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# USSR Report

## ENERGY

No. 134



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# USSR REPORT

# ENERGY

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ENERGY CONSERVATION



GENERAL

UDC: 622.332:622.272.8

# CONSTRUCTION OF LOW CAPACITY MINES QUESTIONED

Kiev UGOL' UKRAINY in Russian No 9, Sep 82 pp 41-42

[Article, published under the heading "Design and Mine Construction," by engineers L. G. Avramenko and I. F. Sliz'ko, Vatutinskoye Mine Administration: "On the Advisability of Building Small-Capacity Mines on Lignite Deposits"]

[Text] The Vatutinskoye Mine Administration of the Aleksandriyaugol' Association produces more than 1.1 million tons of coal each year, 500,000 tons of briquettes, and generates 73 million kilowatt hours of electric power. The underground mines and the strip mine operated by the mine administration are working a horizontally-bedded (dip angle 0-6°) seam of brown coal 1.85-7.3 meters in thickness. The seam is immediately overlain primarily by fine-grained sand, and to a lesser extent by marl and by coal clay; the soil consists of inequigranular wet sands of varying thickness, and in places primary kaolin. The shaft mines are hazardous in regard to potential coal dust explosion and coal spontaneous combustion. The principal customers for the brown coal are the Yurkovskaya Briquette Factory and a heat and electric power plant which burns pulverized coal, which means it can use a low-grade fuel with high ash ($A^c$=35 percent) and moisture ($W^p$=52 percent) content. As a result of mines being shut down, delays in new enterprises coming on-stream, little growth in mining production capacity and the extended timetables required by new mines to reach planned production capacity (the Novomirgorodskaya, for example), coal production volume is declining in the Dnieper brown coal basin. In the 10th Five-Year Plan there was a coal production shortage for the Vatutino brown coal complex. The fuel shortfall was partially made up for with peat (200,000 tons per year) and coal from other enterprises. The situation is due to reorganization of the administration at the middle level and to inadequate attention to replacement of coal production capacity. In connection with this it became necessary to work deposits with small coal reserves (0.8-1.8 million tons).

In 1977, considering the commercial-quantity reserves (1.81 million tons) of the Bogachevskaya deposit, the Bogachevskaya Experimental Mine was designed and built, with a designed output of 200,000 tons per year. Total estimated cost of construction of this enterprise is 1.498 million rubles, with specific capital investment (per ton of designed output capacity) 7.48 rubles. The Bogachevskaya Mine, with an annual output capacity of 300,000 tons, is presently working a seam of brown coal 2.7-7.3 meters thick at a depth of 50-70 meters; the soil and top of the seam are undulating. The mine area is

| | 1. Показатели | 2. Шахта „Богачевская" | | | | 3. Шахта „Казацкая" | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1978 | 1979 | 1980 | 1981 | 1978 | 1979 | 1980 | 1981 |
| 4. | Добыча, тыс. т . . . . . | 310/308 | 310/336,5 | 310/382,2 | 350/368 | 600/591,2 | 610/625,7 | 480/381 | 480/494 |
| 5. | В т. ч. механизированными комплексами, тыс. т . . . . | 265/259.2 | 286/311,1 | 281/340,3 | 324/335 | 530/540,8 | 412/422,3 | 431/327 | 445/443,6 |
| 6. | Объем проведения подготозительных выработок на 1000 т. м | 16.3/19,5 | 7,7/8,8 | 11,6/12,2 | 9.8/11,6 | 12,8/13,2 | 13,3/13,8 | 13,5/15,7 | 12,1/12,7 |
| 7. | В т. ч. вскрывающих и подготавливающих, м . . . . . | 15/17,2 | 6.8/7,7 | 11,1/8,9 | 8,9/10 | 11,5/11,9 | 12,1/12,3 | 12,3/12.3 | 11,2/11,4 |
| 8. | Месячная производительность труда рабочих, т . . . . . | 87.9/93.7 | 90/95.7 | 96/107,2 | 99,9/100.7 | 65.8/65 | 58.6/57,2 | 45.8/32,8 | 45/44.4 |
| 9. | Суточная нагрузка на очистной забой, т . . . . . | 871/936 | 659/763 | 551/639 | 704/662 | 607/610 | 544/524 | 529/424 | 545/545 |
| 10. | Себестоимость 1 т угля, руб. | 7.31/7.41 | 7,25/6,49 | 7.11/6,56 | 6,78/6,88 | 10,65/10.91 | 12,99/13,11 | 15,73/19,88 | 16.04/16.33 |

(*) Примечание. Проектная годовая мощность шахты «Казацкая» 600 тыс. т угля, полная сметная стоимость строительства 13 млн. руб., удельные капиталовложения (на 1 т проектной мощности) 2 16 р. В числителе — плановые показатели, в знаменателе — фактические.

Key:

1. Indicators
2. Bogachevskaya Mine
3. Kazatskaya Mine
4. Production, thousand tons
5. Of that, by mechanized systems; thousands of tons
6. Volume of development excavation per thousand tons, meters
7. Of that, stripping and development, meters
8. Monthly worker labor productivity, tons
9. Daily work load per working face, tons
10. Production cost per ton of coal, rubles

Note: (*) Designed annual production capacity of the Kazatskaya Mine is 600,000 tons of coal, full estimated construction cost 13 million rubles, specific capital investment (per ton of designed production capacity) 2.6 rubles. The numerator contains planned indices, and the denominator -- actual figures.

reached by an inclined main shaft and a vertical ventilation shaft. The main shaft (100 meters in length, clear cross sectional area 9.2 $m^2$) passes through bedrock at an angle of 16°, is reinforced by arches of SVP-22 special structural sections, is equipped with a KLA-250 conveyer and 600 mm gauge tracks. The ventilation shaft (clear cross sectional area 4.91 $m^2$) is lined with annular reinforced concrete supports with built-in running section. The seam has a tendency to spontaneous combustion, is carbon dioxide hazardous, and the coal dust is dangerously explosive.

The mine working system involves long pillars, working from the edges of the mine area toward the shaft. The coal is mined by hydraulically-operated POKP systems with KSh-1KG continuous miners, with roof collapsed behind the shields. Preparatory working is handled by PK-3r and KBU-3a combines. The mine has a forced-air central ventilation system. The central water drainage system employs three TsNS-180 pumps. Inflow of subterranean water into the mine workings runs 120 $m^3/h$. Battery-powered 4.5ARP-2m electric locomotives are employed for haulage in the mine. Coal is moved by conveyer from the coal face to loading stations on the surface. The surface facilities consist of buildings and structures required for normal enterprise operations, are convenient to operate and comparatively inexpensive. It is evident from the table that specific capital investment at the Bogachevskaya Mine is one third that at the Kazatskaya Mine, while labor productivity is higher by a factor of 2.2, and coal production cost is 43 percent that of the Kazatskaya Mine. These mines operate in identical mining-geologic conditions.

A specific feature of the Dnieper brown coal basin is the limited nature of coal reserves, deposits of which occur in separate lenses of complex configuration. Enterprise production life is 8-15 years, and therefore it makes sense to build new underground and strip mines in place of petering-out mines in order to achieve continuous and systematic replacement of production capacity. The occurring coal deficit for the Vatutino complex can be made up by stripping and developing sections at existing enterprises, as well as construction of underground and strip mines at enterprises with small commercially-extractable reserves.

CONCLUSIONS [in boldface]. In the conditions of the Dnieper brown coal basin, in order to make up for declining coal production figures it is economically advisable to build small-capacity mines (200-300 thousand tons) on deposits with commercially-recoverable reserves of 0.8-1.8 million tons. Coal-production facilities shutting down due to exhaustion can be replaced by exploiting the Novoukrainskoye, Ryzhanovskoye, and Mokrokaligorskoye deposits. It is essential to speed up work on a detailed survey and confirmation of coal reserves at the promising Zhuravskoye and Novoselkovskoye deposits (Cherkassy Oblast).



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CSO: 1822/85

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Kiev UGOL' UKRAINY in Russian No 9, Sep 82 pp 47-48

UDC: 622.333 (477) "Gukovugol'"
Chernyshkov, L. N., "Gukovugol' Production Association in the 11th Five-Year Plan," UGOL' UKRAINY, No 9, 1982, pp 2-5.
Achievements of the miners of the Gukovugol' Association in the 11th Five-Year Plan. Measures to improve mining operations and to mechanize production processes. Factors deterring an increase in the pace of mechanization of production and development operations.

UDC: 622.01:658.387 "sh. im. Frunze"
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Mining-geologic conditions in which the brigade of N. N. Skrypnik works at the Mine imeni Frunze of the Roven'kiantratsit Association. Organization of work in this brigade and distribution of duties among its members.

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Results of in-mine studies of the K1MKS scraper-loader system with 1MKSR mechanized two-stage adjustable resistance roof bolting. Two tables, three illustrations.

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UDC: 622.15.002.612 "TsOF Kiyevskaya"
Cherepkova, M. M., "Top-Grade Product," UGOL' UKRAINY, No 9, 1982, pp 15-17.
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Borisov, A. A.; Mokryy, G. V.; and Shirokov, Yu. D., "Adjustment and Monitoring of Pressureless Mine Hydraulic Transport," UGOL' UKRAINY, No 9, 1982, pp 29-30.
Method and system of distributed monitoring and optimization of pressureless hydraulic transport employing models making possible its continuous optimal operation in the hydraulic mine. Two illustrations.

UDC: 622.647.1-408.64
Simonov, V. A., and Galkin, N. A., "Determination of Geometric Parameters of the Tractive Element of an SPTs-91 Conveyer by the Graph-Analytic Method," UGOL' Ukrainy, No 9, 1982, pp 30-31.
Results of a theoretical study to determine change in haulage chain link pitch in an SPTs-91 coal face conveyer as a consequence of transverse twisting in transition units. Graphs of the relationship between change in chain pitch and magnitude of angle of relative twisting of adjacent links. Two illustrations.

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Bobokhidze, A. S., and Gol'dbaum, M. I., "Investigation of Centrifugal Brake Governor Thyristor Electric Drives," UGOL' UKRAINY, No 9, 1982, page 31.
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Concise analysis of methods of combating sudden coal and gas blowouts, new high-energy method employing electrohydraulic effect. Unit for relieving and degassing blow-out hazardous coal seams. One illustration.

UDC: 622.831
Shatilov, V. A.: Kulemin, V. Ye.; and Chechel', A. S., "Features of Gas-Dynamical Phenomena in Working Blowout-Hazardous Seams," UGOL' UKRAINY, No 9, 1982, pp 35-36.
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Relationship between bridge flocculation of coal flotation waste products and characteristics of the solid and liquid phases of condensable suspensions. Employment of polymeric flocculants for flocculation of flotation waste materials. Two tables.

UDC: 622.332:622.272.8
Avramenko, L. G., and Sliz'ko, I. F., "On the Advisability of Building Small-Capacity Mines on Lignite Deposits," UGOL' UKRAINY, No 9, 1982, pp 41-42.
Ways to make up the coal production shortfall in conditions of the Dnieper brown coal basin. One table.

UDC: [622.815:550.853]"313"
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Analysis of existing methods of forecasting the blowout danger of seams on the basis of geological survey data, for the purpose of substantiation of a better method. Forecasting by several methods in relation to requirements on the forecast. One table.

UDC: 622.222.6

Ovchinnikov, V. F.; Voldayev, Yu. I.; and Palant, G. Ya., "Role of Cage and Skip Shafts in Development of Donbass Mines," UGOL' Ukrainy, No 9, 1982, pp 43-44.

Advanced versions of main and auxiliary shafts with functions ensuring stable mine development. One illustration.



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## SUPPLY, CONSTRUCTION PROBLEMS AT ROSTOV NUCLEAR POWER PLANT VIEWED

Moscow MATERIAL'NO-TEKHNICHESKOYE SNABZHENIYE in Russian No 9, 1982 pp 39-41

[Article by Ye. Seliverstov from Rostov-na-Donu: "Departmental Barriers and Irrational Substitutions"]

> [Text] Among the nuclear power plants being built in the European USSR, a prominent place is held by the Rostov AES. Its importance is hard to overestimate. This nuclear giant is rising next to the Atommash [Nuclear Machine Building] Plant, the pioneer of Soviet nuclear power building. The plant will provide cheap electric power to hundreds of towns, villages, plants and factories, kolkhozes and sovkhozes of the Don and Northern Caucasus. It will significantly strengthen the amount of electric power available to them and will help in further increasing production efficiency.

The Rostov AES is being built by Volgodonskenergostroy [?Volga-Don Power Construction] Trust. The construction workers, having initiated a socialist competition under the motto "We Will Build on Time and We Will Reach Capacity Ahead of Time" (this competition was highly praised by the General Secretary of the CPSU Central Committee and Chairman of the Presidium of the USSR Supreme Soviet, Comrade L. I. Brezhnev), are increasing the construction pace at the plant and are struggling to promptly start the first power unit.

Construction is in full swing on the equipment division and the turbine room, the building for special water treatment, the auxiliary systems of the reactor division, the storage capacity for liquid and solid wastes, the pipeline trestles, the water intake equipment and the covered off-take channel. The modern design of the plant and the process for generating electric power ensure complete safety both for the service personnel as well as the rich Don fauna and flora.

In supplying the construction of the AES with the essential material resources, a major role is played by the Volgodonsk Preassembled Supply Administration [Volgodonskkomplekt] and the other subdivisions of the Northern Caucasus Main Territorial Administration of the USSR Gossnab. The success of the common cause depends upon how precisely the mechanism of their activity has been organized and how the questions of organizing rhythmical deliveries have been thought out.

In carrying out the decree of the CPSU Central Committee and the USSR Council of Ministers on improving the economic mechanism, the main territorial administration has widely employed progressive forms of supply. Among them are direct long-term economic ties, centralized delivery of freight, comprehensive supply of construction projects included in the state capital construction plan and according to the orders of the construction-installation organizations in accord with their demand as determined by the designs and estimates.

The experience acquired by Volgodonskkomplekt in building the first stage of the Atommash Plant is being used in erecting the Rostov AES. The basis of this is to supply the construction of the AES according to weekly-daily schedules which clearly determine the range of the products, the volume and date of delivery to the projects. All the necessary materials are transported on a centralized basis to the AES construction site strictly following these schedules.

The most important area of work for the preassembled supply administration is the further development and improvement of the brigade form of organizing and encouraging labor. The first comprehensive brigade in the administration was set up in October 1980. It was then headed by the young communist V. Bubucha. Now there are four such brigades. According to the estimates of local economists, precisely such a number is essential for efficiently processing the various production and technical freight arriving for the construction of the Rostov AES. During the present year, it is essential to process over 18,000 tons of rolled metals, around 5,000 tons of pipe, [number illegible] tons of cement, and much other building materials.

Such an amount of freight handling work can be successfully carried by Volgodonskkomplekt due to the comprehensive brigades. Here car stoppages are reduced by almost double, the safekeeping of loose materials is improved and the wages of the brigade members increase significantly.

