

178095

JPRS 83400

4 May 1983

# USSR Report

ENERGY

No. 145

**DISTRIBUTION STATEMENT A**  
Approved for Public Release  
Distribution Unlimited

19990617 184

**FBIS**

**FOREIGN BROADCAST INFORMATION SERVICE**

REPRODUCED BY  
NATIONAL TECHNICAL  
INFORMATION SERVICE  
U.S. DEPARTMENT OF COMMERCE  
SPRINGFIELD, VA 22161

10  
82  
A05

## NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

## PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service (NTIS), Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semimonthly by the NTIS, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

Soviet books and journal articles displaying a copyright notice are reproduced and sold by NTIS with permission of the copyright agency of the Soviet Union. Permission for further reproduction must be obtained from copyright owner.

# JPRS REPORTS

Japan Report  
Korean Affairs Report  
Southeast Asia Report  
Mongolia Report

Near East/South Asia Report  
Sub-Saharan Africa Report  
West Europe Report  
West Europe Report: Science and Technology  
Latin America Report

## USSR

Political and Sociological Affairs  
Problems of the Far East  
Science and Technology Policy  
Sociological Studies  
Translations from KOMMUNIST  
USA: Economics, Politics, Ideology  
World Economy and International Relations  
Agriculture  
Construction and Related Industries  
Consumer Goods and Domestic Trade  
Economic Affairs  
Energy  
Human Resources  
International Economic Relations  
Transportation

Physics and Mathematics  
Space  
Space Biology and Aerospace Medicine  
Military Affairs  
Chemistry  
Cybernetics, Computers and Automation Technology  
Earth Sciences  
Electronics and Electrical Engineering  
Engineering and Equipment  
Machine Tools and Metal-Working Equipment  
Life Sciences: Biomedical and Behavioral Sciences  
Life Sciences: Effects of Nonionizing Electromagnetic  
Radiation  
Materials Science and Metallurgy

## EASTERN EUROPE

Political, Sociological and Military Affairs  
Scientific Affairs

Economic and Industrial Affairs

## CHINA

Political, Sociological and Military Affairs  
Economic Affairs  
Science and Technology

RED FLAG  
Agriculture  
Plant and Installation Data

## WORLDWIDE

Telecommunications Policy, Research and  
Development  
Nuclear Development and Proliferation

Environmental Quality  
Epidemiology

# FBIS DAILY REPORT

China  
Soviet Union  
South Asia  
Asia and Pacific

Eastern Europe  
Western Europe  
Latin America  
Middle East and Africa

To order, see inside front cover

4 May 1983

## USSR REPORT

## ENERGY

No. 145

## CONTENTS

## FUELS

## COAL

Coal Industry Minister Surveys Sector's Progress (B.F. Bratchenko; UGOL', Dec 82) .....	1
Kuzbass Coal Industry Surveyed (A.I. Petrov; UGOL', Dec 82) .....	15
Georgian Coal Mine Modernization Needs Outlined (B.G. Zanikidze, Sh. V. Leladze; UGOL', Dec 82) .....	21
Krasnoarmeyskugo' Announces Socialist Pledges for 1983 (TRUD, 6 Jan 83) .....	25
Rostovskaya Coal Mine Undergoes Reconstruction (M. Rabichev; SOTSIALISTICHESKAYA INDUSTRIYA, 4 Feb 83) .....	27
Future Tajik Coal Mining Site Visited (O. Latifi; PRAVDA, 3 Feb 83) .....	30
Synopses of Articles in 'UGOL' UKRAINY', No 1, 1983 (UGOL'UKRAINY, Jan 83) .....	33
Synopses of Articles in 'UGOL' UKRAINY', No 2, 1983 (UGOL'UKRAINY, Feb 83) .....	38
Selected Synopses of Articles in 'THE UKRAINE'S COAL', October 1982 (UGOL'UKRAINY, Oct 82) .....	43
Selected Synopses of Articles in 'THE UKRAINE'S COAL', November 1982 (UGOL'UKRAINY, Nov 82) .....	50

Selected Synopses of Articles in 'THE UKRAINE'S COAL', December 1982 (UGOL'UKRAINY, Dec 82) .....	55
--	----

#### Briefs

Mining Plans Exceeded	59
Shale Power	59
New Tunneling Complex	59
Ekibastuz Mining Figures	59
Coal Compacted for Shipment	60
"Vorgashorskaya" Mine	60
'Tulaugol' Plan Surpassed	60
'Saranskaya' Mine	60
New Mine Excavators	61
Kusheyakovskoye Deposit Operational	61
Donetsk Mine Imeni Kalinin	61
"Novikovskiy" Open Pit	61
Neryungri Coal Mining Plans	61
Railroad Coal Losses Lowered	61
'Shirinskaya' Mine Takes Lead	62
ERP-2500 Rotary Excavator	62
Personal Services for Miners	62
Mine Imeni Frunze	62
Coal Mining Plans Surpassed	62
New Ekibastuz Open Pit	63
'Tulaugol' Association	63
Mine Centrifugal Pumps	63
'Tsentral'Naya' Mine	63
New Pavlograd Mine	64
Mine Imeni Sverdlov	64
Steam Cannon Cleans Boilers	64

#### ELECTRIC POWER

##### NUCLEAR POWER

Turbogenerator Construction at Leningrad Elektrosila (L.A. Drozdova; ENERGETIK, Feb 83) .....	65
Improving Conditions for Night Minimum Power Loads (V.S. Sharygin, S.A. Pletnev; ENERGETIK, Feb 83) .....	72

## COAL

### COAL INDUSTRY MINISTER SURVEYS SECTOR'S PROGRESS

Moscow UGOL' in Russian No 12, Dec 82 pp 2-11

[Article by B. F. Bratchenko, minister, USSR Coal Industry, Hero of Socialist Labor: "A Glorious Sixty Years" passages in slantlines printed in boldface]

[Text] Sixty years ago, on 30 December 1922, by the will of our nation's peoples was created the Union of Soviet Socialist Republics -- the world's first unified, allied, multinational state of workers and peasants.

The birth of the USSR was the result of the Great October victory, the magnificent services of the Communist Party, the living embodiment of V. I. Lenin's ideas, and Leninist principles of nationalities policy. The result of the revolutionary-transformative activities of the people, united under the leadership of the Communist Party in the USSR, was the construction of a developed socialist society.

From their own experiences the Soviet people are convinced that consolidation into a single union multiplies their strength, and accelerates socioeconomic development. This was manifested in all its fullness during the years of industrialization, agricultural collectivization, and the cultural revolution. Shoulder to shoulder the fraternal peoples stood at the Motherland's defense during the years of the Great Patriotic War. Together they restored its demolished economy to life, and dealt with the tasks of the post war five-year plans. The grand fraternity of working people, united by the indivisible friendship of nations and nationalities, arose in the struggle for the party's policies.

The USSR's formation and successful development is of huge international significance. Today our Motherland is in the front ranks of the struggle for peace, independence, freedom and happiness. The peace program put forward by the 26th CPSU Congress points out realistic, constructive ways of lessening the threat of war, deepening detente, and expanding widespread international cooperation.

/The coal industry is a vivid example of our nation's socioeconomic transformations and the successful development of a unified national economic complex./ In six decades it has been transformed into one of heavy industry's largest sectors, providing the nation's requirements for solid fuel. While in 1922 a little more than 11 million tons of coal were extracted, annual extraction

now exceeds 700 million tons. Republics with traditions of a developed coal industry, such as the RSFSR and the Ukrainian SSR, and those where practically no coal was produced prior to the revolution have all made huge contributions to the levels of solid fuel extraction.

High rates of solid fuel extraction in the union republics are a powerful impulse to the development of productive forces in the republics themselves and in the entire nation.

In its development, the USSR coal industry has traveled a long and difficult path. It is sufficient to recall the years of the civil war and the intervention, when about 70 percent of the industrial productive capital in the Donbass was put out of order or destroyed. Coal mines in the Moscow basin, the Urals, and other regions were also in a serious situation then.

V. I. Lenin, the founder of the Communist Party and the Soviet State, placed great importance upon the rebirth and further development of the coal industry. His mobilizing speeches at the 1st and 2nd All-Russian Congresses of Mine Workers are widely known. "...Without the coal industry," he said, "no modern industry, factories, or plants are thinkable. Coal is the real bread of industry, without this bread, industry will not operate" (Poln. sobr. soch. [Complete collected Works], Vol. 40, p 292).

During this period V. I. Lenin signed many documents, orders, and telegrams on giving specific assistance to miners. A labor army was created to rebuild the Donbass.

Outstanding state and party leaders such as F. A. Artem (Sergeyev), G. K. Ordzhonikidze, and I. V. Kosior also did much to restore and develop the coal industry.

In subsequent years the sector's development is directly linked to the activities of a number of prominent organizers and specialists in the coal industry: V. V. Vakhrushev, A. F. Zasyad'ko, Ye. T. Abakumov, L. Ye. Grafov, and others.

During the prewar five-year plans the coal industry's tasks were determined by plans for the nation's industrialization. During this period coal extraction increased 4.7 fold. In 1931 the decision was made to create, in the eastern part of the country, a second coal and metallurgical base and develop the Kuznetsk basin in order to supply coking coal to the Magnitogorsk and Kuznetsk metallurgical combines, and increase the extraction of coal for power production.

During the 2nd Five-Year Plan 25 large coal mines were built and put into operation in the Kuzbass, and 20 were built in the Karaganda basin. The development of the Pechora basin began in the 3rd Five-Year Plan. There was extensive development work on the extraction of brown coal in the Moscow basin, where 43 mines were built in the prewar years. Coal extraction increased in the Urals and the country's eastern regions.

Thus, as a result of mine construction and reconstruction in the 1st Five-Year Plan, capacity totaling 56 million tons of coal annually was introduced; during the 2nd Five-Year Plan capacity increased by 75 million tons; and in

of the 3rd the increase was 43.5 million tons. The Kuzbass share of total coal extraction reached 13.6 percent, Moscow basin - 6.1 percent, East Siberian fields 5.6 percent, the Far East - 4.3 percent, and the Karaganda basin 4.1 percent. They played an important role in supplying the needs of the nation and the front when the Donbass and Moscow basin were temporarily occupied during the Great Patriotic War. The intensive development of new coal centers in the country's east made it possible to completely meet the national economy's needs for fuel.

After the expulsion of the German-fascist aggressors from the Soviet land, the restoration of the Moscow and Donets basins began. The Soviet people's immense creative labor made it possible to restore the Donbass by 1949 and to increase coal extraction to 130 million tons in the 5th Five-Year Plan. In 1958 the Soviet Union moved to first place in the world with respect to the volume of coal extracted. In 1975 the nation's miners exceeded the 700 million ton mark. Coal extraction per mine increased from 562,000 tons in 1965 to 825,000 in 1981 (a 1.5 fold increase) and mines extracting more than 900,000 tons of coal annually increased their share of total output from 29.6 percent to 60.5 percent.

A program of large mine construction was undertaken. In the past decade giants such as the Rapsadskaya in the Kuzbass, with a capacity of 7.5 million tons annually, the Vorgashorskaya No 1 in the Pechora basin - 4.5 million tons; the imeni A. G. Stakhanov - 4 million tons, the Dolzhanskaya-Kapital'naya - 3 million tons, the Komsomoléts Donbass - 2.1 million tons, and the imeni 60 Years of the VLKSM - 3 million tons in the Donbass; the Tenteksyaya - 4 million tons in the Karaganda basin, the Estoniya oil shale mine - 9 million tons of rock, 5.4 million tons of concentrate in the Baltic area, and other mines have gone into operation.

The sector's mines are now producing about 60 percent of the coal extracted in the country. The September 1981 decree of the CPSU Central Committee and the USSR Council of Ministers: "On Measures for the Accelerated Technical Reequipping of USSR Ministry of the Coal Industry Mines" is of huge significance for improvements in the underground method of coal extraction. It is directed towards the liquidation of recent lagging in the reconstruction of existing mines, the preparation of new beds and the development of working faces, the organization of the series production of machinery for operation in difficult mining-geological conditions, and for improving work conditions and safety.

/Problems of coal production mechanism have always been at the center of attention of the Communist Party and Soviet government./ Even back in 1920, V. I. Lenin, posing the problem of mechanizing all economic sectors, gave first priority to the necessity of mechanizing the coal industry.

The creation of a domestic coal machinery building industry actually began in 1924, when five machinery building plants were transferred to the Donugol' [Donets Coal] Trust. They were: the Khar'kov (it is now the Svet shaktera), Gorlovka (Machinery Building Plant imeni S. M. Kirov), Toretskiy (Druzhkovskiy Machinery Building Plant imeni 50 Years of the Soviet Ukraine), and the Staro-Kramatorskiy. The basic work of these plants became the production of mining equipment. Special design offices were set up. They developed the first



domestic hoist machinery, scraper hoists, and other equipment. In 1928 the DT heavy coal cutting machine was manufactured at the Gorlovka plant, and in 1932 imports of coal cutting machines into the USSR were curtailed completely.

By 1940 coal machinery building plants, by that time there were already 19, in addition to cutting machines, were manufacturing rock loading and hoist machinery, mine conveyors, main ventilators, and other machinery.

A new machinery building base for the coal industry was created in the country's east. During the Great Patriotic War coal machinery building workers and engineers-technicians filled orders from the front and met mine requirements.

Machinery builders exerted heroic and intense labors in restoring the mines and faces in the Donbass destroyed by the fascists. Especially great contributions were made by workers and production managers such as boiler-maker I. Koval', foremen Ye. Shevchenko and V. Il'yachenko (Gorlovka plant) enterprise directors I. Katerinich (Gorlovka plant) and P. Kostyuchenko (Svet shakhtera Plant), Glavuglemash [Main Administration of Coal Machinery Manufacture] N. Krylovskiy, and others.

With the organization of Giprouglemash [State Planning, Design, and Experimental Institute of Coal Machinery Manufacture] TsNIIpodzemmach [Scientific Research Institute for Underground Machinery], VNIIPtuglemash [All Union Scientific Research, Planning and Technological Institute of Coal Machinery] coal machinery building obtained a planning and design and planning technology base ensuring the highest level of heavy and labor intensive work mechanization at coal industry enterprises.

In 1949 the Machinery Building Plant, imeni S. M. Kirov began series production of the "Donbass" widespan coal combine; in 1950 - the UKT, and in 1952 - the "Gornyak". This was a turning point in the solution of problems in the mechanization of the cutting and loading of coal at working faces.

The Soviet Union was considerably ahead of the Western European nations in beginning work on the creation of mechanized panel supports [shchitovaya krep'] and in the Donbass, holding type supports. Mechanized units, including narrow span combines or knife devices, mechanized props and mobile conveyors became the basic type of face working equipment. At the same time the first models of domestic entry driving combines were built. Their production has increased annually, and by 1981 548 combines of various types were built. This has made it possible to increase the tunneling work done by combines to 2,000 kilometers annually (38 percent of tunneling where the loading of rock mass is required)

Coal machinery building now includes 28 main plants and production associations, 7 experimental plants, 2 planning-technological institutes, the VPO [All Union production association] Soyuzuglemash and Soyuzugleavtomatika.

Coal machinery building plants are now engaged in planned work on the introduction of progressive technological processes and highly productive equipment, important factors in raising labor productivity, work quality, and machinery service life.

From 1970 to 1980 the production of the basic types of mining equipment increased considerably: complexes and mechanized supports - 3.2 fold; knife devices - 4 fold; entry driving combines - 1.8 fold; mobile scraper conveyors - 1.4 fold. There were increases in the production of high powered face working combines (the 1 GSh-68, KSh-3m), mechanized supports for thin seams (1Mk-97D, 2MKDM), coal extracting assemblies for steeply dipped seams (ANShch), 1AShchM), loading and auger-loading machines, and there was a substantial modernization of the assortment of belt and scraper conveyors. Production of the KM-103 complexes for excavating thin (0.7 meters) seams has begun. Such seams are especially difficult for miners. It has also begun on Ak-3 aggregates for excavating steep seams; these units have remote controlled face working equipment, permitting coal extraction without the constant presence of service personnel at the face; and on the SK-1u combines for sinking vertical shafts, and on other progressive mining equipment. As a result, coal extraction from comprehensively mechanized working faces increased from 26 million tons in 1965 to 266 million tons in 1981, and its share of total underground extraction increased from 8.3 percent to 68.8 percent. Work has been practically completed on the comprehensive mechanization of face work at mines in the Moscow and Pechora basins, and is being completed at the Kuznets and Karaganda basins.

The creation of domestic coal and rock loading machinery began in 1938-1940. In the postwar years the mechanization of such loading work during tunneling operations increased at rapid rates. While in 1940 only 36 loading machines were in operation, by 1965 their number reached 6,199, and later entry driving machines started replacing them. Coal and rock were loaded by machine on 8.9 percent of all preparatory tunneling work in 1950, by 1981, this had increased to 81.1 percent.

Underground transportation has changed radically. At the majority of prerevolutionary mines horse haulage was used in the main drifts, and manual haulage in the small mines. Brake pulleys were used on slopes, small winches on inclines, and one might encounter steam operated machinery at vertical shafts.

By 1950 haulage at mines was completely mechanized. In subsequent years transportation was mechanized, and heavy electric locomotives and highly productive conveyors were introduced.

The improvement of mine working systems was of major significance. In the prewar years, and during the restoration of the Donbass coal industry destroyed during the war, the necessity of very rapidly increasing coal extraction led to the preeminent use of blind wall [sploshnyy] working systems (in 1945 95.5 percent). However, in the 1950's the shortcomings inherent in these systems began to delay the use of mining technology's growing potentials. The increased working pace resulting from the introduction of loading machines made possible the planned replacement of blind wall systems by the more progressive retreat longwall methods.

Beginning in the 1930's the hydraulic method of extraction was introduced into the coal industry. In the first stage in the Donbass and Kuzbass experimental-production hydraulic mines and sections having a total capacity of 3.3 million tons annually were introduced. Later, many years work by specialists, designers,

and production workers resulted in a progressive technology for hydraulic extraction of coal. It was a continuous flow process not requiring people's constant presence at the face. In 1981 9.2 million tons of coal were extracted by the hydraulic method, including 5.6 million in the Kuznets basin and 3.6 in the Donbass.

/Pace setting development rates for strip mining of coal deposits are a very important factor determining production growth rates and efficiency./ The intensive development of this method began in the 1940's and is linked to the nation's general industrialization. Between 1932 and 1940 coal strip mines were put into operation in the Urals, East Siberia, and the Karaganda basin. However, strip mine equipment standards during this period remained low: the average size of an excavator bucket was 1.8 cubic meters. These were primarily foreign makes of excavators, and most were steam powered. Steam locomotives pulling 20 ton dump cars were used to transport coal and overburden rock.

During the Great Patriotic War, when it was essential to sharply increase coal production in the eastern regions, the problem was solved mainly through the development of strip mining. By 1945 strip mines were already producing 17.8 million tons of coal. Coal production rates at strip mines continued to grow rapidly as the result of newly introduced capacity. In 1981 total strip mine production in the USSR was 275.5 million tons, with this method accounting for 39.1 percent of total coal production. Today half the coal produced in the RSFSR comes from strip mines. In Kazakhstan in 1981, 74.1 million tons were extracted from strip mines, an 18 fold increase over 1950.

Coal extraction at strip mines is characterized by high production concentration: in 1981 average mine capacity was 4.1 million tons, 1.7 fold greater than in 1965. In the Kazakh SSR there is the huge Bogatyr' mine (50 million tons annually), and in the RSFSR such large ones as the Borodinskiy (19.7 million tons), the Nazarovskiy (13 million tons), and the Azeyskiy (10.8 million tons). Kuzbass strip mines produce more than 45 million tons of coal annually. Output is increasing rapidly at the Neryungrinskiy strip mine in Yakutia, by 1985 its annual production will reach 13 million tons. In 1981 the Angrenskiy strip mine in Uzbekistan produced 5 million tons of coal.

In recent years the excavator fleet has been intensively modernized: in replacement of obsolete low productivity machines, strip mines are being equipped with powerful new excavators: the EKG-8, EKG-12.5, EKG-20, EVG-36/65, ESh-25/100. Since 1977 ESh-100/100 walking draglines have been operating at the Nazarovskiy strip mine.

The creation and introduction of powerful walking excavators has promoted the development of the economical non-transport system of removing overburden rock. Excavators with a productivity of up to 5,000 cubic meters per hour are working at coal production operations.

Diesel and electric locomotives hauling large capacity self-dumping cars are used to transport coal and overburden. There have been considerable improvements in railroad rolling stock structure (more than 70 percent are 100-180 ton dump cars).

The CPSU Central Committee and USSR Council of Ministers decrees on the creation of the Ekibastuz and Kansk-Achinsk Fuel-Energy Complexes, and the South-Yakutsk Coal Complex, and on additional measures for accelerating coal production development rates by strip mining methods during 1981-1990 outline broad perspectives for further increases in strip mine coal production. They provide measures ensuring the fulfillment of targets for the construction of open pit mines, the creation and introduction of large unit capacity overburden and coal haulage equipment, and other equipment. The implementation of these measures will increase strip mines' share to 50 percent of total production.

/Coal cleaning has been transformed into an independent sector./ In 1928 the total capacity of operating facilities was only 4.2 million tons. In the years following a number of large enterprises for cleaning and grading coal were built. The processing volume at such facilities increased from 26 million tons in 1940 to 339 million tons in 1981.

Among the cleaning and grading facilities introduced in the past 10 years are large enterprises such as the Chervonogradskaya (9.6 million tons annually), the Sibir' (6.2 million tons), Komendantskaya (6 million), Vostochnaya (6 million), Pavlogradskaya (5.3 million), Kaz'yanovskaya (4.1 million tons), and others. About two-thirds of total coal production is now processed in some way, including grading and briquetting.

The development of coal cleaning and grading is a major factor in supplying the nation's economy and most of all the metallurgical industry with high quality coal. In addition to increases in facility capacity, coal processing technology is also being improved. There is an expanded use of such progressive methods as coal processing in dense media and sludge flotation. Simultaneously there has been a reduction in the volume of processing in low efficiency washing channels. At new facilities, as a rule, it is planned to process lump coal in a magnetite suspension.

/There has been a considerable improvement in the technical standards of industrial transportation,/ which delivers coal to railroad mainlines, hauls overburden from strip mines, and provides transportation for mines, cleaning facilities, mine construction organizations, coal machinery building plants, and other enterprises in the sector. Since 1970 the volume of freight hauled by the USSR Minugleprom's industrial transportation operations has grown 1.7 fold and reached 2.7 trillion tons in 1981. It was possible to support this huge freight movement through the construction of new railroad lines and roads, the increase in existing supply line capabilities, and the introduction of new types of transportation.

Motor vehicle haulage has developed at pace setting rates. During the 10th Five-Year Plan the truck fleet grew by 14 percent, and total tonnage capacity by 34 percent. At strip mines the fleet is reinforced by a sizable number of 40-180 ton dump trucks.

/Socialist competition has always played a major role in improving coal industry production efficiency./ In 1932 N. Izotov, a coal hewer at the Kochegarka mine in Gorlovka began the practice of qualified miners instructing new workers

It was at this time that competitions began for the title "Best Miner", "Best Brigade", "Best Section", and "Best Mine".

