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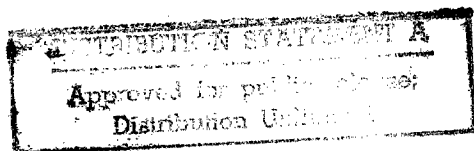
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USSR Report

ENERGY



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22 February 1984

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ENERGY

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COMBUSTION-GAS DRIVE FOR KYURSANGYA FIELD STUDIED BY MODELING

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 10, Oct 83 pp 9-11

[Article by E. G. Aga-Zade, M. E. Aliyev, A. O. Bogopol'skiy, L. A. Ismaylov and E. I. Kadyrova of AzNIPIneft' [Azerbaijan Scientific-Research and Design Institute for the Oil Industry]: "Oil Drive by Combustion Gas as Applied to the Kyursangya Field Environment"]

[Text] Characteristic features of the productive members of the Kyursangya, Karabagly and Kyurovdag fields are the comparatively low permeability of the formations and the high current formation pressures. These circumstances predetermine low injectivity of the wells during water injection. The results of experimental laboratory study of the effectiveness of displacing oil with combustion gas and other gases under the Kyursangya field's conditions (horizon IV PT) are cited below [1].

The research was conducted on a UIPK installation (figure 1), which includes a high-pressure press 1, a proportioning pump 2, high-pressure bombs 3, a linear model of the formation 4, a container for the drive gases 5, manometers 6, tanks for water 7 and oil 8 and a measuring cylinder 9.

The model of the formation was created by means of quartz sand that had a porosity of 0.3, a permeability of $2 \cdot 10^{-13} \text{ m}^2$, and an initial water saturation of 15 percent and oil saturation of 80-85 percent.

The formation's initial hydrocarbon system was prepared in bomb 3. It had a bubble-point pressure of 25 MPa and a gas factor (adjusted to normal conditions) of $90 \text{ m}^3/\text{m}^3$. The formation was saturated by the indicated system at a pressure of 25 MPa, that is, at the initial state the formation did not have a gas phase and was at the level of the bubble-point pressure.

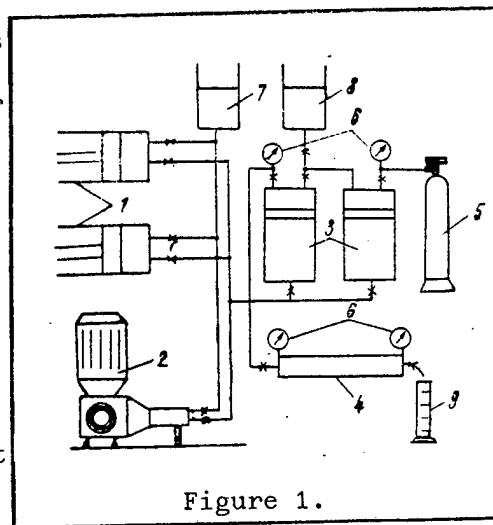
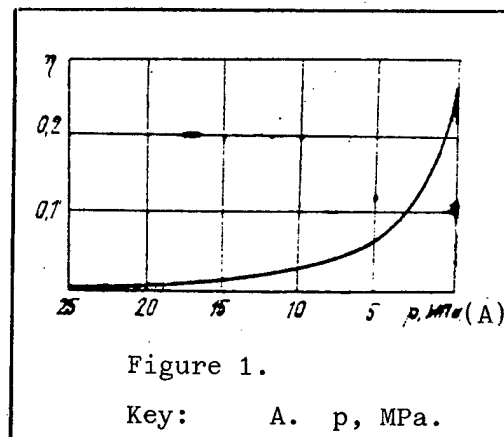


Figure 1.

The following schemes for developing the formation were studied: 1--depletion during a solution-gas mode, from 25 to 0.1 MPa; 2 and 3--displacement by combustion gas at 25 and 35 MPa; 4--displacement by air at 25 MPa;

5--displacement by a hydrocarbon-gas fringe, then combustion-gas displacement at 25 MPa; 6--displacement by combustion gas enriched by carbon dioxide, at 25 MPa; 7--displacement by carbon dioxide at 25 MPa; and 8 and 9--depletion to 10 MPa, then displacement by combustion gas at 30 and 10 MPa. In schemes 2-9, after completion of the displacement, the formation was depleted in a solution gas mode.

