manganese ores; 11 -- nonferrous and rare metals; 29 -- coal; 88 -- peat; 206 -- nonore minerals; and 180 -- underground bodies of water. The Zapadno-Krestishchenskoye gas field with reserves of 318 billion cubic meters of gas was explored. The plan for increasing explored gas reserves was fulfilled by 112 percent and of petroleum -- by 111 percent. Reserves of iron ores were increased by over 4 billion tons and areas were prepared for building mines with a capacity of 52.6 million tons of coal. The five-year plan on raising the reserves of mercury, sulfur, rare metals and other minerals was fulfilled. Industry was provided with explored reserves of coal, iron and manganese ores, titanium, sulfur, kaolin, potassium and rock salt not only for the current five-year plan, but also for the distant future.

Yet, in spite of the achieved results, the republic still has limited reserves of petroleum, mercury and nickel. Some regions and mines have insufficient reserves of coal and rich iron ore. The exploration of certain nonferrous and rare metal deposits remains inefficient; new large natural gas fields are not being discovered to a great extent; and a local raw materials base for phosphates is lacking. Although industry is well provided with explored reserves of titanium, the situation is tense with a raw material base for ilmenite, suitable for manufacturing pigments. It is necessary to increase irrigation aid to agriculture by using underground waters.

In the current five-year plan period, the Ministry of Geology of the Ukrainian SSR allotted large amounts of money for geological prospecting, exceeding by 16 percent the money allotted in the previous five-year plan period. The volumes of prospecting for power-fuel raw materials increased by over 15 percent. It is planned to explore a number of deposits of petroleum, gas, iron ore, coal, sulfur, kaolin, raw materials for fluxes, construction materials and underground waters. Explored reserves of basic minerals must be increased by 10 to 16 percent. Investigations for comprehensive studies of deposits will be strengthened for fuller utilization of mineral reserves. The economic efficiency and quality of reserve preparations must be increased in fulfilling the entire complex of prospecting work. Therefore, attention is being concentrated on searching, exploring and preparing deposits that have the highest quality indicators and that will have the greatest national economic effect.

To achieve the goals of the Tenth Five-Year Plan period, it is necessary to develop and realize consistently a single geological-engineering policy. Accordingly, the most important directions of work for each mineral were determined. For example, the volumes of prospecting for petroleum and gas were increased by almost 20 percent with work being carried out at many

promising areas and at all accessible levels. The volume of geophysical investigations will increase by 1.4 times. Explorations for coal and iron ores will be concentrated in regions of mining enterprises of the Krivbass, Belozerskiy and Kremenchug iron ore regions, and in the Donetsk, Dneprovsk and L'vov-Volynsk basins. To make up for depleted coal mines in the Tsentral'nyy, Torezskiy, Krasnovodskiy and other regions of Donbass, new sections will be prepared for building mines with a capacity of 7 million tons of anthracite and 4.5 million tons of coking coal. The volumes of geological-prospecting work will double in the L'vov-Volynsk basin. Work will develop on a wide front on prospecting the Krivbass rich iron ore deposits at depths greater than 1500 meters and more exploration will be done in new regions on the left shores of the Dnepropetrovsk River and in the south of the Zaporozhskaya and Donetskaya oblasts. The exploration will be basically completed of the first main deposit of titanium ores, which will make it possible in the very near future to expand the production of high quality ilmenite concentrate for the chemical industry. Great attention is being given to explorations for sulfur deposits in the Carpathians for organizing mining by means of underground smelting.

Complication in the conditions of work due to the greater depth of exploration and assimilation of new regions increased the unit costs of explored reserves. Therefore, of great importance in the successful solution of problems faced by Ukraine geologists will be the efficient help of geological science. Cooperation is being expanded between production organizations, industrial scientific research institutes and Academy of Sciences [AN] of the Ukrainian SSR institutes. In 1976, seven programs of comprehensive investigations were approved at a joint conference of the presidium of the AN Ukrainian SSR and the Board of the Ministry of Geology of the Ukrainian SSR. They covered a wide range of problems, the solutions of which were urgent not only for geological science, but also for geological prospecting. The protection of the environment occupied a special place. Of interest was the problem of finding new deposits of petroleum and gas and studying the sea shelves. On the agenda were the investigation of patterns for the distribution of formations of petroleum and gas, related to traps of the nonanticlinal type, and the development of methods for their exploration. Science must give practical aid in developing this new direction of work in the republic. It is necessary to evaluate petroleum and gas resources at great depths and create and improve geophysical methods and apparatus, as well as the technology of drilling superdeep wells under complex geological conditions.

Scientific subdivisions of the ministry, geological institutes of the AN Ukrainian SSR, the Dnepropetrovsk Mining Institute, and the Kiev and L'vov universities are working on the investigation of the Ukraine metallogeny shield which will make it possible to do prospecting and exploration of iron ore, copper, nickel, phosphorous sulfur, etc. However, bringing to life the planned measures still will not fully solve the problems faced by the geological service of the Ukraine. The work of several institutes on a number of important problems of petroleum geology are of a general nature and are not backed by factual data. There are a number of unsolved problems in the area of prospecting and exploration of solid minerals and

underground waters. Stratigraphic maps have still not been created for the Ukrainian shield of the Precambrian period which reflects negatively on the quality of large-scale photography, forecasting and prospecting. Analyses of Precambrian formations are not developed sufficiently either theoretically or practically. Only the first attempts are being made in the preparation of the necessary models of large-scale formation maps. To check developments in geochemical methods for prospecting in practice, it is necessary to do a considerable amount of work in concrete regions.