The deed of the Donetsk miner A. Stakhanov is written in golden letters in the history of the building of the new socialist society. In 1935 at the Tsentral'naya-Irmino mine in one shift he filled 14 quotas and extracted 102 tons of coal. The Stakhanov movement was transformed into a national competition for increasing labor productivity.

The introduction, in the beginning of the 1950's, of the cyclic production organization -- a collective form of Stakhanovite work -- ensuring the strict sequence of operations in coal excavation and work site preparation, was a new stage in the improvement of work organization. By the end of 1960 about 60 percent of the working faces had been converted to work on cyclic schedules, their average daily loadings were 1.5 higher than at the other mines. Among the first initiators of the cyclic organization were the twice Hero of Socialist Labor I. I. Brid'ko -- section chief at the mine imeni Dimitrov in the Donbass, and V. V. Pashkevich -- section chief at mine No 3 of the Skuratovugol' trust in the Moscow basin.

The introduction of narrow span excavation machinery and mechanized supports which began in the 1960's made it possible to combine all coal extraction operations and thus create the conditions for the conversion to continuous production, from individual specialized brigades to comprehensive brigades.

/The sector's widespread socialist competition for fulfillment and overfulfillment of plan targets, the maximum use of highly productive mining equipment, and for a communist attitude towards labor is a worthy continuation of the Stakhanovite movement./ Working face brigades competing to load 1,000 tons and more of coal per day have made a substantial contribution to coal production growth and the improvement of sector technical-economic indicators. The number of such brigades increased from 23 in 1967 to 418 in 1981. They extract more than 40 percent of the total at underground mines. In 1981 74 brigades extracted 500,000 and more tons each, including 8 brigades with 1 million tons each. Such "millionaire" collectives are headed by the famous brigade leaders Hero of Socialist Labor M. P. Chikh, M. N. Reshetnikov, N. N. Skrypnik, A. D. Polishchuk, K. S. Markelov, and others. Average monthly labor productivity per worker at such brigades is almost three fold higher than for face work in the sector as a whole.

There is also widespread competition among tunneling brigades to achieve high rates of preparatory work, and among excavator and transportation brigades at strip mines to master increased quotas for mining and transportation equipment productivity. In 1981 there were 548 high speed tunneling brigades working at mines. They did about one-fourth of all preparatory work. The brigades of V. M. Vernigorov and Ye. M. Koshelev in the Donbass, A. Ya. Khmelev, G. F. Zayts, V. Ya. Rud in the Kuzbass, I. I. Faber and M. P. Kurnakov in the Karaganda basin, A. M. Sakharov in the Pechora basin and K. Lyaydves in the Ekstonslanets Association dug 4-6 kilometers of tunnels each.

Increased productivity quotas at coal strip mines have been mastered by 874 brigades, including 400 excavator, 146 locomotive, and 328 motor vehicle crews.

At the Nazarovskiy strip mine, the ESh-100/100 walking excavator crew of B. N. Eshke did 13.8 million cubic meters of stripping, compared to a 12 million cubic meter quota. At the Krasnobrodskiy strip mine, the comprehensive mining transportation brigade led by USSR State Prize winner V. V. Frantsuzenko and K. A. Aksent'yev, broke up and moved 1,739,00 cubic meters of rock in one year, exceeding the established norm 1.7 fold.

Standing at the labor watch for honorably celebrating 60 years since the USSR's formation, coal industry workers have widely expanded socialist competition to increase coal extraction, raise production efficiency, accelerate scientific and technical progress, economize on labor and material resources, and improve product quality.

/The widespread exchange of work experience among competing mine collectives in the nation helps in achieving good results./ Competition between miners of the Donbass and Kuzbass, Ukraine and Georgia, Russia and Estonia, and between mine builders in Kazakhstan and Bashkiria has become traditional.

Outstanding successes for the jubilee year were attained by M. N. Reshetnikov's extraction brigade at the Zyryanovskaya mine in the Yuzhkuzbassugol' Association, which already by 19 August had reported extracting 1 million tons of coal. The excavator brigade led by S. N. Zubko at the Bogatyr' strip mine extracted more than 4 million tons of coal in 6 months. This is a record.

At the same time one should note that the highly productive brigades' experience is still insufficiently disseminated. The number of brigades extracting 1,000 tons and more per day has declined in recent years in the Donets, Kuznetsk, and Karaganda basins, leading to reductions in coal extraction for the sector as a whole. The basic reasons for this are: slow preparation of excavation work front, violations of schedules for equipment installation and removal, and for planned repairs, shortcomings in material-technical supply, and lessening attention towards the development of the brigade form of work organization and stimulation.

At all stages in the coal industry's development great attention has been given to problems in the improvement of management./ Already in December 1917 a decree was ratified on the Main Fuel Committee of the Supreme Council of the National Economy of the RSFSR (Glavtop VSNKh), and in February 1919 the Central Administration of the Coal Industry of the Donetsk basin (TsPKP), subordinate to Glavtop VSNKh, was formed. By 1922 the first four element management system for the coal industry in our country was in existence. It consisted of: Glavtop VSNKh, the Administration of the State Coal Industry (UGKP), ore administrations, and finally, mines

The decrees of the VKP(b) All-Union Communist Party (of Bolsheviks) and the USSR Council of People's Commissars of April 1933 "On the Work of the Donbass Coal Industry", and May 1933 "On the Organization of Mine and Trust Administration in the Donbass" outlined specific measures for restructuring the sector's management system, and established a standardized structure for mine management.

Due to the intensive development of coal extraction and complications in sector management, the People's Commissariat for the Coal Industry was created in 1939. V. V. Vakhrushev was appointed as the first commissar.

In 1970 a general scheme for the sector's management was approved, in accordance with which there was a conversion from the 4-5 level structure to a 3 level: USSR Minugleprom -- combine -- mine, strip mine; USSR Minugleprom -- UkSSR Minugleprom -- combine -- mine, strip mine. Eighty four trusts were abolished and combines with a large number of mines were broken up.

Since 1974 the sector has converted to a 2-3 level management system: USSR Minugleprom -- production association; USSR Minugleprom --UkSSR Minugleprom -- production association.

These conditions have required the maximum use of the advantages of production associations, which since 1976 have become the main (primary) element in the management structure. An automated sector management system has been developed which includes the 2 main computer centers of the USSR Minugleprom and UkSSR Minugleprom, 33 information-computer centers at production associations, 5 centers at machinery building plants, and 12 centers and scientific-research and planning-design institutes, equipped with modern computers. The sector automated management system (ASU) solves 200 sets of problems in production accounting, analysis, control, planning and design. The economic effect from the introduction of the main sets of problems in the 10th Five-Year Plan was 30 million rubles.

/The sector's constantly growing scientific potential is a major factor assisting the coal industry's development./ The creation of a network of scientific-research and planning-design institutes was begun back in the prewar years. The first sector scientific-research institute for work safety in the coal industry MakNII, was created in 1927 in the Donbass. In 1928 the All-Union Scientific Research Institute for Coal (VUGI) was created in Khar'kov, with affiliates in Donetsk and Dnepropetrovsk. In 1934 and 1936 scientific research institutes were set up in the Kuznetsk and Moscow basins. Based on design offices of the Donugol' Trust, in 1928-1929 the State Institute for Mine Design (Giproshakht) was created in Khar'kov, with affiliates in Dnepropetrovsk, Leningrad, and Tomsk.

In 1959, based on the USSR Academy of Sciences Mining Institute and VUGI, the Mining Institute imeni A.A. Skochinskiy was created. It became the leading scientific research center for mining science. Linked to the institute's activities are the names of such great scientists as academicians A.A. Skochinskiy, A. M. Terpigorev, L. D. Shevyakov, A. P. German, N. V. Mel'nikov, and M. I. Agoshkov, and correspondent members of the USSR Academy of Sciences A. S. Il'ichev, A. O. Spivakovskiy, G. I. Man'kovskiy, I. N. Plaksin, and A. V. Dokukin.

Due to the necessity of improving economic research work, in 1967 the Central Scientific Research Institute for the Economics and Scientific-Technical Information of the Coal Industry (TsNIEIugol').

There are now 48 scientific research, planning, and planning-design institutes operating in the sector. They are located in the RSFSR, UkSSR, Kazakh SSR, and Georgian SSR.

The introduction of the institutes' work is having a substantial influence on the sector's level of technical progress and its increased production efficiency.

/Cooperation between CEMA member coal industries plays a major role in the development of the nation's fuel and energy economy./ One of the first commissions established in the Council for Mutual Economic Assistance in 1957 was the Standing Commission on the Coal Industry, which included USSR Representatives.

Strong bonds of friendship tie us to miners from Bulgaria, Hungary, Vietnam, the German Democratic Republic, Mongolia, Poland, Romania, and Czechoslovakia.

Scientific and technical cooperation between the USSR and other CEMA members in the coal industry covers problems in the design and construction of mines and cleaning and grading facilities, the creation of equipment and processes for coal extraction and processing, the introduction of ASU, standardization, scientific and technical information, and fuel and mineral exploration.

The Informugol' international sectorial scientific and technical information system has been in operation since 1974. CEMA nations use it to exchange information on important work and achievements in the improvement of technology for the production of machines and equipment, sector management, and the dissemination of progressive experience. CEMA members have signed an agreement providing for comradely assistance in the prevention of accidents and covering problems of work safety and the functioning of mine rescue services.

Organizations and enterprises in the Soviet Union's coal industry also maintain ties with firms and mining companies in other foreign countries with developed coal industries. For a number of years the Soviet Union has been giving several countries scientific and technical assistance in the development of their coal industries. Scientific and technical cooperation on the basis of licensing is becoming ever more widespread.

/ The equipping of coal enterprises with modern progressive technology has raised mine labor to the level of an industrial worker and in many ways has brought it close to engineering labor./ Today's mine worker is, as a rule, a machinery operator, and a person with a high level of general and technical culture.

/Soviet miners have the world's shortest work week./ They have a number of other advantages and benefits. In particular, workers involved in underground labor have increased pensions.

In 1981 the CPSU Central Committee and the USSR Council of Ministers passed the Decree: "On Increasing Wage Rates and Salaries and Improvements in the Organization of Wages [Zarabotnaya plata] to Workers and Employees of the Coal (Oil Shale) Industry and Mine Construction." In the First Quarter of 1982 workers in the main basins were transferred to the new pay conditions, and in 1983 miners in the remaining coal basins will receive raises.



Pay raises and improvements in the bonus system in the sector have increased the flow of personnel into the coal industry, stimulated the improvement of workers' skills, increased production efficiency, activated the work of all mine collectives, and assisted in the sector's successful fulfillment of coal extraction plans.

Miners' medical services are constantly improving. There are more than 800 medical stations, with modern medical equipment, operating at mines. For their leisure miners have 194 sanatoria and preventive health facilities with a total capacity of 17,400, 6 rest homes totalling 1,500 beds, 24 boarding houses with a total capacity of 7,000, and 300 leisure bases with total capacity almost 20,000. Miners have the nation's better health resorts, including on the Black Sea Coasts of the Crimea and the Caucasus, in the Carpathians and near Moscow.

The expanded network of treatment and prevention institutions permits substantial annual increases in the number of workers sent for treatment and rest. Thus, while in 1976 570,000 people received some kind of treatment, in 1981 the figure was 690,000. The main share of the workers take free vacation trips or pay 30 percent of the cost.

Extensive residential construction is under way at coal basins. In the past decade more than 19 million square meters of residential area has been introduced. During the 10th Five-Year Plan alone 175,000 miners' families received new, comfortable apartments. The construction of houses through the use of the enterprise's or organization's resources, with workers and employees contributing labor has become widespread. Individual residential construction using USSR Gosbank credits also takes place.

Miners have more than 700 clubs, homes, palaces of culture, 200 stadiums, sports palaces, and swimming pools where they can engage in physical culture, sports, and hobbies. For miners' children there are 850 pioneer camps and suburban dachas in operation in the summer.

In order to better organize public food service and to supply miners with additional food products, the sector has set up a network of sovkhoses, enterprise and organization subsidiary farms totalling 310,000 hectares of agricultural land, a cattle herd of almost 70,000 head, about 127,000 swine, 27,000 reindeer and more than 1 million fowl.

Sector workers perceived the Food Program approved by the CPSU Central Committee May 1982 Plenum as their vital concern and outlined specific measures for actively participating in its realization. Already in 1982 meat production at subsidiary farms and feedlots increased by 20 percent, and should increase 1.5 fold by the end of the five-year plan. Measures are being taken to improve crop yields and animal husbandry productivity and intensive work is under way to build agricultural and residential facilities, and improve material-technical supply. Patronage links between sector enterprises and organizations and rural workers are improving.

/Miners' labor has always enjoyed general respect and honor in our country./  
Many miners have been elected deputies to the USSR Supreme Soviet, the supreme

soviets of union republics, and local soviets of people's deputies. In the 10th Five-Year Plan alone, 25,000 outstanding workers, engineers and technicians were awarded USSR orders and medals, 44 of them receiving the high honor of Hero of Socialist Labor. Departmental awards were given to 75,000 people.

For many years of faultless work in the coal industry workers, engineers, and technicians are awarded the medal "Miners' Glory" 1st, 11nd, and 11rd degrees, and are given the title "Honored Miner". The RSFSR, UkSSR, Kazakh SSR, GSSR, and ESSR have introduced the title "Honored [Zasluzhenny] Miner of the Republic.

The remarkable tradition of annually honoring miners with their own professional holiday -- Miners' Day -- is evidence of the deep respect in our nation for people in this heroic profession.

/ In noting the great successes in the coal industry's development, one cannot forget the Leninist instruction to not only see successes, but also shortcomings in work and to concentrate efforts on unsolved problems./ It must be stated frankly that coal extraction growth rates in the 10th Five-Year Plan were considerably lower than in previous plans, while indicators for production concentration and labor productivity even declined. This is definitely linked to deteriorating mining geological conditions, increased mine depth and deposit gas content, more working faces in seams where there is a danger of sudden coal and gas blow outs, and deteriorated temperature conditions.

At the same time one should stress that the negative effects of natural factors were also present in previous years. However, in the 8th and 9th Five-Year Plans we were able to counteract them with effective engineering measures. The attention given to these measures has subsequently weakened.

The sector's lagging development in recent years is also linked to definite shortcomings in production organization and management. The 1976-1981 targets for coal extraction were not fulfilled. There was an increase in the number of mines not fulfilling coal extraction plans and not making use of production capacity. Mine builders systematically failed to fulfill construction and installation work plans.

The deteriorated condition of mining operations is having a substantial effect upon coal extraction. A number of mines are lagging in the preparation of new galleries and only slowly increasing the cross section area of tunnels. This has a negative effect upon ventilation and transportation conditions. In spite of the increased share of coal extraction from comprehensively mechanized faces, in the past six years loadings per working face have declined. There are still great losses of time at working and development faces, and highly productive equipment is not used with sufficient intensity.

The potentials of the sector's scientific research and planning-design institutes are not fully utilized. There is slowness in the creation and introduction of equipment for the comprehensive mechanization of coal extraction from thin and steeply dipping seams, for hard rock tunneling, and for the mechanization and automation of auxiliary processes. There is still a very pressing problem of reducing manual labor, the level of which remains high in the sector, especially in mines.

In recent years less attention has been given to the dissemination of progressive collectives' experiences, and the number of 1,000 ton brigades has declined. The brigade form of work does not yet sufficiently encompass all elements in the sector. While more than 80 percent of workers at faces are in brigades, for underground transportation the figure is only 50 percent, and at the mine surface only 20 percent.

These and other shortcomings in the coal industry were noted in CPSU Central Committee and USSR Council of Ministers decrees on accelerating strip mining production, modernizing mines and increasing pay which, also defined measures for liquidating shortcomings and increasing coal production efficiency. The practical realization of these measures is producing positive results and has already been manifested in the successful fulfillment of 1982 plans and targets.

/The sector's workers must reach higher marks in 1983./ It is planned to produce 716 million tons of coal. As a result of new construction and rebuilding, enterprise coal extraction capacity should increase by 15.7 million tons, including 1.8 million in the Kansk-Achinsk basin, 1.7 at Ekibastuz, and 900,000 tons in the Kuzbass.

Strip mine coal extraction will increase at pace setting rates. Such mines will receive additional continuously operating equipment, the proportion of which will reach 45 percent. Nine new rotary bucket excavators and other types of high unit capacity mining and transportation equipment will be introduced.

Miners' main task is to increase coal extraction from comprehensively mechanized faces by 1.2 million tons and raise its share to 70.6 percent. At UkSSR Minugleprom it is planned to obtain 75 percent of the growth in such extraction from thin seams (up to 1.2 meters). Increased attention is also being given to the comprehensive mechanization of work on steeply dipped seams. It is planned to increase the total tunneling by combines by 89 km and reach 2,810 (42 percent), corresponding to the five-year plan targets.

In this regard coal machinery building has greater tasks in meeting enterprises' needs for mining equipment. In order to increase the mechanization of coal extraction from thin seams there is a significant increase in the production of 1KM-103 complexes, and a one-third increase in the production of 2UKP complexes for thick seams (2.6-4.5 meters). It is planned to increase the production of heavy entry driving combines and of mining equipment spare parts.

In 1983 it is planned to increase coal processing at cleaning and grading facilities by 2.5 percent, and concentrate production by 3.1 percent.

About 70 percent of all production growth in the sector should be attained through increased labor productivity.

From the first of the new year it will be essential to work rapidly at all levels, giving special attention to the unconditional fulfillment of plans for the extraction and delivery of high quality fuel to consumers.

In celebrating the 60th year of the USSR, coal workers fully aspire to honorably complete the tasks the party has given the sector and to worthily contribute to strengthening the economic might of our multinational state, the Motherland of the Great October.

COPYRIGHT: Izdatel'stvo "Nedra" "Ugol" 1982

11574

CSO: 1822/152

## COAL

### KUZBASS COAL INDUSTRY SURVEYED

Moscow UGOL' in Russian No 12, Dec 82 pp 24-26

[Article by A. I. Petrov, Kuzbassugol' All-Union Production Association:  
"Prospects for the Development of the Kuzbass Coal Industry"]

[Text] The depths of the Kuzbass earth are rich in various useful minerals, however, the main wealth is coal. During the first five-year plans the first large program for the comprehensive development of eastern regions was implemented in the Kuzbass basin. This was the construction of the Urals-Kuznets combine, which has played a huge role in the formation of Siberia's industrial appearance. By 1940 coal production in the Kuzbass had reached 21.1 million tons, including 6.9 million tons of coking coal.

Due to the temporary occupation of the Donbass by fascist aggressors during the Great Patriotic War, the Kuzbass became the nation's main supplier of coking and power generation coal. During these years coal production increased to 29 million tons annually.

Requirements for Kuzbass coking coal grew steadily during 1945-1950.. Sixteen mines with a total production capacity of 14 million tons annually and 13 pneumatic cleaning facilities totalling 8.8 million tons annually were built during this period. In the 1950's and 60's new mines went into operation in Tomusinskiy, Berezovskiy, and Biryulinskiy Rayons. There are now 67 mines operating in the Kuzbass, having a total capacity of 94.5 million tons annually, and there are 24 cleaning facilities. Over the past 10 years total production capacity at mines has grown by 17 million tons. New mine construction accounted for 43 percent of capacity growth.

At the present stage in the Kuzbass coal industry's development, mechanized units have become the primary and most efficient means of coal extraction and are substantially influencing mine operation technical-economic indicators. In 1981 comprehensively mechanized working faces accounted for 69.2 percent of total coal extraction from working faces. The comprehensive mechanization of working faces is basically completed at the Leninskugol' and Yuzhkuzbassugol' Associations, where the respective levels are 100 and 94.7 percent, at the Gidrougol' it is 65 percent, and at the Severokuzbassugol' 59.6 percent complete.

The 1,000 ton, 500,000 ton, and 1 million ton movements have acquired the character of a mass movement at Kuzbass mines. Ninety five comprehensively

mechanized working face brigades, or 50 percent, have loaded 1,000 tons and more per shift. Thanks to this coal extraction has increased by 7.2 million tons compared to 1975, while the total increase in coal extraction at comprehensively mechanized faces was 9.1 million tons.

In 1981 23 working face brigades achieved the 500,000 tons or more mark annually, and 2 extracted more than 1 million tons. In 1982, L. N. Reshetnikov's working face brigade, engaged in socialist competition celebrating the 60th year of the USSR's formation, reached the 1 million mark by 19 August.

In 1981 good results were obtained by extraction brigades lead by A.N. Zorkin (Mine imeni Kirov) R. F. Putkov (Komsomolets Mine), V. V. Yegalin (Oktyabr'skaya Mine), V. G. Bovt (Zyryanovskaya Mine) and Ye. I. Drozdetsk (Nagornaya Mine). These brigades worked successfully in the jubilee year.

Concurrently, one must note a number of organizational and technical factors which are delaying the further growth in loadings per working face and the increase in underground extraction of coal. The level of work on mine reconstruction and the preparation of new galleries in the basin is insufficient. At present only 9 mines have reserves for production capacity growth, and 45 percent of the mines are being reconstructed. There is a steadily increasing number of mines where dipping seams have been discovered at the lower galleries, the coal extraction level at such mines reaches 52 percent.

There are disproportions between the growth rates of coal extraction at comprehensively mechanized faces and the excavation of preparatory tunnels; there is a definite lagging in the creation and production of new machinery and equipment for the mechanization of auxiliary processes; and there are still shortcomings in the layouts and parameters of extraction fields [Vyyemochnoye pole] ventilation, degasification, and transportation. Studies show that at 25 percent of the working faces the technical parameters of mechanized units are not completely appropriate to mining geological conditions.

The necessity of further improvements in the equipment and technology of excavation and preparatory work is obvious. This should be the first order task of scientific research and planning-design institutes. Coal extraction growth at mines can only be attained by a comprehensive approach to the problem of production intensification at working fronts and the accelerated development of coal reserves on the basis of progressive mining operation technology plans.

In order to further improve underground coal mining it is essential to technically modernize mines in the Kuzbass, increase the production of mechanized supports for seams up to 4.5 meters thick, and for seams with badly deteriorated roofs, as well as to expand the area of use for comprehensively mechanized equipment on steeply dipping seams. One of the main ways for increasing face loadings and labor productivity is the replacement of the OKP, KM-81E, KM-87, and 2MKE mechanized units with the OKP-70, MK-75, UKP, and KM-130 units meeting new technological standards. This is supported by the replacement of OKP units by OKP-70's at the Yuzhkuzbassugol' Association. Loadings per working face grew 1.7 fold when the KM-81E was replaced by the KM-130 they grew 1.5 fold; and when the KM-130 was replaced by the UKP on seams with badly deteriorated roofs, there was a 1.8 fold increase.

It is essential to more boldly introduce units for dipped seams. The use of KM-81E units on such seams does not produce good technical and economic results, therefore it is necessary under such condition to switch to the OKP-70, MK-75, and KM-130 units and to modernize them in order to ensure support section stability.