The construction workers also gained directly. With a full volume of material resources available, they strengthened the struggle to carry out the established quotas and socialist obligations and endeavored to work ahead of schedule.

However, the construction of the AES would have been carried out at a higher pace if there had not been departmental separation between the Volgodonskenergostroy Trust and Volgodonskkomplekt. Precisely such a separation prevented the trust from promptly carrying out a joint agreement according to which it should determine the demand (the limits) for material resources in order to build the nuclear power plant for the present year with a quarterly breakdown in accord with the plans and estimates. Such information would have made it possible for the preassembled supply administration to improve the supply of the necessary material and technical resources for the construction workers.

At present, the role of Volgodonskkomplekt comes down merely to stockpiling material resources and as they are needed by the construction project, to their warehouse sale. In other words, it serves as a sort of transloading base: it receives the freight from the suppliers and forwards it to the construction site of the AES.

The workers of the administration have repeatedly voiced the notion of the need to deliver the materials directly to the projects. This would be an enormous gain. Railway car stoppages would decline, while work time and labor resources would be saved. For this it is merely a question of building a near-site warehouse with a capacity of 3,000 tons. However, the Atomenergostroy [Nuclear Power Construction] Administration of the trust has rejected the building of such a warehouse hands down.

Of important significance is the correct drawing up of the papers needed for placing the orders. Unfortunately, the Volgodonskenergostroy Trust last year permitted numerous inaccuracies and held up the prompt issuing of these papers. As a result, it was unable to completely place the orders for manufacturing prefabricated reinforced concrete and metal products. For this reason, the construction workers were forced to make irrational substitutions. As a result, in just the first 5 months of the current year, more than a thousand tons of scarce metal have been additionally spent.

It must be pointed out that over several years the trust has stockpiled large above-norm supplies of reinforced prefabricated concrete. These number several score thousand cubic meters. However, instead of using the existing reinforced concrete elements, the construction workers prefer manufacturing new ones and additional metal and cement is used for this.

The following figures show also the instances of mismanagement. Last year, at various projects of the trust, including the Rostov AES, the value of material losses exceeded 220,000 rubles. For example, the housing construction combine spent 6,000 rubles worth of wallpaper above the annual requirement, 62,000 rubles worth of linoleum, more than 32,000 rubles of glass and 9,000 rubles of sanitary porcelain.

The erecting of the Rostov AES involves not only those who work directly at the construction site, but also several score enterprises and organizations from different departments and ministries. These supply the site with the necessary materials and equipment, machinery and mechanisms. Hence, success depends largely upon the efficient work of the collectives from these enterprises and organizations.

Experience has shown that far from all suppliers are filled with a feeling of high responsibility for carrying out the construction site's orders. Frequently, they put the plant's construction workers in a difficult situation in failing to meet the delivery dates for various products. Thus, in the second quarter of the current year, the Krivoy Rog Metallurgical Plant, instead of 3,055 tons of metal products, supplied only 455 tons while the Dneprodzerzhinsk Plant supplied 260 tons out of 1,040. The Magnitogorsk Hardware-Metallurgical Plant over the last 9 months has not delivered a single ton of wire.

For the hydrosealing of the site-cast reinforced concrete elements, the plans envisage the use of shaped polyethylene sheet which is not manufactured centrally and is not distributed by the USSR Gossnab. For more than a year now instead of such sheet, granulated polyethylene is being supplied to all the AES

under construction under the Ministry of Power and Electrification. The ministry's organizations should themselves seek out enterprises which could manufacture the shaped sheet. Over the last 3 years, it has been made by the Yenakiyevo Building Materials Plant and now by the Donetsk Plant and certain other enterprises of the USSR Ministry of Building Materials Industry. Considering that the hydrosealing from shaped polyethylene sheet is effective and dependable, it is essential to organize its planned production and centralized distribution. In our view, Soyuzglavkhim [Main Administration for the Supply and Marketing of Chemical and Industrial Rubber Products under the USSR Gossnab] should make such a proposal. However, as yet it has not done this.

Serious shortcomings have also been permitted by the designers of the Rostov AES. Up to now they continue to send out new working drawings and make individual changes in previously issued ones without working out lists of the required material resources. All of this tells negatively on the rhythmical and uninterrupted supply for the plant's construction and causes the irrational use of shaped metal and the overexpenditure of materials.



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PIPELINE CONSTRUCTION

VOLGA PIPELINE CROSSING DESCRIBED

Moscow VODNYY TRANSPORT in Russian 21 Oct 82 p 1

[Article by V. Chinguzov, in-house correspondent: "Left Bank--Right Bank"]

[Text] The entire vast building slip platform is clearly visible from the deck of the cutter. It is located near Zvenigov on shallow sand which is summer yellow among the green of the pine forest. The gas pipeline traveled a long time before coming here. The intercontinental route cut through the taiga, went directly over wretched swamps, and wound through gullies, and crossed rapid streams.

On a warm June day, the steel lengths, having passed through the forest thicket, dropped to the left bank of the Volga. Here it involuntarily had to stop. In front the rocky wall of the right bank rose threateningly, it is just right for mountain climbers. Before meeting the river, the gas pipeline at times was laid a kilometer a day. In order to cross 2 kilometers of the water obstacle, the builders needed months. It is no joking matter to cross the river. The Volga is the Volga! They prepared for crossing the river even before the gas pipeline came to the Mariy land. The planner-water transport workers had the first word.

"The gas pipeline has long been outlined on the plotting boards," said the chief engineer of "Giprorechtrans" N. Seleznev. "They knew that it will cross the Volga. But at what place? We were asked to answer this question. It was not easy to do this. The building slip platform from which a forced crossing of the river was to start, was sought in that place where the Volga is narrower and shallower. It was also required to have on the bottom soil that was suitable, and a settlement of builders and industrial base was found at hand."

Time continuously hurried. How many variants were examined, how many were abandoned! Finally they decided that the gas pipeline would cross the Volga at Zvenigov.

"The drawings and documents were issued ahead of schedule," relates the author of the project A. Badin. "We had a serious attitude towards the honorable assignment. No one took time into consideration. They stayed even after work, until everything was done as necessary. The ichthyologists are strict and cautious people, it seemed that even they were satisfied."

The project received a pass to life. But it is known that it is one thing to outline and calculate on paper, and another to implement what has been planned. The builders again called the river workers, the route engineers came to the region of the crossing.

"Complicated work awaited us, but it is already customary." said the commander of the suction dredge "Volga," Viktor Serov. "We are laying our 11th pipeline. It is true that a lot is more difficult here. The bottom of the river was very obstructed. We uprooted bushes, raised sunken logs, and once removed a submerged cutter. Moreover we had to cut Upolzenskiy Island in half." The river workers and the builders worked without arguments and were exceptionally friendly. The machine operators Mikhail Belov and Boris Razvodov did not remove their eyes from the machines. The motorized anchor layers controlled by Pavel Kolpakov scurried in a shuttle. The ships of lookouts of Vladimir Krivenkov, Yuriy Baglov and Aleksandr Polushik, competing, laid the trenches. As soon as the strips were considered ready, the senior diver Farkhat Shaydullin followed the "track" of the suction dredge with his divers. They wanted to be convinced that the river gravel was correct. An echo sounder was turned on on the cutter and the self-recording impartially outlined the profile of the bottom. Then the tall A. Varopayev and N. Gavrilov submerged into the dull-colored dark font. The divers literally felt meter after meter of the walls of the trench with their hands. Within a short time Aleksandr and Nikolay surfaced. Each time we read from their satisfied faces: "normal, in order."

Thus, in a little more than a month "Volga" lifted from the bottom over 1 million $m^3$ of soil. Where stubborn viscous clay was found, the brother "Volzhskiy-514" came to the aid. Even inaccurate trenches were laid by the section dredges and a channel of total width a good quarter of a kilometer and depth up to 15 meters was created. All of this was done by the route workers, without halting the rushed traffic of the fleet for an hour.

While the channel was being prepared, a settlement of gas workers is developed on the shore. Life's crossroads brought to this city people of different nationalities. The common goal fused them and brought them closer together.

There is one street in the settlement Urengoyskaya. Reliable small houses were built along it, verified by the cold hard Siberian frosts and northern winds. They have steam heating, electricity, gas plates, and beautiful plastic finishing. When you become wet in the rain, you can spread your coat in a hot dryer, visit friends, look at television, meet in a group and recall the difficult versts.

It is also difficult here on the banks of the Volga. The Volga is only quiet to look at. It has its capriciousness and intractable nature. Now it is a very cold time. First it is quiet, then suddenly such waves develop which the old residents have never seen. At the price of exceptional efforts people succeed in overcoming the capriciousness of the river.

An important event approached, laying of the inverted siphon. The concern swelled. The leaders of the operation V. Mal'tsev, I. Zakharov and V. Pelipenko were very calm. They are experienced people and have experienced a lot in their age of working at construction sites. They understand that the success of all, the welders, pipe layers, drivers, divers, and river engineers will depend a lot on how they act in the difficult hours. They worked in a group. The powerful equipment allowed the gas workers to saturate the work day to the limit.

All 12 steel lengths were prepared deftly in a single breath. Multiple-ton, 200-meter pipes welded into one rested calmly on the sand. They were put into "sleeves" made of wooden racks, covered with a protective film, weighted with heavy pig iron rings. At the same time a powerful winch was supplied and firmly attached on the opposite shore. Powerful cables were unwound and laid on the bottom of the trench. The beginning length with the head of the inverted siphon was attached to them and on it was inscribed: "Urengoy-Pomary-Uzhgorod. Hello Volga!"

Then the disturbing moment occurred. A sweep of flags, a short command and with rapidly deepening twilight, the winch and six strong caterpillar "trumpeters" pulled the inverted siphon to the river. From the side all of this looked strikingly prosaic. At the platform a business-like manner, skill, calculation and a lot of outstanding work reigned. The still rain-wet bulky object slowly disappeared into the gray water haze. The gas pipeline pipes were laid on the bottom of the Volga.

The first length was dragged to the river. On another day the second, then a third. The welders carefully welded the structures, each butt joint was checked with the help of an x-ray photograph. Especial guarantee of strength was necessary.

The builders were filled with different feelings on this day. The main feeling was a sensation of completion and joy. Yet another step had been taken in the construction of the long distance route Urengoy-Uzhgorod, an important and responsible one! The people worked in harmony so that construction of the gas pipeline was not delayed by a day.

The route boldly and decisively traveled on the bottom of the Volga. On the right bank it was connected to the steel length laid on the Chuvash earth, then, without reducing speed, it was sent full speed to the road to the western boundaries of the country.

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PIPELINE CONSTRUCTION

## VOLGA PIPELINE CROSSING DESCRIBED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Oct 82 p 1

[Article by U. Bogdalov, in-house correspondent: "Crossing the Volga"]

[Text] The workers of the Kazan SU-4 of the trust "Vostokpodvodtruboprovod-stroy" have started the completing operation of laying underwater part of the Urengoy-Pomary-Uzhgorod gas pipeline on the bottom of the Volga. An inverted siphon 2,516 m long is not only the longest on the transcontinental route. The great Russian river is being crossed for the first time by a pipeline of this diameter.

From here, from the left bank, the distant right bank rises as a powerful strong embankment. Before it there are a good 2 kilometers of the leaden October Volga. The forced crossing is the most suitable word for this event. Behind are months of the most important preparatory operations. Finally all the forces, reserves have been extended, communication has been set up, and dozens of people are in complete combat readiness.

The 200 meter length barely moves, torn from the earth by the pipelayers. The multiple-ton steel head "the bullet" gives it the appearance of a giant battering weapon which fortresses used in ancient times. It is no easier to overcome the enormous Volga, although powerful equipment has been assembled on the shore, and a ship and hydraulic dredges are at anchor above the underwater trench. This is why the head of the administration V. Pelipenko is noticeably disturbed and again and again asks the right bank where the powerful winch has been installed.

Here on the outskirts of the Mariy city of Zvenigovo, at the last minute before the forced crossing, the words of the welder V. Gryzunov which were written at the meeting of the underwater builders (it took place in July at the pipe welding base Kazan) were recalled: "Mister Reagan will never master the main, construction of socialism, of which our trunkline has become a part. We will not be stopped by any kind of bans. Since any, even the greatest work is made out of the efforts of each individual person, I am obligating myself to fulfill the assignment for welding pipe lengths by 130-150 percent daily."

The words of Vladimir Aleksevich, the aces of welding Nikolay Bogunov, Yakov Savel'yev are not at variance with their deeds. The 200-meter lengths were welded ahead of schedule.

It would seem that welding of long lengths and the subsequent transporting to the underwater crossing complicate the operation. In fact, organization of a stationary pipe-welding base made it possible to set up line production of large elements for the inverted siphon. And not only one. The collective of the specialized administration of underwater-engineering operations No 4 is faced with guaranteeing construction of the underwater part of the pipeline across the Vyatka and Sura. Here two lines each will be laid before the end of the current navigation. Welding of the length on a well-equipped base is more productive and high-quality.

On the radio I hear an accurate, report of the senior diver from the station Farkhat Shaydullin. Only he and his fellows have seen the bottom of the giant inverted siphon, the underwater trench. It is more accurate that they have not only seen it, but know each of its centimeters by touch.

A miracle took place, and on the space of the Volga, although it is not far to the right bank, an impressive picture would be opened before the people. Whereas on dry land the pipe is laid no lower than 2 meters, here it is from 4 to 11. In this case the width of the trench on the bottom is 15, and at the top of the gently sloping inclines from 40 to 80 meters. This is a real underwater canyon in which the powerful tractor or truck would easily be hidden. The mass of soil reliable protects the pipe from breakage, anchors, and submerged logs. According to the calculations of the underwater workers, the inverted siphon could have been pulled through back on 10 October, but about 300 meters of the enormous trench were washed away by the Volga on the holidays. They had to urgently remove the soil to the planned markers, and put off the beginning of operations. Nevertheless, crossing the Volga began 6 months ahead of schedule.

Directly in front of us, closer to the right bank is an island cut in half, overgrown with trees and bushes. In the summer it was the obstacle on the path of the builders and the underwater workers. Now the right Chuvash shore, a broad opening to the horizon, and transits are clearly seen in the passage. It is firmly connected to the Mariy shore. This is not a figurative comparison. The steel cable the thickness of a hand has been attached by one end to the "bullet" on the length, and the other to the winch on the other shore. In order to hold on to the hundreds of tons of its thrust, the heavy unit has been fastened to a long pipe which has been buried deep in the ground.

In order for the inverted siphon to lie firmly on the bottom, it has been weighted with broad rings of weights. The most important in this case is not to allow it to go too far into the bottom of the trench. Six pipe layers roar on the shore. A bulldozer pushes the lengths from behind. Bulky pontoons go underwater together with it, drawing the gas pipeline from the bottom. It is impossible to hurry here, but a delay is impermissible. Each butt-joint should be welded irreproachably and checked.