The combustion gas consisted of 8 percent CO_2 , 8 percent O_2 and 84 percent N_2 . The carbon-dioxide enriched combustion gas contained 50 percent CO_2 . Under development scheme 3, the amount of hydrocarbon fringe gas was 20 percent. Figure 2 shows oil yield η of the formation (for dead crude) as a function of formation pressure p during the depletion regime (scheme 1).



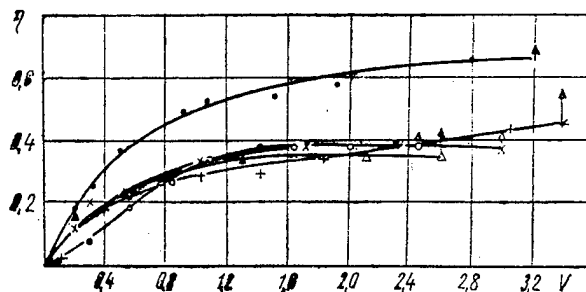
The dynamics of change of the formation's oil yield when developed under a mode of displacement with later depletion as a function of the displacement gas volume, which was taken at the injection pressure in proportion to the pore oil-saturation volume, are shown in figure 3. The average density of flow of the drive gas at the formation's entry was about $10^{-5} \text{ m}^3/\text{m}^2 \cdot \text{sec}$, and the pressure differential along the formation's length did not exceed 7 percent of the injection pressure.

Figure 3.

Key:

- , +, x, Δ, o. Displacement by, respectively, carbon dioxide, enriched combustion gas, combustion gas, a hydrocarbon gas fringe and air;

↑ increase in oil recovery through subsequent depletion.



Evaluation of oil withdrawal from the formation at the end of each stage of development (depletion-drive-depletion), as well as the final oil withdrawal, are shown in the table.

Scheme No	Development scheme and total amount of displacing agent	Oil withdrawal			
		Depletion	Drive	Depletion	Final
1	Without stimulation.....	-	-	25	25
2	Combustion gas ($V_* = 3.0$).....	-	39	4	43
3	Combustion gas ($V_* = 3.0$).....	-	40	4	44
4	Air ($V_* = 2.5$).....	-	38	4	42
5	Hydrocarbon gas fringe + combustion gas ($V_* = 2.5$).....	-	36	4	40
6	Enriched combustion gas ($V_* = 3.5$).....	-	50	9	59
7	Carbon dioxide ($V_* = 3.5$).....	-	68	4	72
8	Combustion gas ($V_* = 2.5$).....	5	34	11	45
9	Combustion gas ($V_* = 2.5$).....	4	31	17	48

The research results showed that, for the pressure range studied (below 35 MPa), displacement of the formation's crude with air, combustion gas and a hydrocarbon-gas fringe did not provide a completely miscible mode for the drive, and high values for final oil withdrawal were characteristic for this mode. Oil withdrawal from the formation increases greatly with increase in the gas's carbon-dioxide content. Here it must be noted that during displacement by air, combustion gas and the hydrocarbon fringe, the injection of 1.5-fold the gas volume was required for getting final oil withdrawal, while during displacement by carbon dioxide and enriched combustion gas, final oil withdrawal was achieved at 3-3.5 pore volumes.

The mechanism of the processes studied are described in adequate detail in works [2 and 3].

The purpose of this article is a quantitative refinement of the displacement coefficients for the conditions of the specific reservoir system of the Kyursangya field, which has been made not on the basis of degassed crude but with dissolved hydrocarbon gas in a band of high pressures up to 35 MPa.

Conclusions

1. It was established that the injection of gas under schemes 2-5, 8 and 9 into horizon IV PT of the Kyursangya field will allow a 15-20 percent increase in final oil withdrawal of the formation in comparison with a depleting mode.
2. An increase in final oil withdrawal by more than 30-40 percent and the execution of miscible drive are achieved when the drive gas is enriched by carbon dioxide, which can be obtained from combustion gas by means of special installations.

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NEW SCHEME FOR TREATING MALGOBEK FIELD HEAVY CRUDE LAUDED

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 10, Oct 83 pp 36-39

[Article by S. A. Zarutskiy and P. I. Kulakov (SevKavNIPIneft' [North Caucasus Scientific-Research and Design Institute for the Oil Industry]):
"Increasing the Effectiveness of Treating Crude Oil"]

[Text] The Malgobekneft' [Malgobek Oil Production Association] NGDU [Oil and Gas Recovery Administration] is developing Mesozoic oil deposits of the Malgobek-Voznesenka, Akhlovo, Severnyy Malgobek and Karagano-Chokrak oil deposits of the Severnaya Voznesenka field. All the fields are in a late stage of development, as a result of which the well product is strongly water encroached.