The reliable operation of highly productive faces can be attained through the following: an increase in tunnel cross section near longwalls to 12 square meters makes it possible to ventilate the longwall with the necessary amount of air, locate the required transportation equipment, and mechanize final operations (nonniche[beznisheviy] excavation of coal); an increase of combine travel speed through the use of the ground-bench form of face working, and an increase in the speed of face support through equipping supports with a third mainline, and the movement of supports from two points by two workers; and improvement of technical servicing of units during the repair shift.

The time is ripe to create working face excavation units with the maximum standardization of machinery and assemblies. This important work should be conducted by scientific research and planning design institutes jointly with manufacturing plants in the shortest possible time. It is essential to reduce equipment testing time and more completely determining machinery design and operational characteristics.

In working gently dipped and inclined seams wide use is made of equipment and techniques for coal extraction without leaving pillars. During the 10th Five-Year Plan their introduction resulted in roughly an additional 5 million tons of coal which had previously been left in pillars; preparatory tunneling was reduced by 20 km annually, and savings totaled more than 2.5 million rubles per year. It is advisable to use the technology for pillar-free extraction and repeated use of tunnels in the excavation field with flanged inclines [flangovyy bremsberg], making it possible to separate haulage flows and ensure direct flow ventilation of the longwall.

At present only 9 percent of coal extraction from steeply dipped seams is comprehensively mechanized. In recent years KuzNIUI [Kuzbass Scientific Research Institute for Coal] and other institutes in the sector created the KPK mechanized units, the ASHch and AK-3 aggregates for working steeply dipped beds from 1.2 to 2.6 meters thick. The use of the 1ASHchM aggregate at the Ziminka Mine in the Prokop'yevskugol' Association set 2 basin records for coal extraction in 1979: in April the working face brigade lead by V. S. Kostin extracted 18,479 tons of coal, and on the even of Miners' Day 26,079 tons. In 1980 this brigade set an all-union record: in 31 working days it extracted 33,116 tons.

The increased level of comprehensive mechanization at average thickness steeply dipped seams is delayed because coal machinery building plants have not mastered the manufacture of these types of units. Their use could ensure high levels of mechanization in the extraction of coal from such seams in the Kuzbass. In addition, these units and aggregates could also be used in the layer by layer working of thick steeply dipped seams, with roof control, and the cave in and hydraulic flushing of worked out areas.

The mining of thick, steeply dipped seams in the Prokop'yevsk - Kiselevsk region has shown that coal from these seams has an increased tendency towards spontaneous combustion. There are 25-30 endogenic fires annually in the Prokop'yevskugol' Association. All excavation fields of thick seams now have several extinguished fires each, and digging them up usually causes flare-ups. Another feature of this region is that residential areas, industrial enterprises and other such facilities are located above the coal beds. Therefore the coefficient of coal extraction does not exceed 0.5. This makes it necessary to convert the region's mines to coal extraction with filling of the worked out area.

Now only 5 of 21 mines in the region use hydraulic filling of worked out areas. For a long time not more than 1.3 - 1.5 million tons of coal extraction was accompanied by filling. The development of hydraulic filling requires the completion of construction on a central filling operation for the region, the construction of hydraulic filling complexes which are automated and mechanized at mines.

In addition to hydraulic filling, by the end of the 11th Five-Year Plan it is intended to introduce the use of hardening filling in the Prokop'yevsk - Kiselevsk region of the Kuzbass. This will permit the use of coal in remaining pillars and the mining of disrupted seams.

The improvement of preparatory tunneling technology and increasing the pace of such work are of major significance to the Kuzbass. The relative proportion of tunneling can be reduced by increasing the working face length. This length is now determined by the length of the equipment and conveyor, something which cannot be considered proper. It is more advisable to position equipment along a length of longwall determined by specific geological conditions. Therefore existing equipment, and more importantly newly built units, should be around 150 meters long.

The level of mechanized tunneling at mines is reaching 82.4 percent, including 50.6 percent by entry driving combines. The level of combine tunneling is quite high at a number of production associations. For example, it is 85.4 percent at mines of the Leninskugol' Association, 65.1 percent at the Yuzhkuzbassugol' Association, and 61.1 percent at Gidrougol'. Concurrently, at mines working steeply dipped seams, where mining engineering conditions for tunneling are considerably more complex (greater diastrophism, smaller extraction districts), the level of combine tunneling is only 19.4 percent, and has declined in recent years. Support emplacement, the most labor intensive operation in preparatory face work, is done manually. Combines are not equipped with machinery for installing anchor bolts, posts or beams.

In order to mechanize labor intensive manual work, especially support emplacement work, on preparatory faces, KuzNIUI, together with the Yuzhkuzbassugol' Association and the Kopeysk machinery building plant, is developing mounted equipment for the GPK entry driving combine, which will drill holes for rock bolts, install metal frame supports, while an outrigger attachment will allow it to be used on sloping tunnels.

In recent years mines have sharply increased the use of metal in supports for preparatory faces. The use of retainers [zamok] developed by KuzNIUI, with a

Anchor bolt support has become widely used at mines in the basin. Every year 350-360 km of mine tunnels in the Kuzbass receive such supports. At a number of mines (Nagornaya, Yubileynaya, Zarechnaya) their use exceeds 90 percent, while the Abashevskaya Mine uses only these supports.

KuzNIUI has created a tubing support from coal plastic [ugleplast] and has organized a production line at an experimental shop. Such tubing is inserted into 1,300 mm diameter holes in tunnels through steeply dipped seams. The institute has developed and transferred to production a mechanized platform and attachment to install such supports in the holes by lowering a column of tubing. In addition to its economic effect, the use of tubing supports and the mechanized platform also makes possible a 1.5 - 2 fold increase in labor productivity in installing supports in raises. About two km of such supports are produced annually. In the immediate years ahead it is planned to introduce capacity to increase tubing production to 9 km annually, and subsequently to build a plant with a capacity of 50 km annually.

In addition, Kuzbass mines need a selective action rock drilling machine for 500 - 1,000 meter tunnels in rocks with a resistance of up to 100 kilo-Pascals.

Work is under way to improve surface equipment at mines. The mechanization of loading and unloading at storage facilities is continuing, the centralized delivery of materials and equipment has been organized, and central and group warehouses created. All this has reduced the labor intensity of surface work per 1,000 tons of coal from 105 person shifts in 1970 to 75 in 1981.

There have been considerable improvements in coal cleaning technical standards in the past decade. In accordance with technical modernization plans, at all enterprises major work has been done to replace obsolete and obsolescent equipment with new, more productive and efficient equipment, to improve process layouts, and rebuild individual operations. Thus, during 1971-1981 more than 1,800 units of basic cleaning and transportation equipment were replaced or newly installed. These include 68 flotation installations, 258 screens, 244 centrifuges, 121 vacuum filters, and other equipment.

The technical modernization of the past decade has made possible a 7.2 million ton increase in facility capacity and a qualitative change in the structure of production processes. Thus, the share of coal cleaned by modern processes -- jigging, heavy media, and flotation -- has increased to 87.1 percent. While the ash content of coal being processed increased from 18.1 percent in 1971 to 22.1 percent in 1981, the ash content of output being shipped away declined from 11.3 to 11.1 percent, while for concentrates the figures were 8.3 and 8.2 percent. There have been sizable reductions in coal losses in cleaning tailings, the ash content of the latter increased from 68.4 percent to 74.8 percent. In 1981 27 percent of the concentrates shipped were in the higher grades. Labor productivity increased by 5 percent during the decade, and was 623 tons per month in 1981.

At the same time it is necessary to note that the amount of technical modernization at existing facilities is still insufficient, and new facilities and installations are not being built fast enough.



One negative factor is that the basin does not have specialized enterprises for the manufacture of cleaning equipment and spare parts.

The solution of a number of key problems by the USSR Minugleprom and other ministries will assist in the successful development of the Kuznetsk basin as one of the main suppliers of coking coal to the national economy. These problems include: the strengthening of the machinery building base and the production of the necessary quantities of mechanized units meeting new technical standards; the accelerated reconstruction and deepening of mines without diverting mine building organizations to other projects not involving coal extraction and processing; and social problems, the solution of which will assist in retaining key personnel in the area and in accelerating mine technical modernization.

COPYRIGHT: Izdatel'stvo "Nedra" "Ugol" 1982

11574

CSO: 1822/152

## COAL

### GEORGIAN COAL MINE MODERNIZATION NEEDS OUTLINED

Moscow UGOL' in Russian No 12, Dec 82 pp 59-60

[Article by B. G. Zanikidze, Sh. V. Leladze, Gruzugol' Association: "Basic Directions in the Technical Reequipment of Mines in the Georgian SSR"]

[Text] Enterprises in the Gruzugol' [Georgian Coal] Association are working the Tkibuli-Shaorskoye and Tkvarchel'skoye deposits, as well as the Akhalitsikhe brown coals. The Tkibuli-Shaorskoye is the main deposit, it is being worked by four mines. Three of them, the imeni Lenin, Zapadnaya, and Vostochnaya-2, extract G grade coal, which when mixed with Tkvarchelskiy coal is used for coking, while D grade coal from the Mine imeni Ordzhonikidze is used for power generation.

The Akhalitsikhe deposit, with reserves of 70 million tons, is worked by the Akhaltsikhskaya No 1 Mine.

According to studies carried out the the Georgian Scientific Research Institute for Power Engineering and Hydroelectric Installations, and approved by Georgian SSR Gosplan, the republic's actual needs for power generation coal are about 1 million tons of standard fuel, or 1,700,000 or 1,800,000 tons annually. In order to meet the republic's needs it is necessary to annually extract 2.8 - 3 million tons of run-of-mine coal, or construct and operationally introduce new capacity for 1 million tons, in addition to mines under construction. It is therefore essential to thoroughly develop coal production in the republic.

Georgian coal deposits are characterized by complex mining geological conditions. The presence of thick (up to 50 meters), contiguous, self-combusting coal seams, dangerous with regard to mine shocks, rock bursts, large amounts of gas, and coal dust explosions, badly deteriorating main roofs, extreme tectonic diastrophism, and the considerable depth of operations (500 - 1,200 meters) all complicate mining and definitely delay increases in coal extraction, and the possibilities of using machinery, equipment, and standard layouts for extraction.

We will briefly characterize the conditions of coal reserves in the Georgian SSR. The mines at the Tkibul'skoye deposit enter the field by adits driven transversely to the direction of the coal beds, blind shafts and level major cross-cuts. The vertical height of the levels is 100 meters.

A level is developed by tunneling fringe level drifts to 15-20 meters from the underside of the coal bed. The level is divided into extraction fields up to 150 meters long in the direction of the bed.

The room-pillar method -- blocks from heading holes, and roof removal -- is utilized. The Tkibuli mines extract 82.7 percent of their coal by this method, and the imeni Ordzhonikidze and Zapadnaya, 100 percent.

Together with its positive features -- ease of roof control, high labor productivity (25-30 tons per shift), minimal labor intensity of driving connecting tunnels for filling in excavated areas, and others -- this method has major shortcomings. These are the large volume of preparatory work, high (40 - 50 percent) coal losses, and the impossibility of using highly productive excavation equipment. This system cannot be used in working protective [zashchitnyy] seams because of the large number of blocks left behind, creating high strains in the lower seams, and leading to mine shocks.

Protective seams are worked by the pillar system, by longwalls along seam direction, and the continuous wall system at depths greater than 900 meters.

Previously, during the hydraulic filling of excavated areas, use was also made of the room-pillar system, with strips along the seam direction and longwalls on the rise. Coal was removed from the rooms by drilling and blasting. One of the shortcomings of these systems is the impossibility of using existing equipment to mechanize coal removal at working faces.

An analysis of these mining systems is evidence of the necessity of changing the technology of coal extraction. This is called for by the program for the technical modernization of association mines and the general plan for the layout of mines. It involves a gradual transition from drilling and blasting extraction to comprehensively mechanized working and preparatory faces.

The plans for entering, developing and working the fields at the Tkvarcheli deposit are similar to those being applied at Tkibuli (with the exception of mines exhausting their reserves, No 2, and imeni Lakob).

In view of the extraction and tunnel driving mechanization situation at mines in the association, it is essential to conduct work on adapting existing equipment to the mining geological conditions at the deposits being worked.

The narrow span 2K-52 and the widespan Kirovets were tested at mines of the Tkvarcheli deposit.

Experimental work on the use of the KM-87DN unit in working protective seams in the upper strata has been conducted in the very difficult mining geological conditions of the Tkibuli deposit on seams laying at angles of 39-41 degrees.

The KSh-1KG and 4PU combines have been introduced in the layer by layer working of thick (6 - 9 meters) seams at the imeni Ordzhonikidze and the Zapadnaya Mines.

Due to the appearance of dynamic phenomena (mine shocks), since 1969 the mines at the Tkibuli deposit have started using special profile pliable metal supports in preparatory faces. This has considerably improved support conditions and mining safety.

Jointly with VNIMI [All Union Scientific Research Institute of Mine Surveying] and the Mining Institute imeni G.A. Tsulukidze, the association has developed and introduced at Tkubuli deposit mines a set of measures in the struggle against mine shocks: the pace setting working of protective seams, local and regional moistening of the coal bed, and supervision of the efficiency of preventitive work. An administration for the struggle against mine shocks, and underground endogenic fires has been created for this.

VNIMI observations have established that at the Tkibuli deposit, located in a seismically active zone, local earthquakes frequently initiate mine shocks and rock bumps at working and preparatory faces. Under such conditions it is very important to regionally moisten coal beds. This produces a considerable positive effect due to the location of preparatory tunnels in the protected zone, the improvement of support conditions, and the elimination of the harmful effects of dynamic phenomena. Although the Tkibuli seismic station has recorded more than 200 local earthquakes after the introduction of regional moistening, no mine shocks have been observed.

Mines are taking measures for the prevention of endogenic fires. The filling of excavated areas is a sufficiently reliable means of preventing spontaneous combustion of coal.

Up until 1966 the Tkibuli-Shaorskoye deposit mines conducted intensive filling operations following coal extraction. Subsequently these declined and now there is no filling. The old, temporary quarries for fill material have exhausted their reserves, and the problem of building a new fill complex has not been solved. There are draft plans for filling operations based on the Nakeral'skiy limestone, but they have been hindered both in construction and operation. The cost exceeds 10 million rubles, and their implementation requires considerable time.

The main problems which the association must solve are: the technical modernization of mines, increased coal extraction, the improvement of plans for opening and development, the implementation of a general layout for the mines.

A rational plan for mine layout at the Tkibuli-Shorskoye deposit, for the opening and development of extraction sections at operating mines, and measures for technical modernization have now been developed.

During the 11th Five-Year Plan it is intended to increase extraction fields to 500 meters, introduce equipment and techniques for excavating seams along rises and horizontal strata, using mechanized units, panel assemblies, and other means.

The association is planning a new mine layout, a considerable acceleration of the operational introduction of the newly built Zapadnaya-2 Mine, the elimination of step by step transportation, the concentration of mining operations, and other measures.

As a result of mine abandonment at the Tkvarcheli deposit (Mines No 5 in 1982, No 2 and the Akhaltsikhskaya in 1985) and the sizable reduction in the capacity of No 3, due to the exhaustion of commercial reserves, by the end of the 11th Five-Year Plan, mine capacity will decline by 63.5 percent compared to 1980.

During this same period production capacity at the Tkibuli deposit will increase by 45 percent as the result of the operational introduction of the Zapadnaya-2 Mine and the technical modernization of the Vostochnaya-2 Mine. However, this is not enough to cover exhausted capacity.

Over the long term the production capacity of Tkibuli deposit mines will increase by 1,750,000 tons, as a result of technical modernization.

Since machinery for the mechanization of coal extraction from 3 - 3.5 meter thick seams lying at angles of 35 to 40 degrees is now only undergoing industrial testing, it has been decided to test a system of working horizontal strata at the Tkibuli deposit using mechanized units. The preparation of an experimental section at the Vostochnaya-2 Mine is being completed.

During 1983 it is planned to use a 20KP complex to mine gently sloping seams by the layer method along the seams' direction from heading crosscuts in the northwest section of the Zapadnaya Mine.

At the Mine imeni Lenin development work has begun on the 35-40 meter thick "Tolstyy" seam, using a combined system with a flexible cover of ships' chains, suggested by association specialists. The mine plans excavation which includes working out the protective seam using an ANShch panel unit. Work is under way at this mine to introduce layer excavation of strata using longwalls along the strike. It is planned to expand the area of using excavation combines at the Mine No 6 imeni Lakob.

As a result of implementing measures for technical modernization at Tkibuli mines, the level of coal production from comprehensively mechanized longwalls should reach 610,000 tons by 1985 (33 percent of total). By 1985 tunneling operations will be 50 percent mechanized.

Thanks to modernization, the extensive introduction of mechanization at excavation and preparatory operations, and the further mechanization and automation of auxiliary processes both underground and on the surface, by 1985 manual labor will be reduced by 30 percent.

COPYRIGHT: Izdatel'stvo "Nedra" "Ugol", 1982

11,574

CSO: 1822/152

COAL

KRASNOARMEYSKUGOL' ANNOUNGES SOCIALIST PLEDGES FOR 1983

Moscow TRUD in Russian 6 Jan 83 p 1

[Article: "Socialist Pledges of the Collective of Krasnoarmeyskugol' Production Association, Donetsk Oblast for 1983"]

[Text] Implementing the decisions of the 26th CPSU Congress, miners of the Krasnoarmeyskugol' Production Association completed their quotas for 2 years of the 11th Five-Year Plan in relation to the principal technical-economic indicators ahead of schedule, having mined 17.9 million tons of coal, to include 776,000 tons in excess of the plan.

The association's laborers were deeply pleased by the decisions of the November (1982) CPSU Central Committee Plenum and the Seventh Session, Ninth Convocation of the USSR Supreme Soviet, and with the premises and conclusions contained in the report given by CPSU Central Committee General Secretary Comrade Yu. V. Andropov at a solemn meeting dedicated to the 60th anniversary of the USSR, and aimed at strengthening our country's economic and defensive power; in response to the enormous concern of the party and government for further growth of the Soviet people's welfare, they adopted the following socialist pledges for 1983.

The association's collective decided to initiate an all-out struggle to strengthen socialist labor discipline, to insure model order and high organization in work, to intensify economy and thrift, and to eliminate all kinds of losses in every section and at every workplace.

By broadly introducing mechanized resources and the best methods of organizing labor and production, by making better use of mining equipment and by raising the occupational proficiency of the miners, the collective intends to exceed the planned labor productivity level by 3 percent and surpass the coal mining plan by 100,000 tons. The level of fully mechanized extraction of coal from longwalls will be increased to 96 percent, and the proportion of combine-assisted preparation of drifts is to be increased to 63 percent. Extraction levels of 1,000 and more tons per day from 12 stopes and 500 and more tons from four stopes working thin seams are to be achieved.

Not less than 10.6 million kilowatt-hours of electric power and 9,000 gigacalories of thermal power are to be saved through sensible use of materials and energy

resources, 6,500 tons of metallic props are to be recycled, and the cost of coal mining is to be reduced by 250,000 rubles.

An economic impact of not less than 2.8 million rubles is to be achieved from introducing new equipment, efficiency proposals and inventions into production.

Measures associated with the collective's social development are to be completed in full volume. The proportion of manual labor is to be reduced by 1.5 percent. About 10,000 laborers and their families are to undergo courses of health improvement in sanatoriums, vacation homes, dispensaries and Pioneer camps. A total of 26,000 square meters of housing space are to be placed into operation, and assistance is to be provided to private builders in the erection of 1,800 square meters of housing space. A program of measures to improve and landscape miners' settlements is to be implemented.

The collective will participate actively in implementation of the country's Food Program, it will expand sponsorship of kolkhozes and sovkhoses in Krasnoarmeyskiy Rayon, 500 centners of pork will be produced at the association's fattening farms as a supplement to what has been allocated for the miners' public food services network, two fish farms will be organized at the mine's settling ponds, and a mushroom farm with an area of 350 square meters will be built. Hot food will be delivered to the workplaces of all laborers doing underground work.

Miners of the Krasnoarmeyskugol' Association vow to the Leninist CPSU Central Committee and the Soviet government that they will apply all of their effort, knowledge and experience to successful fulfillment of the adopted pledges, and they appeal to all laborers of coal industry to respond in deed to the decisions of the November (1982) CPSU Central Committee Plenum, to take an active part in the socialist competition for raising work effectiveness and quality, and thus to make a worthy contribution to increasing the fuel and power potential of our motherland.

The socialist pledges were discussed and adopted at meetings of the laborers of enterprises and organizations in the Krasnoarmeyskugol' Production Association.

11004

CSO: 1822/184

## COAL

### ROSTOVSKAYA COAL MINE UNDERGOES RECONSTRUCTION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Feb 83 p 2

[Article by M. Rabichev: "A Mine Reborn"]

[Text] Mines grow old, just like people. And so it was that miners of Rostovskaya Mine of the Gukovugol' Association sensed the waning of their enterprise 4 years ago. The anthracite yields began to drop. What was being brought to the surface was not coal but the forlorn reflections of a bygone grandeur.

There were fuel reserves left only at a depth of more than 800 meters; moreover these were thin seams, just 60-90 centimeters thick. Imagine a longwall that is not even a meter high from the footwall to the roofing--that is, from bottom to top. One cannot conceive of worse mining and geological conditions in all of the stopes. The roofing is weak and unstable. Be on guard!

Rock pressure climbed to critical. The miners seemed to have barely enough time to install and reinstall props. Entire brigades of tunnelers and timbermen had to be held in reserve for the auxiliary jobs. The cost of mining the coal increased.

Rostovskaya miners had no luck! They once hoped that at least the seam in the east wing of the mine area could be worked. Their hopes fell through.

An emergency meeting of the technical council was convened. The opinion was unanimous: Detailed information had to be gathered on another seam that had been revealed earlier. Geological information was obtained from exploratory wells. A group of experts was sent to the Ukraine, to the neighboring Sverdlovskantratsit Association, the mines of which are working a similar seam. The experience of the Ukrainians was persuasive: Rostovskaya's seam could be mined. The technical council of the Gukovugol' Association gave permission to uncover the seam, but it gave a stern warning: Make no mistakes! It was stipulated, moreover, that the mine would have to do all of the work on its own. In the initial plan the miners were not to have a stope at the seam until 1985. But there was no time to lose--the mine was going under.



The executives and the party committee of the Rostovskaya Mine adopted another variant in which a longwall could be placed into operation at the new seam in 2 years less! But the specialists collided with a new difficulty. The rock in the working area was as hard as it could get. Who could be trusted to tunnel through it fast? The decision was made by the party committee and by the mine trade union committee: V. Kopeyka's shock tunneling brigade would do the job. Kopeyka was a career miner, and a competent and tested individual. He was an authoritative brigade leader, and a good organizer.

"The trust of the administration and of the party and trade union committees added to our strength," said V. Kopeyka. "Every tunneler in the brigade came to feel personal responsibility for the task posed to us, and its importance to the entire mine collective. We tried to justify this trust. We consistently surpassed the plan, and we are still doing so now."

"Despite the relatively favorable mining and geological forecast," said mine director N. Kurilov, "we were aware that all of the anxieties associated with the engineering problems would not be alleviated until the coal seam was actually exposed. But our calculations were correct."