The long-awaited command of Vladimir Grigor'yevich Pelipenko, and the thick cable becomes alive, stretched into a line, and pulls behind it the pipe and the pipe layers moving behind. The forced crossing of the Volga has begun. It will end in several days.

We go from the platform saturated with equipment, past the silvery, well-built houses of the city in which the underwater workers have built on the margins of Zvenigov. They have made themselves firmly at home here not for one year, for this inverted siphon is only the beginning. Next to it they will lay a reserve line, and then six underwater crossings of 100 meters of pipe from pipe. The river of fuel will flow under the Volga River.

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PIPELINE CONSTRUCTION

## PREPARATIONS MADE FOR PIPELINE CROSSING OF DNIEPER

Moscow IZVESTIYA in Russian 29 Oct 82 p 1

[Article by N. Baklanov, in-house IZVESTIYA correspondent: "Crossing the Dnieper"]

> [Text] The route of the gas pipeline Urengoy-Uzhgorod extends 1,146 kilometers on the territory of the Ukraine. There are many natural frontiers which are difficult to overcome on its path, the Carpathians and water obstacles. The builders of the steel trunkline are now preparing for a forced crossing of one of them, the Dnieper.

The lead-colored mirror of the Dnieper covered with ripples, its tributaries and numerous bays, bordered by golden and ruby colors of the autumn forests are clearly visible from the helicopter. The shores of the mighty river are almost empty. Only in some places can you distinguish the single figure of a fisherman huddled against the penetrating wind. But at the village of Prokhorovka, not far from Cherkass, the picture changes: below the orange-yellow bodies of the powerful pipe layers, excavators, and bulldozers shine, and the roofs of houses of the field city appear. Towards the shore of the Dnieper, past the small rivers scattered here and there, through the shore thickets and swamps the wide freshly dug trenches have been laid with a confident flourish. Here the pipes of the main gas pipeline Urengoy-Uzhgorod will be laid.

Today preparation for one of the most complicated operations in the construction of the Ukrainian segment of the route, the laying of the steel artery on the bottom of the Dnieper is underway at full speed. This is an important assignment, just as the crossing of the gas pipeline over the Ros' River. It is being fulfilled by the construction administration of underwater-engineering operations No 5 from the trust "Vostokpodvodtruboprovodstroy."

It is understandable that the success of the operation depends a lot on the people who do it. Highly skilled specialists are working at the construction of the inverted siphon. Each of them has a lot of experience in overcoming water obstacles behind them. Practically all of them have several related occupations. Thus, the brigade foreman of the comprehensive brigade G. Andreyev has already been working for 12 years at the construction of pipelines. He was awarded medals of the CEMA and GDR for excellent work on the gas pipeline "Soyuz." He is also the senior diver of the station. His comrade, the commander of the suction

dredge V. Bragar' is not far behind his brigade foreman. During his many years of work on gas pipelines he has successfully mastered occupations of pipe layer operator and welder.

The builders have to encounter many difficulties in preparing for the forced crossing of the Dnieper. Some of them are natural, for example there were many sunken logs on the bottom of the river. Now they are being dug out with the help of the suction dredge.

"In the appeal of the CPSU Central Committee for the 65th Anniversary of the Great October Socialist Revolution, it says in particular: 'the builders of the gas trunklines, workers of the gas industry! Fight for early start-up and the most rapid development of the facilities of the new gas pipelines!,'" says the brigade foreman of G. Andreyev. "I can assure you that we will apply all our efforts in order to implement this appeal and to fulfill the high socialist commitments that we have adopted: by the holiday of the Great October we will complete the crossing over the Dnieper, and lay one of the two lengths of the Urengoy-Uzhgorod gas pipeline on the bottom of the mighty river.

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PIPELINE CONSTRUCTION

NEW PIPELINE INCREASES GAS SUPPLY TO REPUBLIC

Minsk SEL'SKAYA GAZETA in Russian 14 Nov 82 p 3

[Article by A. Gladysheva, BELTA correspondent: "Roads of Blue Fuel"]

[Text] Our republic will increase by one-third the transportantion and consumption of economical blue fuel in this five-year plan. The third line of the gas pipeline Torzhok-Minsk-Ivatsevichi which has started to operate has brought in additional thousands of tons. At the same time construction has been completed of a number of compressor stations on the most intensive segments of the route. Large and small branchings are being constructed which will bring the blue fire to the cities and villages which are the most distant from this man-made river.

"During the Tenth Five-Year Plan, the 'program of the minimum' for gasification of cities, villages and industrial enterprises of Belorussia was essentially completed because of blue fuel from the Siberian warehouses to which the gas pipeline connected the western regions of the country," relates the director of the Minsk board of gas pipelines under construction V. A. Shvab. "There was a considerable rise in the volumes of transporting inexpensive fuel to the Ukraine and the Baltic republics, to the states of socialist cooperation. There was an almost double increase in the number of services using gas."

The 11th Five-Year Plan is a new stage in the development of the network of main pipelines which have been called upon to lift the productive forces of the republic to an even higher stage. By the end of 1985, additional natural gas of West Siberia will travel on 24 lines to the Bobruyskiy, Tolochinskiy, Dubrovenskiy, Svislochskiy and many other regions, and hundreds of new villages. The needs of such major industrial enterprises in southern Belorussia as "Gomsel'mash," the metallurgical plant which is under construction in Zhlobin and others will be completely satisfied.

Having been included in the socialist competition for a worthy meeting of the 60th anniversary of the formation of the USSR, the builders are considerably ahead of the standard schedules for construction of one of the largest lines of the gas pipeline Torzhok-Minsk-Ivatsevichi. Its path is from the Belorussian capitol to Gomel'. Tests of the suction dredge which passes under the largest Osipovichskiy reservoir in the republic have begun. At the same time the builders have started the forced crossing of the Berezina and Dnieper, two other complicated water obstacles through which the line travels.

With the introduction of the line section of the third gas pipeline length, the entire system of supply and distribution of Siberian gas in the republic has become more reliable and high-quality. This is mainly through a deeper control of the blue stream. It has become possible to insure and double work of the most complicated sections.

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PIPELINE CONSTRUCTION

'SOYUZ' PIPELINE OPERATION DISCUSSED

Moscow GUDOK in Russian 13 Oct 82 p 4

[Interview with Anatoliy Vorotyntsev, chief engineer of the Central Dispatcher Administration by the correspondent of APN Voris Busygin; date and place not specified]

[Text] The gas-transport complex "Soyuz" built by the Soviet Union in cooperation with the Eurpean countries of CEMA has been continuously operating for 4 years. Information of the dispatcher services regarding the passage of the gas stream through the territory of the USSR comes to the Central Dispatcher Administration of the Unified Gas Supply System of the country which is located in Moscow.

The APN correspondent Boris Busygin met with the chief engineer of this administration, Anatoliy Vorotyntsev and asked him to answer a number of questions.

[Question] What is the USSR Unified Gas Supply System?

[Answer] If you look at this map, the chief engineer indicates the wall, then you will see that it is covered with a dense network of twisted lines extended into different regions of our country. They designate the main gas pipelines whose length exceeds 130,000 km. Unification of all into one system makes it possible to rapidly control the set of gas streams and to provide gas to different facilities both within the country, and beyond its limits.

The rates of construction work and the length of the routes increase with each year. Their network is shifted more to the north and east of the USSR, where new large fields of "blue fuel" have been discovered. The word "Urengoy" is identified today with 6 new gas trunklines which will open up access to the richest storehouses of West Siberia. The length of each of them exceeds 3,000 km, while the export gas pipeline Urengoy-Uzhgorod stretches 4,650 km. All of them will have a high throughput, pipes of 1,420 mm diameter are being laid in the trenches.

[Question] The gas pipeline "Soyuz" was probably one of the first "test sites" where these pipes were tested in operation?

[Answer] Yes. The "route of friendship," as is called in the socialist countries, in its technical parameters generally occupies a special place in pipeline transportation of the USSR. The route is 2,750 km long and intersects 3 union republics, the RSFSR, Kazakhstan and the Ukraine. It contains a quantity of "blue fuel" with enough energy equivalent to the potentialities of 5 GES such as the Bratskaya on the Angara.

The branched network of dispatcher points which encompasses all sections of the gas pipeline helps to control such a powerful stream. Each compressor station is under strict control. Using computers and televisions, the dispatchers follow the regime in which the complicated electronic equipment is operating, and guarantee observance of the assigned parameters. The dispatcher points at the compressor stations maintain constant communication with their central dispatcher services in Orenburg, Saratov, Volgograd, Cherkassy, Ivano-Frankovsk. They rapidly send information about "Soyuz" to the Central Dispatcher Administration in Moscow on an automatic system of data transmission.

Accurate activity of the dispatchers, and excellent technical equipment of the services are a guarantee of the reliable operation of "Soyuz." During its operation there have been no stops in the supply of gas, and no technical malfunctions. If preventive maintenance work is being done at some station, then the lacking power because of the turned-off gas pumping unit is compensated for by additional load on another station. Thus, the quantity of pumped raw material is successfully maintained on one level.

Over 100 billion $m^3$ of gas have been shipped on the gas transport system "Soyuz" during the years of its operation. About half of this volume was shipped to the countries participating in construction, People's Republic of Bulgaria, Hungarian People's Republic, GDR, Polish People's Republic, Socialist Republic of Romania , and CSSR. The remaining part of the "blue fuel" was used for internal needs and for export to capitalist countries. A general agreement about shipments of gas to the CEMA states has never been violated, but at the request of the GDR and Poland shipments to these countries were even increased in 1982.

[Question] One facility, the plant whose construction is being completed by the Czechoslovakian builders in the Volga city of Kamyshin is closely tied to the "Soyuz" gas pipeline. What is its purpose?

[Answer] This is a plant for repair of production equipment. The method of plant repair was recently introduced at gas pipelines of the USSR. Now it will become more widespread. Large assemblies of the compressor stations will be repaired at the plants where the quality of repair is significantly high. It is complicated to perform this work at the station itself. The Kamyshin plant will service not only "Soyuz," but other close gas pipelines. Its start-up will increase even more the reliability of the "route of friendship."

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PIPELINE CONSTRUCTION CONTINUES

## Trench for Dnieper Crossing Prepared

Moscow VODNYY TRANSPORT in Russian 26 Oct 82 p 1

[Article by G. Nikolenko: "Welcome Route!"]

[Text] It has been computed that the builders of the Urengoy-Uzhgorod gas pipeline are faced with crossing 794 water obstacles on the 4,451-kilometer route. They vary in complexity, but the crossing over the Dnieper is nevertheless expected to be the most difficult. Taking this into consideration, even now different organizations have developed active preparation here for the forced crossing of the ancient Slavutich.

With the onset of darkness, distinctive lights begin to burn on the suction dredge "Dneprovskiy-30." The crews of the passing ship already know: this dredge is working continuously, day and night, therefore it is mandatory to establish radio communication with it, and pinpoint its location. In this case each navigator considers it his duty to be interested in the watch suction dredge, and how the work of the collective is going. This interest is no accident: the "Dneprovskiy-30" has been entrusted with a responsible task, laying a trench on the bottom of the Dnieper in the region of Kanev for laying of pipes of the already world famous gas-transport system.

"This assignment is not one of the simplest or the easist," relates the head of the Dnepropetrovsk technical section of water lines of the Main Administration of the River Fleet of the Ukraine Ivan Grigor'yevich Musiyenko. "First of all, the dimensions of the trench are fairly impressive: the length is about a kilometer, the width is 32 and the depth is 12 meters. Secondly, we are faced with removing a total of about 300,000 $m^3$ of ground from under the water, and the ground is heavy, very obstructed with residues of a mighty ancient forest.

It also important to note the circumstance that deepening of the bottom for the most part is done in the navigating channel of the river, and it is necessary to be seriously concerned about the safety and observance of the schedules for the intensive traffic of the fleet in these areas, and also to recall the work schedules. Moreover, laying of the trenches is being done near the Kanev GES where the water level constantly fluctuates. This also complicates the excavation work. In a word, it is not simple to overcome this obstacle. This is why we have entrusted such an important and responsible

assignment to the multiple winner of the intrabasin socialist competition, the suction dredge collective "Dneprovskiy-30," headed by the experienced commander Vladimir Mikhaylovich Marchenkov.

The crew justified our trust with honor: on 20 October, on the precisely outlined schedule, it brought the last cubic meter of ground to the surface. The giant underwater trench was ready!

"This is our working response to the attempt of the American administration to torpedo construction of the export transcontinental pipeline," says the commander of the suction dredge V. M. Marchenkov.

The deep-water trench created in time by the Ukrainian river workers will permit the subdivisions of the collective from the trust "Vostokpodvodtruboprovod," who are based here to prepare a well and in the shortest periods for working on laying the route through such a serious obstacle as the Dnieper.

## Dock Dispute Delays Pipe Unloading

Moscow VODNYY TRANSPORT in Russian 26 Oct 82 p 1

[Article by V. Zhivotkov, in-house correspondent: "The Subcontractors Dispute, and the Pipes Are Not Sent for the Gas Pipeline"]

[Text] Loading of large-diameter pipes in the Italian port of Taranto on the motor ship "Zaporozh'ye" went normally. It was previously stipulated among the crew that itwould take an additional cargo: the pipes were placed in 5 rows on the deck instead of 3. Everything that was planned was successfully done.

The crew has long been engaged in shipping large-diameter pipes and skilfully uses an efficient and reliable system for attaching them. The deck has permanent depressions for stands which require the minimum time for installation. A set of cables is always ready. They are marked, they are usually taken and placed in their regular places. All this made it possible for the sailors to begin to fasten the pipes even during the loading.

This time the ship was being worked at a new, unfamiliar mooring of the port, therefore there was a delay in the loading. The sailors calculated that they will be able to make up for the loss time on the way to the Zhdanov port. Having taken on 1366 pipes of large diameter with total weight over 9,000 T, with 404 pipes on the deck, the motor ship headed for Zhdanov. Here it was found that there is no free mooring. The motor boat stood for 3 days in the outer harbor. During the wait, the crew did not lose time: they unfastened the cargo, negotiated with the port workersthe order for unloading, and when the ship made fast, they began to work.

First pipes with polyethylene coating were unloaded on a direct variant ship-car. But here departmental passions began to burn. The new shift of acceptance workers who came the next day to the Zhdanov-Port station refused to send the cars with pipes, citing damages to the polyethylene coatings.

The railroad workers did not want to take into consideration at all that the specifications for shipping, loading and storing large-diameter electric-welded pipes with plant outer insulation approved by the USSR Ministry of the Navy do not indicate a right to refuse to accept them with damages. It is only written there that cases of damages which occur in the process of loading and transfer must be certified.

The port workers were agitated, and began to accuse the crew of everything, although on certain pipes there were visible traces of fresh impacts. The unloading was halted. The next day the leaders of the port and the region, representatives of customs and the office of "Soyuzvneshtrans" assembled and began to discuss and bargain what to do further. The sailors on their part announced that the portworkers from the very begining were unloading with violations of technology. They took from the deck two pipes together which is categorically forbidden. Before loading them into the car, they put them on the moorage for inspection without any packing or separation. Sometimes the cargo was lowered directly on to the rails. It is not surprising that damages appeared.