With considerable explored reserves of minerals, the Ukraine still has great potential possibilities. The problem is to expand the mineral base of the republic as fast as possible with minimum expenditures. The solution of this problem of raising further the efficiency of prospecting and exploration of deposits requires the development of extensively substantiated concrete forecasts with staff workers of scientific establishments taking part in the preparation of the forecasts. In connection with the expansion of drilling at great depths, it is necessary to provide the proper equipment and high efficiency crushing tools to production organizations and to develop a progressive drilling technology. It is necessary to improve a new system of planning and economic incentive. Practice requires the review of the order of planning of the productivity of labor and other indicators so that they would produce an incentive for increasing the economic efficiency of prospecting and exploration.

Successful solutions of great and responsible problems faced by geologists in the Tenth Five-Year Plan period will depend, to a great extent, on the work of the entire collective of mineral prospectors of the Ukraine. In 1976, the Ministry of Geology of the Ukrainian SSR fulfilled ahead of schedule the plans for increasing reserves and all geological tasks, basic technical-economic indicators and adopted obligations. It is important to note that the overfulfillment of tasks on raising reserves and lower costs of exploration for petroleum and gas made it possible to raise the efficiency of geological prospecting for basic types of minerals by 5 to 10 percent as compared to the plan. Last year and in the first half of this year, there were discovered 12 new petroleum and gas deposits; 2 -- of native sulfur, titanium and a number of promising sections of iron ores, nonferrous and rare metals and other minerals. The most powerful gas gusher in the republic was discovered in Khar'kovskaya Oblast with a yield of 18 million $m^3$/day. Gas was found for the first time in reef origin formations in the northern outskirts of Donbass. These discoveries determine new in principle directions in prospecting.

Successes achieved by Ukrainian geologists are the result of widely developed socialist competition and exchange of advanced production experience. Geological prospecting organizations of the Ukraine are competing with similar organizations in Uzbekistan. To exchange advanced experience and check adopted obligations they send, periodically, delegations to each other and become acquainted with the activities and the organization of work and rest of the collectives. Competition brings its fruits. Much was achieved by the Ukrainian and Uzbek geologists due to competition.

The heroic work of mineral prospectors of the Ukraine was appreciated highly by the party and the Soviet government. Many collectives of workers and production leaders received government awards. The "Kievgeologiya" Trust was awarded the Order of Lenin, the "Poltavaneftegazragvedka" Trust -- the order of the Labor Red Banner; the Pervomayskaya Petroleum and Gas Prospecting and the Krivoy Rog Geological Prospecting expeditions -- the order of Emblem of Honor. Eight workers in the industry -- foreman I. I. Kovalenko from the Mirgorodskiy Petroleum-Gas Prospecting Expedition, G. S. Palosh from the L'vov Geological Expedition, V. M. Panasynuk from the Pervomayskaya Petroleum-Gas Expedition, and others were awarded the title of Hero of Socialist Labor.

The following achieve high indicators year after year: drilling brigades of M. D. Avramets (Krasnogradskaya Petroleum-Gas Expedition), F. Z. Rymarenko (Prilukskaya Petroleum-Gas Expedition), V. F. Yakovlev (Novomoskovskaya Geological Prospecting Expedition), V. K. Martynov (Gorlovskaya Geological Prospecting Expedition), etc.

Our country is on the threshold of the Great October jubilee. We, along with the entire Soviet people, are preparing for a worthy reception of the glorious date of the Soviet Ukraine. Production collectives of the industry adopted higher socialist obligations in honor of the jubilee. A worthy reception for the 60th anniversary of the Great October and a successful completion of the tasks of the jubilee year will make a great contribution to solving the problems posed by the 25th party congress.



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SUCCESSES IN GEOLOGICAL WORK IN UZBEK SSR

Moscow RAZVEDKA I OKHRANA NEDR in Russian No 9, Sep 77 pp 4-8

[Article by Kh. T. Tulyaganov (Minister of Geology of the Uzbek SSR)]

[Excerpt] Geological explorations were sharply increased in all directions in the postwar period. In 1953, industrial flow of gas was obtained at Setalan-Tepe and, in 1956, a great event was the discovery of Gazli which was the beginning of the creation of a new industry -- gas production in Uzbekistan. Exploration was completed of the Kurgashinkonskoye, Kumyshkanskoye and Altyntokanskoye polymetallic deposits, and the first stage of the Kal'makyrskoye copper deposits which are the basis for creating the Almalykskiy Mining Metallurgical Combine. Prospecting of the Uchkulakskoye Deposit began. The Naugarzan, Chashly, Kaskana and Chibargata fluospar deposits were explored and released for industrial assimilation. Work is being done on stratigraphy, paleontology, petrology, mineralogy, geochemistry and seismology. The study of regional metallogeny was started. Comprehensive hydrogeological and engineering-geological investigations were completed on a wide scale.