"It would not be an exaggeration to say that the entire mine jumped for joy. It was a real holiday. We learned that the actual thickness of the seam to be developed was 1.2 and 1.3 meters in the place where it was exposed. And we had thought that it would not reach a meter."

"The seam slopes downward at 18-20°. The ash content of the coal is within normal.. Pretty good results! The forecast of the specialists that the rock making up the roofing and footwall would be stable was confirmed."

Consequently these mining conditions will make it possible to use the most up-to-date mining equipment at the stopes of the new coal seams, and to increase the daily load from the longwall to 1,000 tons of fuel. And because the mine collective will be working on two stable 1,000-ton longwalls, it will doubtlessly catch up, and it will successfully assimilate its planned production level by 1983.

In other words a new Rostovskaya Mine, born of the labor and boldness of the laborers, engineers and technicians of the enterprise itself, will begin to produce coal on the basis of the old, outdate mine. We should stress here that this was done with minimum help from the mine builders!

Yes, the miners are doing the rebuilding themselves. Today everyone is responsible for seeing that the new coal seam is placed into operation on time. Everything depends on the rhythmical work of the tunneling brigades, which must work ahead of schedule. Incidentally, now that the seam has been exposed, four tunneling collectives can work here simultaneously. The tunneling rate is growing. The miners are confident that by the third quarter of 1983 the first longwall will go into operation at the new seam.

The Rostovskaya Mine has now organized courses to train tunnelers, miners for the stopes, electricians and electric train mechanics. Chose whatever occupation you wish. Laid-off miners are being granted an extremely sizeable one-time

loan of up to 1,000 rubles. During the year, novice miners just hired for work will be provided quarters in well-equipped residential buildings erected on a self-help basis.

Young people are eagerly flocking to the Rostovskaya Mine. The personnel turnover that had eaten away at the collective not that long ago has dropped sharply. The number of young engineers and technicians in middle-level management has increased as well. Dozens of young workers are studying in the institutes and tekhnikums without leave from work.

The mine is alive, and it is working with confidence.

11004

CSO: 1822/184

## COAL

### FUTURE TAJIK COAL MINING SITE VISITED

Moscow PRAVDA in Russian 3 Feb 83 p 6

[Article by correspondent O. Latifi: "The Fires of Sogdiana"]

[Text] In August of last year an article in PRAVDA carried an article titled "Open Windows" which stated that a subterranean fire has been raging for many millenia in the mountains of the Zeravshanskaya Plain. V. Os'kin, a reader of the newspaper and a veteran of the party and labor from the city of Saratov, requested more details about this story.

Our car hugged the cliffs as it went on. A shear wall descended right down to the road. The Fandarya, a blue tributary of the Zeravshan, bubbled below.

"That used to be under water, and that too," D. Khalikov, chairman of the Ayninskiy Rayon Executive Committee, nodded his head toward the mountain-tops.

Yes, the ocean that had once spread over the expanses of Central Asia reached even here as well. Where we now see mountain ranges with snowy summits, ancient forests once rustled. Some of the most ancient animals, the skeletons of which are now displayed as highly valuable things in museums, once roamed in these forests. Dinosaur footprints have even survived on the sun-scorched slopes on the other side. They are not very large--your palm would hide them from view. Not far away is a petrified tree trunk. The abundance of iron oxide it contains imparted the color of burning coals to it.

"It would be better to get the oldtimers to take us down to the fire caves," Khalikov advised.

We drove on to the village of Takfon. We were met by Gayur Farmonov and the director of the subsidiary farm of the Anzobskiy Mining and Concentration Combine, Bakhridin Arbobov, who hails from Gabirut, beyond the fire-ridden mountain. Both are fabulous experts on the land's history and on its legends.

It is believed that it was here that the practice of the ancient people of Sogdiana of worshipping fire came into being. It has been dependably shown that human life first appeared in Central Asia in the mountains. As the water level receded, people descended to the lowlands and inhabited the plains. As legend would have it, they took fire for their shrines from this mountain.

The land is rich with ancient relics. Documents written by the Sogdian ruler Divashtich were found in the ruins of the fortress of Mug. Spoken Sogdian language has partially survived among the Yagnobtsy, most of whom have reestablished themselves in the Golodnaya Steppe. Some of them continue to reside in inaccessible settlements on both sides of the Gissar Range.

A cave extends from Gabirut--the place we were going with our guides--in the direction of the Lake Iskanderkul. At its exit sits a mummified man. He is called Khodzha Iskhok. As the residents of the village of Makhshevat tell it, he is more than a thousand years old. Science has not yet studied this case. But it is very interesting. A rushing stream flows deep within the cave. The water-washed cliffs give the appearance of carved pillars. And all of this is deep within the heart of the mountains.

Ten years ago I managed to clamber up to where Khodzha Iskhok was. Just the recollection of that ascent continues to throw me into a cold sweat to this very day. Many times people have plunged into the abyss from the trail, if one could call this rarely traveled rock-climber's route that. But Iskanderkul with its astoundingly beautiful waterfall is a tourist mecca. Legend has it that the fiery Rakhsh--the horse of the legendary Pustam, hero of Firdousi's epic "Shakhname"--grazes on the floor of the lake. Rabbits are abundant and bears are encountered in the juniper and sparse birch forests. In summer you might catch a swallows' concert. But this is the season for the calls of rock partridges--kekliks. The bird has an uncommon plumage, and it is easily domesticated, which is why it can be found in almost every house.

Our journey took us past the village of Ravot. Its inhabitants had pulled up stakes and moved to the virgin lands of Yavanskaya Valley. There is little land suitable for planting along the upper reaches of the Zeravshan. Many old and new orchards spread over the stony terraces. The apricots that grow here are unusually sweet. These fruits have yet another merit: They do not fall when strong winds blow; only after they mature and dry do they themselves drop from the branches. Besides apricots, mulberries used to be a valuable food. They were dried and ground in a mill. There still are many mulberry trees around today, but their leaves are now the food of silkworms.

Farmonov and Arbobov turned my attention to some dilapidated huts. They used to contain ancient hearths and settling tanks in which sulfur, ammonium chloride, alum and saltpeter were separated from burning coals. These minerals were traded in many countries.

During the Great Patriotic War a little factory in Ravot produced substances used to tan leather. The local population also made some medicines. Presence of excavations in the caves led some scientists to suggest that the coal in the mountains was set afire as a result of human activities.

"But this is not so," I was told later on in Dushanbe by a section chief of the Geology Administration of the Tajik SSR, A. Džaynukov. "The fires have been burning for about three or three and a half million years. About 3-5 percent of the coal that has been explored thus far has burned away in this long period of time. But the reserves that have been determined and that will soon be extracted are quite significant. There are plans for building a coal enterprise."

It is practically possible to quench the fire. But considerable outlays would be required for this. Coal mining could be organized here, thus satisfying the republic's fuel demand. But the more than 200 sites of burning coal will continue to burn in Sogdiana for a long time to come. They are especially beautiful in twilight and during clear nights. It is as if an ancient monster comes to life and breathes tongues of flame.

11004

CSO: 1822/184

## COAL

### SYNOPSIS OF ARTICLES IN 'UGOL' UKRAINY', NO 1, 1983

Kiev UGOL' UKRAINY in Russian No 1, Jan 83 pp 47-48

[Synopses of articles]

[Text]

UDC 622.333:658.589

Laptev, O. S. "The Main Direction of Technical Progress in the Coal Industry." UGOL' UKRAINY, 1983, No 1, pp 2-5. New developments of Dongiprouglemash, design of mine-shaft equipment. Tasks facing the institute in connection with technical re-equipment in the coal industry.

UDC 622.01:624.1

Malakhov, S. N. "The Role of Komsomol Organizations of the Ukraine in the Development of the Coal Industry of the Donbass." UGOL' UKRAINY, 1983, No 1, pp 5-6. The leadership of Komsomol organizations of the Ukraine over the coal industry. Rapid construction of 37 Komsomol mines in 1957. The construction of modern large mines in the Donbass.

UDC 622.28:622.831.24

Anosov, O. S. "Control of Roofs With Complex Caving Systems in Steeply Pitching Beds." UGOL' UKRAINY, 1983, No 1, pp 7-8. Method of predicting the negative influence of secondary settlements of the main roof; control of the rock pressure in shafts of the Ordzhonikideugol' Combine.

UDC 622.274:526.48.003(477.61/.62)

Averkiyev, V. I., and Ovcharov, V. S. "Graduated Working of the Shield Area To Control the Condition of a Work Face." UGOL' UKRAINY, 1983, No 1, pp 8-9. The work of shield units IAShchM and ANShch and the main reasons holding back increasing the load on a stope. Recommendations are offered on the efficient performance of work with an increased cleaning front and use of pressure treatment of coal.

UDC 622.232.8-519

Shetser, M. G. "Experience in Operation of the LKM-103." UGOL' UKRAINY, 1983, No 1, pp 9-10. Working experience of the brigade of A. S. Kozhanov from the "Miuskaya" mine of the Sovetskugol' Combine on a thin bed.

UDC 622.01:658.387

Beda, F. P. "Optimizing Number of Workers in a Longwall Per Shift Unit." UGOL' UKRAINY, 1983, No 1, p 10. The relationship of a shift's coal output and the labor productivity of a worker at a face to the numbers of workers in the shift unit in a longwall is shown. The influence of optimization of the numbers of the shift unit on the technical-economic indicators of operations is calculated.

UDC 622.26.002.2:338.45

Il'yenko, S. M., and Shamayev, V. V. "Evaluation of Engineering Plans for Conducting Exploratory Mining." UGOL' UKRAINY, 1983, No 1, pp 11-12. The paper discusses questions of estimating operational plans for conducting exploratory work using an economic-mathematical model for labor-intensity of the processes and applications in an automated planning system.

UDC 622.232-192(047)

Dashevskiy, M. V., and Karpenko, G. I. "Increase of the Load on Faces With Integrated Mechanized Equipment." UGOL' UKRAINY, 1983, No 1, pp 12-13. The article discusses potential for increasing the load on stopes with integrated mechanized equipment. Measures and proposals are presented.

UDC 622.268.13:622.232.8

Finkel'shteyn, Yu. L. "Productivity of the 'Titan-1' Crusher-Filler Complex." UGOL' UKRAINY, 1983, No 1, pp 13-14. The article discusses technical and operating productivity and the area for effective use of the "Titan-1" complex at the Donbass mines.

UDC 531.787:622.414.32

Panov, N. S., Gorbatenko, A. B., and Pestov, S. N. "M-75 Universal Microbarograph for Measuring Depression of Mine Workings." UGOL' UKRAINY, 1983, No 1, pp 14-16. Describes development of an instrument for making depression photographs of mines--the M-75 universal microbarograph. The operating and technical parameters of the instrument, the results of experimental testing of positions of theoretical analysis, and also of industrial and government tests of experimental models are presented.

UDC 622.807--622.411.512.3

Grodel', G. S., Kudryashov, V. V., and Yaremachenko, P. P. "The IKAP Radioisotopic Dust Counter." UGOL' UKRAINY, 1983, No 1, p 16. The article describes the purpose, design and operating principles of the dust counter and the merits of the instrument.

UDC 622.625.272.001.24

Reznichenko, V. Ya., and Ostapenko, S. A. "Characteristics of Unloading Mine Cars in Dumpers." UGOL' UKRAINY, 1983, No 1, pp 17-19. The article describes physical properties of the process of unloading mine cars in a dumper and the reasons for onset of load irregularities in its transmission.

UDC 622.625.24:621.797  
Lesnikov, A. I. "Experience in Mine Car Operation." UGOL' UKRAINY, 1983, No 1, pp 20-21. The article describes experience of the mine imeni Frunze in the repair and numeration of mine cars. Devices recommended to mine efficiency experts are mentioned.

UDC 621.316.542--213.34.004.1  
Vakul'chik, V. G., Derkach, K. V., and Martovitskiy, I. A. "Industrial Tests of VET Explosion-Proof Contactless Switches." UGOL' UKRAINY, 1983, No 1, pp 21-22. The device and operating principles of VET's are described and test results are presented.

UDC 681.3.06:621.879:622.271.4  
Khotimchenko, Yu. N. "Algorithms for Planning Technical Servicing of Wheel Excavators With Use of Computers." UGOL' UKRAINY, 1983, No 1, p 23. The basic positions, algorithms and block diagrams are presented for planning every-shift tasks in the technical servicing and monthly routine inspection of wheel excavators with use of an ES digital computer. The necessary source information for putting problem into the computer memory and deriving solution are given. Forms and results are presented.

UDC 622.232:[621.867.2--252]--776  
Smirnov, L. P. "Self-Cleaning Properties of Elastic Linings of Driven Drums on Belt Conveyors." UGOL' UKRAINY, 1983, No 1, p 24. Experiments to determine self-cleaning properties of elastic liners of various designs. A procedure for conducting experiments is described.

UDC 622.61.002.52  
Shmigol', A. V., Fedorenko, S. V., and Denishchenko, A. V. "Transport Problems in the Application of Preparatory Workings at Mines of the Western Donbass." UGOL' UKRAINY, 1983, No 1, pp 25-26. The article presents an analysis of the slopes (in mines of the Western Donbass) of the path of stratal workings passing over a rise (or fall) and the transport equipment being utilized. Recommendations are made for improving plans and means of transportation during cutting.

UDC 622.678--592  
Belikov, N. L., Vasil'yev, V. I., Shapochka, S. N., and Traube, N. Ye. "Dynamic Phenomena During Controlled Safety Braking." UGOL' UKRAINY, 1983, No 1, pp 26-27. Discusses the influence of dynamic phenomena arising in a multi-mass system with elastic bonds, the work of a unilateral system of automated safety braking. Recommendations are made on the adjustment of such systems, and suggestions for their improvement.

UDC 622.01:621.797.004.67:621.515  
Zakharchenko, A. I., and Parshintsev, V. P. "Maintainability of Mine Turbine Installations." UGOL' UKRAINY, 1983, No 1, pp 28-29. Summary indicators of maintainability of mine turbine installations are discussed, as is the need for an overall approach to solving the problem of greater maintainability of stationary machines. The main steps for assuring maintainability of equipment are noted.



UDC [621.315.5:621.762+621.316.542.027.3.064.25] (045)  
Shchutskiy, V. I., and Fominykh, Yu. A. "Contact Systems of Series VME-6 Oil Switch Under Loads of Current." UGOL' UKRAINY, 1983, No 1, pp 29-30. Operating features of the contact systems of series VME-6 oil switches, widely used in the electric supply systems of quarry excavators, are described. The procedure and results of investigation of their operation under nominal currents and under different overload currents are discussed.

UDC 622.831.325:622.861  
Valinchenko, I. I., Simonov, A. A., and Ivanov, I. S. "Analysis of Measures to Assure Safety on Seams Subject to Outbursts." UGOL' UKRAINY, 1983, No 1, pp 31-32. The article presents an analysis of the application of measures and means of protection of people on seams subject to outbursts. Suggestions for conduct of mining operations.

UDC 622.831.322:622.817  
Gorbunov, I. A., Dorofeyev, D. I., Ettinger, I. L., and Radchenko, S. A. "Determining Degree of Outburst Danger With Temperature Variation." UGOL' UKRAINY, 1983, No 1, p 32. Discusses observations of temperature variation of a dangerous bed in the "Pereval'skaya" mine of the Voroshilovgradugol' Combine and confidence interval of reduced temperatures in beds in the dangerous zones. Also discussed is the possibility of using temperature reduction as an indication of outburst threat.

UDC 622.031.55.001.5  
Novichikhin, I. A., Il'yashov, M. A., and Khil'ko, V. V. "Estimation of Variation of the Gas-Dynamic State of Beds in Zones of Increased Rock Pressure." UGOL' UKRAINY, 1983, No 1, pp 33-34. Presents the main positions resulting from experimental checking of the procedure for evaluating the effect of increased rock pressure on the gas-dynamic properties of beds.

UDC 622.456.2:621.039.85  
Kasimov, O. I., Krivitskiy, M. D., and Dett'yarev, A. P. "Investigation of Gas Influx Into Wells Drilled From the Surface." UGOL' UKRAINY, 1983, No 1, pp 34-35. The article presents the results of determining by radioisotope indication the aerodynamic connection between vertical degassing holes drilled from the surface, and also the sites and intensities of methane flows in them.

UDC 622.831.322:550.83  
Ponomarev, I. F., and Linetskiy, A. P. "Economic Effectiveness of the Electrometric Non-Drillhole Method for Monitoring the State of Beds Subject to Outbursts." UGOL' UKRAINY, 1983, No 1, pp 35-36. The article discusses results of comparing the annual saving from use of an electrometric non-drillhole method with a normative method of monitoring the efficiency of measures against outbursts based on the dynamics of gas evolution under identical conditions.

UDC 622.822.2:614.842.618

Kaledin, N. V., and Al'perovich, V. Ya. "Combating Self-Combustion of Coal in Donbass Mines." UGOL' UKRAINY, 1983, No 1, pp 36-38. The article discusses methods of predicting self-ignition and of detecting the causes of self-ignition of coal, monitoring the development and damping of endogenic, self-ignition fires. The need to isolate worked areas is discussed, as are active methods of suppressing endogenic fires.

UDC 622.51:628.33

Grigoryuk, Ye. V., Semenenko, B. A., and Afanas'yeva, E. Ya. "Use of Local Materials to Purify Mine Waters." UGOL' UKRAINY, 1983, No 1, pp 39-40. The article presents the results of the study on filtering properties of local deposit granular materials. Recommendations are made on the use and preparation of filtering charges for mine cleaning installations.

UDC 69.059:622.837:338.94

Kapunov, Yu. F. "Substantiation of the Economic Advisability of Restoring Exploratory Settlements." UGOL' UKRAINY, 1983, No 1, pp 40-42. Recommendations on use of constructive measures for reinforcement and restoration of exploratory sites based on application of technical and economic considerations.

UDC 339.553.94/.479.61/.62

Shul'ga, V. F. "Use of Type Designs on Donbass Mine Beds Affected by Erosion." UGOL' UKRAINY, 1983, No 1, p 42. The article presents the procedure of type-design for mine beds affected by erosion, based on a combination of two indications: mine-bed area afflicted with erosion and the amount of erosion per 1 km<sup>2</sup>. The value of type-design for the solution of general and specific questions of the surveying and development of coal deposits of the Donbass is discussed.

UDC 622.7.013:658.56

Yakunin, V. P., Bondar, A. Ya., and Makarenko, N. I. "Certification of Coal Production at Concentrating and Briquet Plants." UGOL' UKRAINY, 1983, No 1, p 43. The article discusses the procedure of certifying coal production of concentrating and briquet plants of the UkrSSR Ministry of Coal Industry in connection with the introduction of a new branch standard and production list of the USSR Ministry of Coal Industry, that will be subject to certification. An estimate is presented for the quality of production during certification of the coal enrichment procedure.

UDC 662.6.53/.54+622.7--52

Zhukov, P. P. "Estimating the Density of Organic Mass and Mineral Impurities of Donetsk Coals." UGOL' UKRAINY, 1983, No 1, pp 43-44. The article describes the interconnection between ash content and density of coals of various grades, methods for determining the density of organic and inorganic mass as a function of the degree of metamorphism.

COPYRIGHT: Izdatel'stvo "Tekhnika" "Ugol' Ukrainy", 1983

2174

CSO: 1822/153

## COAL

### SYNOPSIS OF ARTICLES IN 'UGOL' UKRAINY', NO 2, 1983

Kiev UGOL' UKRAINY in Russian No 2, Feb 83 pp 47-48

[Synopses of articles]

[Text]

UDC 622.013.3:658.5.018.2:622.26

Polyakov, N. S. "Technical Re-equipment of Combine Mining." UGOL' UKRAINY, 1983, No 2, pp 2-4. The article discusses ways to improve the tunneling of combines by developing items like self-controlled robots which perform a complete cycle of tunneling work both in an automatic and manual mode.

UDC 622.28:65.015.1:658.387

Bubnov, B. I., and Sidoruk, A. S. "Use of the Brigade Contract Method in Mining." UGOL' UKRAINY, 1983, No 2, p 5. The article discusses improvement of labor organization in the tunneling brigade of ShSU No 3 of the Dneprshakhtostroy Combine. Duties and performance are summarized.

UDC 622.833.3:622.273.18.016:622.838.5

Zborshchik, M. P., and Vodyanov, V. F. "Displacement of Contour Media During Preparatory Operations." UGOL' UKRAINY, 1983, No 2, pp 6-7. The article presents the results of instrumental observations of displacements of contour rocks of the main workings site during development of a suite of sloping beds in Donbass mines. Empirical relationships are presented for determining displacements when stabilizing them as a preparatory bed with rubble strips and their distribution in caved-in and compacted roof media.

UDC 622.273.131:622.234.5.002.02116

Rad'ko, B. V., Morozov, Ye. G., and Kachura, M. N. "Hydraulic Technology, the Working of Sloping Beds With Complex Mining and Geological Conditions." UGOL' UKRAINY, 1983, No 2, pp 8-9. The article presents the results of investigation and the introduction of a short-face extraction system using a hydro-monitor on a gently sloping bed with a complex roof caving system and readily-saturated, swelling soil.

UDC 622.633.6:656.259.4:622.232.8

Shumilov, I. V. "Effectiveness of Reinforcing a Coal Mass With Polymer Resins." UGOL' UKRAINY, 1983, No 2, p 10. The article presents the results of investigations on the effectiveness of reinforcing a coal mass.

UDC 622.284-525-118(477.61/.62)

Kolokolov, O. V., Litvinov, Yu. G., and Ozerova, A. S. "Advisability of Installing Pneumatic Chocks in the Upper Part of a Longwall." UGOL' UKRAINY, 1983, No 2, pp 11-12. Investigation results of the extent and rate of contiguousness of lateral media in the upper part of a longwall and in the ventilation heading, and discusses the application of pneumatic and wooden chocks.

UDC 622.284-525-118

Nikolenko, N. A. "Investigation of the Carrying Capacity of Pneumatic Chocks." UGOL' UKRAINY, 1983, No 2, pp 12-13. The article reports investigation of the operating conditions of pneumatic chocks on steep beds. It describes a method of calculating the carrying capacity of chocks in relation to the non-parallel angle of the lateral media.

UDC 658.3:622.013:622.232.117

Rubinskiy, Yu. M. "Optimization of the Number of Workers in Combine Longwalls." UGOL' UKRAINY, 1983, No 2, pp 14-16. The article describes a procedure for determining the optimum number of miners in longwalls in the presence and absence of reserves of mine production capacity. Optimization of the number of miners permits to improve considerably the technical and economic indicators of mine operations.

UDC 622.01:62-52;62.019.3

Voropayev, V. I., Mishchenko, N. A., and Belomestnova, A. A. "Labor Intensity of Technical Servicing of Automated Workface Equipment." UGOL' UKRAINY, 1983, No 2, pp 16-17. Principal factors influencing the level of labor intensity, type and organization of equipment servicing facilities.

UDC 622.647.1.883:658.511

Yaroshinskiy, I. I. "Reduction of the Labor Intensity of the Assembly and Disassembly of Threaded Connections of Conveyors." UGOL' UKRAINY, 1983, No 2, p 17. An analysis of the labor intensity of installing an SP-87P flight conveyor. Shortcomings of an existing instrument for the bracing of bolted connections. Requirements for developing torque enlarger-keys with interval links for transmission to threaded connections, situated at difficult-access sites.