After long disputes between the port workers, the railroad workers, and the sailors, finally a compromise solution was adopted. Loading continued, however time was lost.

The sailors noted that in the previous trip their motor ship supplied 1328 pipes from Taranto with polyethylene coating, and the portworkers were able to unload them in 3 days and safely give them to the railroad workers. As we see, the subcontractors if they want can work harmoniously, and intensively. It is a pity that such an interruption occurred at this arrival of the motorship "Zaporozh'ye" to the Zhdanov port. The sailors noted quite correctly that a bucket of honey could be spoiled by a fingernail.

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## BRIEFS

AIR COOLING UNITS--Series production of new air cooling units has been mastered in a short time. They will be installed at the Siberian route of the export gas pipeline Urengoy-Pomary-Uzhgorod. The workers of the Tallinn Machine Construction plant imeni I. Lauristin fulfilled at the same time the main point of their socialist commitments which were adopted in honor of the 60th anniversary of the formation of the USSR. Continuing their shock labor watch of the anniversary year, they decided to complete the annual plan for supplies of modern equipment 10 days ahead of schedule. The Tallinn machine builders took less than a year to switch from the first experimental samples to series production of the unique units. Created in cooperation with the scientists from the sector of the scientific research institute, they were designed for the main gas pipelines of increased power. Another feature of these units of air cooling is the fact that they are manufactured at the plant especially for the "Siberian branch" of the export gas pipeline, for which purpose they must have a great margin of strength and reliability. The plant specialists jointly with the innovators of production have done everything for this purpose. In the process of preparing the new air cooling units for series production, creative brigades and groups were set up at the enterprise from the engineering-technical workers, inventors, efficiency experts and workers who made a whole number of improvements in the design of the units. The scope of this activity is indicated by the fact that about 260 people participated in the work of the creative collectives. The additional commitment adopted by the Tallinn machine builders means that the builders of the export gas pipeline will receive ahead of schedule complete equipment for the compressor stations, which moreover is supplied to them with increased installation readiness. this will permit a significant acceleration in the assembly of the air cooling units of the brand of the Tallinn machine construction plant. **(Article by L. Firsov) (Text)** [Tallinn SOVETSKAYA ESTONIYA in Russian 14 Oct 82 p 3] 9035

WATER OBSTACLE OVERCOME--Vyatskiye Polyany (Kirov Oblast), 23 Oct--Yet another water obstacle has been overcome on the path of the gas pipeline Urengoy-Pomary-Uzhgorod. Two days ahead of schedule outlined by the pre-October commitments, the collective of the Kazan specialized administration of underwater-engineering operations completed today the laying of the inverted siphon 527 m long through the Vyatka, the main water artery of the Kirov Oblast. The success was achieved because of the extensive use of powerful equipment, high skill of the builders and accurate organization for socialist competition. Thorough preparation for a forced crossing of the river promoted acceleration of work. The pipes were

welded under shop conditions in five lengths that were supplied from Kazan on the Volga, Kama and Vyatka to the crossing site. The collective of the comprehensive brigade of installers of G. Minutdinov covered the pipes with an insulating film, and wooden braid in a short time. The brigade of divers headed by M. Novikov had to work a lot. During the preparation for dragging the inverted siphon, the divers went into the cold water to a depth of 8-10 meters many times and determined the condition of the trenches. The situation was complicated. The river rapidly covered the bottom with silt, and filled it with submerged logs. Now the high skill of the experienced machine operator of the suction dredge M. Karpov which was displayed. The builders of the Vyatka section of the gas pipeline have a holiday today, crowning many months of intensive work. In front of them are new tasks: they are faced with extending the inverted siphon further, through the swamp and oxbow lake. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Oct 82 p 1] 9035

IVATSEVICHI-DOLINA GAS PIPELINE--Kiev, 2 Oct--The last section of the gas pipeline Ivatsevichi-Dolina was put into operation today on the territory of the Volyn Oblast. The tests conducted yesterday confirmed the high quality of all work. Workers from Leningrad, the Ukraine, Belorussia, and the Central Asian republics worked here shoulder to shoulder. Now three lengths are operating on the gas pipeline extending over 500 kilometers. Continuing the trunkline traveling from Ukhta to Ivatsevichi, it permits a considerable improvement in the gas supply to the western oblasts of the Ukraine and increase in its export to countries of socialist cooperation. The creation of the gas pipeline used large-diameter pipes on broad scales. The accumulated experience will be used to construct the export gas pipeline Urengoy-Pomary-Uzhgorod. [Text] [Leningrad LENINGRADSKAYA PRAVDA in Russian 3 Oct 82 p 1] 9035

INVERTED SIPHON CONSTRUCTION--Kazan'--The conveyer method of building inverted siphons for the Urengoy-Pomary-Uzhgorod gas pipeline has been introduced by the Kazan specialists. Today an inverted siphon was shipped from the capital of Tatariya. It will cross the Sura River on the section of the gas pipeline which lies on the territory of Chuvashin. The pipeline of length 650 meters was prepared by the collective of the Kazan administration of underwater-engineering operations 7 months ahead of the planned. The progressive method of centralized preparation of pipelines promoted acceleration. The Kazan underwater workers were the first in the country to begin to assembly the underground trunklines not in the field, as is done traditionally, but under shop conditions. The innovation which was awarded medals of the USSR VDNKh (Exhibition of Achievements of the USSR National Economy) permitted maximum mechanization of all operations, and a five-fold increase in labor productivity. Five-fold less people and equipment are now required for assembling the pipeline. [Text] [Baku VYSHKA in Russian 9 Oct 82 p 1] 9035

CHUVASH RAPID CONSTRUCTION--Tsivil'sk, Chuvash ASSR--A high rate has been adopted at the Chuvash section of the Urengoy-Pomary-Uzhgorod gas pipeline: half of the 127-kilometer route has been made. The welders are butt-joining the pipes into a steel length simultaneously in several places. It "moves" along the trunkline at a velocity up to a kilometer per day. The most complicated work on the route has been entrusted to the comprehensive brigade of P. Ivanov: it is sending pipes across ravines and streams. Among those who have begun to weld the first

butt joints here is the welder V. Loginov. It rained for a long time during the crossing of the Malyy Anish River. But the flames burned from dawn to dawn at the work site of V. Loginov and his comrades as before: the welders built sheds. V. Loginov inherited his occupation: his father built pipelines all his life. Viktor himself, despite his youth, laid trunklines in Central Asia and the Volga region. Participation in construction of the gas pipeline Urengoy-Pomary-Uzhgorod has become a new stage in skill for him. The welders are working for the first time in a single comprehensive-production line with the escavators, pipe layer operators, installers and electricians for the final result. Friendship, a helping hand, plurality of occupations have become the main components of success and help to maintain a high work rate. [Text] [Moscow IZVESTIYA in Russian 20 Sep 82 p 1] 9035

BALLAST WEIGHTS--Donetsk--The order of the builders of the Urengoy-Pomary-Uzhgorod gas pipeline has been fulfilled by the machine builders of Donetsk. The collective of the plant imeni Leninskiy Komsomol of the Ukraine yesterday completed shipping so-called ballast weights to the route ahead of schedule. They are needed for sinking the pipes when they are laid on the bottom of water basins. [Text] [TRUD in Russian 7 Sep 82 p 1] 9035

CSO: 1822/74

## PETROCHEMICAL INDUSTRY CRITICIZED FOR POOR RECYCLED ENERGY USE

Moscow MATERIAL'NO-TEKHNICHESKOYE SNABZHENIYE in Russian No 9, Sep 82 pp 35-37

[Article by M. Kaganskiy: "Programmed Losses (USSR Ministry of Petrochemical Industry Uses Recovered Energy Resources Poorly)]

[Text] The wheels of the express clacked monotonously on the steel track. Outside, we could see bright flares on the stacks of the petrochemical complex. "A beautiful sight, those flares on a backdrop of the black sky!" said one of my companions, with admiration.

"Too costly a beauty," another countered. "Painful to see the people's money blowing away in the wind."

Unfortunately, I have often had to recall these words. Each year, hundreds of thousands of tons of fuel are burned off in handmade bonfires. Flares are not the sole channel of useless loss. Along with the heat of burned petroleum products, emissions discharge into the air enormous amounts of recoverable energy resources. Last year, unrecovered losses just in the USSR Ministry of Petrochemical Industry exceeded 1.7 million tons of conventional fuel. This is a significant portion of the ministry's fuel-energy balance, one which can and must be used at petrochemical enterprises.

Unfortunately, instead of becoming technological or furnace fuel, these valuable resources have been converted into useless burned or dumped waste. At L'vov Oil Refinery, for example, all the sludge generated has been buried in dumps this year, together with more than 3,000 tons of conventional fuel. Much valuable recyclable fuel energy resources has been destroyed at Gur'yevskiy and Pavlodar oil refineries and at "Omsknefteorgsintez" and "Gor'knefteorgsintez" production associations.

The USSR Ministry of Petrochemical Industry is one of the most fuel-intensive ministries. It is both a consumer and a producer of fuel-energy resources. Its enterprises generate tens of millions of gigacalories of heat along with their planned output. Some of this heat is already being used at many enterprises, but still, an enormous amount of recoverable energy resources is not being used. Last year, the ministry failed to carry out the assignment set it on utilizing them. Due to this, upwards of four million gigacalories of additional heat had to be extracted from primary fuel.

But why hasn't the ministry used all the opportunities available to it?

They explain that in the USSR Ministry of Petrochemical Industry first of all by the lack of sufficient recovery equipment to convert used heat, hot gases and steam into energy carriers. And insufficient recovery boilers and other recovery installations have in fact been produced thus far. But is that the only thing?

Recovery boilers have sat in an open yard for more than 10 years at Kremenchug Oil Refinery. They have already been hit by corrosion. Those foremost to blame are the installation organizations, which have failed to ensure prompt equipment installation. But the Kremenchug petrochemists also bear a bit of the blame, as it was they who were to properly store the boilers and prevent damage to them.

And the ministry itself could have taken appropriate steps as well, since the equipment has been lying there unused for years. It should have been transferred to those enterprises with opportunities for quickly switching it into existing power equipment. The more so, since workers at the Kremenchug refinery repeatedly appealed to superior organizations to transfer these boilers to other enterprises.

However, the problem was not solved, although applications from many enterprises for new recovery equipment were not filled. The Novo-Ufimskiy Oil Refinery did not receive needed recovery boilers and the Volgograd Oil Refinery still does not have air preheaters.

And how is the available equipment being used? It has long been known that, in order to use it effectively, it must be serviced properly, preventive maintenance and major overhauls must be done promptly and an optimum technological regime must be followed. However, checks made by USSR Gossnab agencies have shown that recovery equipment is not, by any means, being serviced as outlined in the specifications at many enterprises of the USSR Ministry of Petrochemical Industry. There are gross violations of technical operating rules. Large amounts of cold air are allowed to enter boilers and furnaces, lowering their efficiency of operation, and insulation is often damaged and is sometimes absent entirely. Improper water-chemical procedures are used, operating adjustments and preventive maintenance are not always done.

All this leads to premature malfunctions. As a result, the consumption of recovered energy-resource heat decreases. For example, recovery boilers are operated at only a 50-percent level at "Gor'knefteorgsintez" production association due to inefficient operation. Some recovery boilers at "Angarsknefteorgsintez" production association are inoperative. Recovery boiler subassemblies must often be dismantled at Pavlodarskiy Oil Refinery. This leads to a significant rise in the temperature of discharge gases over the normative, causing rapid wear on the installations.

A closed circle is generated. Poor equipment operation leads to an increased demand for spare parts, and high-quality maintenance is impossible due to the lack of spare parts. The USSR Ministry of Petrochemical Industry allocates six- to seven-fold fewer spare parts than are required. As a result, recovery equipment is inoperative. The "Angarsknefteorgsintez" production association's gas

plant needs repairs on 15 recovery boilers, but the plan is to repair only 12 units. A similar situation has also developed at the association oil refinery. Only 11 of 31 furnaces at the Volgograd Oil Refinery are equipped with air preheaters, of which half have been switched off due to damage.

Conducting a correct technical policy, observing operating norms and ensuring maintenance -- all this depends directly on workers at the ministry and its enterprises. But they are insufficiently concerned with questions of improving the use of fuel-energy resources.

Experience proves that capital expenditures on recovery are two- to three-fold lower than those on increasing the extraction and transport of an equivalent amount of primary fuel. More attention must be paid to increasing the use of recovered energy resources in all ways possible. However, the use of heat and fuel recovered resources in the USSR Ministry of Petrochemical Industry has decreased in recent years. The basic reasons should be sought not in technical and technological problems, although they unquestionably exist, but in the lack of proper organization and responsibility for the intelligent use of fuel-energy resources.

Recycled fuel and thermal energy are an inseparable component in the fuel balance, an important source for supplementing energy resources. However, they are by no means fully taken into account in this balance and are not included in expenditure norms. For example, recovered thermal energy resources are not considered in the fuel-consumption balances at Pavlodar, Volgograd, L'vov, Kremenchug and several other oil refineries.

Fuel-energy resources expenditure norms for individual types of output being produced at many enterprises of the USSR Ministry of Petrochemical Industry are approved without adequate technical-economic substantiation. As a result, they often turn out to be considerably above actual expenditures achieved in preceding years. This leads to overstatement of enterprise demand for electrical and thermal energy. Having achieved an increase in the limit, the enterprise creates energy conditions freely for itself. Why struggle for economy, to introduce organizational-technical measures to draw recovered energy resources into circulation, if overstated norms permit obtaining a "savings" without doing so? In fact, this savings is calculated in comparison with the norms.

In our view, expenditure norms should have to include all fuel and energy resources available at enterprises which could possibly be recycled. This would force us to seek out not justifications which can be cited to cover up a lack of desire to economize properly, but actual reserves for using fuel and energy efficiently.

To this point, enterprises have been insufficiently actively involved in seeking them out. And USSR Ministry of Petrochemical Industry workers are largely to blame for this. In order to raise the use of recovered energy resources to a scientifically substantiated level, we need first of all to determine their amounts of generation and consumption. In order to obtain constantly updated statistical information on the generation and possible and actual use of recovered fuel and energy, the USSR Central Statistical Administration has instituted an annual statistical report on the generation and use of recovered energy

resources (appendix 2 to annual form 11-sn). Each ministry, including the USSR Ministry of Petrochemical Industry, has its own methods of calculation. Using these methods enables enterprises to properly calculate the indicators of amount of recovered energy resources being generated, their possible use and fuel savings which are being considered. However, many enterprises do not use these methods and even fail to compile reports on the expenditure of such resources.

The appendices to form 11-sn are often poorly compiled or distort the actual situation. This has been revealed in checks. At "Gor'knefteorgsintez" production association, the discrepancy between the data in form 11-sn and attachments to that form exceeded 300,000 gigacalories. At Volgograd Oil Refinery, the heat from producing wells is used in 500 heat exchangers, but the reports indicate 14.