The crudes of the fields being developed differ considerably in their physical and chemical properties and in their content of natural emulsion stabilizers. Because of peculiarities of the physico-chemical properties of the crudes of the Akhlovo, Severnyy Malgobek and Severnaya Voznesenka fields, emulsions are formed that are marked by high stability, while the crudes of the Malgobek-Voznesenka field form emulsions of average stability [1].

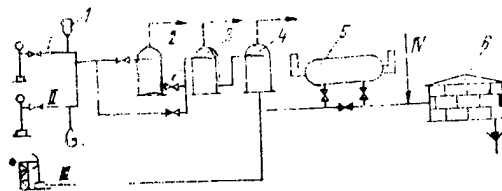
Crude from the Karagano-Chokrak oil deposits of the Severnaya Voznesenka field is recovered by deep pumping, while other fields work the wells by the flow method.

The Malgobekneft' NGDU gathers oil and gas together from the flowing wells. The output of the various fields is mixed and then enters the separation installation. After final separation, oil from deep pumped wells is introduced into the stream of the crude from the flowing wells, and then the mix of all the fields goes to combined treatment (figure 1).

The stability of the oil emulsions that are obtained by mixing the output of all the fields being developed by the NGDU changes as a function of the content of the relatively light crude of the Malgobek-Voznesenka field in the mixture. A reduction in the level of oil recovery from this field increases the stability of the emulsions of the oil mixture that arrives at the Malgobekneft' NGDU's head structures (table).

Prior to 1974-1975, the Malgobek-Voznesenka field's share was the main portion in Malgobekneft' NGDU oil recovery. The crude-oil mix was treated at its natural temperature, which, during this period was 40-50 degrees C, and the specific consumption of the demulsifier (disolvan 4411) was 74 g/ton.

Figure 1. The Existing Scheme For Oil Treatment at the Head Structures of the Malgobekneft' [Malgobek Oil Production Association], NGDU [Oil and Gas Recovery Administration]



Key:

1. Input for the demulsifier.
- 2, 3 and 4. Separators for the I, II and III separation stages.
5. NN-6.3 heater.
6. Tank.

I and II. Heavy and light crudes.

III. Heavy crude from deep pumped wells.

IV. Drain water from the VGPZ [Voznesenka Gas-Treatment Plant].

Designation of the constants	Date of withdrawal	
	August 1975	March 1982
Density, kg/m ³	859.4	861.8
Kinematic viscosity, 10 ⁻⁶ m ² /sec:		
20 degrees C.....	13.62	14.43
40 degrees C.....	7.94	7.17
60 degrees C.....	4.54	4.42
80 degrees C.....	3.41	3.22

The reduction in recovery of Upper Cretaceous crude of the Malgobek-Voznesenka field that was planned, beginning in 1975, was accompanied by a reduction in the temperature of the crude arriving at the Malgobekneft' NGDU head structures and an overall increase in the stability of the crude-oil emulsions (because of the increase in the share of heavy crudes), as a result of which the specific consumption of demulsifier for treating oil at the NGDU rose to 136 g/ton in 1976.

During the winter of 1976-1977, research was performed (for the final treatment and stabilization) on the effect of the crude's temperature on demulsifier consumption and the quality of the crude turned over to the Voznesenka Gas Treatment Plant (VGPZ). In 1978 the research was repeated (figure 2). It was established that a reduction down to 8 degrees C in the temperature of the crude arriving at the head structures leads to an increase in the specific consumption of demulsifier to 426 g/ton. At a temperature of 27-28 degrees C, demulsifier consumption is reduced to 110-116 g/ton (curves 1 and 2). The residual water content of the crude in this case was reduced from 10 percent (at a temperature of 8 degrees C) to 2-2.5 percent (28 degrees C).

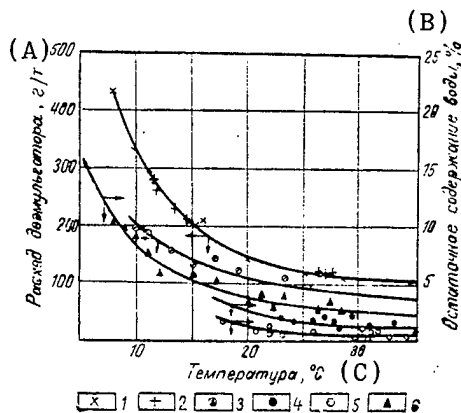
It was established that an increase in the crude's temperature above 28-30 degrees C leads to practically no additional reduction in demulsifier consumption, while in the 8-28 degree C range, demulsifier consumption is reduced more than 3-fold, with a 4-fold to 5-fold reduction of residual water in the crude.