UDC 662.271.4:685.5.011.56

Berezanskiy, R. T., Chernoplechiy, L. I., and Yavorskiy, V. A. "Analysis and Selection of Methods for Construction of Equipment To Monitor and Record Production of Excavators." UGOL' UKRAINY, 1983, No 2, pp 18-19. An analysis of possible methods and principles of construction for automatic monitoring and record-keeping devices for continuous and cyclical excavators. Methods and principles of constructing devices for an ASU TP a section. Includes a generalized design of the device.

UDC 621.867.2:620.178.4.622

Norenko, I. I. "Evaluation of Conveyor Belts for Endurance Under Impact Load." UGOL' UKRAINY, 1983, No 2, pp 20-21. Results of experimental and theoretical investigations of rubber cable conveyor belts under impact load.

UDC 621.31.006.1:622

Pyatetskiy, G. Yu., Pichakhchi, I. F., and Shilov, V. V. "Standardization of Rules for Manufacture of Standard Electrical Mining Equipment." UGOL' UKRAINY, 1983, No 2, pp 21-22. Information on standardization of the rules for manufacture of standard electrical mining equipment intended for operation in underground workings where there is no danger of explosion of gas, vapor or dust. An analysis is presented of the requirements included in the SEV standards and the government standard for typical electrical mining equipment.

UDC 622.232.83

Yumina, V. G., and Grigor'yev, A. I. "Directed Driving of the KRT Combine." UGOL' UKRAINY, 1983, No 2, pp 22-23. The article describes tests of the KRT combine, the characteristics that determine its trajectory. The actual characteristics of the combine are described. Shortcomings of the monitoring equipment's location are discussed. Ways to improve the design are pointed out.

UDC 622.232:62-52

Gamalyuk, V. I., and Krichenko, K. I. "Modernization of the Speed Channel Unit of the IPIR-3 Load Regulator." UGOL' UKRAINY, 1983, No 2, p 23. The article presents a diagram of a three-position relay using operational amplifiers and permitting independently variation of the dead zone and hysteresis when they have high precision and stability. The application of the three-position relay in the speed channel unit of the IPIR-3 load regulator is described.

UDC 622.647.2

Orokhovskiy, I. I., and Yakimenko, G. S. "Telescopic Belt Conveyors in the Coal Industry." UGOL' UKRAINY, 1983, No 2, pp 24-25. Discusses the effectiveness of introduction of telescopic conveyors and conveyor models.

UDC 622.647.2.002.513.5:62-192

Zavgorodniy, B. Kh., Popov, I. Ya., and Vychigin, A. N. "On the Selection of Distances Between Idlers of Rope Columns of Belt Conveyors." UGOL' UKRAINY, 1983, No 2, p 25. Discusses the influence of individual parameters on the distance between idlers. Recommendations are made on the design of cable columns for belt conveyors having a belt 1000 mm wide.

UDC 622.807.2:622.411.522:533.6

Medvedev, E. N., Korenev, A. P., and Sklyarov, L. I. "Improvement of Dust Removal Methods During Screen Extraction of Steep Beds." UGOL' UKRAINY, 1983, No 2, pp 26-27. Results of studies under mine and laboratory conditions of coal crushing processes, the distribution of dust-air currents, hydraulic dust removal and dust suction. The optimum design parameters are presented for application and management of an upgraded set of dust-removal measures utilizing screen units at slopes of steep beds in Donbass.

UDC 622.831.322

Zhukov, A. Ye., Kanin, V. A., and Uzbek, I. G. "Possibility of Localizing Discharges During Vibratory Explosion in Development Workings." UGOL'

UKRAINY, 1983, No 2, pp 27-29. The article presents the results of experimental work on localizing discharges of coal and gas resulting from vibratory explosion in exploratory workings. The experimental certificate of the VVR is shown.

UDC 622.822:622.417.2

Gushchin, A. M., Lobov, V. L., and Shevchenko, V. N. "Formation of Temperature Fields in Workings of Deep Mines During Variation of Ventilation Conditions." UGOL' UKRAINY, 1983, No 2, p 29. The article discusses temperature variation in workings of deep mines during transition from normal ventilation conditions to the reverse. Estimates are made of the influence of natural propulsion on the air distribution in the ventilation network during reversal of the jet.

UDC 622.477:628.935

Mikhedov, N. A., Yazev, V. L., and Guzenfel'd, Z. M. "The Influence of Opaueness of the Mine Atmosphere on the Level of Illumination of Working Places." UGOL' UKRAINY, 1983, No 2, p 30. A method of calculating the illumination in a dust-laden atmosphere using a given model of light absorption. The data of experimental measurements of light absorption under the mine conditions are presented. Recommendations are made.

UDC 622.51:628.33

Matlak, Ye. S., Rudakova, I. Yu., and Kazimirenko, N. V. "Investigation of the Contamination of Mine Waters." UGOL' UKRAINY, 1983, No 2, pp 31-32. The article presents the cause and character of contaminants of mine waters in mine workings.

UDC 628.334:622.01

Kharionovskiy, A. A., and Krylova, O. A. "Use of a Flow-Equalizing Reservoir in Purifying Mine Waters." UGOL' UKRAINY, 1983, No 2, pp 32-33. The article deals with the need and the conditions for use of flow-equalizing reservoirs in the structures of mine-water purification equipment and engineering design of such reservoirs. The means to determine design of reservoirs and their technical and economic indicators are given.

UDC 622.142:551.24

Khalimendik, Yu. M. "Study of the Disjunctive Displacer's Intersection Plane With the Stratum." UGOL' UKRAINY, 1983, No 2, p 34. Results of observations on the undulation plane of a disjunctive displacer during extraction work in Western Donbass mines. The intersection line of the displacer's plane with the stratum is a random stationary function with an ergodic property.

UDC 553.93:622.01

Zhuravlev, S. Sh., and Kosinskiy, V. A. "Silicification Characteristics of Coal Beds in Krasnoarmeyskiy Rayon of the Donbass." UGOL' UKRAINY, 1983, No 2, p 35. Describes distinctive petrographic features of inclusions of coal substances in a coal-chalcedony interlayer seam on the site of the Dobropol'yegol' Association mine, imeni 21st CPSU Congress.

UDC 622.011:553.291

Kramarenko, A. I. "Geochemical-Structural Mapping as a Complex Method of Predicting the Degree of Tectonic Disturbance." UGOL' UKRAINY, 1983, No 2, pp 35-36. The article presents essential status of the geochemical structural mapping of mines during surveying and operation stages. An equation is derived for the correlational connections between the coefficient of fine-amplitude disturbance and the parameters of the geochemical field. Potential overall use of the geological-structural mapping results of coal-bearing depositions is discussed.

UDC 622.23.02:552.574.1;553.93(477.61)

Karalkin, V. F. "Method of Predicting Low Complications of Bed Morphology." UGOL' UKRAINY, 1983, No 2, pp 36-37. The article discusses a statistical processing method for information gained during mining work on the morphology of beds and possible applications of that method to predict the low strata disturbances in mine fields.

UDC 622.7:658.589

Sabel'nikov, G. F., and Belyavskaya, N. B. "Results of Technical Re-equipment of Enrichment Plants." UGOL' UKRAINY, 1983, No 2, pp 37-38. The article discusses the implementation of measures on the technical re-equipment of coal enrichment plants of the UkrSSR Ministry of Coal Industry during the 10th Five-Year Plan and 2 years of the 11th.

UDC 622.648.24:621.928.3.001.5

Svitlyy, Yu. G., Karlina, T. V., and Sokolova, Ye. M. "Techniques for Dehydrating Coal Transported Over Main Pipelines." UGOL' UKRAINY, 1983, No 2, pp 38-39. The article discusses the possibility of using main hydraulic pipeline systems for dehydrating coal at electric power stations. Results of investigations are presented.

UDC 622.267.33

Drutsko, V. P., Shevtsov, A. Yu., Gorbunov, I. A., and Petrenko, I. I. "Stabilizing of Media Around the Loading Line at the 'Slavyanoserbская' Mine." UGOL' UKRAINY, 1983, No 2, p 40. The article describes experience in stabilizing of the rock contour when expanding operations in conditions where rock inrushes occur, with cavities of up to 6-7 m.

UDC [622.7.012+622.33.014.5]:624.04/.07

Mikheyev, I. I., Ozhiganov, I. I., and Domres, Ye. E. "Hermetic Sealing of Buildings and Structures Over Mine Shifts at High Depressions." UGOL' UKRAINY, 1983, No 2, pp 41-42. The article presents an analysis of the causes of air leaks in coal shafts with high depression, and empirical formulas for calculating individual leaks of air through parts of the hermetically sealing structures. It describes methods for checking structural parts for air permeability.

COPYRIGHT: Izdatel'stvo "Tekhnika" "Ugol' Ukrainy", 1983

2174

CSO: 1822/153

## COAL

### SELECTED SYNOPSSES OF ARTICLES IN 'THE UKRAINE'S COAL', OCTOBER 1982

Kiev UGOL' UKRAINY in Russian No 10, Oct 82 pp 47-48

UDC 622.013.3 "sh. im. Lutugin"  
[Underground Mine imeni Lutugin]

#### EXTENDING THE SERVICE LIFE OF THE UNDERGROUND MINE IMENI LUTUGIN

[Synopsis of article by V. I. Malov, UGOL' UKRAINY No 10, 1982 p 2]

[Text] Organizational and technical measures performed at the Underground Mine imeni Lutugin of Torezantratsit [Torez Anthracite Production Association] that will allow its service life to be extended up to 25 years without reducing production capacity. 2 tables.

UDC 622.831.24

#### STUDY OF DEFORMATIONS OF EXCAVATION WORKINGS WHERE THERE ARE VARIOUS METHODS FOR PROTECTING THEM

[Synopsis of article by A. S. Dimanshteyn, V. G. Lisichkin, V. Ya. Mininberg and V. F. Khutornoy, UGOL' UKRAINY No 10, 1982 pp 3-5]

[Text] The results of underground-mine studies of mine-pressure phenomena in excavation workings of the Lutuginskaya-Severnaya Underground Mine. 3 illustrations. Bibliography: 1 title.

UDC 622.245:622.235

#### ADVANCE TORPEDOING AT UNDERGROUND MINE MOLODOGVARDEYSKAYA

[Synopsis of article by V. S. Kachanov, V. I. Pavlov and V. P. Safronov, UGOL' UKRAINY No 10, 1982 pp 5-6]

[Text] An analysis of use of the roof-weakening effect of an excavation section of a neighboring previously worked longwall that has been prepared for working. 1 table, 1 illustration.

UDC 622.261.27:622.833.5

#### CONTROL OF THE STRESSED STATE OF ROCK AROUND A WORKING

[Synopsis of article by G. G. Litvinskiy, G. V. Babiyuk and S. G. Korobkin, UGOL' UKRAINY No 10, 1982 pp 6-8]

[Text] The results of research of a method for increasing the stability of a working by controlling the stressed state of the rock, at Underground Mine No 1-bis imeni S. Tyulenin of Krasnodonugol' [Krasnodon Coal Production Association]. 3 illustrations. Bibliography: 2 titles.



UDC 622.831.031.55

#### REASONS FOR LEAVING COAL PILLARS AT UKSSR MINUGLEPROM MINES

[Synopsis of article by I. A. Novichikhin, V. Ye. Budkov and Ye. V. Goncharov, UGOL' UKRAINY No 10, 1982 pp 8-9]

[Text] Reasons for leaving pillars at UkSSR Minugleprom [Ministry of Coal Industry] underground mines and measures for precluding or reducing the harmful influence of PGD [mine-pressure phenomena] zones on the coal pillars that have been left. 1 table. Bibliography: 1 title.

UDC 622.221.425

#### DETERMINATION OF MAIN DIMENSIONS OF LATERAL SECTIONS OF WORKINGS WITH 'KPS'-TYPE SUPPORTS

[Synopsis of article by I. N. Tolstykh and S. V. Krivonos, UGOL' UKRAINY No 10, 1982 pp 9-10]

[Text] Choice of standard sizes of KPS3 supports of Donugi [Donetsk Scientific-Research Institute for Coal] design, taking into account the dimensions of the lateral section of the inside clearance of the working that are required during the maintenance process and values of structural yield, as a function of the expected dislocations of the rocks that the supports should accept. 2 tables, 1 illustration. Bibliography: 1 title.

UDC 622.013

#### EVALUATION OF CONSTRUCTION BACKLOG OF WORK ACCOMPLISHED ON HORIZONS AT ACTIVE UNDERGROUND MINES

[Synopsis of article by D. F. Lazakovich, UGOL' UKRAINY No 10, 1982 pp 11-12]

[Text] A method for calculating the standard value of uncompleted construction at operating mines. 1 table.

UDC 622.232.75.054.54

#### INFLUENCE OF BLADE WEAR RESISTANCE AND COAL-BLOCK PROPERTIES ON SCRAPER-CUTTER PRODUCTIVITY

[Synopsis of article by Yu. N. Linnik, UGOL' UKRAINY No 10, 1982 pp 12-13]

[Text] The results of studies of the influence of the wear resistance of scraper-cutter blades and the indicators of coal-block properties on the productivity of SO-75 and SN-75 units. A regression equation for determining scraper-cutter productivity. 1 table, 2 illustrations.

UDC 622.245.72

#### ARRANGEMENTS FOR ISOLATING THE VOID OF A HOLE DURING DRILLING

[Synopsis of article by M. S. Baranovskiy, V. L. Starodubtsev and V. L. Fin'ko, UGOL' UKRAINY No 10, 1982 pp 13-14]

[Text] Classification of devices for isolating the void of a hole that are used in various branches of industry. Analysis of the devices and recommendations for possible use thereof in underground drilling. 1 illustration.

UDC 622.234.575:622.063.46.004

HYDRAULIC DRILLING OF ASCENDANT HOLES FOR UNMANNED EXCAVATION OF COAL SEAMS

[Synopsis of article by Ye. S. Luk'yanchenko, UGOL' UKRAINY No 10, 1982 pp 15-16]

[Text] Research of the efficiency of a water jet at the face of ascendant holes of various diameters. Nomograms for calculating depth and speed of introduction of the jet into the coal block and hydraulic drilling productivity. 4 illustrations. Bibliography: 1 title.

UDC 622.625-83.063.84

ELECTRIC-LOCOMOTIVE HAULING THAT PROVIDES FOR A HIGH WORKLOAD AT THE MINE FACE

[Synopsis of article by V. S. Ovcharov, V. G. Rybin and Ye. Yu. Vysotskaya, UGOL' UKRAINY No 10, 1982 pp 17]

[Text] Experience in the operation of electric-locomotive hauling while delivering coal from a highly productive longwall at the Underground Mine imeni Izotov of Artemugol' [Artem Coal Production Association]. 1 illustration.

UDC 622.673.1

PROTECTION OF UNDERGROUND-MINE HOISTING INSTALLATIONS UPON OVERWIND

[Synopsis of article by V. A. Sidorenko and A. N. Shatilo, UGOL' UKRAINY No 10, 1982 pp 17-18]

[Text] Method and device for protection upon overwind. The principle of the device's operation. 1 illustration.

UDC 622.276.52

INCREASING THE EFFECTIVENESS OF USING AN AIRLIFT INSTALLATION

[Synopsis of article by L. N. Kozryatskiy and A. P. Kononenko, UGOL' UKRAINY No 10, 1982 p 19]

[Text] Raising the operating effectiveness of airlift installations by using heat from the cooling of compressed air in turbocompressors.

UDC 622.276.52

USE OF AIRLIFT FOR PUMPING WATER FROM A SHAFT DURING DEEPENING

[Synopsis of article by A. V. Treyger and S. I. Stepnykh, UGOL' UKRAINY No 10, 1982 pp 19-20]

[Text] Operation of airlift drainage pumping during deepening of a shaft. A comparison of airlift and drainage pumping. A rational scheme for organizing drainage. 1 illustration.

UDC 622.647.2.002

ON STABILITY OF MOTION OF THE BELT OF A LOWER STRAND ON IDLERS

[Synopsis of article by Ye. Kh. Zavgorodnyy, T. N. Borodina and A. I. Vychigin, UGOL' UKRAINY No 10, 1982 p 20]

[Text] Questions of the theory of stability of the motion of the lower strand of a belt on idlers of various designs. 1 table, 1 illustration.

UDC 622.673-592.2

STUDIES OF HYDRAULIC PLUMMET DRIVE FOR UNDERGROUND-MINE LIFTING MACHINERY

[Synopsis of article by N. I. Yatsenko, Yu. N. Oprishchenko and V. I. Lavrenchuk, UGOL' UKRAINY No 10, 1982 p 21]

[Text] Results of additional research of hydraulic plummet brake drive. Analytic functions, research of working characteristics of the base design of a hydraulic plummet drive, and ways to modernize it.

UDC 622.831

PHYSICO-CHEMICAL METHOD FOR PREVENTING GAS-DYNAMICS PHENOMENA AT PANELBOARD LONGWALLS

[Synopsis of article by F. A. Abramov, V. S. Kulinich, G. A. Shevelev and V. V. Repka, UGOL' UKRAINY No 10, 1982 pp 22-24]

[Text] Operating scheme and results of research at the Underground Mine imeni Gagarin (of Artemugol' [Artem Coal Production Association]) on the influence of physico-chemical treatment with hardening solutions on the burst safety of a coal seam and stability of the side rocks at a paneled longwall. 2 tables, 1 illustration.

UDC 622.454.24

AIR-AND-GAS DYNAMICS OF THE FACE SPACE AT DEVELOPMENTAL WORKINGS DURING OPERATION OF 'APU' UNITS

[Synopsis of article by A. D. Kizryakov and R. P. Kuz'mina, UGOL' UKRAINY No 10, 1982 pp 24-25]

[Text] The gas situation in the face space of a developmental working under a combined method for ventilating it with the use of APU and in accordance with a scheme for partial release of air through a side hole of an injection pipeline. Functions of the change in methane concentration of various sections for the working. 2 illustrations.

UDC 622.831.322

ON THE POSSIBILITY OF CONSTRUCTING A FORECASTING CHART FOR BURST-PRONE SEAMS

[Synopsis of article by N. V. Sakhnevich and G. M. Stobas, UGOL' UKRAINY No 10, 1982 pp 25-26]

[Text] Methodology for constructing forecasting charts of proneness to bursts in accordance with geological prospecting data, and an example of the construction of a chart of burst proneness for three seams of the Underground Mine imeni Rumyantsev. 1 table, 1 illustration.

UDC 622.831.322.622.411

ON THE INTERRELATIONSHIPS OF GAS CONTENT VARIABILITY OF KUZBASS [KUZNETSK COAL BASIN] COAL SEAMS WITH THEIR PRONENESS TO BURSTS

[Synopsis of article by L. M. Knurenko and V. A. Knurenko, UGOL' UKRAINY No 10, 1982 pp 26-27]

[Text] The interdependence of the depth of occurrence of the methane zone's surface, the gradient of the buildup of the methane content and the degree of

metamorphism of the coal with the upper boundary of sudden outbursts. Evaluation of the informativeness of the regional indicators of proneness to bursts. 2 tables.

UDC 620.192.53+66.081:622.01

#### ON THE STRESS OF SWELLING IN A COAL-METHANE SYSTEM IN A SEAM

[Synopsis of article by I. A. Ryzhenko, UGOL' UKRAINY No 10, 1982 p 27]

[Text] The results of determination of the stress of swelling in a coal-methane system, according to laboratory research data. 1 table. Bibliography: 3 titles.

UDC 622.457:622.692.43

#### CONSIDERATION OF THE WEAR OF AIR CONDUITS IN VENTILATION CALCULATIONS

[Synopsis of article by B. I. Medvedev, V. P. Sukhorukov and V. L. Kondratskiy, UGOL' UKRAINY No 10, 1982 pp 28-29]

[Text] Methodology and results of experimental research on deterioration and wear of conduits in underground mines; functions which permit this process to be considered. Methodology of analyzing pipelines. 1 table, 3 illustrations.

UDC 622.673.2:614.841.345

#### ON RAISING THE FIRE SAFETY OF EVACUATION ROUTES IN TOWER-TYPE HEADFRAMES

[Synopsis of article by A. D. Barzenkov and A. P. Gayduk, UGOL' UKRAINY No 10, 1982 pp 30-31]

[Text] Basic causes of fires in tower-type headframes. Constructional measures for laying cable lines and for increasing the fire safety of evacuation routes in tower-type headframes. 3 illustrations.

UDC 622.822.7:614.844.2.003.13

#### AUTOMATION OF COMPUTATIONS IN THE DESIGN OF WATER-SUPPLY SYSTEMS FOR UNDERGROUND-MINE FIRE SPRINKLERS

[Synopsis of article by V. G. Velichko, UGOL' UKRAINY No 10, 1982 pp 31-32]

[Text] Methodology for the design and analysis of water-supply systems for underground-mine fire sprinklers in coal mines, using an ETsVM [electronic digital computer].

UDC 622.831.3

#### ON INDICATORS OF ROOF STABILITY OF DONBASS [DONETS COAL BASIN] COAL SEAMS

[Synopsis of article by V. S. Vereda, UGOL' UKRAINY No 10, 1982 pp 32-33]

[Text] Two quantitative indicators of roof stability. The connection of these indicators with the roof-stability category and with maximum speed of longwall advance. Ways to evolve prognoses of roof stability at the geological-exploration stage. 1 illustration. Bibliography: 1 title.

## CALCULATION OF ROCK PILLAR THICKNESS DURING CEMENTING

[Synopsis of article by E. Ya. Kipko, Yu. A. Polozov, Yu. N. Spichak and I. V. Muz-yukina, UGOL' UKRAINY No 10, 1982 pp 33-34]

[Text] Method for computing the thickness of a protective rock pillar that is left in the mine when analyzing horizontal excavation under complicated hydrogeological conditions, using preliminary cementing. 2 illustrations.

UDC 553.93:552.578.14(477.62):622.01

## ON METHANE PRESSURE IN COAL SEAMS AT GREAT DEPTHS

[Synopsis of article by I. F. Lysenko and N. M. Shchabel'skiy, UGOL' UKRAINY No 10, 1982 p 34]

[Text] Asymptotes of gas pressure in coal seams that are determined by means of KII-65 testing. Change of value of the gas's seam pressure with depth. 1 table. Bibliography: 1 title.

UDC 622.333.302:612.002.237

## QUALITY OF MINED COAL AND RECOMMENDATIONS FOR IMPROVING IT

[Synopsis of article by A. A. Krivchenko, A. I. Smirnov and N. V. Kuznetsov, UGOL' UKRAINY No 10, 1982 pp 35-36]

[Text] The dynamics of the quality of coal mined and shipped during the 10th Five-Year Plan, and an analysis of the causes of contamination with country rock. Results of introducing measures for improving the quality of coal mined in 1976-1980, and ways to reduce the ash content in succeeding years.