The fact is that enterprise reports are generalized only by the ministry, which is interested in understating the amounts of recovered fuel-energy resources which can be involved in circulation, so as to obtain a little more primary fuel. As a result, the amounts of heat, steam and exhaust gas generated are often understated. This does not permit a sufficiently accurate evaluation of true fuel economy reserves.

It should be noted that the ministry does a poor job of monitoring work on saving fuel-energy resources at subordinate enterprises. Insufficiently taut recovered energy resources use assignments are set for many of them. This permits an inefficient expenditure of fuel and energy and, at the same time, it goes without saying, economy is still achieved...in the reports.

The secret is simple. Taking advantage of poor monitoring on the part of superior organizations, enterprises conceal the true amounts of possible recovered energy resources consumption. Due to this, a significant portion of the reserves is not taken into account when setting assignments. Certain enterprises therefore fulfill and even overfulfill their assignments easily, "demonstrating" a supposed great deal of work to save fuel and energy resources.

In general, such report data manipulation is easily revealed. It is sufficient to analyze how the economy was obtained. Here, much can be done by our territorial agencies. They receive the reports on fuel-energy resources use at the enterprises. But these reports unfortunately are by no means always properly studied and verified. But when such work is approached seriously, an opportunity appears to set up a reliable barrier to fuel-energy resources losses and to reveal reserves. For example, a careful analysis of reports from "Perm'nefteorgsintez" production association imeni 23rd CPSU Congress, which carried out the recovered thermal energy resources use plan, allegedly, by 164 percent, showed that when this plan was drawn up, the enterprise provided incomplete information on actual amounts of recycled thermal energy consumption. Had the amounts been accurately indicated, the actual plan fulfillment would not have exceeded 79 percent. This case is no exception.

Setting recovered energy resources use assignments is not a formal act, but the start of a great deal of laborious work on involving available reserves in economic circulation. But, as experience shows, once having set the assignment, the ministry considers its mission carried out. And enterprises, taking advantage of the absence of monitoring, do not carry those assignments out.

Checks made the first quarter of this year showed that nearly a third of the enterprises surveyed were "programed" not to carry out assignments. For example, measures developed by the Baku Oil Refinery will ensure that assignments on lowering fuel expenditure norms will be met by only a third, those on thermal energy -- 50 percent, and those on saving electric power -- 40 percent. A similar situation has also evolved at the Bobruyskiy Tire Combine and Ryazan' Oil Refinery imeni 50th Anniversary of the USSR. And certain enterprises have not received any assignments at all for involving recovered energy resources.

At the same time, USSR Ministry of Petrochemical Industry workers are reconciled to such events and do not strive for a more active search for reserves in subordinate enterprises. And the enterprises themselves are not very interested in this either. In fact, bringing all economy reserves into play is accompanied by additional concerns for which there is practically no reward whatsoever. This means we need to work out an effective system for stimilating the recovery of waste heat and fuel and other fuel-energy resources.

That is not all that new a proposition. An effective incentives system has been instituted in the USSR Ministry of Nonferrous Metallurgy, for example. There, industrial enterprise workers are awarded one-time bonuses for putting recovery equipment into operation. Standing bonuses for good results in using such equipment, that is, for consuming recovered energy resources to the extent that is technically possible, are also anticipated. The USSR Ministry of Petrochemical Industry should study leading experience and introduce it itself.

Additional funds will unquestionably be required to pay bonuses, but these funds are incomparably less than the savings obtained by the national economy from the intelligent use of recovered energy resources.



11052
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# RECYCLING COAL INDUSTRY WASTES IN KAZAKHSTAN

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 7, 1982 pp 58-64

[Article by economist-engineers R. Almagambetova and S. Krapchin under the heading "The Economy Must Be Economical": "Using Industrial Wastes"]

[Text] Constant production expansion causes an increase in labor and material expenditures on extracting and processing raw material of mineral and organic origin. The intelligent use of natural resources should therefore be viewed as a most important condition of the practical implementation of the basic principle of running our country's economy, that of attaining the best results with the fewest expenditures.

Resolution of this task is ensured in considerable measure by involving in the sphere of repeated industrial consumption the production wastes which are obtained in all stages of social production and in everyday life.

This article examines the conditions, technical opportunities and economic effectiveness of using the wastes which are most characteristic of Kazakhstan.

Coal industry and branches concerned with processing and burning coal are major suppliers of wastes. This is confirmed by the high specific generation of waste, which is described by the following average values (tons per ton of coal):

Table 1.

| | numerical value of wastes, by stage | | | |
|---|---|---|---|---|
| | mining: | | | |
| | open-pit | mine shaft | concentration | burning |
| all USSR coals | 3.4 | 0.239 | 0.15 | 0.212 |
| Kazakh SSR coals: | | | | |
| Karaganda | 2.4 | 0.126 | 0.17 | 0.29 |
| Ekibastuz | 0.8 | -- | -- | 0.391 |

Total annual generation of wastes within the Kazakh SSR is 72 million cubic meters in the mining stage, six million tons in the concentrating stage and 34 million in the combustion stage.

Currently, hardly any of the enumerated types of waste are used. They are included in the category of industrial production waste and are irretrievably lost as potential raw material, and as an additional source of fuel as well, in a number of instances. In this connection, there are also negative socioeconomic consequences such as environmental pollution, the expropriation of arable agricultural land for use as dumps and the expenditure of materials means for collection and storage. According to the available data, adjusted expenditures on collecting and storing each ton of coal mining wastes average 0.5 rubles, and these expenditures fluctuate between 1.5 and four rubles per ton of ash for combustion wastes.

The impact of these consequences can be significantly limited if wastes are involved in the industrial consumption sphere. It should be noted that all the conditions and prerequisites necessary for this are available, as was pointed out by K. Marx. The most important conditions included: "the accumulation of a significant quantity of excrement [wastes], which is possible only when working on a large scale; perfecting the machinery by which substances not previously consumed in a given form would acquire a form suitable for use in new production; the successes of science, and of chemistry in particular, in revealing the useful properties of such wastes."[1]

Coal mining, concentration and combustion wastes can therefore be viewed as potential raw material for the production of a variety of industrial output.

It is recognized, both abroad and in our country, that the most well-developed and economically best-substantiated direction of coal mining and concentration waste use is to process them into such widely used building materials as brick and "agloporite" [porous agglomerate].

This direction has been verified on an industrial scale abroad. Thus, the Polish-Hungarian "Khaldeks" [Haldex] joint-stock company was created more than 20 years ago to process coal mining wastes. It presently has several plants which are extracting coal from rock dumps (one ton of coal with 5,500 kcal/kg heat of combustion per 10 tons of rock) and processing raw material to produce agloporite and brick. Moreover, enterprises of the Polish-Hungarian company have cleared huge tracts of land of rock dumps in recent years, and the land is now growing trees and grass and is being used for sports complexes.

There are similar enterprises in France, the FRG, Belgium and other countries.

The technological possibility of producing the above types of output under our conditions has been confirmed by semicommercial experiments, and the design elements of individual stages of the process have been formulated in technical plans or other kinds of developments as applicable to wastes from coals from Karaganda (Saburkhan CCP [central concentrating plant] at "Ekibastuz (Bogatyr'" open-pit mine), Donetsk IOCP [ore-concentrating plant] at "Dolzhanskaya-Kapital'naya" mine), and Vorkuta CP [concentrating plant] at "Severnaya" mine).

The first industrial enterprises (shops) to produce brick from Kuznetsk coal wastes will be put into operation late this five-year period at the Abasha and

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[1]K. Marx and F. Engels, Vol 25, Part 4, p 113.

Berezovskiy concentrating plants. The production capacity of each shop will be 10 million bricks per year, and they will use only 10 percent of the Abasha CCP wastes and six percent of the Berezovskiy CCP wastes.[1] Were the wastes obtained at the "Saburkhanskaya" CCP in the "Karagandaugol'" association to be fully utilized, for example, we could produce 190 million bricks or a million cubic meters of agloporite per year.

Experimental checks have established that the brick and agloporite obtained from any coal wastes meet GOST [All-Union State Standards] for analogous output produced from natural raw material.

The effectiveness of using wastes for these purposes is also fully substantiated economically. Planning organization and scientific research institute calculations have determined the expenditures on producing brick and agloporite from coal wastes from the country's main basins, and their numerical value fluctuates insignificantly depending on region. For this reason, Table 2 presents average expenditure values describing the economic aspect of the problem as a whole.

Table 2. Effectiveness of Building Materials Production, in rubles

| indicators | agloporite ($m^3$) made from: | | brick (1,000) made from: | |
|---|---|---|---|---|
| | wastes | clay | wastes | clay |
| capital investments: | | | | |
| total | 17.6 | 23.0 | 125 | 150 |
| raw material extraction | -- | 5.0 | -- | 20 |
| output production | 17.6 | 18.0 | 125 | 130 |
| net cost | 5.1 | 8.0 | 36 | 40 |
| adjusted expenditures | 7.8 | 11.5 | 55 | 62.5 |
| relationship, percent | 70 | 100 | 87 | 100 |

Processing wastes into alumina, the raw material for aluminum production, is a promising direction in the use of wastes. Its legitimacy results from the high aluminum oxide content of such wastes -- 37 percent in wastes from Ekibastuz coal concentration or electric power plant ash, while the aluminum oxide content of the nephelines, alunites and kaolins currently being used in alumina production does not exceed 30 percent.

The technological possibility of producing alumina on a base of Ekibastuz coal wastes has been demonstrated by work done by a specialized institute at a Leningrad pilot plant. The effectiveness of using wastes as aluminum-bearing raw material is now considered substantiated. This position is illustrated by the data in Table 3 [following page], in which approximate expenditures on producing alumina from Ekibastuz coal wastes are compared with indicators of an enterprise producing analogous output in the same amounts using traditional raw materials and situated in the exact same territorial belt.

Consequently, it is entirely possible, technically and economically, to pose the question of creating a large alumina production facility using wastes.

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[1]It takes 4 $m^3$ of wastes to make 1,000 bricks and 0.8 $m^3$ to make 1 $m^3$ of agloporite.

Table 3. Alumina Production Effectiveness, million rubles

| indicators | numerical value of the indicator, production from: | |
|---|---|---|
| | wastes | traditional raw material |
| capital investments[1] | 560 | 584 |
| operating expenses | 90 | 104 |
| adjusted expenditures | 174 | 192 |
| relationship, percent | 100.0 | 110.0 |

A large fuel savings could be obtained in the future by using coal wastes as raw material to produce energy-class gas. The so-called "interior strip" rock from the "Bogatyr'" open-pit mine is of particular interest in this regard. As is known, it has long been discarded onto rockpiles, as the deposit was worked selectively. According to the available data, this rock now contains 0.95 million tons standard fuel.

Without providing a full description of this category of wastes, let us note simply that the heat of combustion of interior-strip rock equals 3,000 kcal/kg and that the ash content varies from 50 to 60 percent. To complete the picture, we must not fail to point out that large sums are being directed into mining several types of fuel minerals with a lower heat of combustion than this rock in our country. For example, Baltic shales have a heat of combustion of 2,000 kcal/kg and coals from the Moscow area -- 2,700 kcal/kg.

Further. The technological possibility, in principle, of gasifying coal-bearing rock has been verified by the Institute of Mineral Fuels under laboratory conditions and, together with the Scientific Research Institute of Shales, at a pilot gas generator at the Shale-Processing Combine imeni Lenin (Kokhtla Yarve). Bulk-mined coal has also been gasified at this combine.

Table 4 gives descriptions of the raw material and the gas, as well as results of a calculation made by the IGI [Institute of Mineral Fuels] of the economic indicators of gas production.

Table 4.

| | coal | rock |
|---|---|---|
| ash content, percent | 48.5 | 55.8 |
| heat of combustion, kcal/kg | | |
| raw material | 3,480 | 30.52 |
| gas | 1,450 | 1,450 |
| raw material expenditure, t/1,000 $m^3$ of gas | 0.5 | 0.68 |
| expenditures, rubles/1,000 $m^3$ of gas | | |
| capital | 5.4 | 6.9 |
| net cost | 1.39 | 1.2 |
| adjusted, per ton u.t. | 10.5 | 10.5 |

For comparison, let us note that the adjusted expenditures on coal mining for the branch as a whole are 26.4 rubles per ton u.e., that is, considerably higher than the analogous indicator for gas.

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[1]with consideration of expenditures in related branches (raw material mining, steam production, electric power, water supply)

Wastes processing in this instance therefore leads to a reduction in expenditures on developing coal industry and ensures a more intelligent use of the natural resources of the Kazakh SSR.

One can draw an unambiguous conclusion as to the national economic effectiveness of producing various kinds of industrial output from solid wastes on the basis of the materials given above which describe individual directions in solid waste processing.

Involving wastes in the sphere of industrial consumption is also economically effective from coal-industry positions. This conclusion is based, first, on the fact that all waste processing production facilities (shops) which are part of concentrating plants, shaft and open-pit mines and electric power plants will have a higher level of profitability[1] than subdivisions of basic branch activity (mining, concentration, briquetting, electric power production) and, second, on the fact that a portion of overall expenditures on mining, concentrating and burning will be related to wastes, inasmuch as they have acquired a consumption value.

The use of Ekibastuz mining wastes and Karaganda coal enrichment wastes will lead to a reduction in operating expenses in the following amounts:

Table 5.

| stage | expenditures, rubles/ton of coal: not using wastes | using wastes | savings in expenditures, rubles/ton | reduction in expenditures, percent |
|---|---|---|---|---|
| mining | 1.34 | 1.06 | 0.28 | 21 |
| concentrating | 1.25 | 1.19 | 0.06 | 5 |

The use of wastes along this line should therefore be viewed as a reserve for improving the economies of coal-mining and coal-processing enterprises.

Along with the use of solid wastes, the involvement of mine methane enterprises in the fuel balances to a greater extent must become a substantial reserve for saving natural resources, as this is a gas contained in coal seams and brought to the surface only as a coal-mining by-product. According to the available data, methane reserves down to the 1,800-meter depth at which coal reserves have currently been mapped are estimated to be more than 60 trillion cubic meters.

The distribution of these reserves, by deposit depth, recalculated to conventional fuel are given in billion tons u.t. in Table 6:

Table 6.

| basins | total, all depths | by depth, in meters | | | |
|---|---|---|---|---|---|
| | | to 300 | 301-601 | 601-1200 | over 1.200 |
| USSR total | 61.7 | 5.0 | 11.6 | 24.8 | 20.3 |
| Karaganda only | 0.5 | -- | 0.1 | 0.2 | 0.2 |

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[1]The level of profitability of brick production from wastes fluctuates from 14 to 20 percent and that of agloporite -- from 13 to 18 percent, while at the same time, it is significantly lower by subbranch of coal industry.

The highest amounts of methane are contained in coal seams in the Donets, Karaganda, Pechora and Kuznetsk basins (50-100 $m^3$ per ton of coal).