Geological-prospecting developed especially widely in 1957 after geological services of various ministries and departments were combined into a Main Administration of Geology and Preservation of Mineral Resources at the Council of Ministers of the Uzbek SSR. A general plan for the intensification of geological work in western and southern regions of the republic was developed at that time. Accordingly, a broad network was created of territorial comprehensive and specialized expeditions, "Uzbekgidrogeologiya," "Uzbekgeofizika" and "Uzbekneftegazrazvedka" trusts. The Central Laboratory, the Tashkent Machine Repair Plant and a Training Combine were established in Tashkent. In 1964, a second machine repair plant was built in Bukhara. During this period, three new scientific research institutes were organized in the republic: the SAIGIMS, the IGIRNIGM and the GIDROINGYeO in the AN [Academy of Sciences] UzSSR transferred in 1969 to the UzSSR Ministry of Geology. The volumes of geological photography, prospecting, drilling and exploring increased sharply and required a change in the organizational forms of managing the geological service of the republic. In 1962, on the basis of the "Uzbekneftegazrazvedka" Trust, the following specialized petroleum-gas prospecting trusts were created: the "Karshineftegazrazvedka,"

the "Bukharaneftegazrazvedka" and the "Karakalpakneftegazrazvedka," while, in 1964, the "Samarkandgeologiya" and "Tashkentgeologiya" trusts were created to improve the guidance of geological prospecting for solid minerals. These organizational changes made possible wide geological investigations in all directions.

The volume and efficiency of structural and deep drilling for petroleum and gas increased sharply, the role of geophysical methods and their ratio became greater, and geochemical and other methods of investigation developed. The wide study of the territory made it possible to explore and discover a great number of petroleum and gas deposits with over half of them being put in production. At present, explored reserves of natural gas exceed 1.5 trillion $m^3$. They are mainly in the Bukharskaya and Kashakadar'inskaya oblasts and partly in the Surkhadar'inskaya Oblast and the Karakalpakskaya ASSR. On the basis of these achievements, the gas producing industry was created in Western Uzbekistan. It is sufficient to say that in 1971-1975, 175.6 billion $m^3$ of gas were produced. A considerable part of the gas was transported over gas pipelines to industrial enterprises in the Urals and the Center. The ratio of gas in the fuel balance of the republic increased from 3.3 percent in 1958 to 75 percent at present. Gas improves household conditions of workers considerably. Most cities and villages have gas. A sulfur extracting industry was created in recent years on the basis of the reserves of high sulfur-content of the Urtabulakskoye and other deposits. The first stage of the Mubarekskiy Gas Processing Plant is in operation producing a considerable amount of sulfur.

Concentrating efforts, money and geological prospecting on solid minerals in a single research center increased their efficiency sharply. The discovery in 1960 of gold deposits in the republic was an important achievement of the geologists. The prospecting of the Sarychenskoye and Ka'makyrskoye copper deposits is being completed and the exploration of the Dal'noye copper deposit is being started; due to a considerable increase in their reserves, premises are created for expanding the capacity of the Almalykskiy Mining Metallurgical Combine imeni V. I. Lenin. With the Yakhtonskoye Deposit being put in operation, the raw materials base for the production of tungsten broadened. The Khandzinskoye lead-zinc deposit is being explored. A study was completed of the technology of the Uchkulachskoye lead-zinc deposit and the prospects were broadened. The large Tyubegatanskoye potassium salt deposit was explored to expand the raw materials base of the mining-chemical industry in the Kashkadar'inskaya Oblast. A base was created for the development of the chemical industry using chlorine salts. A new promising Shabrezskoye flouride deposit was discovered which, along with the increased reserves of the previously known Agata-Chibargatinskaya area, will place Uzbekistan among the important flouride-bearing regions in the country. Deposits of graphite were explored in Kyzylkumy; of talcum in Sultanuizdag; of feldspar, quartz and quartz-feldspar sands in the Bukharskaya and Samarkandskaya oblasts; as well as of bentonite clays, gypsum, etc. on the basis of which various enterprises are operating or planning to operate. For the first time in the USSR, a large wollastonite deposit, the Koytashskoye, in

the Dzhizaksakaya Oblast was explored. This is a new type of mineral raw material for the radio-electronic, abrasive and varnish paint industry. It is planned to begin operating it by the end of the Tenth Five-Year Plan period.

People call the Angrenskoye Deposit the "Uzbek Stoker" because it has two billion tons of coal reserves. Beside coal, the overburden rocks contain great amounts of secondary kaolin which, according to the conclusions of specialized institutes, may be used for producing alumina, high quality cement, refractory products and other products. For planned mining of 10 to 15 million tons of coal by the end of the Tenth Five-Year Plan period, almost as much kaolin will be obtained at the same time. Regrettably,so far it is practically unused and is dumped. The processing of kaolin into alumina and cement raw materials is economically expedient. It should be organized in the very near future. The needs of the construction materials industry are fully satisfied. It has nine large deposits of cement raw materials, 97 brick and 78 sand-gravel materials, 3 clay deposits for the production of keramzit and drain pipes and 34 deposits of other construction materials. Already explored in Uzbekistan are 12 deposits of marble, granite, gabbro, and porphyrites, many of them widely known beyond the republic. Decorative stones and marble decorate many subway stations in Moscow and Tashkent, pavilions of the Soviet Union at international exhibitions, the museum imeni V. I. Lenin in Tashkent, etc.