UDC 622.794.42

## ON PERMISSIBLE NONUNIFORMITIES IN DISTRIBUTION OF COAL IN DRIERS WITH FLUIDIZED BED

[Synopsis of article by Yu. A. Margolin and Yu. M. Rubin, UGOL' UKRAINY No 10, 1982 pp 36-37]

[Text] The prerequisites for transferring a layer of wet coal in a pseudofluidized state where there is nonuniform loading into a drying apparatus with a central feed. The parameter that characterizes inhomogeneity of the layer by height, and its critical values. The results of industrial tests of devices for distributing heat-carriers and materials. 1 table, 2 illustrations. Bibliography: 2 titles.

UDC 622.794.42:622.335

## STUDIES OF ANTHRACITE DUST REMOVAL IN AN APPARATUS WITH A FLUIDIZED BED

[Synopsis of article by G. V. Alekseyev, V. K. Irshko and I. A. Zaika, UGOL' UKRAINY No 10, 1982 pp 38-39]

[Text] The results of studies of the process of removing anthracite dust in an apparatus with a fluidized bed. The dust-removing installation at Kiselevskaya TsOF [Central Preparation Plant]. 2 tables, 4 illustrations.

## THE INFLUENCE OF DUST-SUPPRESSOR REACTANTS DURING FLOTATION ACTIVITY OF COAL

[Synopsis of article by V. L. Basenkova, Ye. V. Kopytovskaya, A. L. Antonova and I. B. Zubkova, UGOL' UKRAINY No 10, 1982 pp 40-41]

[Text] The influence of coal treatment in the dust-suppression process during flotation. The flotation activity of coal that has been treated with solutions of alkylsulfate with additives of carboxymethylcellulose and surfactants. 4 tables, 2 illustrations.

UDC 622.79

## HIGHLY CONCENTRATED THICKENING OF FLOTATION WASTES AT COAL PREPARATION PLANTS

[Synopsis of article by A. F. Kondratenko, Ye. V. Kharlova and I. D. Peychev, UGOL' UKRAINY No 10, 1982 pp 42-43]

[Text] Experience in thickening of coal-flotation wastes of various grades in S-10 thickeners at the Komendantskaya, Kal'miuskaya and Chumakovskaya TsOF's [Central Preparation Plants]. 1 table, 1 illustration.

COPYRIGHT: Izdatel'stvo "Tekhnika". "Ugol' Ukrainy" 1982

11409

CSO: 1822/141

## COAL

### SELECTED SYNOPSSES OF ARTICLES IN 'THE UKRAINE'S COAL', NOVEMBER 1982

Kiev UGOL' UKRAINY in Russian No 11, Nov 82 pp 47-48

#### 65TH ANNIVERSARY OF 'GREAT OCTOBER'

[Synopsis of editorial, UGOL' UKRAINY, No 11, 1982 pp 1-3]

[Text] The achievements of the Ukraine's miners and the tasks that face the coal industry.

UDC 622.867

#### ORGANIZATION AND DEVELOPMENT OF MINE-RESCUE SERVICE IN USSR

[Synopsis of article by M. N. Sudilovskiy, UGOL' UKRAINY No 11, 1982 pp 4-6]

[Text] Stages in the development of mine-rescue affairs in the USSR, and measures for further improving its development and intensification. 5 illustrations.

UDC 622.232 "Krasnoarmeyskugol'"  
[Krasnoarmeysk Coal Production Association]

#### MECHANIZATION OF OPERATIONS AT KRASNOARMEYSKUGOL' UNDERGROUND MINES

[Synopsis of article by A. F. Lotkov, UGOL' UKRAINY No 11, 1982 pp 7-10]

[Text] The association's experience in integrated mechanization. Technical and economic indicators. 2 illustrations.

UDC 622.232.83

#### 'KRT' TUNNELING COMBINE FOR HARD ROCKS

[Synopsis of article by V. D. Tikhorskiy, UGOL' UKRAINY No 11, 1982 p 10]

[Text] Tests of the KRT tunneling combine of Dongiprouglemash [Donetsk State Design Development and Experimental Institute for Coal Machinery] design at the Underground Mine imeni 25th CPSU Congress of Makeyevugol' [Makayevka Coal Production Association]. Improvements and test results. 1 illustration.

UDC 622.232.8.001.4

#### EXPERIENCE IN TRANSFERRING A LONGWALL MINING MACHINE THROUGH A CONNECTOR

[Synopsis of article by V. N. Churakov, UGOL' UKRAINY No 11, 1982 pp 11-12]

[Text] The results of operations conducted at the Komsomolets Donbass Underground Mine of Shakhterskantratsit [Shakhtersk Anthracite Production Association] to transfer a longwall miner through a connector. 2 illustrations.

UDC 622.26.001.8

#### TUNNELING BRIGADES AT THE BEZHANOVSKAYA UNDERGROUND COAL MINE

[Synopsis of article by G. K. Sobina, UGOL' UKRAINY No 11, 1982 p 12]

[Text] Brigades of a developmental operations section at an underground mine. Achievements and commitments.

UDC 622.268.13:622.831.3

#### CONDUCT OF WORKINGS IN UNLOADING ZONE AS A METHOD FOR PROTECTION THEREOF

[Synopsis of article by A. F. Lorzykh, Yu. V. Filonyuk and V. A. Tishchenko, UGOL' UKRAINY No 11, 1982 pp 13-14]

[Text] An analysis of expenditures connected with protecting and maintaining drifts at the Krasnyy Partizan Underground Mine of Sverdlovtratsit [Sverdlovsk Anthracite Production Association] as a function of operating depth. Substantiation of the method for protecting the drift at a depth greater than 600 meters where its use is repeated in the unloading zone with a continuous narrow pillar 3-5 meters wide left to the side of the excavated space. 2 illustrations.

UDC 622.274.016.342:622.272.031.54

#### STABILITY OF A FLOOR OF A VENTILATION DRIFT IN A STEEP SEAM'S FOOTWALL

[Synopsis of article by S. K. Strizhiboroda, B. I. Kuritsyn and R. I. Nozdrina. UGOL' UKRAINY No 11, 1982 pp 14-15]

[Text] Comparative data of underground mine observations on the dislocation of side rocks in the floor of ventilation drifts and the stability thereof under various laying conditions. 2 illustrations.

UDC 622.275(088.8)

#### CONTROL OF THE MINE MASS'S CONDITION

[Synopsis of article by K. K. Sofiyskiy and A. F. Papyrin, UGOL' UKRAINY No 11, 1982 pp 16-17]

[Text] The basic principles for controlling the deformation-stress condition of the gas-saturated material of a mine by the action thereon of elastic surface waves; the waves are created by vibrators. Bibliography: 1 title.

UDC 622.817.47

#### EFFECT OF ADVANCED TORPEDOING OF COUNTRY ROCK ON DEGASSING HOLE OPERATION

[Synopsis of article by I. Ye. Drobnov, O. S. Gershun and S. A. Turilin, UGOL' UKRAINY No 11, 1982 pp 17-18]

[Text] Results of experimental observations of degassing-hole operation in a torpedoing zone. Weakening the country rock is a promising means for controlling the gas emission at the excavation section. 2 illustrations. Bibliography: 2 titles.

UDC 622.33.013:685.5.002.237:677.657.1

#### PRODUCTION CONTROL AND ACCOUNTING

[Synopsis of article by Yu. P. Red'ko, UGOL' UKRAINY No 11, 1982 pp 18-19]

[Text] Status of the recording of expenditures for production and calculations of the breakdown of the prime costs for producing the coal. Recommendations for improving them. 1 illustration.



## SIMPLIFIED METHODOLOGY FOR DETERMINING COST OF PREPARATION AND UPKEEP OF WORKINGS

[Synopsis of article by F. E. Vershinin and N. A. Rangin, UGOL' UKRAINY No 11, 1982 p 20]

[Text] Simplified methodology for analyzing the cost of preparing and maintaining workings per 1 ton of reserves. The methodology permits the analytical formulas to be simplified considerably, while insuring the required calculating precision. 1 illustration.

UDC 622.23.05.002.612

## TECHNICAL LEVEL AND QUALITY OF COAL MACHINERY

[Synopsis of article by A. I. Petrakov and I. F. Ignatov, UGOL' UKRAINY No 11, 1982 pp 21-22]

[Text] Experience in work on preparing for and conducting certification of quality of articles for the products list of equipment that is the responsibility of Don-giprouglesh [Donetsk Design-Development and Experimental Institute for Coal Machinery].

UDC 622.235.754:622.26.031.22

## INDUSTRIAL TESTS OF EQUIPMENT FOR DIVIDING LONGWALLS AT EXTREMELY NARROW SEAMS

[Synopsis of article by V. L. Drozdov, A. I. Bil'deyenko and V. I. Poddubnyy, UGOL' UKRAINY No 11, 1982 pp 22-24]

[Text] The design and operating principle of an experimental cutting installation, and the results of tests at the Kholodnaya Balka sh/u [Underground Mining Administration]. 2 illustrations.

UDC 622.411.33.533.17.817.4

## VMTsG-7 FAN FOR METHANE DRAWOFF AND LOCAL VENTILATION

[Synopsis of article by B. V. Balinskiy, I. V. Bogatov, Yu. V. Preobrazhenskiy and G. A. Lichkov, UGOL' UKRAINY No 11, 1982 pp 24-26]

[Text] The design and results of tests in the Donets and Karaganda Coal Basins' underground mines of the new VMTsG-7 fan. The drawoff of methane-air mixes, and the ventilation of long, dead-end workings. 3 illustrations.

UDC 622.625.24

## DIESEL LOCOMOTIVES OF AN UNDERGROUND MINE'S SURFACE OPERATING COMPLEX

[Synopsis of article by N. T. Demchenko, V. A. Zadorozhnyy and I. N. Ostroumov, UGOL' UKRAINY No 11, 1982 p 28]

[Text] Design characteristics and test of the operation of diesel locomotives built on the basis of AM-8 electric locomotives and of diesel generators for general industrial application. Reduction of operating expenditures for the delivery of auxiliary freight and rise in the reliability of locomotive transport operation. 2 illustrations.

UDC 622.647.2-83 "2LB-120"

## TESTS OF SYSTEM FOR DYNAMIC BRAKING OF 2LB-120 INCLINED-DRIFT CONVEYOR

[Synopsis of article by K. P. Bocharov, B. S. Fal'kov and O. M. Zaretskiy, UGOL' UKRAINY No 11, 1982 pp 29-30]

[Text] System for braking the 2LB-120 conveyor and an experimental-computational method for determining actual parameters of the dynamic braking system. 2 illustrations.

## VIBRATION ACOUSTICS CHARACTERISTICS OF MINE LOCOMOTIVES

[Synopsis of article by S. Ye. Chigirinskiy, N. S. Ponomarev and Ya. A. Leyman, UGOL' UKRAINY No 11, 1982 pp 31-32]

[Text] The necessity for determining the vibration-acoustics characteristics of mine locomotives (the AM-8D electric locomotive, the 1D-8 diesel locomotive and the GR-4 inertia-type locomotive). Basic directions of work in the drive against noise and vibration on locomotives. 2 tables.

UDC 658.284:622.489

## COMBINING OF CHANNELS FOR SPARKPROOF REMOTE POWER SUPPLY AND REMOTE CONTROL

[Synopsis of article by V. B. Neyman and E. G. Kogan, UGOL' UKRAINY No 11, 1982 pp 32-33]

[Text] Results of studies of the effect of frequency signals during switching on of a thyristor, methodology for evaluating the effect of frequency signals during false operation of the assembly for spark protection for a source of remote power supply. 1 table, 3 illustrations.

UDC 622.67:621.313.13

## STANDBY POWER SUPPLY FOR DC ELECTRIC MOTORS FOR LIFTING FACILITIES

[Synopsis of article by V. R. Bezhok and A. L. Kosolapov, UGOL' UKRAINY No 11, 1982 pp 33-34]

[Text] Methods for supplying standby power for electric drives of high-capacity DC underground-mine lifting facilities. A mobile thyristor installation for standby power. Design and operating principles of the installation. 2 illustrations.

UDC 622.232.72

## INTRODUCTION OF CHAIN-FREE 'POLTRAK'-TYPE FEED SYSTEM ON POLISH-PRODUCED COAL-MINING CUTTER LOADERS

[Synopsis of article by V. Skochinski, A. Vlazhevich and Ya. Sedlyachek, UGOL' UKRAINY No 11, 1982 pp 35-37]

[Text] The chain-free mechanism of the POLTRAK feed and the effectiveness of its use. 1 table, 8 illustrations.

UDC 622.861:614.89

## ON A METHOD FOR DETERMINING THE SERVICE LIFE OF MINERS' COVERALLS

[Synopsis of article by V. O. Ovcharenko, UGOL' UKRAINY No 11, 1982 pp 38-39]

[Text] Methods for calculating standard service life for underground miners' coveralls made of textile fabrics that were developed on the basis of the use of some of the dynamics of the basic criteria for wear and methods of reliability theory, taking into account renovation and maintenance of the protective properties during the work process. Bibliography: 3 titles.

UDC 622.822.22:622.232

## ANALYSIS OF CAUSES OF SEASONAL FLUCTUATIONS IN METHANE EMISSION

[Synopsis of article by A. Ye. Gorbatenko, UGOL' UKRAINY No 11, 1982 pp 39-40]

[Text] Analysis of the effect of air-pressure fluctuations, changes in the depression of the natural draft and of air feed on seasonal fluctuations of methane

emission in underground mines. The dependence of methane emission upon changes in absolute atmospheric pressure. Recommendations on reporting changes in air pressure.

UDC 622.413.3.012.22:536.244.001"313"

COMPUTATION OF ESCAPE OF HEAT AND MOISTURE FROM MINE MASS BEING TRANSPORTED BY CONVEYOR IN A DEEP MINE

[Synopsis of article by A. M. Krivoruchko, UGOL' UKRAINY No 11, 1982 pp 40-41]

[Text] A numerical method for solving the problem of heat and mass exchange between the air and mined material that is being moved by conveyor in deep mines.

UDC (550.8:528.3):553.94.004.12.622.01

GEOMETRIZATION OF STATISTICAL INDICATORS OF COAL-FIELD PROPERTY PARAMETERS

[Synopsis of article by K. L. SEMENOV, UGOL' UKRAINY No 11, 1982 pp 41-43]

[Text] Method of research of coal fields during exploration by means of geometrization of statistical indicators of the parameters of various seam characteristics. 2 illustrations. Bibliography: 4 titles.

UDC 622.834.2

PARAMETERS FOR UNDERWORKING OF FACILITIES TO BE PROTECTED

[Synopsis of article by Ye. V. Belyayev, UGOL' UKRAINY No 11, 1982 pp 43-44]

[Text] Methodology for selection of a system for development and determination of the parameters of breakage-face working below surface facilities to be protected. 1 illustration. Bibliography: 1 title.

UDC 622.75/.76-52

CORRELATION FUNCTIONS AND EFFECTIVENESS OF SMALL COAL PARTICLE SEPARATION IN HYDROCYCLONES

[Synopsis of article by I. M. Aspis and M. N. Yampol'skiy, UKOL' UKRAINY No 11 1982 p 45]

[Text] A criterion suitable for evaluating the effectiveness of separating small coal particles in hydrocyclones. 1 illustration.

COPYRIGHT: Izdatel'stvo "Tekhnika". "Ugol' Ukrainy" 1982

11409

CSO: 1822/141

## COAL

### SELECTED SYNOPSSES OF ARTICLES IN 'THE UKRAINE'S COAL', DECEMBER 1982

Kiev UGOL' UKRAINY in Russian No 12, Dec 82 p 48

#### THE UKRAINE'S COAL INDUSTRY ON THE 60TH ANNIVERSARY OF THE FORMING OF THE USSR

[Synopsis of article by N. S. Surgay, UGOL' UKRAINY No 12, 1982 pp 1-5]

[Text] Results of the Ukraine's coal-industry operations, and achievements and tasks. Creative collaboration.

UDC 622.3:658.387.62

#### BREAKAGE-FACE WORKER BRIGADES ON THE 60TH ANNIVERSARY OF THE FORMING OF THE USSR

[Synopsis of article by A. P. Loza, N. I. Gontarev and P. I. Olefirov, UGOL' UKRAINY No 12, 1982 pp 5-7]

[Text] Commitments and fulfillment thereof by brigades at the Khartsyzskaya Underground Mine, the Underground Mine imeni Kiselev and the Protopopovskiy Strip Mine.

UDC 622.3.001.88:658.387.4

#### THE BRIGADE CONTRACT IN TUNNELING COLLECTIVES

[Synopsis of article by I. S. Sosulev and A. A. Krasnov, UGOL' UKRAINY No 12, 1982 pp 7-8]

[Text] Introduction of the brigade contract at the Underground Mine imeni Kalinin and the Pioneer Hydraulic Underground Mine. Commitments and fulfillment.

UDC 622.01:658.387

#### TRADITIONS OF THE STAKHANOVITE MOVEMENT DURING THE ANNIVERSARY YEAR OF THE USSR

[Synopsis of article by N. V. Primush, UGOL' UKRAINY No 12, 1982 pp 9-10]

[Text] A brief history of the development of the Stakhanovite movement. Socialist competition among the Ukraine's underground miners for a worthy greeting to the 60th anniversary of the forming of the USSR.

UDC 622.337.2 "Krasnoyarskugol'"

[Krasnoyarsk Coal Production Association]

#### THE KRASNOYARSKUGOL' PRODUCTION ASSOCIATION DURING THE 11TH FIVE-YEAR PLAN

[Synopsis of article by V. A. Gus'kov, UGOL' UKRAINY No 12, 1982 pp 11-13]

[Text] Conditions for mining coal underground and by open-cast methods. Achievements. 5 illustrations.

UDC 622.33 "Sredazugol'"  
[Central Asian Coal Production Association]

#### CENTRAL ASIA'S COAL PRODUCTION

[Synopsis of article by A. I. Leleko, UGOL' UKRAINY No 12, 1982 pp 13-14]

[Text] Development of Central Asia's coal industry. Peculiarities of the fields. Improvement of the technology and integrated mechanization of production processes. Prospects for development. 2 illustrations.

UDC 622.01:658.387 "Karagandugol'"  
[Karaganda Coal Production Association]

#### KARAGANDA'S MINERS ON THE 60TH ANNIVERSARY OF THE FORMING OF THE USSR

[Synopsis of article by F. S. Shnayderman, UGOL' UKRAINY No 12, 1982 pp 15-17]

[Text] Achievements of Karagandugol' Association miners. Socialist competition. Readiness of the miners' collectives to greet the holiday of the 60th anniversary of the forming of the USSR with new labor achievements. 5 illustrations.

UDC 622.337.2:622.011 "Estonslanets"  
[Estonian Shale Production Association]

#### ESTONSLANETS PRODUCTION ASSOCIATION DURING THE 11TH FIVE-YEAR PLAN

[Synopsis of article by Yu. V. Tambet, UGOL' UKRAINY No 12, 1982 pp 17-18]

[Text] Work indicators of Estonslanets during the 10th Five-Year Plan and the first 2 years of the 11th. Friendly ties of Estonia's miners with the workers of other Soviet republics. 2 illustrations.

UDC 622.273.23:622.063.46-118

#### ON UNMANNED CUTTING AND WORKING OF LONGWALLS AT STEEP THIN SEAMS

[Synopsis of article by V. N. Tkachenko and A. I. Kostenko, UGOL' UKRAINY No 12, 1982 pp 20-21]

[Text] Proposed method for unmanned cutting and working of steep seams 0.3-0.7 meters thick by means of the MRT-2 machine; advantages in comparison with known methods. 1 table, 2 illustrations. Bibliography: 1 title.

UDC 622.232:658.387.397

#### RECESS-FREE EXCAVATION OF COAL AT KUZBASS [KUZNETSK COAL BASIN] UNDERGROUND MINES

[Synopsis of article by A. M. Yermolayev and V. A. Skukin, UGOL' UKRAINY No 12, 1982 pp 21-22]

[Text] Experience in the use of means for reducing labor intensiveness of the work while excavating coal in recesses of breakage faces equipped with cutter loaders. Operating schemes without recesses. 1 table.

UDC 622.831.322

#### HYDRODYNAMIC ACTION ON MINE MASS WHERE ROOFS ARE DIFFICULT TO COLLAPSE

[Synopsis of article by V. A. Gromov, A. I. Bukhantsov and Z. F. Matyushina, UGOL' UKRAINY No 12, 1982 p 22]

[Text] Method for controlling roofs that are difficult to collapse, including drilling holes from the earth's surface down to the level of the seam's footwall,

preliminary hydraulic treatment of the roof and footwall, the detonation of VV [explosive] charges, and later hydraulic treatment conducted in a hydraulic dispersal regime.

UDC 622.031.5:622.831.325.2

ECONOMIC ASSESSMENT OF UTILIZATION EFFECTIVENESS OF ADVANCED UNDERWORKING OF GENTLY SLOPING SEAMS

[Synopsis of article by A. F. Bakhtin, Yu. K. Batmanov and I. A. Gaynutdinov, UGOL' UKRAINY No 12, 1982 pp 23-25]

[Text] Methodology and a mathematical-economics method for computing the utilization effectiveness of advanced underworking. 4 tables. Bibliography: 3 titles.

UDC 622.53:621.67-213.32.013

ECONOMIC VALIDATION OF SYSTEM FOR UNDERGROUND MINE-WATER DRAINAGE BY SUBMERGED PUMPS

[Synopsis of article by E. I. Antonov and I. P. Yemelina, UGOL' UKRAINY No 12, 1982 pp 25]

[Text] Results of a comparison of the traditional scheme for draining with submerged pump unit drainage systems (proposed by VNIIGM imeni Fedorova) that are placed in vertical self-washing drain sumps. 1 table.

UDC 622.673.7+622.678.525.078.2

UNSK-40 INSTALLATION FOR MOUNTING CABLES AND CONTAINERS

[Synopsis of article by V. I. Dvornikov, V. G. Morozov, N. V. Gontarev and Ye. I. Burda, UGOL' UKRAINY No 12, 1982 pp 26-27]

[Text] Requirements for equipment for mounting and changing cables and containers on multiple-cable lifting installations. The arrangement and operation of a test model of an UNSK-40 installation for mounting cables and containers on multiple-cable lifting machines with friction pulleys. 2 illustrations.

UDC 622.625.242.2

RESULTS OF UNDERGROUND MINE TESTS OF SELF-PROPELLED 1VS5 RAIL CAR

[Synopsis of article by Yu. M. Shenderovich, A. V. Safonov and V. D. Mel'nik, UGOL' UKRAINY No 12, 1982 pp 28-29]

[Text] Technical and operational merits of using self-propelled rail cars in underground mines, and the results of tests of an experimental model of the 1VS5 self-propelled rail car. 1 table, 2 illustrations.

UDC 621.313.13-213.34.019.3

INSURING HIGH RELIABILITY OF ELECTRICAL MACHINERY PROTECTED AGAINST EXPLOSIONS AND ELECTRICAL MINING MACHINERY

[Synopsis of article by I. G. Shirnin and V. D. Glavnyy, UGOL' UKRAINY No 12, 1982 pp 30-31]

[Text] Insuring high reliability of electrical machinery with purposeful planning of the required amount of work at all stages: operation of the prototype, design, preparation for production, and production and operation of the new development, using modern methods and means for research, design-development, manufacturing technology, methods for evaluating and monitoring reliability and the industrial operations, and the control of reliability.