Figure 2.

Key:

- 1, 2 and 3. Specific reactant consumption (in 1977, 1978 and 1980, respectively).
- 4 and 5. Water content in the stock-tank oil (1980 and 1981).
6. Water content in the stock-tank oil as a function of temperature (1976-1977).

- A. Demulsifier consumption, g/ton.
- B. Residual water content, percent.
- C. Temperature, degrees C.



Based upon research that was performed to improve the quality of the crude that is turned over to the GPZ [gas-treatment plant], it was recommended that drain water from the VGPZ in the amount of 400-600 m³/day, which has a temperature of 80-90 degrees C and which contains the demulsifier, be introduced into the stream of crude that arrives at the head structures, following stage III separation [2], it being the case that the artificial increase in water encroachment of the wells' product will help to further reduce the stability of the emulsion and reduce the effect of water redispersed into the crude at a reduction in pressure by separation stage from 1.2 to 0.2 MPa. However, this variant was not conclusive, and it was proposed that, along with the introduction of drain water, the crude be heated by a type NN-6.3 unitized heater [2]. In 1978-1980 the crude was treated while drain water from the VGPZ was being fed into it in the amount of 600-700 m³/day at a temperature of 60-70 degrees C. In so doing, the oil's temperature increased from 16-18 to 23-24 degrees C, specific demulsifier consumption was reduced by 30-40 percent (see figure 2, curve 3), while crude with a water encroachment of no more than 1.5-3 percent was being turned over to the VGPZ.

It should be noted that in 1980 the pressure in the gathering system was reduced from 1.2 to 0.2 MPa, because of the necessity to reduce the counterpressure on the formation (in order to prolong the well's flowing period). In so doing, the well product entered the second stage of separation (stage one was shut off), enabling elimination of the hazard of redispersion of water into the oil.

In 1980 the NN-6.3 preheater (see figure 1) was introduced into operation. Curve 4 characterizes the change of the crude's residual water content during use of the NN-6.3 preheater and during operation of the gathering system at a pressure of 0.2 MPa (drain water from the VGPZ was not fed during this period). A set of measures was taken that enabled a reduction to 1-1.5 percent in the residual water content of the crude that is turned over to the VGPZ.

In 1981, during operation of the NN-6.3 preheater, the feed of drain water from the VGPZ into the crude arriving at the head structures was renewed, providing for a further reduction in the oil's residual water content (down to 0.3 percent).

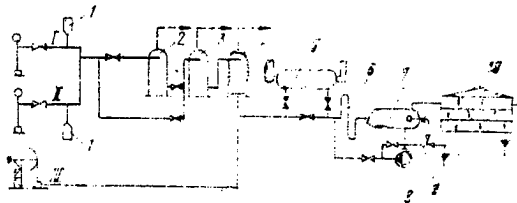
It has been established as a result of the research performed that the redispersion of water into heavy, highly viscous crude leads to the forming of stable emulsions. Precluding these circumstances during gathering and treatment of the crude enables the quality of the treated oil to be improved, even when moderate-temperature treatment modes are used. The delivery of drain water that contains the demulsifier into the flow of preheated crude flow enables realization of a set of favorable factors that help to intensify the oil-treatment process and to improve the crude's quality [3].

Based upon experimental studies of the technology for treating heavy Malgobekneft' NGDU crudes, an improved operating scheme for an installation for the NGDU's heavy crudes, which is shown in figure 3, was proposed. An important element of the new installation is the presence of a mass-exchange section and a water separator, which were installed following the preheater, and which were supplied with a pump and lines over which the warm drain water from the water separator is fed into the intake of the dripper in such a way that a closed circuit for the circulation of hot drain water is formed. The existence of this circuit enables feed of the hot water into the intake to the mass-exchange section to be changed over a broad range and the pattern of the emulsion's flow and of the mass-exchange processes in the dripper to be regulated within optimal limits. This same circuit enables one and the same amount of drain water with demulsifier dissolved in it to be used repeatedly in the treatment of crude without causing practically any additional heat consumption for preheating the water. Oil treatment in this installation is intensified by providing for optimal values of water encroachment of the product at the stage of preparation of the emulsion for demixing, the maintenance of an optimal mode for flow of the emulsion into the mass-exchange section, and maintenance of temperature of the flow within optimal limits during treatment of the crude.

Figure 3.