In connection with the growing need for underground waters for water supply, irrigation and assimilation of new and better land improvement methods for irrigated lands, various hydrogeological and engineering-geological investigations were developed widely. Such work was the basis for solving the problems of the assimilation of the Golodnaya, Karshinskaya and Sherabadskaya steppes, the lower parts of Amudar'ya, the construction of many irrigation canals, supplying water to hundreds of cities, kolkhozes, sovkhozes and industrial enterprises. Over 200 $m^3$/second reserves of high quality underground waters were confirmed by the USSR GKZ [State Commission on Mineral Resources].

The modern structure of the UzSSR Ministry of Geology provides the possibility of completing large investigations in all directions of geology. The "Tashkentgeologiya," "Samarkandgeologiya" and "Uzbekneftegazrazvedka" production associations were created, to which the IGIRNIGM was transferred in 1974, as well as the "Uzbekgidrogeologiya" Scientific Production Association together with the GIDROINGYeO. The following are directly subordinated to the UzSSR Ministry of Geology: The SAIGIMS, the Continuous Expedition on Geological and Economic Investigations, the Central Laboratory, the Tashkent Geological Prospecting Tekhnikum, the Tashkent "Geolograzvedka" Plant, etc. The UzSSR Ministry of Geology, along with specialized institutes and associations, a broad network of parties on specific subjects directly related to production, represent a single scientific-production complex. It cooperates closely with many scientific research organizations in the country, the Institute of Geology and Geophysics imeni Kh. M. Abdullayev of the AN UzSSR, the geological facilities of the Tashkent Geological University, the Tash Pl, etc.

Unbelievable changes have occurred in the amount of equipment provided for geological prospecting work and in the cultural and personal living conditions of the mineral prospectors. Personnel grew and its professional skill improved which helped complete continuously increasing volumes of geological prospecting work and improved its technical-economical indicators. Since 1957, the volume of geological prospecting rose by almost eight times; core drilling reached 800,000 meters and deep exploration drilling for petroleum and gas of 140,000 to 150,000 meters per year has been done. The volume of drilling under difficult mining conditions has risen many times.

A huge amount of work has been done on improving the well-being of geological prospectors. The total housing area in 28 basic settlements is 350,000$m^2$, having increased six times since 1957. Thirty-one kindergartens, five pioneer camps, 32 clubs, 136 red corners, new schools, clinics, hospitals, medical stations, the "Chatkal" sanatorium-dispensary, stores, dining rooms and other personal service enterprises were built. Work on training personnel was also at the center of attention. Organizations of the UzSSR Ministry of Geology have a collective of almost 30,000 skilled engineers, technicians, workers and employees with 7600 specialists with higher and secondary special education, 21 doctors and 288 candidates of sciences. A number of steps were taken to promote further the technical level and to introduce achievements of science and engineering in production. Geophysical, geochemical, nuclear physics and mathematical research methods and computers are being used widely. New powerful drill rigs and pumps, highly productive coreless drilling with milling bits, wear-resistant hard alloy boring bits, machines for screwing and unscrewing drilling pipes and semiautomatic elevators that made it possible to mechanize labor-intensive lifting and lowering operations and reduce the size of the drilling shift are implemented widely. Wells are being drilled with the bottom of the hole being blown out with compressed air and an aerated solution.

At the end of the Ninth and the start of the Tenth Five-Year Plan period, a new, more efficient technology of diamond drilling wells was introduced using removable core receptables which raises the speed and quality of drilling. The speed of core drilling increased from 233 meters/st [expansion unknown] -month in 1957 to 407 meters/st-month in 1976. The pool of deep drilling equipment was supplemented by "Uralmash-3D-71" drill rigs and higher power pumps; high torque turbine drills, diamond bits, etc., are being introduced widely. The level of technical progress may be judged by the following comparison. In the fifties, it took about a year to drill wells 400 to 500 meters deep and up to 3 years to drill wells 2000 to 2500 meters deep. At present, the depth of wells increased to 4000 meters and the annual depth of drilling by a rig is over 3000 meters. Great changes were also made in underground mining-prospecting work. The basic processes of underground tunneling were fully mechanized because of modern equipment. The average monthly speeds of horizontal tunneling with a cross section of over 5$m^2$ reached 120 to 130 meters, and by individual brigades -- 200 meters and more. Geological organizations now have at their disposal the latest equipment, devices and apparatus, as well as the necessary production and

scientific bases which will provide for the successful work of the ministry in the Tenth Five-Year Plan period. The efforts of geological prospectors are directed mainly toward expanding the raw materials base of nonferrous metallurgy, power, chemical, gas and petroleum production, construction materials and other industries. A great amount of hydrogeological and engineering-geological work will be done for irrigation and land improvement construction and water supply.

All of this must be achieved by introducing advanced achievements of science and engineering to the greatest extent, improving methods, and furthering the efficiency of prospecting and exploration work. A great role must be played by the improvement in the organization of work; by strengthening the production and material base; raising the productivity of labor; introducing cost accounting and the contractor method; strict economy in using material and money resources; and improving working and personal service conditions of geological prospectors. Collectives of scientists of the SAIGIMS, the GIDROINGYeO and the IGIRNIGM, as well as of the main institutes of the USSR Ministry of Geology, the AN UzSSR and VUZ of the republic must give efficient aid in solving the problems posed, with their efforts being concentrated on a scientifically substantiated evaluated forecast of all kinds of minerals, the creation of new methods of prospecting and exploring, and improvement in the equipment and technology of drilling and mining work.