Given the current scale of coal mining, about six billion cubic meters of methane is released from mine shafts to the surface annually (7.3 million tons u.t.), which corresponds to the heat content of 10 million tons of anthracite with a heat of combustion of 5,000 kcal/kg.

The high energy value of the gas and those well-known complications which methane causes when deposits high in gas are worked necessitate that the gas be removed and used.

In 1980, the gas was extracted from 200 mines of the USSR Ministry of Coal Industry, resulting in the extraction of approximately 1,150 million cubic meters of methane-air mixture, including 740 million cubic meters in the Donets Basin, 180 million in the Kuznetsk, 90 million in the Karaganda and 10 million in the Pechora. This comprises approximately 15 percent of all the methane removed from the seams. The remainder of the gas is discharged into the atmosphere in an outgoing flow of ventilation air containing not more than 0.7 percent pure methane. It should be emphasized here that safety requirements permit the use of a methane-air mixture containing not less than 30 percent pure methane for burning in boilers and one containing upwards of 50 percent pure methane for household use.

Only 50 percent of the total methane-air mixture obtained when removing gas from mines of the Ministry of Coal Industry meets the above requirements. The methane content in the mixture as a whole fluctuates within a broad range branch-wide (12 to 74 percent). This is one reason preventing the use of all the potential resources of mine-shaft methane.

A second reason retarding the large-scale use of mine methane is the instability of deliveries in individual periods of time (hourly, daily, and so on). Unevenness in gas delivery, which is in turn caused by the system of coal mining organization and by no means identical content of methane in the seams being worked, has a negative effect on the economies of enterprises basing their power systems on the use of a methane-air mixture. This risk can be eliminated and an uninterrupted supply of this type of fuel to consumers can be achieved by building intershaft methan collectors, as is done in the CSSR, or by combining, circularly, into a unified complex the degassification facilities of several mines, as is recommended by Kazakh SSR specialists, to provide a methane-air mixture for the TeTS-3 under construction in the Karaganda Basin.

In the Soviet Union, mixtures meeting standards in terms of composition and constancy of delivery (flow rate) are basically used as a local power fuel. Thus, 22 boilers in the Donets Basin, three in the Pechora and one in the Karaganda are currently operating on methane. This year, this type of fuel will be used in driers at a concentrating plant attached to "Severnaya" mine in the "Vorkutaugol'" association.

The Donets Basin has the most experience in using mine methane as a power fuel, as the transfer of 100 boilers at 35 mine boiler installations has provided an annual economic impact of three million rubles. Also achieved were a fuel economy of 200,000 tons and a reduction in discharges of particulates into the air.

According to planning developments by the SAO VNIPIenergoprom [probably: automatic optimization system of the All-Union Scientific Research and Planning Institute of Power Industry], burning methane at TETs-3 will produce an economic impact totalling 1.2 to 1.5 million rubles per year as compared with using coal.

The material presented on this group of coal production wastes testifies to large and by no means fully used opportunities in the area of raising the quantitative level of mine methane use. In this connection, foreign experience is of great interest. The use of mine methane in the CSSR, Britain, the FRG, Belgium and elsewhere is characterized by great diversity. It is burned in steam boilers not only in pure form, but also together with low-grade coal; it is also used in metallurgical and other furnaces, internal combustion engines, motor transport, municipal and household systems, and chemical industry. Thus, the CSSR efficiently uses 95-97 percent of the 240 million cubic meters of mine methane removed in the course of a year by degassifying wells, 20 percent being consumed at coal industry enterprises and the remainder in other branches of the national economy.

Further still. The utilization of the sulfur in coals and polymetallic ores is an integral part of the problem under review and a very important task at this stage. The urgency of resolving it is determined by the constant growth in the mining and processing of high-sulfur compounds for technological equipment and the environment.

The amount of sulfur contained in the coals being mined can be judged from the values below (million tons):

Table 7.

| | 1970 | 1975 | 1980 | 1985 |
|---|---|---|---|---|
| all USSR coals | 8.6 | 9.3 | 9.7 | 10.8 |
| Kazakh SSR coals only | 0.44 | 0.66 | 0.87 | 1.12 |

At present, coal sulfur is being partly removed at concentrating plants and is being recovered in small quantities (18,800 tons) at coke-chemical plants. Consequently, this raw material is hardly being used. The main reason is the lack of effective methods of recovering sulfur compounds. In this connection, the development of technically progressive and economically effective ways of solving the problem is a task of state importance confronting scientific research institutes, planning organizations and industrial enterprises.

Much still remains to be done in the area of further introducing methods of recovering sulfur compounds from nonferrous metallurgy plant stack gases. We should first disseminate the available experience of such enterprises as the Ust'-Kamenogorsk Lead-Zinc Combine, the Dzhezkazganskiy Mining-Metallurgical Combine, Chimkent Lead Plant, and others.

Along with steps to utilize sulfur compounds, the development and improvement of technological schemes for increasing the concentration of sulfur in stack gases are an important link in the chain of general tasks. Sulfur is presently not being recovered from gases with a low concentration (up to 3.5 percent) of so-called "weak" gases.

The above materials testify to the great but far from fully utilized opportunities for using solid and gaseous wastes from industrial enterprises.

Their extensive involvement in the raw material balance can be accelerated by implementing many organizational measures, a special place among which is occupied by the following:

-- wastes must be used for planned purposes, that is, their reprocessing must be planned, just as is production using primary raw material;

-- the construction of waste reprocessing enterprises must be financed centrally, following the targeted-purpose principle;

-- industrial enterprises must be allocated primary raw material resources only after fully exhausting potential opportunities for using wastes whose technological readiness has been verified under pilot-industrial conditions and whose economic appropriateness has been substantiated by planning organizations;

-- including in the estimate-planning documentation for the construction of new enterprises a section devoted to revealing the effectiveness of using the wastes obtained when reprocessing (using) raw material.

Practical implementation of the enumerated measures will enable us to convert production wastes into a large source of raw material and will ensure the intelligent use of natural resources, as well as lead to a reduction in expenditures on production and creating conditions for organizing waste-free production facilities; in so doing, it will facilitate preventing environmental pollution.



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ENERGY CONSERVATION

## AZERBAIJAN ENERGY ECONOMY EFFORTS

Baku VYSHKA in Russian 5 Oct 82 p 2

[Article by Azglavenergo Energy Inspectorate inspector F. Samedov: "Taut Norms, the Basis of Economy"]

[Excerpts] A significant portion of Azerbaijan's electric power comes from other regions, so the question of consuming it efficiently is especially pressing to us.

Strict economy procedures assume a rejection of the customary principles of accounting and demand a new approach, as when enterprises constantly seek out ever newer opportunities for lowering energy expenditures per unit of output produced, as there is no shop or plant sector in which economy reserves have been exhausted. However, we specialists in the energy inspectorate have, in the course of our duties as monitors of electric power use, repeatedly been convinced that significant economy reserves have for many years remained unused. Take, for example, enterprises of the "Soyuzneftemash" association, one of the largest consumers of energy. During the 10th Five-Year Plan, they expended 825 million kilowatt-hours of electric power and saved 45 million, that is, 5.9 percent of that used. As we see, all is in order in the report: no overexpenditure. This suffices in reporting to the Ministry of Petroleum Refining and Petrochemical Industry [Minneftekhimmash], as the ministry plans specific energy consumption norms per thousand rubles in gross output. "Soyuzneftemash" association lowers the norms for specific enterprises, and it also takes the high road, planning expenditures per 1,000 rubles in gross output.

The instability and nonobjectivity of calculating this way have been discussed many times. It places no barrier in the path of thriftlessness and fails to arouse labor collectives to introduce energy-saving equipment and technology, to persistently seek and find economy reserves and bring them into play.

We need to take the path of establishing technically substantiated, taut norms. There is an instruction developed by special design and technological bureaus of the Ministry of Chemical and Petroleum Machinebuilding which obligates enterprises to develop their own specific fuel and energy resources expenditure norms which take specific conditions into account for the physical or reference indicators being planned for shops (cubic meters, tons, sets, and so on). The instruction was approved and has been in effect since 1980. However, enterprises unfortunately neither have nor use technical norms in their practical work to this day.

BNIIPIneftemash [not further identified] specialists, to be precise, the normative group created on its basis, must, in our view, state their weighty view and point out the main channels of energy loss. The more so, since this is the very group instructed by the Ministry of Chemical and Petroleum Machinebuilding to map out reserves for reducing expenditures of and saving fuel and energy resources in the 11th and 12th five-year plans. However, this map did not take all reserves into account. There are quite a few instances in which enterprises essentially squander energy while at the same time appearing to save it. Here are a couple of examples.

Gas furnaces have been installed at all plants. Ventilators must be used to feed in air so the gas will burn completely in the furnace. However, the plants imeni Lt. Schmidt and imeni Sardarov use compressed air produced by the compressor station. A double loss. First, due to furnace leaks, large amounts of heat vanishes because the compressed air comes in under unnecessarily high pressure and, second, ventilator air feed would enable us to switch off a portion of the energy-intensive compressor machinery. According to our estimates, due just to these two enterprises' using compressed air in gas furnaces, the association overexpended 275,000 kilowatt-hours of energy per year.

Or take the important reserve of utilizing recovered energy carriers, to wit, the heat from cooling electric and gas furnaces or recovered condensate, which is also not being used. At "Bakinskiy rabochiy" plant, for example, electric furnaces are turned on to dry electrodes while enough heat is being given off by the gas furnaces in the thermic shop to perform a number of other technological operations.

And instances of direct losses are totally intolerable.

Checks made at 10 enterprises of the "Soyuzneftemash" all-union production association during 1980-1982 revealed that steel smelters were operating with open shields. Arc furnace hot down time due to uncoordinated actions with the molding sector is high. Electric furnaces are loaded at less than 10 percent. You glance at the furnace and see a couple of parts being worked, the bulk of the space empty. This is simply extravagance.

The attitude of specialists towards this is especially alarming. They agree that each plant and sector needs technically substantiated norms to create an objective energy consumption picture and constantly lower electric power expenditures. But it is one thing to nod one's head in assent and quite another to display initiative in changing the situation.

I should like to take this opportunity to draw the attention of enterprise leaders and specialists to the task of immediately changing over to taut energy consumption norms. This is a most-pressing task as it will be impossible without these norms to establish very stringent economy routines. And this must begin with the proper adjustment of recording engineering statistics.

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ENERGY CONSERVATION

## ESTONIAN ENERGY CONSERVATION DIFFICULTIES DETAILED

Tallinn SOVETSKAYA ESTONIYA in Russian 15 Sep 82 p 2

[Article by "Estenergonadzor" chief engineer V. Mil't: "Energy -- Strict Accountability"]

[Text] The urgency of the problem of using energy resources intelligently and the growing attention being paid to saving them are obvious. In recent years, definite results have been achieved in the republic. Thus, for example, the volume of industrial production increased twice as fast as the consumption of electric power and heat this past five-year plan. Last year, socialist obligations on saving electric power and heat were successfully met. Some 129 million kilowatt-hours of electric power and 354,000 GCal of heat were saved. The attainment of such indicators was also facilitated by the widespread socialist competition among enterprise collectives to save, by the activeness of party and trade-union organizations and by annual republic and unionwide contests for the best proposals to save energy.

Such enterprises as the Tallinn Water Supply and Sewage System Production Association, "Slantsekhim" production association imeni V. I. Lenin, "Yarvakandi Tekhased" combine, "Silikat" production association and others most often figure among the competition winners.

And how do things stand this year with regard to meeting socialist obligations? In the first quarter, the electric power savings in republic industry was only 14.1 million kilowatt-hours (or 1.6 percent), and in the second quarter -- 20 million kilowatt-hours (2.5 percent). Why? The answer is easy. Eight enterprises in the first quarter and four in the second overexpended about 10 million kilowatt-hours of electric power.

Who are these "overdoers"?

Let's name several: "Estonbumprom" production association -- 3.6 million kilowatt-hours, five enterprises of the ESSR Ministry of Meat and Dairy Industry -- 2.3 million kilowatt-hours, the "Punane Kunda" plant -- 3.4 million kilowatt-hours. Overexpenditures of specific thermal energy norms were permitted by enterprises of the ESSR Ministry of Meat and Dairy Industry -- 5,000 GCal and the Maarduskiy Chemical Plant -- 990 GCal.

Consequently, large economy reserves are concealed in eliminating all types of overexpenditure. The reasons are hidden basically in the poor technical condition of the equipment and in uneven enterprise operation, meaning the leaders of a number of ministries and departments, associations and enterprises do not have enough responsibility for solving problems of conserving energy resources. The introduction of equipment which uses energy efficiently, of progressive technological processes, of installations and machinery with lower specific expenditures of energy per unit of output produced, and the replacement and modernization of obsolete equipment -- these are the ways to save.

However, recordkeeping is equally important. It is appropriate at the large industrial enterprises to organize electric power recording using automated systems. Such systems are available, but many enterprises are unwilling to concern themselves with installing them.

Thus, for example, the Akhtmeskiy Construction Materials Combine, Tallinn Reinforced Concrete Products Plant, Vykhmaskiy Packing Plant, Tallinn Asphalt-Concrete Plant, Tallinn Commercial Port and others acquired these expensive systems several years ago but have thus far not put them into operation.

Recording thermal energy both in the municipal-services and housing system and at industrial enterprises requires particular attention. At present, more than 5,000 facilities are switched into just the heat networks of the energy system. The existing recording system provides no opportunity for revealing which consumer is expending thermal energy economically and which is not. The reason is simple: a majority of the customers simply do not have recording devices.

Only half of the industrial enterprises, which use 37 percent of all the heat consumed, are equipped with recording devices, and many of them are inoperative, for a variety of reasons. You can count the remaining consumers equipped with recording devices on the fingers of one hand. And in fact, any economy measures will not yield the desired impact without such recording.

The republic has an enterprise producing heat meters, the "Prompribor" association. However, the meter production volume there is comparatively small, and Estonian SSR enterprises are not receiving them. In our view, it would be logical to leave a portion of the output from this Tallinn enterprise to meet republic needs. In order to do this, we possibly should increase the release of heat meters at the "Prompribor" association.

Further. According to USSR Gosplan and USSR Gosstroy instructions, all production planning organizations are obligated to anticipate in plans for various building heat centers automated heat consumption systems and the installation of devices to record heat used. Union agencies are also obligating subordinate operating organizations to ensure the installation of such automated systems and devices at existing building heat centers from 1981 through 1985.

In view of the fact that using these devices and automated systems permits a 5-6 percent reduction in fuel-energy resources for heating, ventilation, hot water and technological purposes, as of 1 January 1983, buildings and facilities may not be put into operation if heat centers for them do not have automated thermal energy consumption and heat expenditure recording.

With a view towards monitoring the use of electric power for all consumers (excluding the general populace), consumption plans have been established. Consequently, the consumers themselves are also obligated to strictly record daily expenditure. Unfortunately, this work has thus far been set up poorly. There has been significant above-plan excess energy consumption.