Key:

1. Demulsifier intake.
- 2, 3 and 4. Separators for the I, II and III stages of separation.
5. NN-63 heater.
6. Mass-exchange section.
7. Settling tank.
8. Pump.
9. Interphase regulator.
10. Tank.



The flow scheme that has been worked out for the installation can also be used in treating the heavy crudes of other fields, including viscous "mined" oils.

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PUTTING OILFIELD EQUIPMENT TO USE AT PROPER PLACE IMPORTANT

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 10, Oct 83 pp 54-56

[Article by B. A. Dadashev, G. E. Gambarly and R. V. Yakubovich (AzINmash [Azerbaijan Scientific-Research Institute of Oil Machinebuilding]): "The Importance of Area of Use in Increasing the Effectiveness of New Machinery in an Era of Scientific and Technical Progress"]

[Text] Scientific-research institutes, which are called upon to speed up in every possible way the processes of creating new equipment and technology, organizing production and so on, have a special role in increasing production effectiveness.

In an era of scientific and technical progress, new equipment should, while it is operating, provide a return that would enable all the expenditures on producing it to be covered, provide for an increase in quality and a rise in technical level, and enable the manufacturer of the equipment to obtain a profit and the customer thereof a saving.

The effectiveness of new equipment is associated with the three stages of its creation and use: design, manufacture and operation of the machinery.

The economic effectiveness of new equipment depends primarily upon the basic features of its design. Expenditures on its manufacture are predetermined at this stage in accordance with the adopted design solutions. However, at this stage only the prerequisites for high economic effectiveness of the new equipment are created. The characteristics, parameters and operating qualities that determine an article's effectiveness are provided by oil machinebuilding plants during manufacture by using appropriate technology, materials and so on. During the manufacturing process, characteristics are incorporated in the machine that should provide a benefit during operation, and the article's value is shaped. During the operating stage, realization of high effectiveness of the new machinery's objective should be insured. Therefore, the most important prerequisites to resolving the task of increasing effectiveness in the creation and use of equipment for recovering oil and gas in the modern era of scientific and technical progress are mutually related and mutually responsible efforts of developers, manufacturers and customers.

The demands made on operations at the stages of creation and use of new equipment are different, depending upon the changes that occur in the main areas at each of the indicated stages under the influence of scientific and technical progress.

In the modern era of development of machinery for recovering oil, among the most important characteristics are the differentiation of equipment and tools by purpose and area of their use and an expansion in their variety. The process of differentiating equipment and increasing the number of types, standard sizes and modifications will be intensified still more later because of the growing diversity of conditions for operating the equipment in the oil and gas recovery industry and the striving of designers to bring the equipment's characteristics closer to the parameters of the production processes, with a view to decreasing the equipment's weight and, correspondingly, the metal consumed in its manufacture. Differentiation of equipment by expanding the number of standard sizes will allow prices for the equipment to be brought into line with its technical characteristics, and, in so doing, realization of the benefit should be achieved with a definite correlation between increased expenditures for manufacturing the new equipment and reducing expenditures with its use.

One part of the task is being solved by AzINmash, the other by the manufacturing plant. Based upon operating requirements and in order to provide high effectiveness for the new machinery, that degree of perfection and improvement of the design that can be realized during use of the new equipment must be considered. If indicators of the new equipment such as load-carrying capability, speed, pressure, corrosion resistance and adaptability to cold climates exceed the demands made on the equipment during use, then this excess cannot be realized.

The most important task arises in insuring use of the equipment strictly according to its area of application. If this proviso is not observed, the technical and economic advantages incorporated in its design cannot be realized.

Experience indicates that this prerequisite for various basic types of equipment is not being observed in the area of oil recovery. All the wells in the inventory can be worked by equipment of high capacity, productivity and load-lifting and high-pressure capability, which possesses features designed for difficult physical-geology conditions, but this is not always desirable. It should also be noted here that oilfield workers prefer primarily a limited number of standard sizes of equipment, a preference that creates for them certain conveniences in tending, repairing and spare-parts provisioning, but, simultaneously, causes excessive expenditure of labor and metal during manufacture and an increase in consumption of power and fuel during operation.

It should also be noted that, in converting from one method of operation to another (for example, from free-flow to pumping), it is customary to install equipment once at the well for the entire operating period, yet the yield of each well changes sharply during its operation.

Moreover, analysis of primary oilfield data has indicated that in the past 10 years large and medium-size pumping jacks have been installed even at wells with small flow rates, yet the withdrawal from these wells does not increase but decreases over a long period of time.