By bringing to life the directives of the 25th party congress and of the plenums of the CC CPSU, the geological prospectors of Uzbekistan fulfilled ahead of schedule the goals of the national economic plan for 1976 and the higher obligations, as in previous years, on the basis of competition and the mobilization of internal reserves. The plan for increasing the reserves of copper, lead, zinc, flourspar, gas, petroleum and condensate was fulfilled. The USSR GKZ confirmed reserves in eight deposits, including Zevardinskoye and Khodzhinskoye for gas condensate, the Aktau -- for marble, the Sheykhdzheyli -- for construction stone, underground waters for supplying water to Syrdar'ya and Bekabad, etc. Three gas-condensate deposits with gas reserves of 126 billion $m^3$, a lead deposit and three construction material deposits were released for industrial use. Four gas fields, the Chandyr, the Tegermen, the Umid and the Amanata in the Bukharo-Khivinskaya petroleum-gas bearing province and the Predgissar'ye, promising ore outcroppings of nonferrous and rare metals at Kul'dzhuktau, the Severo-Nuratinskiy Ridge and the Chatkalo-Kuraminskiy region have been discovered. Prospects of a number of the following deposits have been expanded considerably: the Dalnoye copper molybdenum, the Uchkulachakskoye lead-zinc, the Shabrezskoye, and the Suppatashskoye flourite deposits. Detailed prospecting of the first celestite deposit in Uzbekistan at Sherabad has been completed.



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EXTRACTION OF METAL FROM ARMENIAN NONFERROUS ORES

Yerevan PROMYSHLENNOST' ARMENII in Russian No 9, 1977 pp 20-23

[Article by F. A. Petrosyan, candidate of engineering sciences, R. L. Agababayan, candidate of economic sciences: "Comprehensive Utilization of Mined Raw Materials at Nonferrous Metallurgy Enterprises in the Republic"]

[Text] The problem of the comprehensive utilization of raw materials, of great importance for the entire national economy, is especially acute for nonferrous metallurgy.

In evaluating the comprehensive utilization of raw materials in the enrichment cycle of nonferrous metal ores, it should be noted that the technical level of this stage of technological production predetermines to a great extent the efficiency of production and the level of comprehensiveness of utilization of ore raw materials for the mining metallurgical cycle as a whole. Therefore, the comprehensive utilization of the raw materials and the completeness of metal extraction in enriching ore are of decisive importance in raising the technical-economic indicators of the operation of a given sector of the industry as a whole.

In recent years, the technology of enrichment was improved at enriching factories. New high efficient flotation reagents were successfully developed and introduced, and collective-selective arrangements for enrichment were used widely at the Kadzharanskaya and Agarakskaya enriching factories. At present, the ratio of reprocessing ores by means of collective-selective flotation arrangements using new reagents is over 90 percent in the total volume of reprocessing.

Since 1975, a separate reprocessing of ores received from the pit, and the northern section of the mine was organized. Parallel with this, an arrangement of intercycle flotation was developed and assimilated. Due to this and to the realization of a number of organizational-technical measures, the loss of useful components in waste dumps decreased considerably at enriching factories. Thus, in 1976, the extraction of molybdenum at the Kadzharanskaya and Agarakskaya factories increased (in absolute values) as compared to 1973, by 0.97 and 4.47 percent respectively; of copper at the Kadzharanskaya Factory -- by 1.32 percent, at the Agarakskaya -- by

3.35 percent and at the Kafanskaya -- by 1.02 percent. These indicators were achieved despite a continuous reduction of useful components in the mined ore.

In the last four years, the contents of metals in reprocessed ores were as follows: molybdenum at the Kadzharanskaya Factory -- 0.0025 percent; copper at the Agarakskaya Factory -- 0.106 percent and at the Kafanskaya -- 0.155 percent. The technical-economic indicators of enrichment were improved at the same time.

At present, the Kadzharanskaya Factory of the Zangezurskiy Copper-Molybdenum Combine exceeded the rated indicators for extracting copper and molybdenum. Also increased considerably was the extraction of commercially useful components of enrichment byproducts such as gold, silver, selinium, tellurium and sulfur which, in further metallurgical reprocessing of copper concentrates, are extracted at the Alaverdskiy Mining Metallurgical Combine.

Production is intensified at metallurgical enterprises by using natural gas and more progressive technological processes.

In the Ninth Five-Year Plan period, modernization was continued at the Alaverdskiy Mining Metallurgical Combine. The technology of electric smelting of calcined copper concentrates was assimilated for the first time in nonferrous metallurgy at this enterprise. Reverberatory and roasting furnaces, anode and wire bars furnaces, converters and other metallurgical plants were converted to natural gas heating. Work continued on improving the apparatus and technological arrangements for dust collection and gas purification. Type UGT-3-30 electric filters of new design were installed at the combine.

As a result of the indicated measures, irrevocable losses of copper and sulfur were reduced at the Alaverdskiy Combine. The utilization of sulfur for the production of sulfuric acid increased from 29.1 percent in 1970 to 43.5 percent in 1975. Raising the extraction of copper led also to a higher level of extraction from crude copper of copper byproducts, such as, gold, silver, selenium and tellurium. Work was continued during the indicated period on improving the technology of production of cement, and the apparatus and technological arrangements for collecting dust.