Thus, for example, in March, the Narva Construction Materials Combine consumed an excess of 114,000 kilowatt-hours, "Kiyr" production association (February) -- 15,700, and "Sel'khozkomplekt" office -- 9,000. But "Punane Kunda" Cement Plant broke all records with an excess of more than a million kilowatt-hours. The enterprise had to pay 84,000 rubles for that additional energy.

One effective way of increasing the effectiveness of steps to save fuel-energy resources is the precisely organized stimulation of their implementation. Saving energy resources has been viewed in the directive documents adopted in recent years as one of the basic indicators in the material incentives system. The proportion of deductions to the bonus fund has also been increased correspondingly, which is the basis for the increased material interest of workers and engineering-technical personnel in the more intelligent use of energy resources.

The question often arises of awarding bonuses to workers in individual structural subdivisions which have permitted violations of electric power and heat consumption procedures. The answer is unambiguous: failure to follow such procedures is a violation, and those at fault must be deprived fully or partially of bonuses.

On the whole, republic reserves in the area of saving energy resources are quite significant, and their use is a necessary condition to continued growth in the efficiency of social production.

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ENERGY CONSERVATION

KEMEROVO OBLAST ENERGY-CONSERVATION INITIATIVE

Moscow PRAVDA in Russian 15 Oct 82 p 2

[Article under the heading "Routes of Leading Experience": "Sources of Economy"]

> [Text] The experience of the Kemerovo Oblast party organization in the effective, economical expenditure of fuel, heat and electric power has been approved by the CPSU Central Committee. How has this initiative been developed in the 11th Five-Year Plan? [Three local officials] discuss this at the request of PRAVDA correspondent A. Bogachuk.

Ye. Musokhranov, Hero of Socialist Labor and brigade leader at "Yubileynaya" Mine of the "Gidrougol'" association.

Hydraulic coal mining is still a young method, but one which has already proven its advantages. Average monthly output per mine worker here is twice as high as the basin average, which is foremost a result of the high availability of energy to labor. The thrifty expenditure of electric power has therefore become the primary concern for us. During the first half of the year alone, the miner collective saved three million kilowatt-hours. But the reserves are still high, the primary one being to improve technology, to develop and introduce new equipment.

I did not misspeak myself: development also. The fact is that our association is a scientific-production one and includes, along with the mines, the VNIIgidrougol' Institute and a hydraulic machinebuilding plant. Cooperation among scientists and designers, miners and machinebuilders permits a significant reduction in the time involved in working on new units and "registering" them in the flow charts faster.

The brigade was quite recently instructed to test a prototype of the 12GD2 monitor. After finishing work was done by the designers to reflect our desires, the unit was both more productive and more convenient to operate. As the monitor operators say, with the same energy expenditures, the unit removes 250 tons of coal per pass, two times more than the previous monitor. And the volume of preparatory work has also been decreased by a third, also a sizable savings in electric power.

Or take the series-produced K-56MG combines. Scientists proposed changing them over to remote control, increasing machine time by 20 percent and reducing electric engine idle. Increasing the load at the longwall is a large reserve for saving energy resources.

G. Sal'nikov, director of the Kuznetsk Ferroalloys Plant.

Ferroalloy production is connected with high expenditures of electric power.

If you trace out a curve of energy expenditures on smelting ferrosilicon, the basic plant output, it shows that the most economical alloys are those containing 45-50 percent silicon. Either increasing or decreasing the amount of silicon in the alloys entails increased specific energy expenditures. In cooperation with metallurgists, we have begun mastering the release of so-called intermediate brands of ferroalloys. They are economical, but their practical use in steel smelting will require certain changes in technology. And it is good that we are supported by our allies, metallurgists at the Kuznetsk combine and the West-Siberia, Chelyabinsk and Verkh-Isetskiy plants. As a result, electric power expenditure on smelting a conventional ton of ferrosilicon was reduced an average of five percent and the annual savings was 10 million kilowatt-hours.

Our plant is among the oldest in the branch. By partially modernizing units in the course of major overhauls over the last 10 years, we have been able to increase the release of ferroalloys by 30 percent. This reserve has now been exhausted, but the collective's creative search has opened up other opportunities. A year ago, for example, we began mastering the release of complex alloys containing the manganese metallurgists need. In and of themselves, such alloys have been long known but, as distinct from other plants, we make our manganese additives by using discarded raw materials, "tailings". These alloys are now being successfully used at the Kuznetsk combine and the Zapsib, at "Santekhlit" and Altay Motor plants. We are thus able to save thousands of tons of scarce manganese annually.

Kemerovo Oblast Party Committee Secretary V. Sitnikov comments.

This is now the second five-year plan the oblast has worked out comprehensive programs to save fuel-energy resources, metal, lumber, building and other materials. In order to do this, the reasons for losses and inefficient expenditures of energy resources are carefully studied, with the active participation of scientific-research and planning institutes. Particular attention is paid to substantiating the measures being planned. They are discussed in labor collectives, in the rayon and city committees, and these plans are then summarized by branch and reviewed in the party obkom. This is, in brief, the procedure for drawing up the comprehensive savings programs.

Implementation of the entire complex of measures will enable us to save upwards of a billion kilowatt-hours of electricity, 2.6 million GCal of heat, more than half a million tons of conventional fuel and 42,000 tons of petroleum products in the 11th Five-Year Plan.

Reaching each person and each workplace is very difficult but, we are convinced, most necessary to success in the struggle for economy. An appreciable role in

this is played by the personal plan obligations and personal accounts, which have become a successful form of worker participation in this work. But it is important to strengthen initiative from below through precise organization of this work. In particular, specialists and scientists help improve steps to encourage competition participants to save and to introduce progressive forms of expending materials and electric power with consideration of the achievements of science and leading experience.

The collective at Kemerovo GRES has accumulated positive experience in saving. During the five-year period, it increased electric power generation by 73 percent and heat production by 23 percent. In this regard, specific fuel expenditures to generate one kilowatt-hour of power were lowered by 58.4 grams and expenditures to produce one gigacalorie of heat were reduced by 6.8 kilograms. Production retooling, the replacement of obsolete units with more productive and economical ones, changing the plant over to gas as a fuel, have played a decisive role here. This power engineering experience has been comprehensively studied in the oblast school of advanced experience. Understandably, it cannot be mimicked, as each labor collective has its own conditions and its own reserves. But we can and must teach each other a creative approach to our work and the ability to create an atmosphere of searching. "Azot" association, the silk fabrics combine, "Strommashina" plant and the chemical fiber plant, Kirov garage -- each has accumulated useful experience and has set up economy work in different ways, based on its production specifics. However, a concreteness and an inseparable bond between organizational and educational work are characteristic of each.

The party committees have created economy and thrift coordinating commissions which operate in close contact with the councils for political and economic cadre education, party groups and shop party organizations, as well as with people's inspectors. Inspection contests and schools of economic education assist in the collective search for economy reserves.

The thrift movement has brought considerable benefit not only to large enterprises and construction projects. Take energy consumption to meet household needs. As is known, there are no limits on this consumption, but that does not mean that immeasurable consumption. As experience in Prokop'yevsk and other cities has shown, significant heat and fuel savings can be obtained by centralizing the sources of heat supply, closing small boilers, renovating heat systems and eliminating all kinds of heat losses. We have intensified work on saving electric power at home among communists in zheki [not further identified] and municipal services enterprises. They are helped by Komsomol "searchlight" posts and Pioneer monitors serving at residences.

Over the first year and a half of the 11th Five-Year Plan, oblast laborers saved 155 million kilowatt-hours of electric power, nearly a million gigacalories of heat and 342,000 tons of conventional fuel.

But the reserves are still large and success does not accompany all collectives. During the second quarter alone this year, 10 enterprises overexpended upwards of 10 million kilowatt-hours. Some steps to reduce coal losses at steep and inclined seams were not carried out. In a word, there is still work to be done, especially from the viewpoint of strengthening energy consumption discipline. At the same time, it is useful to examine this work from another side as well.

Back in the previous five-year plan, the USSR Gossnab, Ministry of Instrument Making, Automation and Control Systems, and other departments were to have provided our enterprises with instrumentation to record electric power and heat consumption. However, as before, only 25-30 percent of our orders for these devices are being met. Need it be said that deficiencies in recording and monitoring energy consumption in the shops and sections generate irresponsibility and hamper publicizing and comparing results in the competition for economy and thrift.

Or the fact, correctly noted by ferroalloys plant director G. Sal'nikov, that it is very efficient to produce intermediate alloys. What is the USSR Ministry of Ferrous Metallurgy's position on this? These progressive new brands have not yet been legalized by All-Union State Standards, so their production at the plant is only 10 percent of total production volume, while expanding the production of economical brands with no decrease in quality could save not 10 million kilowatt-hours of electric power annually, but 50-60 million at the Kuznetsk plant alone.

I have no intention of shifting the responsibility for oversights in work to save energy resources onto the ministries and departments. Together with economic leaders, the oblast party committees and Soviet, trade-union and Komsomol organizations will be able to ensure unconditional fulfillment of the obligations assumed. At the same time, the labor collectives have a right to count on more active support on the part of branch headquarters in the struggle for the thrifty and efficient expenditure of fuel and electric power.

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ENERGY CONSERVATION

## TATARIA ENERGY-USE RECORDKEEPING PRACTICES SCORED

Moscow IZVESTIYA in Russian 18 Oct 82 p 2

[Article by correspondent A. Sabirov: "Fuel Reported Saved, In Fact Overexpended (Reserves Used Poorly in Tataria)"]

[Text] Who hasn't seen a little stream of gasoline running down to the ground as a car is being refueled. A couple of drops, you think. But the simple truth is that saving in little ways means big savings, especially with regard to fuel, with its inherent ability to soak through, leak out, evaporate or fly unused out a smokestack.

During the first half of this year, instead of a planned savings of 71,500 tons of conventional boiler-furnace fuel in the autonomous republic, there was an overexpenditure of 85,000 tons. Given a planned reduction in electricity use of 510 million kilowatt-hours, 335 million kilowatt-hours above the normative was spent.

Incidentally, the tallest smokestacks in Tataria are at the Zainskaya Thermal Electric Power Plant, which also consumes the most fuel. Consumers receive a billion kilowatt-hours of electric power from it. After overcoming quite a few difficulties, they have mastered the use of Orenburg gas.

"We save 0.3 grams of conventional fuel per kilowatt-hour produced," I was told at the power plant. "During the first nine months of this year, we have saved about 4,000 tons."

The indicators of the Naberezhnyye Chelny and Nizhnekamsk TETs's are quite good. Thermal and electric power generation there are fully automated. The "Tatenergo" administration has saved approximately 15,000 tons during the first nine months of this year.

But I was quoted a different figure in the statistics administration. Power enterprises have already overexpended more than 30,000 tons of conventional fuel. It was proposed that specific fuel expenditures at electric power plants would drop by 2.2 grams per kilowatt-hour of electric power produced and that the fuel saved would generate an additional 210 million kilowatt-hours of electric power. Thus far, specific expenditures have dropped by only one gram, so power enterprises have now overexpended tens of thousands of tons of conventional fuel. Whence these variant readings? It turns out there is double bookkeeping: one

set of records along departmental lines and another in a territorial cross-section, and different expenditure norms are used.

I do not know who gains from this accounting. Does it really make sense to pay even half a bonus if more fuel than is stipulated in the norms is being burned in the boilers? The 1982 socialist obligations in the republic anticipate saving 143,000 tons of conventional boiler-furnace fuel, 11,000 tons of diesel fuel and 9,000 tons of gasoline. It is not yet appropriate to say that things are going well.

As a result, much fuel above the norm has been spent at enterprises of the Ministry of Textile Industry and quite a bit of electricity and heat has been expended to no purpose. Fuel overexpenditures are high at the Zelenodol'skiy Plywood Plant and the Povolzhskiy Plywood-Furniture Combine. Due to engineering service oversights, more than 2,000 tons of fuel was burned pointlessly at the Kazan' Dairy Combine.

In order to actually save fuel, not just on paper, we should achieve qualitative changes in production and establish a strict economy regime at each workplace. But some people, instead of serious obligations, write down the first number that comes to mind, just to follow form. Thus, they decided in "Tatavgoremont" association to save one ton of fuel over the entire year. And then they reported that they had saved 865 tons in the first half of the year.

The coming cold weather will, like strict inspectors, check the readiness of preparations for this harsh season. In Naberezhnyye Chelny and Nizhnekamsk, a majority of the housing is heated from a single source, a large TETs. The central boiler plant in Aznakayevo settlement is operating splendidly.

However, there are still many technically obsolete and therefore inefficient boiler plants in the capital of the ASSR, with its population in the millions. They devour fuel without measure and require high labor expenditures on service. Specialists estimate that each burns up to 500, sometimes 1,000, tons of fuel above the norm each year.

Development of the republic capital heat-supply system is lagging behind housing starts, the rates of provision of public amenities and population growth. A poor situation has developed in Bugul'ma, Zelenodol'sk and Yelabuga. A boiler system has been started up in Chistopol'.

The "Tatteploenergo" association was created recently, bringing under its control 200 heat sources and 600 kilometers of heating system. In the future, all local-agency boilers, which currently have a very motley assortment of equipment, will be transferred to its care. The association will equip them with automatic devices. Specific fuel expenditure to generate one gigacalorie of heat is already 173.2 kg in the "Tatteploenergy", while it exceeds 200 kg on averate in the republic and is 260-270 kg in spots.

Many boiler plants lack chemical water treatment installations, leading to the development of scale in the boilers and pipes. Each millimeter of scale causes a two-percent fuel loss. And in some boilers, a check showed that the layer of scale reaches three centimeters, meaning 50 percent of the fuel burned in them goes for naught.

Fewer boilers have been using coal and liquid fuel in recent years. An overwhelming majority operate on highly efficient natural gas. But it, too, must be used skillfully; wider use must also be made of automatic controls which permit maintaining an efficient "gas - air" ratio without human interference. Experience in using automatic regulators has been accumulated at Al'met'yevsk, where, on the initiative of specialists of the Moscow administration of "Gazmontazhavtomatika" trust, a set-up group has been created to improve the efficiency of heat-engineering equipment. The task of automatically regulating combustion in the boilers has been resolved, and a large deaeration installation to provide a hot water supply to the new housing developments has been automated.

I was interested in whether the leading Al'met'yevsk experience has been widely disseminated. But it turns out that the set-up organizations are unwilling to automate boiler plants and many means of automation are not to be found for a month of Sundays. How can one work blindly and achieve a fuel savings? It is obviously time for the USSR Ministry of Instrument Making, Automation Equipment and Control Systems and planning agencies to finally ensure the development of instrumentation and apparatus production.

The Kazan' administration of the RSFSR State Committee for Supplying Petroleum Products is a major supplier of fuel in Tataria. It has 33 petroleum centers and branches and 72 gas stations in the republic. Overall, they supply upwards of 10 million tons of petroleum products annually. The administration provides more than 5,000 major consumers with fuel.