As a result, there is a large gap (see table) between the pool of equipment required (based upon the depths of suspension and the flow rate of the wells' liquid) and the equipment actually installed at the wells.

Standard sizes of pumping jacks	Actually present, %	Required according to calculations, %
SK2-0.6-250.....	2.5	33.64
SK3-1.2-630.....	15.7	28.18
SK5-3.0-2500.....	34.3	26.16
SK6-2.1-2500.....		
SK8-3.5-4000.....	40.1	9.86
SK-12-2.5-4000.....		
Imported.....	7.4	2.16

Since the saving of metal and electricity has been advanced as a primary task, maladaptation of the well equipment to the needs of the area of use is intolerable, for it deprives the available pool of well equipment of an economically desirable makeup.

Everything that has been said above indicates clearly how important the joint participation of the developer, manufacturer and customer of the equipment is in insuring the realization of the equipment's effectiveness. It seems to us that the area of the economically effective use of new equipment could be the connecting link that stabilizes and unites the interests of developers, manufacturers and customers, which will bring to realization the advantages of the new equipment and will allow the changes in indicators made possible by development of the machinery to be reflected in the standards and plans.

Determination of the area of use of equipment, machinery, devices and tools and adherence to that determination as a means for increasing effectiveness can be further developed. Considering the importance that is attached to increasing the effectiveness of new machinery, it should be converted now to the area of economically effective use.

Introduction of the area of economically effective use will enable a conversion to be made from determining the economic effectiveness of various items of equipment (or of materials) to determining the effectiveness of a single-purpose complex or group of equipment (or materials). Doing so will correspond to the modern work methods that have been adopted.

The area of economically effective use as a function of the task that has been set can be used for such ends as insuring realization of the economic effectiveness of new machinery or as a scientific method for determining the scale for producing equipment and tools, and it can be the basis for establishing a joint document for coordinating with the customer the economic benefit of the new equipment and one that can also be used for determining the wholesale price level for the new equipment.

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REPORT ON YANBURG'S DEVELOPMENT

Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 83 p 9

[Article by V. Filatov, subsection director of the Interdepartmental Territorial Commission of Gosplan, and R. Sayfulin, senior engineer, "Siborg-gazstroy", Tyumen, "Yamburg, the Brother of Urengoy"]

[Text] Yamburg is a distant, Arctic gas condensate field on the Tazov peninsula. Where is it? What is it? A geography textbook gives the answer as: sixty-seventh parallel. Mean annual temperature, -10. Permafrost. Here, nature has hid very rich reserves of valuable raw materials.

A Treasure House of "Blue Fuel"

The new treasure house of "blue fuel" is being increasingly talked and written about. Yamburg is constantly on the agenda of the Interdepartmental Territorial Commission for Development of the Western Siberian Oil and Gas Complex (ZapSibMVTK) of Gosplan, and out-of-town sessions of the Scientific Council of the Siberian Branch of the USSR Academy of Sciences.

According to the VNIIGaz plan, seven integrated gas refining complexes (UKPG) of unique capacity are to be built. Medvezhe and Urengoy have served as a good testing ground for testing and introducing the best models of Soviet equipment. At Medvezhe there are units of seven billion cubic meters of gas a year; at Urengoy, twice as much. At Yamburg, they will be four times as powerful. It is noteworthy that the new plants require the same amount of metal, space and maintenance personnel as the first ones.

The field's extreme conditions require year-round cooling of the gas to the permafrost temperature. This will be done using another innovation: turbo-expander plants. Besides protecting the tundra from warming, the below-zero temperature of the dehydrated gas will allow an increase in pipeline capacity.

The gas goes to the plants from hundreds of operating wells. Scientists have designed a special type of well, using heat insulated columns that protect the permafrost. From the field, two threads of trunk lines go to the center of the country; a third, to Gornozavodsk in Perm Oblast.

The First Winter Road, The First Sites

The pioneer base is already being built here. The first crew to land here two years ago included builders, drillers, future operators, and researchers. They also included the senior engineer for the construction of the field from the institute "YuZhNIIgiprogaz", G. Shemrayev. In his words:

"The Yamburg housing settlement will be four kilometers from the mouth of the Ob. It will be the connecting link between the base city of Nadym and the watch points at the field. The plan is to build two micro-regions in the settlement. The northwestern one will be of two-story wooden houses and apartment buildings. In the eastern part will be the social center, with administrative, cultural, educational, commercial, athletic and medical buildings."