Resmelting of aluminum tailings in an induction furnace was organized at the Kanakerskiy Aluminum Plant in 1973 with the result that irrevocable losses of metal in this conversion were more than halved. The annual output of finished products in manufacturing aluminum rolled stock and capacitor foil is increasing every year at this plant.

However, far from all production reserves were discovered and utilized by enterprises in the comprehensive utilization of the raw materials.

The process of extracting useful byproduct components from commercial concentrates of basic metals is still at a low level at enriching factories due

to a lack of efficient arrangements for raising the level of extraction, in particular, of precious metals.

There are shortcomings in the organization of supplying copper concentrates with proper moisture content. Moisture content in the copper concentrate of the Kadzharanskaya Factory varies within 16 to 19 percent as against a norm of 14 percent which makes the work of the Alaverdskiy Mining Metallurgical Combine considerably more difficult in unloading the concentrate (under winter conditions) and in batching it with other concentrates. This reflects negatively on the technological indicators of calcining and producing crude copper. At present, the Zangezurskiy Copper-Molybdenum Combine is taking steps to eliminate these shortcomings.

The level of copper and molybdenum extraction at the Agarakskiy Copper-Molybdenum Combine is lower than the rated, and losses of molybdenum in the copper concentrate exceed the allowed norms considerably. Due to the shipment of copper concentrate in piles hundreds of tons of copper in the concentrate are lost every year.

Last year, the Alaverdskiy Combine had a shortfall of 17.7 percent in sulfuric acid production and in extraction of copper from raw materials (88.78 percent instead of 92.7 percent per plan) due to the low level of organization of production; irregular operation of technological shops; nonobservance of preventive maintenance schedules of basic equipment of metallurgical shops; low utilization of production capacities, as well as not modernizing gas-cleaning systems on time, etc. The Akhtal'skaya Mine and the enriching factory of the Alaverdskiy Mining Metallurgical Combine did not fulfill the plans for product output and metal extraction due to poor organization of mining and unstable operation of the enriching factory. As a result, a considerable amount of metal was lost irrevocably. The combine permits large losses in the production of crude copper due, mainly, to the unsatisfactory condition of the dust-catching equipment and high content of metal in dump slags. At present, the amount of irrevocable copper losses in dump slags is about 4 percent, while copper losses in gases and dust are 2.8 percent. Copper is also lost with the electrolytes in the electrolysis shop due to poor insulation of electrolysis vats.

Proper measures are not being taken at enterprises for reducing harmful exhausts into the air and run-offs of waste water into bodies of water.

Raw and basic materials are utilized inefficiently at individual enterprises.

Because of the unsatisfactory work of construction and installation contractor organizations, plans were not being fulfilled systematically on construction; structural steel was not delivered on time by the USSR Minmontazhspetsstroy [Ministry of Installation and Special Construction Work] , while the Soyuzglavtsvetmetuglekomplekt did not deliver equipment, electrochemical and cable products on time. As a result, capacities important to nonferrous metallurgy for the production of sulfuric acid and an installation for burning sulfur at the Alaverdskiy Mining Metallurgical Combine, as well as electric filters of a new design and a number of other important facilities were not put in operation on time.

Collectives of nonferrous metallurgy enterprises must solve a number of important problems in the Tenth Five-Year Plan period, including the elimination of existing shortcomings and radical improvement in the comprehensive utilization of raw materials.

The "Basic directions of development of the national economy of the USSR in 1976-1980" specify further development of nonferrous metallurgy in the country, including the Armenian SSR. The industrial output will increase be 18.7 percent and productivity of labor -- by 17.6 percent. The output of molybdenum concentrates, sulfuric acid and other products will increase considerably. It is also planned to raise efficiency and improve the quality indicators of production further. In the Tenth Five-Year Plan period, it is planned to put in operation capacities for the production of alumina and chemical products. Production will be organized on the basis of comprehensive utilization of nepheline raw materials of the Tezhsorskoye Deposit. The aluminum industry of the republic will be provided with its own alumina.

In parallel with the assimilation of the additional capacity of the Kadzharanskaya Enriching Factory, it is planned, during the Tenth Five-Year Plan period, to involve ore poorer in useful component content gradually in reprocessing.

The successful fulfillment of the plan requires raising the degree of comprehensive utilization of raw materials, raising the quality of output and efficiency of production. In the Ninth Five-Year Plan period, easily accessible reserves were uncovered and used. To involve the deepest reserves in production will require more difficult and tedious work. Collectives of nonferrous metallurgy enterprises of the republic together with industrial institutes must solve a number of important scientific and engineering problems, test and introduce new technological arrangements, and modernize and replace outdated equipment. For this purpose, it is necessary to raise sharply the efficiency of scientific and project planning developments, and accelerate their introduction in production.

To raise the coefficient of the comprehensive utilization of raw materials at enriching factories, the following operations should be done: involve poor ores in reprocessing (in particular, at the Kadzharanskaya Enriching Factory) by the wide introduction of selective flotation systems; expanding the assortment and improve the quality of the flotation reagents used; utilize new processes for preparing ores, new equipment and improved methods for monitoring the technological process of enrichment; and introduce automated systems for controlling technological processes.