## RESERVE FOR INCREASING OPERATING RELIABILITY OF 6-KVELECTRICAL EQUIPMENT PROTECTED AGAINST EXPLOSION

[Synopsis of article by A. M. Nosov, F. A. Aydarov and V. N. Savitskiy, UGOL' UKRAINY No 12, 1982 p 31]

[Text] One of the ways to raise operating reliability and increase the service life of 6-kV electrical equipment protected against explosion, which consists in supplying the underground network with protection from single-phase ground fault (ground leak). Recommendations. 1 illustration.

UDC 622.412.1

## DEVELOPMENT OF METHANE MEASURING SYSTEMS IN THE POLISH COAL INDUSTRY

[Synopsis of article by B. Firganek and V. Mironovich, UGOL' UKRAINY No 12, 1982 pp 32-35]

[Text] Principle of operation and a device for methane-measuring systems produced in the Polish People's Republic. 12 illustrations.

UDC 622.8:541.183

## AMOUNT OF ADSORBED MOISTURE IS AN INTEGRATED INDICATOR OF GAS-DYNAMICS STATE OF A COAL SEAM

[Synopsis of article by B. V. Pestryakov, UGOL' UKRAINY No 12, 1982 p 36]

[Text] Qualitative and quantitative effect of free and sorbed moisture on the mechanical properties and chemical nature of the inner hard surface of fossil coals. 2 illustrations.

UDC 622.831.322

## CONDITION OF THE COAL MASS CLOSE TO OUTBURST CAVITIES ON STEEP SEAMS

[Synopsis of article by Yu. T. Khorunzhiy, I. S. Fridman and A. P. Golovinskiy, UGOL' UKRAINY No 12, 1982 pp 37-38]

[Text] The results of research of the state of the coal mass in the vicinity of outburst cavities. 3 illustrations.

UDC 622.882:622.834.53

## METHODS FOR RECULTIVATING LAND IN THE NORTHERN DONBASS [DONETS COAL BASIN]

[Synopsis of article by A. S. Furta, I. M. Chernenko and A. F. Vasil'yev, UGOL' UKRAINY No 12, 1982 pp 38-39]

[Text] The recultivation of swamp lands that are formed as a result of coal-seam excavation, subsidence of the earth's surface, and the swamping over of hollows; and the recultivation of unsuitable lands by filling in gullies, ravines and spent quarries with waste rock and overburden. 1 illustration.

UDC 622.765:622.335

## FLOTATION OF ANTHRACITES

[Synopsis of article by Ye. Ye. Rozhnova and V. G. Pisarenko, UGOL' UKRAINY No 12, 1982 pp 40-41]

[Text] Results of studies of granulometric and fractional composition of anthracite slurries. The effect of type and expenditure of reactants and methods for batching and dilution of pulp based on anthracite-flotation indicators. Recommendations on optimal operating regimes for performing the process. 2 tables, 1 illustration.

COPYRIGHT: Izdatel'stvo "Tekhnika". "Ugol' Ukrainy" 1982

## COAL

### BRIEFS

MINING PLANS EXCEEDED--Miners of the Mine imeni XXVI S"yezd KPSS of the "Pavlogradugol'" Production Association brought 1.3 million tons of fuel to the surface last year. One-sixth of that was in excess of the plan. Competent use of equipment, utilization of progressive work procedures and high occupational proficiency permitted the friendly collective to complete its 1982 quota way ahead of schedule. The product sales program was exceeded by a little more than 4 million rubles, and labor productivity was 11 percent higher than required by the plan. [Text] [By S. Troyan] [Moscow IZVESTIYA in Russian 17 Jan 83 p 1] 11004

SHALE POWER--Erection of a magnetohydrodynamic facility with an output of 25,000 kw has begun at the Kokhtla-Yarveskaya TETS. For the first time in Soviet practice a plasma flow will be formed not by a gas but by particles of solid fuel--shale--burning at high temperature. The inventors of the system--scientists of the All-Union Power Engineering Institute imeni G. M. Krzhizhanovskiy--also plan to use this facility to test the suitability of coal from the Kansk-Achinsk, Kuznetsk and Ekibastuz basins for the magnetohydrodynamic process. Utilization of the magnetohydrodynamic principle--that is, direction conversion of thermal energy into electric energy--will make it possible to raise the power plant's efficiency from 40 to 50-80 percent. [Text] [Yerevan KOMMUNIST in Russian 14 Dec 82 p 2] 11004

NEW TUNNELING COMPLEX--A tunneling complex designed at the Alma-Ata Geological Machinery Repair Plant will accelerate the the tunneling of exploratory shafts by a time and a half. The first complex has been shipped to explorers of the mineral deposits of northern Kazakhstan. Recycling of metallic linings and props will make it possible to save dozens of cubic meters of timber each year. [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 24 Oct 82 p 1] 11004

EKIBASTUZ MINING FIGURES--Six excavator and 12 drilling brigades of the "Ekibastuzugol'" Association completed the quota for 2 years of the five-year plan ahead of schedule. They dedicated their achievement to the 60th anniversary of the USSR. One of the first to exceed the coal mining plan was R. Fetser's collective. Drillers led by L. Perechnev of the "Severnnyy" open pit are laboring ahead of schedule. Ekibastuz miners shipped 58 million tons of fuel to the electric power plant within 10 months. This is 2.3 million tons more than in the same period of last year. A hundred miner brigades are



participating in the competition for the highest labor productivity. Seventy-eight of them have reached the higher productivity standards. [Text]  
[Moscow EKONOMICHESKAYA GAZETA, in Russian No 49, Dec 82 p 19] 11004

COAL COMPACTED FOR SHIPMENT--A device designed by the "UkENIIProyekt" Institute is helping to prevent losses of coal concentrate shipped by rail. Before each gondola car leaves the "Krivorozhskaya" Concentration Factory in Voroshilovgrad Oblast, its contents are compacted. The machine unit works like a road roller. The device, which is secured to a frame, is brought into motion by an operator, leveling out and compacting the bulk material after it is poured in. Winds are no longer a problem to the fuel en route. This means a savings of up to 600 kg of concentrate per gondola car: This would be a good 10 trains of additional fuel per year from just the Krivorozhskaya Factory alone. Compacting has also made it possible to raise the effectiveness of the shipments: Now a gondola car can be loaded to its maximum capacity--70 tons, as opposed to 50. [By A. Kovalenko] [Text] [Kiev PRAVDA UKRAINY in Russian 15 Nov 82 p 4] 11004

"VORGASHORSKAYA" MINE--Experts have called "Vorgashorskaya-1" mine in the Pechora coal basin a model of modern mine building. "For the first time in practice"--it is with these words that their conclusion begins. The planned output capacity--4.5 million tons of coking coal per year--was assimilated almost a year and a half ahead of schedule. Now this mine is the largest enterprise not only in the basin but also in the European part of the country. Nineteen inventions and about 30 efficiency proposals were introduced in the course of this facility's planning and construction. The total economic impact is estimated in the millions of rubles. The average monthly coal mining output per worker is higher than at the "Raspadskaya" mine in the Kuznetsk Basin--the largest coal industry enterprise, and the mining cost is lower. The relative capital investments turned out to be better than planned as well. It will take less than 3 years to compensate for these investments. The USSR Council of Ministers awarded a prize for creating this facility to a group of specialists and workers representing the "Pechorshakhtostroy" Combine, the "Giproshakhta" Institute, the "Vorkutaugol'" Association, the "Mosbassshakhtostroy" Combine and a number of other organizations. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 48, Nov 82 p 17] 11004

"TULAUGOL'" PLAN SURPASSED--Miners of the "Tulaugol'" Association extracted their half-millionth ton of coal in excess of the plan ahead of schedule. This means they have satisfied their socialist pledges in honor of the 60th anniversary of the USSR's formation. This success was achieved owing to introduction of progressive equipment and procedures. In comparison with the plan, the labor productivity of the association's miners increased by 6 percent. [Text] [Moscow TRUD in Russian 4 Dec 82 p 1] 11004

"SARANSKAYA" MINE--The "Saranskaya" mine, Karaganda Oblast is working a month and a half ahead of schedule. It has brought its millionth ton of fuel to the surface since the beginning of the year. The plan has been surpassed by almost 60,000 tons. This substantial increment was achieved owing to accelerated repair of the mechanized complexes. [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 24 Oct 82 p 1] 11004

NEW MINE EXCAVATORS--Two high-power excavators are now being assembled for work at the new stopes of the Borodinskiy open pit of the Kansk-Achinsk fuel and power complex. These machines are the first produced by the "Krastyazhmash" Plant now under construction near Krasnoyarsk. The products of the future enterprises are high-productivity rotary complexes and walking and quarry excavators intended for presently operating enterprises of the Kansk-Achinsk fuel and power complex and those under construction. The young enterprise, collective has planned to manufacture six high-power excavators this year. Such is the concrete response of the Siberians to the decisions of the November (1982) Plenum of the CPSU Central Committee, which devoted special attention to developing the fuel and power complex, of which the Kansk-Achinsk fuel and power complex will become an important part. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Jan 83 p 2] 11004

KUSHEYAKOVSKOYE DEPOSIT OPERATIONAL--Fuel extraction has begun at the Kusheyakovskoye deposit. A large section of the "Nagornaya" mine of the "Gidrougol'" Association has been placed into operation at Novokuznetsk. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 5, Jan 83 p 3] 11004

DONETSK MINE IMENI KALININ--Miners of the stope of the Donetsk Mine imeni Kalinin headed by A. Fedosov, cavalier of the Order of the October Revolution, produced their first ton of coal in excess of the plan this year. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Jan 82 p 2] 11004

"NOVIKOVSKIY" OPEN PIT--Having extracted 20,500 tons of coal in excess of the plan, the collective of the "Novikovskiy" open pit on Sakhalin completed an important item of its annual pledges. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 47, Nov 82 p 8] 11004

NERYUNGRI COAL MINING PLANS--The zone contiguous with the Baikal-Amur Rail Trunkline is under intensive development. Special attention is being devoted to formation of the Southern Yakut Territorial-Production Complex. Its raw material base consists of huge coal deposits. Fuel is now being extracted at the Neryungri deposit. Construction of an open pit with an output of 13 million tons and of a concentration factory with a productivity of 9 million tons of coal per year is to be completed in the 11th Five-Year Plan. The Neryungrinskaya GRES is being erected not far away. Its planned output is to be 1,200 kw. The station will provide electric power to all of southern Yakut ASSR, and it will provide the city of Neryungri with heat and hot water. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 51, Dec 82 p 2] 11004

RAILROAD COAL LOSSES LOWERED--The collective of the "Karagandaugol'" Association exceeded its daily fuel shipment norm by 500 tons. This increment, which is equivalent to opening up a new high-output mine section, was credited to workers of the loading lines of the basin's rail station. A complex that applies a bitumen emulsion over cars filled with fuel has been placed into operation here. This complex will now be used to apply such a protective film over each rail car brought up on the spur. This will make it possible to keep hundreds of tons of coal from blowing away en route. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 7 Jan 82 p 1] 11004

"SHIRINSKAYA" MINE TAKES LEAD--Miners of "Shirinskaya" mine, "Novomoskovskugol'" Association were the first in the Podmoskovnyy Basin to complete their fuel extraction plan ahead of schedule in the competition dedicated to the 60th anniversary of the USSR's formation. Other mining collectives are also working toward the jubilee with good production achievements. Since the beginning of the year over 730,000 tons of coal have been shipped from the basin in excess of the quota. [by N. Makharinets] [text] [Moscow PRAVDA in Russian 15 Nov 82 p 7] 11004

ERP-2500 ROTARY EXCAVATOR--The ERP-2500 rotary excavator successfully passed integrated working trials at the "Borodinskiy" open pit. This means that the fleet of mining equipment belonging to the Kansk-Achinsk fuel and power complex has now been supplemented with a giant capable of loading up to 2,500 tons of coal per hour. The rotor was assembled by a top brigade led by A. Kryuchkov from the "Sibtekhmontazh" Trust. The excavator has been transferred to dependable hands. Machine operators A. Mayorov, N. Shchetinkin, L. Vozhenin and V. Koshman underwent their apprenticeship at open pits of the Ekibastuz Basin, where two such machines are already operating. [By V. Khrustalev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Jan 83 p 2] 11004

PERSONAL SERVICES FOR MINERS--Gorlovka miners can now take advantage of all kinds of personal services without leaving their enterprise. Now that an integrated personal services station has been opened at the "Kochegarka" mine, construction of a services network in the city on the territory of the coal enterprises has been completed. This was the result of a cooperative effort between trade union activists and personal services specialists. The schedule of personal services has been drawn up with a consideration for the production schedule. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 25 Jan 83 p 4] 11004

MINE IMENI FRUNZE--N. N. Skrypnik's brigade of the Mine imeni Frunze honorably completed a difficult examination deep in the mine. Today the miners surpassed the 1 million mark in this year's coal mining effort. This included 75,000 tons of coal in excess of the plan. This is now the 5th year that the brigade has produced a million tons. But this was perhaps the hardest year. In spring, one of the longwalls suddenly collapsed: It was as if the hard rock had been torn asunder, and with every step it took, the combine was buried by more rock. To make matters worse, a new longwall was not to go into operation until 3 months later. This is where the strength of the collective made itself known. The miners did everything they could to bypass the zone of collapse with minimum extraction losses. The joy of victory can be pleasant. Forming into a human chain extending from the subterranean shaft to a podium set up on the mine grounds, the miners carried a chunk of coal bearing the seven-digit number to the surface. B. T. Goncharenko, first secretary of the oblast party committee, spoke at a meeting held in the mine. [By A. Kovalenko] [Text] [Kiev PRAVDA UKRAINY in Russian 29 Dec 82 p 1] 11004

COAL MINING PLANS SURPASSED--Young miners of Donetsk Oblast are doing excellent work these days. Using the mining equipment with high productivity, they are surpassing their quotas and beating the timetable for fulfillment of the five-year plan. The collective of the Komsomol youth brigade led by N. Andrianov at the Gukovo Mine imeni 60-Letiye Leninskogo Komsomola has already been

credited with more than 24,000 tons of fuel in excess of the plan. The collective of F. Kiyanitsyn's Komsomol youth section of the "Zapadnaya" mine in Donetsk mined 22,500 tons of coal in excess of the plan. Brigades led by A. Belov, V. Romanenko, M. Tatarintsev and N. Fomin are working excellently in the competition between the miners' combines of "Rostovugol'" and "Gukovugol'." In 11 months of the present year the young miners of the Don surpassed the plan by 500,000 tons of anthracite. [by Yu. Maksimenko] [Text] [Moscow SELSKAYA ZHIZN' in Russian 18 Jan 83 p 1] 11004

NEW EKIBASTUZ OPEN PIT--A new open coal pit, the "Vostochnyy," is being prepared at a rapid pace in the Ekibastuz Basin of Pavlodar Oblast. Its productivity will be 30 million tons of high-energy fuel per year. Excavator crews of the "Ekibastuzshakhtostroy" Trust, which are loading the overlying rock into 27-ton "BelAZ" trucks, are increasing their work pace. The first generation of the "Vostochnyy," which will have an output capacity of 7.5 million tons of coal per year, is to be placed into operation as early as in 1984. [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 25 Jan 83 p 2] 11004

'TULAUGOL' ASSOCIATION--Miners of the "Tulaugol'" Production Association have decided to surpass the fuel extraction plan for the third year of the five-year plan by 100,000 tons. The collective of "Podlesnaya" mine is holding the lead in the competition for early fulfillment of this pledge. In January this leading collective has been exceeding its coal mining quota by 250-300 tons per day. This is the result of well organized preparation of the mine workings and efficient engineering support to the entire extraction process. The mechanics of the sections headed by V. Antonov, I. Vnukov and V. Ruban are taking good care of the mining machine units, they are using them proficiently, and they are systematically surpassing their shift quotas. [by N. Makharinets] [Text] [Moscow PRAVDA in Russian 18 Jan 83 p 1] 11004

MINE CENTRIFUGAL PUMPS--The collective of the local machine building plant in Yasnogorsk, Tula Oblast has begun producing high-power centrifugal pumps intended to remove water from the deepest underground workings. These articles significantly surpass existing Soviet models of similar equipment in terms of their basic technical parameters. Each such giant pump can pump 180 cubic meters of water to the surface per hour from the lowest horizon of a mine up to 900 meters deep. The plant in Yasnogorsk provide pumps, coal pumps, rock loaders, shaft parachutes and electric locomotives as well as other equipment to the country's mining enterprises. [by N. Makharinets] [Text] [Moscow PRAVDA in Russian 3 Feb 83 p 2] 11004

'TSENTRAL'NAYA' MINE--Ya. Storchevyy's mining brigade, one of the best of the "Antratsit" Association's "Tsentral'naya" mine has been working at a shock pace in January. Developing a thin seam, the miners have been raising 830 or more tons of fuel to the surface each day. Compare this with the daily quota of 690 tons. The brigade has decided to achieve the 1,000 ton mark some time soon. The labor productivity of the miners is continually increasing. The brigade is credited with about 3,000 tons of anthracite in excess of the plan. Other mining collectives of "Tsentral'naya" mine are also working ahead of schedule. As an example A. Chebatyuk's brigade extracted more than 1,000 tons of coal in excess of its program. [by V. Milhaylichenko] [Text] [Moscow SOTSIALSTICHESKAYA INDUSTRIYA in Russian 20 Jan 83 p 1] 11004

NEW PAVLOGRAD MINE--Mine No 21-22 of the "Pavlogradugol'" Association brought its first coal to the surface. The new enterprise is outfitted with top-class equipment, and it possesses an automated production control system. Its output capacity is 1.5 million tons of coal per year. Initially the mine was intended to open in late 1983. But the general planner, the "Dneprogiproshakht" Institute, worked with the "Dneproshakhtostroy" Combine to find ways to reduce the enterprise's construction time by a year. This was achieved owing to extensive installation of larger units prefabricated in parallel, and to other innovations. For the first time in the practice of building mines in the western Donets Basin all major drifts are reinforced with metal. This will exclude the need for sending over 10,000 tons of concrete down into the mine, and it will significantly reduce prop deformation. [by S. Akhmatov] [Text] [Kiev PRAVDA UKRAINY in Russian 29 Dec 82 p 1] 11004

MINE IMENI SVERDLOV--Miners of the Mine imeni Sverdlov of the "Sverdlovantratsit" Production Association warmly congratulated V. I. Lapay's brigade on its labor victory. The members of this leading collective fulfilled their annual plan ahead of schedule, and the coal they are now raising to the surface is being credited to the third year of the five-year plan. The miners are armed with a KM-88 mechanized complex. The daily load it handles has been increased to 1,400 tons, which is 200 tons more than standard. Since the beginning of the year the brigade has been credited with 80,000 tons of anthracite in excess of its plan. [by V. Mikhaylichenko] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Nov 82 p 1] 11004

STEAM CANNON CLEANS BOILERS--Scale formed on the surface of the boilers of heat and electric power stations has now become the target of a "steam cannon" designed at the Georgian SSR Polytechnical Institute. Within just minutes the shock of its stream, which has a force of up to 25 kilograms per square centimeter, disintegrates the strongest "armor" of scale. Moreover the steam, which breaks down into hydrogen and oxygen as it strikes the surface, promotes better combustion of fuel, as a result of which less smoke enters the atmosphere. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 25 Jan 83 p 2] 11004

CSO: 1822/184

## NUCLEAR POWER

### TURBOGENERATOR CONSTRUCTION AT LENINGRAD ELEKTROSILA

Moscow ENERGETIK in Russian No 2, Feb 83 pp 1-3

[Article by Candidate of Technical Sciences L. A. Drozdova, engineer  
A. M. Trofimov, Doctor of Technical Sciences G. M. Khutoretzkiy and engineer  
B. S. Yanik]

[Text] General trends of development. More than 60 percent of the turbo- and hydrogenerators is now delivered by the Leningrad Electric Machine Building Production Association for our country's power engineering. The association is producing serially, including export, 15 versions of turbogenerators of series TVF and TVV with unit output from 50 to 800 MW with direct hydrogen and hydrogen-water cooling.

Development of turbogenerators with output greater than 300 MW is related to significant difficulties and is a complex engineering problem. This is explained by the fact that an increase of unit output is achieved with an insignificant increase of overall dimensions, determined by the transport conditions and capabilities of the metallurgical industry, mainly by increasing the electric, thermal and mechanical loads. And this in turn results in an increase of the electrodynamic forces and thermal and mechanical stresses and to an increase of sensitivity to various types of operating deviations.

Practice showed that upon conversion from output of 300 to 500 MW or more a number of new design solutions must be provided. Turbogenerators with output of 500 and 800 MW were developed on the basis of these decisions during 1970-1971, a two-pole turbogenerator with output of 1,200 MW was produced in 1976 and a quadrupole turbogenerator with output of 1,000 MW for AES was produced in 1980.

The increase of turbogenerator output is achieved mainly by more intensive use of active materials. The laboriousness of manufacture per unit hour and specific consumption of materials are reduced in this case.

Simultaneously with an increase of outputs, there was an increase of the nominal voltage of the generator, which reached 24 kV in power generators. An increase of the thickness of the insulation, which worsens filling the stator grooves with copper and the increase of electromagnetic load, is required with a subsequent increase of voltage. One should expect only an insignificant increase of generator voltage in this regard with a further increase of output.

The current in the stator groove, which reached 27 kA in the turbogenerator with output of 1,000 MW, increases as the unit outputs of generators increase. Since, all things being equal, the electrodynamic forces acting on the stator winding bars increase sharply as the current in the groove increases, there is apparently a need to use windings with increased number of parallel turns with a further increase of generator outputs.

The efficiency of power turbogenerators reached 98.8-99.9 percent. A further increase of efficiency can be achieved only when using the effect of the superconductivity of metals at low temperatures.

The  $\cos \varphi$  of machines was increases as the unit output of turbogenerators was increased. Whereas  $\cos \varphi = 0.8$  in turbogenerators up to 100 MW and  $\cos \varphi = 0.85$  in generators of 150-500 MW, inclusively,  $\cos \varphi = 0.9$  in generators of 800-1,200 MW. This value is retained with a further increase of output.

As output increases, the short-circuited ratio of turbogenerators decreases and the synchronous and contact reactances increase, which generally worsens the conditions of parallel operation of generators in the energy system. However, the use of high-speed excitation and automatic power excitation control systems, introduction of electrohydraulic regulators of turbines and also an overall increase of the stability of modern energy systems permit a reduction of the negative effect of the indicated parameters. In this regard, one should expect an additional increase of the short-circuited ratio and an increase of the synchronous and contact reactances with a further increase of turbogenerator output.

Their sensitivity to deviations from the normal operating mode -- overloads and asymmetrical and asynchronous modes -- increases as the active volume of turbogenerators is used.

Twofold boosting of rotor current is employed in Soviet turbogenerators. The length of boosting is reduced from 20 to 15 seconds in turbogenerators with output of 800 MW and to 10-15 seconds in the turbogenerator with output of 1,200 MW as output increases. The length of boosting is limited by overheating of the copper and insulation due to the additional current during boosting. The length of boosting is subsequently reduced to 10 seconds.