The first to build a winter road to Yamburg over the ice of the Ob bay were oil field workers of the association "Nadymgazprom". They brought in a drilling rig, pipes, chemical reagents, fuel, and girders. They also founded the trailer city, naming its first street Nadezhda [Hope] Street. The first oil field facilities were built: two wells, drilled by the team of foreman V. Gavrilenko. A hovercraft appeared here recently. In one trip, it carries tons of cargo over the swampy tundra, without disturbing the plant cover. Tests are under way on two 700 hp all-terrain vehicles with controlled trailers, made by Ufa machine builders.

There is much activity at the construction sites of the river port, housing settlement and airport. About 12,000 tons of various cargos were delivered to the site in the last trip via the approach channel, built by the explosion method. A large amount of equipment, drilling pipes and fuel is hauled by water today. In the future, almost half of all cargo will be supplied to Yamburg through the port.

Of course, there is an urgent need to develop river transport, since it is the least expensive. Unfortunately, the institute "Giprorechtrans" has held up supplying the documentation for the port facilities. But delay is intolerable, if you consider that years will be needed for its construction. The association "Tyumen'gazprom" will need to haul over two million tons of cargo a year through the Arctic port in the near future. This requires a mechanized wharf. Its construction has been assigned to the Ministry of Transport Construction.

The Gosplan Interdepartmental Territorial Commission recently reviewed the pace of Yamburg construction at its meeting. It directed the head of the association "Zapsibdorstroy", Comrade Kasparov, and the head of the trust "Zapsibgidrostroy", Comrade Baklanov, to speed up construction of the first port phase, as well as the landing strip and hard-surface roads.

A Railroad is Needed

Unfortunately, the question of the advisability of building a 183-km road from Medvezhe to Yamburg has been under discussion for too long at various levels. An expert committee from Gosplan recently ended the dispute. A team from the institute "Soyuzdorstroy" has been instructed to quickly develop the

technical documentation. The builders have been told to begin the road without delay. Its completion will eliminate millions in costs for aviation.

The experience of developing Medvezhe and Urengoy indicates the need to speed up the pace. For example, for some ten years economists have been proving the advisability of building the Nadym-Medvezhe road. According to their calculations, it would pay for itself in three and a half years. But, Mingazprom has decided to "save money" on it. The result is that large sums have been spent on delivering cargoes over roadless terrain, but the road had to be built eventually all the same.

Calculations show that motor and river transport people can't handle all the hauls to Yamburg. Over six million tons of construction materials and equipment are needed for building its first phase alone.

At meetings of the Interdepartmental Territorial Commission, specialists and scientists have proven that a railroad from Novyy Urengoy is also needed. A third of all cargo could be carried to the field by this, the most reliable form of transport in the Far North. Mintransstroy will complete preparation work on the route of the future railroad this year. Next year, it will finish developing the project. Its customer has also been designated: Mingazprom. Working traffic on the new line should begin in 1986.

Time Won't Wait

In a word, the strategy for developing the Arctic giant has been laid out. It must be implemented immediately. But, the sluggishness of Mintransstroy subdivisions in laying roads, which should be built at least two years before the Yamburg site, is alarming.

Field facilities based on large, prefabricated, factory-finished, 200-300 ton units are scheduled to be built. The basic construction work at the new field has been assigned to Glavurengoygazstroy (A. Nalivayko, director), but so far he is slow in getting his people started.

A number of institutes are currently working on designing Yamburg facilities. But their work is still poorly coordinated. Scientific recommendations and serious research are frequently replaced by a statement of the obvious. For example, here is what representatives of "LenNIIPgradostroitel'stvo" "revealed": an unconventional nature of city construction; a central nature of development; limited residence periods; a complete lack of social and production infrastructure. In other words, so far just a statement that at Yamburg the conditions are a good deal more complex than at Medvezhe and Urengoy. In the meantime, the answers to many questions are being awaited from the scientists and researchers: water supply, drilling and casing of production wells, construction of foundations under the field facilities, and others.

The Urengoy field will come on line in this five-year plan. Yamburg should pick up from there. This is why it is so important to begin its development now, to start creating the necessary infrastructure. This largely depends on Mingazprom, Minneftegazstroy, Mintransstroy and other ministries and departments.

OIL AND GAS

VYBORG YARD MANUFACTURES OIL DRILLING EQUIPMENT

Leningrad LENINGRADSKAYA PRAVDA in Russian 19 Oct 83 p 1

[Article by G. Alekseyeva: "Drilling Crews for the North," in the column "Meeting October"]

[Text] The Vyborg plant is called a shipbuilding one, by custom. But it changed its "profession" long ago. In place of conventional ships, special drilling equipment is now produced here, meant for searching for oil and gas in the coastal offshore areas of seas.