Positive solution of the problem of obtaining pyrite concentrates will create the possibility of organizing their production from flotation tailings at the Kafanskaya and Kadzharanskaya enriching factories in tens of thousands of tons annually. This measure will raise considerably the degree of comprehensive utilization of mined ore in the enrichment stage.

The most efficient reserves in raising the comprehensive utilization of ore at the Alaverdskiy Mining Metallurgical Combine are: expanding the production of sulfuric acid and improving the system of dust collecting; reducing losses of copper in dump slags of electric smelting (by stabilizing the technology and observing the electric smelting mode); raising the production and technological disciplines in metallurgical shops; accelerating the development of efficient arrangements for collecting fine converter dusts and organizing comprehensive extraction of useful components from them; and solving the problem of purifying drainage from the sulfuric acid shop, rendering it safe from arsenic and obtaining commercial products from it.

The successful solution of these problems, outlined in the Tenth Five-Year Plan, will make it possible to provide an additional output of a considerable amount of nonferrous and rare metals, as well as sulfuric acid by raising the degree of comprehensive utilization of the mined ore.

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# TIMBER, WOOD WORKING, AND PAPER INDUSTRIES URGED TO IMPROVE

## Using Substitutes for Wood

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Oct 77 p 2

/Article by A. Yakunin, director of VNIPIEIlesprom /All-Union Scientific Research, Planning and Experimental Institute, Timber and Wood Processing Industry/, and N. Kuzmin, division chief/

/Text/ The builders have been and still are the chief consumers of timber. At present they receive one out of every five cubic meters of procured timber. During the past ten years its expenditure was reduced almost by half. But this first of all is the result of the change in the proportions of materials used in construction, of the increased share of precast reinforced concrete and metal reinforcement.

Nevertheless the relative norms of expenditure of timber in the construction industry are still very big. The actual expenditure of lumber for every million rubles' worth of construction and installation jobs throughout the USSR Ministry of Construction of Heavy Industry Enterprises exceeds 1,000 cubic meters.

For example, only for casing up to 6 million cubic meters of lumber are expended annually. In the meantime, one can substitute it with wide plywood and in this way greatly economize on timber.

Timber can also be successfully replaced by other, more effective materials. Instead of the usual flooring one can use linoleum and parquetry. Wooden boards should be used on a larger scale for making doors and erecting temporary construction buildings.

An analysis of timber use in capital construction shows that in the Tenth Five-Year Plan it is possible to reduce without prejudice the expenditure of lumber at least by 15 percent. This will make it possible to economize 1.5 million cubic meters every year. For this it is first of all necessary to create reasonable, scientifically substantiated norms for the use of timber in construction which will take into account the utilization of new materials.

The second consumers of timber are enterprises manufacturing tare. Today nearly 20 percent of timber procured in the nation is used for this purpose. What can one do in order to reduce the expenditure of lumber there?

In any wholesale storage one can see thousands of crates, made from quality pinewood slats. And nearby fires in which they are burned. As a rule, tare is used once or twice. Several years ago this was reported in the satirical movie magazine FITIL'. Since then the situation has hardly changed. The fires are still reeking in tare warehouses. This smoke is a distress signal.

One of the realistic ways to economize on lumber is to create tare for different purposes which can be used many times, and to ensure its collection and safekeeping.

Large reserves of timber economy lie in the expansion of shipments in containers and packages. Experience shows: Delivery of one million tons of cargoes in containers saves on the average 0.3 million cubic meters of commercial timber. In this five-year plan the share of shipments in containers will increase from 52 to 87 million tons. This will result in an economy of 10 million cubic meters of lumber. Successful resolution of this problem first of all depends on rapid expansion of the production of various types of containers.

Pulp and paper industry is also an important consumer of lumber. Its share of total timber consumption in the nation is nearly 10 percent. In the past few years the proportionate expenditure of raw materials in this industry has not been lowered. Moreover, during the past 10 years more than 3 million cubic meters of valuable softwood was overexpended. One of the most important tasks is to assimilate the most advanced technology of boiling cellulose which would permit to use leaf wood and industrial chips instead of softwood. However, it is exactly this raw material that the paper industry does not like to use. So far the share of leaf wood is extremely small--it does not exceed 7 percent, although experience in foreign countries shows that it can be increased at least twice.

We would like to remind that foliage trees constitute almost one third of commercial forests in the European part of the country. Along with this one should consider that the main capacities of the cellulose and paper industry are also situated there. And the felling of softwood in this region is limited in the first place. One has to bring this raw material from the Transural region. This makes it indeed "golden," if huge transport costs and losses during the 1,000-kilometer journey are taken into account. While in the European part of the country nearly 40 million cubic meters of leaf wood remain unused every year. It is worthwhile to add that we absolutely do not use sawdust in the production of cellulose, although this technology already long ago passed the stage of production experimentation.

A few words about the waste paper. In countries with a developed cellulose and paper industry the share of this raw material in fibrous materials constitutes 30-40 percent. Our share, however, does not exceed 20 percent. In the meantime it is already now possible to increase it one and a half times without incurring considerable expenses.

The expenditure of lumber can also be reduced through the improvement of debarking equipment and use of more active chemicals in the making of cellulose and semicellulose. Calculations demonstrate that on the whole during a five-year period in the cellulose and paper industry it is possible to reduce the consumption of lumber by 3 million cubic meters. A substantial reserve!