Let's go to Pestrechinskiy Rayon and make a sample check at "Shigaleyevskiy" sovkhoz, reported to be making substantial savings. However, it turns out to be a "false-bottom" savings, as mentioned before. The farm actually permitted an overexpenditure. For example, irrecoverable losses of gasoline were six tons here last year; diesel fuel losses were 12,500 tons. The situation is the same on neighboring farms and at "Tatarskiy" poultry farm.

Jointly with associates in the Tataria People's Control Committee, inspectors from the State Petroleum Inspectorate have comprehensively surveyed Tetyushskiy Rayon. Last year, the overexpenditure on shipments increased over the 1980 level and was 875 tons. And 147 tons over-regulation of diesel fuel was spent on field work. Actual diesel fuel expenditure on a conventional reference hectare on the farms checked exceeded the norm by up to 30 percent and motor-transport gasoline expenditure exceeded the norm more than two-fold.

I have before me long lists of violators from Aksubayevskiy, Arskiy, Kukmorskiy, Laishevskiy, Mamadyshskiy and other rayons. The illegal "couple of drops" of petroleum products has, in the words of one official document, taken on "massive dimensions." Scarce gasoline is being sold right and left, being exchanged wholesale and retail. This valuable fuel is being burned in dozens of settlements in all corners of Tataria in the fireboxes of standard and homemade furnaces, in all manner of workshops and feed plants. Only a little mismanagement has been detected, but even there, not every squanderer has been punished. In the first half of the year, 66,000 rubles in fines were levied for squandering gasoline and diesel fuel, but only a little over 20,000 rubles of that was collected....

Who would notice a few drops amid this disorder? But in fact, scientists have estimated that drop by drop, a tank loses a total of half a ton of fuel a year. And who isn't counting fuel expenditure in agriculture and related branches! It is traced by the State Sel'khoztekhnika Committee, which has the funds, monitored by the State Petroleum inspectorate, closely inspected by the Gossnab, regularly discussed by the interdepartmental commission for the economical and intelligent use of material resources, and kept under the unblinking gaze of the State Standards Committee's Standardization and Metrology Center; also involved are the State Gas Inspectorate of the Ministry of Gas Industry and the State Energy Inspectorate of the Ministry of Power Engineering and Electrification. And the level of losses is still high.

Fuel must be strictly accounted for everywhere. Much can be done by the local Soviets and people's monitors. The responsibility of officials for inefficient, extravagant fuel use should probably be increased. Isn't it time planning and supply agencies, jointly with scientists and branch ministries, work out proposals on radically improving monitoring and inspection? This question is more urgent today than ever before.

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## PRESENT, FUTURE OF KANSK-ACHINSK FUEL AND ENERGY COMPLEX

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[Article, published under the heading "Scientific and Technical Programs," prepared by the Mineral Resources Department of the State Committee for Science and Technology: "The Kansk-Achinsk Fuel and Energy Complex (KATEK)"]

[Text] The first issue of EKONOMICHESKAYA GAZETA contained an article by Academician G. I. Marchuk, deputy chairman of the USSR Council of Ministers and chairman of the USSR State Committee for Science and Technology, entitled "Comprehensive Specific-Purpose Programs," which deals with 170 scientific and technical programs being carried out in the 11th Five-Year Plan. Many of these will be discussed in State Committee for Science and Technology survey articles to be published in this weekly.

The Kansk-Achinsk Brown-Coal Basin in Krasnoyarsk Kray is truly unique; a fuel and energy complex is being established on the basis of this energy source. Producible coal reserves here exceed 110 billion tons, while geologic reserves exceed 400 billion tons. KATEK facilities will eventually include thermal electric power stations with an aggregate generating capacity of 34 million kilowatts.

Favorable mining engineering and geologic conditions make it possible to develop the basin's coal deposits by the most efficient surface-mining method, with which labor productivity in producing coal is 10 times that of underground mining, while production cost is only slightly more than one fifth as much.

Presently only the Irsha-Borodinskiy and Nazarovskiy coal strip mines are in operation in this basin, as well as an experimental-commercial section of the Berezovskiy No 1 strip mine. In 1982 Kansk-Achinsk coal production totaled approximately 37 million tons, half again as much as in 1975. Production in 1983 is planned at 40 million tons, with 49 million tons planned for 1985. By the end of the present decade KATEK will reach a production of 70 million tons, and 170-200 million tons by the year 2000.

The vast scale and rapid pace of coal production growth make problems of scientific and technological advance paramount items in the development of KATEK.

As a result of adoption of new equipment, the average monthly per-worker labor productivity in producing coal at this basin's strip mines has already reached 815 tons, as compared with the 442 tons national average for this country's surface coal mining enterprises, while production cost is half the average. The percentage share of coal production with the employment of rotary excavators more than tripled in 1982 in comparison with 1975 -- from 22.3 to 70 percent of the total volume. Our country's first supergiant walking excavator has gone into operation at the Nazarovskiy strip mine, removing overburden by an advanced transferless process, with which labor productivity is higher by a factor of 3-4, while stripping cost is from one third to one half that of an operation using transport to haul away overburden. Its bucket capacity is 100 cubic meters, with a boom length of 100 meters. This giant moves 12-13 million cubic meters of overburden a year.

Further increase in coal production volume in this basin is to be achieved by putting on-line giant strip mines producing 50-60 million tons of coal per year. Presently the production capacity of the largest of the enterprises operating here -- the Irsha-Borodinskiy strip mine -- is 22.5 million tons.

Two Berezovskiy GRES, with a generating capacity of 6.4 million kilowatts each, will be constructed during the 11th-12th Five-Year plans. The first two 800,000 kilowatt generating units will come on-line in the current five-year plan.

Giant-Capacity Equipment

Resolution of the entire aggregate of scientific and technical problems connected with the development of KATEK is being accomplished on the basis of specific-purpose programs ratified by the USSR State Committee for Science and Technology, USSR Gosplan, and the USSR Academy of Sciences. These plans, in addition to project tasks pertaining to developing new, innovative equipment, also specify targets for increasing the production capacities of machine building plants and other facilities for accelerated development, commercial-scale manufacture and adoption of newly developed equipment. All this has been incorporated into the five-year and annual plans of organizations and enterprises. It is precisely this which constitutes the fundamental difference from previous programs and coordination plans, which included plan targets only for the development of new equipment. This ensures continuity of the unified "research-production-application" cycle.

Territorial scientific and technical information centers of the State Committee for Science and Technology have been enlisted in this work, in order to increase oversight and monitoring of progress in achieving the targets specified in the programs. Coordination councils have been set up for each program, consisting of scientists, ranking officials and leading specialists at ministries and agencies.

Of fundamental importance is the comprehensive specific-purpose program entitled "Development and movement on-stream of industrial processes and mining equipment systems for developing in the Kansk-Achinsk and other basins in our country's eastern regions of high-output coal strip mines with a labor productivity exceeding the currently achieved level by a factor of 3-4."

This program calls for the development of 35 types of equipment and six different process arrangements for the conduct of mining operations. A total of 29 types of equipment and all process arrangements are being adopted in the 11th Five-Year Plan.

More than 30 scientific research and engineering-design institutes, production associations and machine building plants of 7 ministries and agencies are participating in implementation of this program. Leading organizations include the Mining Institute imeni A. A. Skochinskiy and Ukrniiproyekt of the USSR Ministry of Coal Industry, the Uralmash and Zhdanovtyazhmash production associations, the Novokramatorsk Machine Building Plant of the Ministry of Heavy and Transport Machine Building, and the Institute of Geotechnical Mechanics of the UkSSR Academy of Sciences.

In particular, targets for the current five-year plan specify development and adoption of 20 and 40 cubic meter walking excavators in an Arctic version and with reduced specific ground pressure; systems of continuous-operation equipment with an output of 5250 cubic meters per hour, consisting of rotary excavators with elevated cutting forces, as well as materials transfer units, belt conveyers, and spoil dumpers with a dumping radius of up to 200 meters, quarry excavators with a bucket capacity of up to 20 cubic meters, including equipment designed to operate at low temperatures (down to -50°C) and with hydraulic drive; multipurpose equipment systems for mechanizing shothole drilling, blasting and auxiliary operations. In addition, technical documentation is being prepared for the building of lead units of a walking excavator with a bucket capacity of 100 cubic meters and a boom length of 120-125 meters, as well as a rotary excavation system with an output capacity of 12,500 cubic meters per hour.

Mining materials transfer equipment under development will boast improved specifications and performance. For example, the specific metals requirements (per unit of output capacity) and specific consumption of electric power (per cubic meter of rock material) of the new rotary excavators and power shovels will be 20-40 and 15-25 percent less respectively than models currently in production.

Advanced engineering solutions and equipment will also be extensively employed in this country's other coal basins. They will constitute a basis for implementation of a new stage in the technical reequipping of the coal industry, concentration and intensification of production, and will make it possible to eliminate heavy manual labor, to restore mined-out land to its original condition, and to increase labor productivity at the surface mining operations of this branch as a whole by a factor of 1.3 in 1985 and in 1990 by a factor of 2 in comparison with the 1980 level.

Solid and Liquid

The significance of another comprehensive specific-purpose program based on KATEK also extends far beyond the boundaries of this region. Its full title is "Development and Adoption of Economical Processes and Modes of Combined Processing of Kansk-Achinsk Coal and Other Non-Petroleum Types of Fossil Fuels

into refined solid, liquid, and gaseous fuels and chemical feedstocks, and utilization of refined products in the power industry, metallurgical industry, the chemical and petrochemical industry, fuel transport and electric power transmission, with the aim of increasing fuel, chemical feedstock and energy resources." The end objective of this program is extensive adoption of the indicated processes and methods, which will make it possible substantially to expand our high-quality fuel resources.

More than 150 scientific and design organizations as well as industrial enterprises of 25 ministries and agencies, including 19 institutes of the USSR Academy of Sciences, the Siberian Department of the USSR Academy of Sciences, and the academies of sciences of the union republics have been enlisted to implement this program.

Construction is presently in progress on eight experimental and experimental commercial-scale facilities for developing industrial processes and methods of processing and refining coal on a commercial basis. These include the ETKh-175 unit for processing coal for power engineering, with an output capacity of 1.2 million tons of coal per year; an installation for the in-cycle gasification of coal, a component of the PGU-250 power generating unit with a generating capacity of 250,000 kilowatts; S-5 and ST-75 units for hydrogenation processing, with an output capacity of 2000 and 20,000 tons of coal per year respectively.

The problems of KATEK are also reflected in scientific and technical programs connected with the construction of thermal electric power stations burning organic fuel, long-distance coal slurry lines, and environmental protection.

What Has Already Been Accomplished

A number of important plan targets have been accomplished in the first two years of the 11th Five-Year Plan, pertaining to development of new mine transport equipment to be installed at the Berezovskiy No 1 strip mine, which is under construction, with a production capacity of 55 million tons of coal per year, as well as achievement of on-schedule production startup at such surface mining operations as Uryupskiy No 1 (53 million tons), Itatskiy No 1 (60 million tons), and Itatskiy No 2 (50 million tons).

A lead unit of the ERP-5250 rotary coal-mining excavator, with an output capacity of 5250 cubic meters per hour, has been fabricated and is presently being assembled at the Berezovskiy No 1 strip mine. This equipment is 850 tons lighter and has 5 percent greater output capacity than its predecessor, the ERShRD-5000. Preliminary engineering has been completed and production has commenced on a rotary excavator of equal output capacity for stripping overburden, as well as PKZ-5250/65 materials transfer units, components of a continuous-operation equipment system, for overburden stripping and production operations, with a total beam length of 65 meters, LK-5250 belt conveyers together with conveyer linking devices, as well as the OShR-5250/190 spoil dumper, with a dumping radius of 190 meters.

Employment of a continuous-operation equipment system at the Berezovskiy No 1 strip mine will make it possible, for the first time in this country, to

perform both overburden stripping and production operations by a continuous process, which will ensure excellent technical-economic indices. According to preliminary design figures, per-worker labor productivity in producing coal at this strip mine will be 2760 tons per month, which is more than triple the average labor productivity level achieved at the strip mining operations in the Kansk-Achinsk Basin.

Serious deficiencies have also been revealed in addition to successes in implementation of these programs. For example, a plan target was specified for Mintyazhmash [Ministry of Heavy and Transport Machine Building] (Deputy Minister Ye. Matveyev) to produce by 1981 a walking excavator with a bucket capacity of 40 cubic meters, a boom length of 85 meters, and specific ground pressure of 0.9-1.0 kg/cm$^2$. 1982 came, however, and this equipment, for stripping operations by a transferless system, was not built. Mintyazhmash is not planning to build it before 1985, although the required documentation was available in 1979.

Construction of installations for combined processing of coal is proceeding unsatisfactorily. USSR Minenergo [Ministry of Power and Electrification] (First Deputy Minister P. Falaleyev) has for quite some time now failed to build the ETKh-175 power engineering installation at Krasnoyarsk TETs-2, which was to come on-line back in 1978. Regular failure to meet construction and installation plan targets by Krasnoyarskgesstroy (a 50 percent shortfall in 1982) is postponing the startup date.

USSR Minugleprom [Ministry of Coal Industry] (First Deputy Minister V. Belyy) met the plan target in 1982 by only 80 percent for construction and installation work on the ST-5 hydrogenation coal processing plant, which is to come on-stream in 1983, at the Bel'kovskaya Mine in the Moscow Basin. The fallbehind on the part of the Mosbassshakhtostroy Combine (V. Radchenko, chief executive officer) is delaying progress on a larger installation, the ST-75, startup of which is scheduled for 1985.

Long delays in the manufacture and delivery of excavator equipment are one of the reasons for the behind-schedule movement on-stream of coal mining facilities, while the fallbehind in construction of experimental installations for processing Kansk-Achinsk coal is slowing the process of solving this problem on a commercial scale. In view of the fact that the development of KATEK aims at solving one of the most important, key problems of the nation's economy pertaining to development of this country's fuel and energy base, USSR Minugleprom, Minenergo, Mintyazhmash and other ministries whose organizations and enterprises are taking part in the development of this complex must speed up performance of their assigned tasks.

The practical experience of implementing these programs suggests the need for certain organizational improvement in this work. USSR Minugleprom, which is currently performing the functions of lead ministry in solving the problems of coal processing, lacks both experience and personnel for this. At the same time USSR Minneftekhimprom [Ministry of Petroleum Refining and Petrochemical Industry] has long been working with similar problems of processing fuel shale into liquid fuel and has solid scientific and technical potential at its disposal

for this. It would evidently be better for USSR Minneftekhimprom to become the lead ministry for this program.

It would be advisable, based on the experience of Western Siberia, to establish a unified interbranch agency to manage the development of KATEK, in order to improve planning and more efficiently to resolve all current problems.

The production capacity of the Kansk-Achinsk Complex, our country's large new fuel and energy base, will be growing year by year, from one five-year plan to the next.

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