A severe mode for power turbogenerators is operation at voltage different from nominal. Operation with stator current comprising no more than 0.95 of nominal current due to core heating is permissible with a 5 percent increase of voltage in Soviet turbogenerator construction, while stator current should not exceed 1.05 of nominal current when voltage is increased by 5 percent to avoid heating of the stator winding.

The requirement of tolerating sudden short circuits beyond the transformer is placed on modern turbogenerators; in this case connection of the turbine rotors and the generator should be calculated for short-circuiting on the generator leads. This requirement will apparently be maintained in the future. At the same time, inspection of the attachment of windings of active

steel and the coupling after short-circuiting and similar modes have occurred should be put into practice.

The thermal stability of turbogenerator rotors with output of 500-800 MW with brief operation in asymmetrical modes should be no less than 8 for effective norms and this criterion can be reduced to 4-5 in more powerful turbogenerators.

Cooling systems. An increase of the cooling efficiency of the stator winding in powerful turbogenerators was guaranteed by introducing direct water cooling. Series connection of the water for the two stator winding bars was used in turbogenerators with output up to 500 MW, while parallel cooling of all bars was employed in turbogenerators with output of 800 MW and above. The water flow rate in the hollow conductors is no more than 1.8 m/s. A further increase of the cooling efficiency of the stator winding can be achieved by increasing the number of hollow conductors (there are now two solid conductors to one hollow conductor) and by increasing the flow rate of the distillate to 2-2.5 m/s in them. A radial-tangential gas ventilation scheme is used in turbogenerators with output of 300-1,200 MW. The adopted ventilation scheme guarantees low level of heating of the core, which does not exceed 35-40°C. Thus, the radial-tangential gas cooling scheme can also be used for turbogenerators of greater output.

Flat cooling units placed between the core packets were used to cool the stator core in type TZV experimental turbogenerators with output of 60 and 800 MW with total water cooling. The cooling units have the shape of segments made of aluminum alloy, inside which is placed a coil of copper tubing through which the cooling water circulates. The use of this cooling of the core opens up new opportunities for future turbogenerators.

The magnetic flux scattering fields are increased significantly, especially in the end zones of the stator core, in power turbogenerators with regard to the increase of electric loads, which results in increased heating of these zones. This phenomenon is aggravated especially when the generators are operating at  $\cos \varphi = 1$  and in the underexcitation mode (capacitive mode), the need for which is now more and more dictated by the operating conditions of energy systems. Special attention is therefore being devoted in modern turbogenerators to improving the design of the end parts of the stator.

It is planned to implement a number of additional design measures such as the use of water cooling of locking rings, installation of magnetic shunts between the copper shields and the main core laminations, an increase of the taper of the end zone in the bore of the core to approximately the bottom of the groove at an angle of approximately 45° and intensification of cooling of the outer laminations using specially directed flow of the cooling gas to attenuate the stray fluxes in the end zone of the stator to ordinary measures which were used up to this time in all turbogenerators (the use of copper shielding, manufacture of locking rings and locking pins of nonmagnetic steel and introduction of splines in the teeth of the outside laminations). Bench tests of a turbogenerator with output of 1,000 MW in the quadrupole version, in which these supplementary measures were employed for the first time, showed high efficiency of them even in the absence of water cooling of the



locking rings. The excess of temperature was considerably lower (one-third to one-fourth as much) than in other turbogenerators of the same output and comprised approximately 26°C in the mode with nominal stator current. The use of these measures permits one to guarantee operation of generators with output of 1,000 MW and above in the underexcitation mode and with  $\cos \varphi = 1$ .

A multiflow gas cooling system with gas intake from the gap is used in the rotors of turbogenerators of LPEO Elektrosila [Leningrad Experimental Production Association Elektrosila]. Trapezoidal grooves are employed in the winding to reduce losses in turbogenerators with output of 500 MW and above. The cooling channels in the groove part of the rotor winding of turbogenerator of 800 MW and above are internal rather than open type on the lateral surface of the coils, as is the case in lower-output turbogenerators. Cooling of the front parts of the rotor coils has been considerably improved by using the multiflow cooling scheme.

A considerable increase of the rotor cooling efficiency was achieved by installing axial barriers in the gap, the operating efficiency of the intakes in the rotor blades is increased and the gas flow rate through the channels of the winding is increased. The excess temperature of the rotor winding of the turbogenerator with output of 800 MW was reduced from 76 to 32°C as a result of using this measure. The average excess temperature of the rotor winding comprises 35-38°C at nominal current in turbogenerators rated at 1,000 and 1,200 MW.

As indicated by calculations, when using the solutions adopted in turbogenerators rated at 800-1,200 MW, one can develop turbogenerator with output up to 1,600 MW at rotor rotational frequency of 3,000 rpm when hydrogen is used to cool the rotor. The output of turbogenerator with gas cooling of the rotor will apparently be increased to 2,000 MW at rotational frequency of 3,000 rpm upon introduction of additional improvements: an increase of the height of the axial barriers, improvement of the shape of intakes and an increase of the pressure drop at the inlet and output of the channels in the groove part of the rotor by arranging the inlet and output openings of the intakes on different diameters.

Further improvement of rotor windings will be related to the use of water cooling and of the phenomenon of superconductivity at low (cryogenic) temperatures.

Design features. The stator winding in power turbogenerators experience considerable variable-direction electrodynamic forces dependent on the current in the groove. The highest achieved value of current in the groove (26.7 kA) is in a turbogenerator rated at 1,000 MW (for example, the current in the groove is 10.2 kA in a turbogenerator rated at 300 MW). In this case the forces acting on the bar in the groove are 23 kgf per centimeter of length in the steady nominal mode and approximately 700 kgf per centimeter of length in the sudden short-circuited mode (these values comprise 40 and 440 kgf, respectively, in a turbogenerator rated at 300 MW).

These forces may create such significant displacements (vibration) of the winding that it may break down within a very short period without adoption of special measures while the generator will fail. The most serious attention by all turbogenerator-building enterprises is now being devoted to design of attachment of the stator winding of power turbogenerators.

A design for attaching the stator winding, which was developed in the early 1970's, is being used in the turbogenerators of our association. The basic idea of this design includes reduction of the winding displacements to a minimum, i.e., in achieving the maximum possible rigid attachment for this complex structure.

The bars in the groove part are attached by using setback wedges of strong fiberglass laminate and lateral packing of the gaskets of corrugated fiberglass laminate using gaskets of shaped thermosetting materials on the bottom of the groove and between the bars. Many years of experience of operating turbogenerators with output of 500 and 800 MW and the long service-life trials on a model with current of 27 kA in the groove showed reliable and stable operation of the developed design for attaching the winding in the groove and the capability of using it in high-power generators.

Mechanical fasteners using massive brackets, wedges, plates and rings tightened by pins are employed in the front parts of turbogenerators with output of 500-1,200 MW in addition to binders of self-shrinking lavsan cord.

Detailed vibrational tests of the front parts of windings, carried out on several turbogenerators with output of 500-1,200 MW, showed that a low level of vibration (with double amplitude not exceeding 50  $\mu$ m) is observed with this attachment. This permits application of the adopted fastener design to high-power generators as well.

The maximum possible overall dimensions of the rotor forging of a bipole turbogenerator have now been reached in the Soviet Union in a turbogenerator rated at 1,200 MW, the body diameter of which is equal to 1,250, the both length of which is equal to 8,000 mm, the total length of which is equal to 15,500 mm and the mass of the forging of which is equal to 105 tons. One can hardly expect production of forgings for bipole turbogenerators greater than 1,300 mm in diameter with body length greater than 8,500-9,500 mm within the next few years. A turbogenerator with output of approximately 2,000 MW, with rotational frequency of 3,000 rpm with high engineering and economic indicators of the traditional design version can be produced from this forging.

The rotor diameter of quadrupole turbogenerators is 1.4-1.5-fold greater than that of bipole turbogenerators. Under these conditions, the peripheral speed is 30-35 percent less than that in the bipole version of the rotor, which permits one to reduce somewhat the requirements on the mechanical characteristics of the forgings.

The greatest mass of the forging has now been reached for the quadrupole turbogenerator with output of 1,000 MW and comprises 155 tons with body diameter of 1,800 mm and length of 6,600 mm. This forging is made of three

parts by the welding-forged method. If it becomes possible in the future to produce a rotor forging with mass of 200-250 tons with high mechanical properties, then development of a quadrupole generator with output of 2,000-2,400 MW is possible. If the unit output of quadrupole turbogenerators must be increased to 3,000 MW or more, rotor forgings with mass of 300-330 tons are required.

Nonmagnetic austenitic steel with high mechanical properties--yield point of 105 kgf/mm<sup>2</sup>, strength of 110 kgf/mm<sup>2</sup> and elongation of 18 percent--is used for the band rings of rotors. Band rings of a material with yield point up to 130 kgf/mm<sup>2</sup> and relative elongation of approximately 16 percent are required to develop a bipole turbogenerator with output of 2,000 MW. The use of titanium alloys for the band rings is promising here. There is now some experience in operation of band rings made of titanium alloys in turbogenerators with output of 100 and 200 MW.

The yield point of the material of band rings of a quadrupole turbogenerator with output of 1,000 MW has been reduced to 75-80 kgf/mm<sup>2</sup> with regard to the lower linear velocity, and a value of 100 kgf/mm<sup>2</sup> may be sufficient in generators rated at 2,000-2,400 MW.

Further prospects for development. Soviet turbogenerators with output of 63-800 MW with rotational frequency of 3,000 rpm were developed during the period 1955-1970. Considerable success has been achieved, problems of vibration stability of generators as a whole and of their individual parts have been solved successfully and more improved structural assemblies, methods of monitoring, control and protection during operation have been developed during the past 20 years in turbogenerator building since the first machines with direct hydrogen cooling were developed.

It became necessary during the late 1970's to develop new turbogenerators with higher technical and economic indicators which could replace turbogenerators of all types produced at different plants from different design documentation and production technology. Thus, the task of developing a unified, standardized series of turbogenerators with output of 63, 110, 160, 220, 320, 500 and 800 MW was posed.

Introduction of a unified standardized series should guarantee total standardization of the configurations of electric power plants, improvement of the operating and maintenance conditions during repairs, interchangeability of equipment and centralized support with spare parts, improvement of design and production and cooperation in production of individual assemblies and parts and optimum loading of the plants.

The following investigations have now been conducted to develop a unified, standardized series of turbogenerators: the detail designs have now been developed for turbogenerators with output of 63, 110, 160, 320 and 500 MW, eight turbogenerators with output of 160 MW have been manufactured at LPEO Elektrosila, manufacture of a turbogenerator with output of 500 MW has begun, production of a turbogenerator with output of 63 MW has been organized at the Lysva Turbogenerator Plant and manufacture of a turbogenerator rated at 110 MW

has begun at the Novosibirsk PEO [Experimental Production Association] Sibelektrotiyazhmash. Delivery of a turbogenerator with output of 500 MW of the unified series is planned in 1983 for the Ekibastuz GRES-2.

The main technical and economical indicators (efficiency, consumption of materials, mass, overall dimensions and so on) of turbogenerators of the unified series are higher than those of presently existing turbogenerators, which yields a definite saving in the national economy. For example, the use of materials increased by 27 percent for a turbogenerator with output of 320 MW.

Reliability indicators have been improved considerably: operational readiness has been increased from 99.0 to 99.5 percent, the mean cycles between failures has been increased from 12,000 to 18,000 hours and service life has been increased to 30 years.

A great deal of attention has been devoted to improving the operating characteristics of turbogenerators of the unified series--the maneuvering characteristics have been improved, the number of startups and shutdowns have been increased from 120 to 332 per year, the operating range in underexcitation modes has been expanded significantly and the period between overhaul has been increased from 3 to 5 years.

The Soviet Union's first quadrupole turbogenerator with output of 1,000 MW was manufactured in 1980. The turbogenerator passed bench trials and is now being assembled at the Southern Ukraine AES. The bench trials confirmed the high technical indicators, the especially low temperature of the excitation winding and of the end zones of the stator core and the good vibrational stability. Turbogenerators of the same type are now being manufactured for the Kalinin, Southern Ukrainian and Zaporozhe AES and manufacture of them will subsequently be expanded.

Bipole turbogenerators (at 3,000 rpm) with output of 1,000 MW will be developed for AES during the 11th and subsequent five-year plans. A design of a turbogenerator of this type was developed in 1981 on the basis of subsequent advances of turbogenerator building and its technical and economic indicators will correspond to the highest requirements. Manufacture of this turbogenerator is planned in 1983 for the Rovno AES.

COPYRIGHT: Energoatomizdat, "Energetik", 1983

6521

CSO: 1822/181

## IMPROVING CONDITIONS FOR NIGHT MINIMUM POWER LOADS

Moscow ENERGETIK in Russian No 2, Feb 83 pp 4-6

[Article by Candidate of Technical Sciences V. S. Sharygin and engineer S. A. Pletnev, Northwestern Department of All-Union State Planning, Surveying and Scientific Research Institute of Power Systems and Electric Power Networks]

[Text] An extensive reduction of the nighttime load, the minimum of which comprises an average of approximately 65 percent with respect to the maximum, reaching 57-60 percent in some energy systems, is typical as a result of the established structure of electric consumption for most electric energy systems (EES) in the European USSR (with the exception of the Urals OES [combined energy system]).

Basic energy equipment--unit-type KES [condensation electric power plant] and TETs--occupies a high specific weight in the indicated energy systems, while nuclear power plants should achieve the maximum possible development in the future, according to conditions of the country's optimum fuel and energy balance. In this case the scales of introduction of AES will depend on the whole on the dimensions of the basic load available to them in the EES, with regard to which the effectiveness of different measures that contribute to an increase of the fraction of AES and energy systems by "freeing" the base load, will increase significantly in the future in this regard.

The presently used measures--operation of KES units at the technical minimum load, nighttime relief of TETs according to their heat consumption schedule--will yield a limited saving. Therefore, development and recruitment of other possible resources are required, which may include nighttime shutdown of units, extending the relief of TETs by installation and use of ROU [not further identified] at them, disassembly of obsolescent unit equipment of KES (with a corresponding reduction of the participation and making up for the nighttime load of the EES), achievement of nighttime regime overcurrents of power from energy systems with primary use of AES in the country's eastern energy systems, where atomic energy will force out more expensive energy of fuel-powered KES at night and, finally, filling the nighttime load gaps of EES with different specialized users, for example, by storage-battery heat supply systems (using GAES and regulator-users for this which also affect the conditions for making up the maximum load of EES, is not considered in this article with regard to the related features).

The article is devoted to determining conservation of expenditures at EES (system efficiency) of the indicated measures, with regard to which the problem of the feasibility and scales of their use is being solved. A specific saving of expenditures at EES may be an estimate of the maximum permissible in-house expenditures to implement the considered measures.

All these measures not only improve the conditions for covering the nighttime minimum load, but they also have a significant effect on the structure of the generating capacities and conditions of the EES as a whole. Therefore, the postulated problem can be solved only on the basis of calculations of optimization and investigation of the structure of the EES.

These investigations were carried out by using an economic mathematical model for optimization of the structure of EES on the basis of available design data for the indicated energy systems of the European YeES [unified energy system] of the USSR for a future period of 10-15 years. Specific indicators (per kilowatt of output) that characterize the related changes in the structure and consumption of various types of fuel at EES were determined by comparing the derived optimum versions for development of the EES with and without implementation of the given measure.

Taking the ambiguity of the input data, objectively existing for the future, during the indicated investigations into account, the effect of it on the system efficiency of the enumerated measures was analyzed. The analysis showed that some factors (the level of maneuverability of AES and TETs, the type of fuel on which the plants to be disassembled operate and so on) have a specific effect on it, which makes a differentiated approach to determination of the variation of the structure and conditions of EES necessary when implementing various measures. The ambiguity of data about the specific cost of newly introduced power plants and the closing expenditures for fuel is less significantly reflected. This permits one to average the indicators obtained for the possible range of variation of the indicated input data that characterize the variation of the structure and consumption of fuel in the EES upon implementation of one or another measure.

The indicated averaged values are taken as generalized indicators, on the basis of which it is rather simple (without laborious calculations of optimization of the EES structure) to determine with accuracy acceptable for the future the saving of expenditures at EES due to implementation of a given measure for possible combinations of input data according to conditions of development of the EES.

The saving of expenditures in the EES using generalized indicators is determined on the basis of the following expressions--separately for the constant ( $Z^m$ ) and fuel ( $Z^t$ ) component of expenditures, rubles/kW per year:

$$Z^m = \sum K_i^{ya} (E_{ia} + U_i^{\text{noct}}) K_i^{\text{om}} \alpha_i; \quad (1)$$

$$Z^t = \sum \Delta b_{\theta} a_{\theta}^t. \quad (2)$$

where  $K_i^{ud}$  and  $U_i^{post}$  are the specific capital investments and permanent operating expenses (in percent of  $K_i^{ud}$ ) of various types of power plants (i), variation of the structure of which is affected by the given measure,  $K_i^{om}$  is a coefficient that takes into account immobilization of expenditures during the period of constructing power plants (usually in the range from 1.0 to 1.1),  $\alpha_i$  is the specific variation of the output of various types of electric power plants,  $\Delta b$  is the specific conservation of consumption of various types of fuel and  $a_\theta$  is the closing expenditures for the  $\theta$ -th of fuel.

The suggested generalized indicators, besides determination of the conservation of systems expenditures, can also be used to estimate the effect of implementation of one or another of the considered measures on the structure of the EES.

The derived generalized indicators of variation of the structure and fuel consumption in the EES upon implementation of various measures are presented in Table 1. Because of the significant effect of conditions that characterize the maneuverability of basic energy equipment on them, the indicated generalized indicators were worked out for possible versions of conditions without relief of AES and with relief of TETs only according to a natural nighttime reduction of the heat consumption schedule, with an average 15 percent relief of AES put into service after 1985 and with an additional 15 percent relief of TETs above the natural reduction of their load by using ROU (the given version is arbitrarily called "With relief of TETs," and with operation on the heat schedule--"Without relief of TETs") and with relief of AES and TETs (the maneuverability of basic KES in all the versions is taken according to existing norms (without nighttime shutdown of the energy units)).

In this regard, the measures should be substantiated either for specific conditions for equipment maneuverability established for the considered future or (in case of their ambiguity) on the basis of using the decision-making criterion under conditions of ambiguity. Since the indicators of the version to be replaced for nighttime users of energy are considerably dependent on the degree of filling the nighttime load gap, they were determined on the condition of introducing hydraulic accumulator power plants in the energy system (at approximately 5 percent of the output of the system) and without GAES. The annual number of hours of using the output of the night consumer was taken as 2,000-2,200 hours.

As can be seen from the data presented in Table 1, failure to implement the considered measures results in a significant reduction of the introduction of AES output in EES (it has a "minus" sign in the version to be replaced), which is compensated for by a corresponding introduction of output of semipeak power plants operating on fossil fuel.

Thus, the systems effectiveness of the considered measures is largely determined by the positive effect which they have on making the structure of the generating capacities of EES more efficient and the related conservation of fossil fuel.

The specific expenditures of the version of considered measures to be replaced are also presented in Table 1. The indicated expenditures were determined on

Table 1

Conditions for development of energy systems	Variation of structure of measure per kW of output		Variation of conventional fuel consumption per kW of output and generation of electric energy of AES (104 kW·hr/kw)			Annual expenditures for version to be replaced, rubles/kw	
	AES	Semipeak KES (PGU)	Basic GAES	Coal	Gas- mazut fuel	Generation of energy by AES	with "in- expensive fuel
Reduction of nighttime minimum load of KES units (by shutting them down)							
With relief of AES and TETs	-0.21	0.20	-	0.48	0.36	-	15.02
With relief of AES	-0.35	-	-0.06	0.36	0.29	-	20.11
Relief of TETs (by use of ROU)							
Without relief of AES	-1.15	1.11	-	0.01	2.09	0.16	-4.94
With relief of AES	-1.04	1.01	-	0.01	2.29	-0.07	-2.42
Disassembly of energy equipment							
With relief of AES upon disassembly of KES:							
gas-mazut	-1.00	-	-	-0.30	-	1.96	-30.19
coal	-1.14	-	-	-0.02	2.72	0.34	-40.13
Nighttime overflows of power							
Without relief of AES and TETs	-1.09	1.00	-	0.06	2.14	0.11	-0.41
With relief of TETs	-1.11	1.13	-	-0.04	2.32	-0.02	-0.48
of AES	-0.76	0.81	-	-0.06	1.60	0.12	1.39
Increase of nighttime load							
With relief of AES:							
without GAES	-0.59	-0.58	-	-	0.79	0.09	-14.42
with GAES	-1.18	1.16	-	-	1.69	0.15	-19.80



the basis of available planning concepts on the technical and economic indicators of the power plants to be replaced at two levels of closing expenditures for fuel (Table 2).

Table 2

Version	Closing expenditures for conventional fuel, rubles/ton		
	coal	gas-mazut fuel	gas turbine fuel
"Inexpensive" fuel	32	39	45
"Expensive" fuel	47	52	58

One can judge the systems effectiveness of the given measure by the extent of expenditures for the version to be replaced: a "minus" sign denotes overconsumption while a "plus" sign denotes a saving of expenditures in the EES.

A reduction of the nighttime minimum load of KES units, easing of TETs and transfer of nighttime power surpluses to the energy systems of the eastern regions of the European USSR (to the Ural OES) yield a considerable saving of expenditures, especially with "expensive" fuel.

For example, there is no doubt of the effectiveness of the latter measure since implementation of it by the existing intersystem links, besides compensating for the energy losses that comprise 2-3 rubles/kW per year, requires no additional expenditures in the system at all. Moreover, the saving achieved from this under specific conditions could substantiate a further strengthening of intersystem links. Thus, these expenditures are estimated at 7-10 rubles/kW annually, whereas the saving in the EES (with regard to compensation for losses) reaches 22-30 rubles/kW annually.

An increase of the nighttime load of the EES in most of the considered cases requires some additional expenditures in the system. However, if they are compared to the expenditures which were to be required for supplying electricity to a given customer during nighttime operation rather than during peak hours (these expenditures comprise 40-45 rubles/kW annually), it is obvious that conversion of the peak load to the hours of the nighttime gap yields a saving from 25 to 50 rubles/kW annually, depending on initial conditions.

Replacement of the dismantled worn-out energy equipment does not result in a saving of expenditures in the EES, but it is considerably less expensive upon appropriate accounting for all the structural and regime changes in the energy system than on the basis of the usually employed estimate of expenditures for the basic and semipeak electric power plants operating on fossil fuels to be replaced, which comprise from 85 to 110 rubles/kW per year, depending on the cost of fuel.

The proposed method and the generalized indicators of the versions to be replaced for development of the EES permit one to determine rather simply

(without complex calculations of optimization of their structure) the system effectiveness of various measures that improve the conditions of passage through the nighttime minimum load of energy systems and to determine on this basis the economic feasibility and efficient scales of implementing the indicated measures.

COPYRIGHT: Energoatomizdat, "Energetik", 1983

6521

CSO: 1822/181

END