A lot of lumber is used in furniture-making. In the past 10 years the expenditure of lumber in this industry was reduced by 3 to 4 percent. It was possible to achieve this through the introduction of strict proportionate norms and improvement of the composition of the materials used itself. The expenditure of, for example, lumber and plywood has been sharply reduced. At the same time the use of wood boards has been considerably increased. More and more plastics, metal, polished glass, and synthetic materials are used in the manufacture of furniture.

However, far from everything has been done. The expenditure of lumber can be reduced there too. For example, through the reduction of the thickness of chip boards by 3 millimeters. The quality of furniture will not be any lower, this has been proved in practice. A simple calculation shows: at the end of the five-year plan this will give an economy of no less than 3 million cubic meters of lumber.

...Timber is needed by all. Every industry of the national economy, taking a step further in its development, demands: "More lumber!" During the years of the previous five-year plan more than 100 million cubic meters of timber were used in machine building, nearly 160 million for repairs and operational needs. More than 20 million cubic meters of the most valuable timber was even used for ordinary telegraph poles. Whereas specialists have already proved long ago that it is better to stop using timber in this field and to make poles for powerlines from other, more durable materials.

VNIPIEIlesprom had conducted extensive research in order to reveal opportunities of reducing the expenditure of lumber in various industries of the national economy and determine the reserves of economy in the field of its consumption. The end results show: Already today there exists a real possibility to reduce the expenditure of timber by no less than 10 million cubic meters during the five-year plan. This will make it possible to conserve great numbers of growing trees.

What needs to be done? In the first place, it is necessary to realize a number of organizational and operational measures. And most importantly, to change the attitude toward timber of those who use it. Strict, truly progressive proportionate norms for the expenditure of timber must be worked out for

all industries. And, of course, these norms must take into consideration the most widespread assimilation of new advanced materials to substitute lumber.

We must use timber with extreme care, frugally. A policy of strictly substantiated and economical timber consumption is urgently needed. We would like to repeat once more: Timber is a national wealth. We must conserve it all together and individually.

## Planning Forest Restoration

Moscow EKONOMICHESKAYA GAZETA in Russian No 23, Jun 77 p 18

/Article by E. Solodukhin, professor, and I. Seperovich, candidate of agricultural sciences/

/Text/ In the current five-year plan forest restoration (of state forest resources) will have to be made in an area of 10-11 million hectares at a rate of more than 2 million hectares a year. The area of forest restoration by the active method will be almost equal to the annually cleared space. The sowing and planting alone will constitute 47.5 percent of this area.

But the creation of forests is still very expensive. Judging by the materials of yearly reports of the organs of forestry, the cost of a hectare of forest, taking into account overhead expenses, reaches 225 rubles. And if one considers the production cost (dead trees), this amount will increase to 388 rubles. Not included in this are the expenses of chopping the residue and of certain other measures in respect to the growing of trees. Funds spent on forest trees are excluded from circulation for a long time.

With an average supply of 400 cubic meters of timber on one hectare (best version), the cost of growing 1 cubic meter of timber will be 18 rubles and 60 kopecks. Forest management, in turn, receives as payment per stump on the average only 1 ruble and 12 kopecks for a cubic meter. Such is the economic side of the question.

Numerous research data reveals that during forest restoration the share of trees is 25 percent. This apparently is the true figure of the volume of work in artificial forest restoration. However, to spend considerable sums on the sowing and planting of trees there where they restore themselves well naturally is illogical to say the least.

All of the above, in our opinion, requires to review the principles of planning work in forest restoration. The existing practice of planning from the level attained and the principle of expanded reproduction for this work cannot be acknowledged as successful.

The proposed reduction of work in restoring (artificially) the forests to the actually needed level does not mean at all simultaneous reduction in forest

management financing. It is better to use the allocated funds for fire prevention measures in the forests, because fires destroy not only new natural growth, but the trees as well.

The need for carrying out special work in respect to the restoration of trees, as a rule, arises only during the procurement of timber by total clearing. And this leads to unfavorable consequences: water-preserving, soil-protecting, sanitary, and other qualities of a growing forest are reduced to a considerable degree.

Most countries around the world are now transferring to the selection method of cutting which ensures the formation of more durable species of trees of various ages. It is expedient to start introducing this method of cutting also in our forests and to exclude these areas when planning forest restoration projects.

## Comments on Forest Restoration

Moscow EKONOMICHESKAYA GAZETA in Russian No 44, Oct 77 p 18

/Article by S. Sinitsyn, chief of the division of USSR Gosplan/

/Text/ The Division of Forestry of USSR Gosplan has examined the article "How to Plan Forest Restoration," published in EKONOMICHESKAYA GAZETA No 23. The article pointed out the need to improve the planning of the volumes of forest restoration. In particular, the authors suggested to determine the optimum volume of artificial forest restoration.

The planned volumes of forest restoration jobs are based on the materials of forest management. They result from the actual condition of forest resources. Reduction of the volumes of forest restoration without proper scientific study of this question in concrete conditions will cause deterioration in the use of lands, reduction in the quality and productivity of forests. At present new methods of planning are being developed in which the methods of planning forest restoration will be revised.

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