It is not easy for a person to learn a new skill. It's even more complicated for an entire enterprise to quickly change. This was the subject of a discussion with the secretary of the Party organization of the Vyborg shipbuilding plant, Vladimir Vasil'yevich Kitayev.

"This is the first time we've fulfilled such an order," he said. "This is the source of the problem's complexity and our people's problems. We used to build ships. Now, semisubmersible floating drill rigs."

Mastering the new skill is sharpening the sense of responsibility among all the workers at the plant: engineers, designers, workers, technicians. The July plan was fulfilled ahead of schedule; the shipbuilders met the production schedule in nine months. For their performance in the third quarter, they have been awarded the Red Banner of Vyborg and the rayon. They are keeping up a good pace in October, as well.

It's some distance to the new section, where assembly of the three basic complexes of the drilling rig--technological, power and living--is basically finished. It is separated by a greenish area of water from the building slip where the well-known packet boats of the "Pioneer" series were launched, along with other ships now braving the seas and oceans. The old slip is not idle. Pontoons and part of the stabilizing columns are now assembled there. But the basic work front is here, where the body of the drilling system

"Shel'f" is assembled afloat. Assembly afloat is a technological novelty, one of many which the shipbuilders have successfully mastered.

"We used to assemble a ship completely on the slip," states senior builder Anatoliy Nikolayevich Gorbachev. "Now, the pontoon is lowered into the water, where the individual units, the modules, are assembled. It is somewhat similar to construction of children's building blocks. We have nine such "cubes", each weighing about 300 tons. Naturally, new technological methods had to be mastered."

The lunch break is over. Senior head of the fitting and assembly section, Nikolay Petrovich Shcherbakov, takes me around the drill rig. The construction scaffolding is very impressive: 62 meters wide, 96 meters long, with a draught of almost 20,000 tons. Eight anchors at the corners--the chain alone of each of them weighs 140 tons!

At the side, in a wooden "cage", is the reddish-white tower. The system has no second-rate units. Everything in it is identically important. But, the tower claims a special importance. The entire drilling system is often called the "drilling tower" in its honor. Soon, when the tower itself is installed at the appropriate location, the "Shel'f" will proudly rise upward toward the sky, breaking the altitude records of man-made structures in the city. Till now, the highest structure in Vyborg was the tower of the old fortress, situated on a rise 76 meters above the bay. The rig's height is 100 meters.

An elevator takes us up to the height of a multi-story building. Then, up a narrow metal stairway to the helicopter pad. Nikolay Petrovich shows the recently finished section as we go: the main power plants, diesel generators.

"The diving complex will be here", he says, like an owner building his home.

And it's true. Shcherbakov and his comrades are building a "home", which will eventually depart on a difficult trip through the northern seas. And everything in it must be reliable and solid, so that those living here can safely weather the violent winds and six-point storms.

The reliability and strength test to be conducted by the North itself, is still ahead for the drilling crew. But the crews assembling the popping are already passing the test for work skill. The difficulties they have had to overcome in meeting this order include mastering new terminology, a new technical language used by the project's creators. They had to study. All the workers went through training courses, taught by their own factory instructors drawn from the designers and technicians.

Experienced specialists set the tone in the application of theoretical knowledge in practice. There are many such people in the Communist labor crew headed by Aleksandr Vasil'yevich Tikhomirov. The fitter-assembler unit led by Gennadiy Ivanovich Romanov, assembling the drill tower, always posts stable results. Their success stems from the fact that they have all mastered related specialties; they can replace each other at any time.

Viktor Georgiyevich Petrov has solidly gained renown as a first-class worker.

"You can rest assured about the quality of any work assigned to him," is the appraisal of him given by the deputy director of the delivery section, Valeriy Grigor'yevich Levchenko.

Dmitriy Yegorovich Kuroyedov is called a production veteran. He has extensive work experience to his credit, which he generously shares with younger colleagues. Today, he is working as a team with Sergey Semenov, who is grateful for the tutor's lessons.

Other well-known people at the plant, such as Hero of Socialist Labor Vasil'y Fedoseyevich Kucherin and holder of the order of the Laboring Red Banner Anatoliy Petrovich Martynov, have also invested their knowledge, labor and experience in building the drill rig. Their example is inspiring everyone to shock labor, ahead of the plan.

The shipbuilders are preparing for a serious test: mooring tests will begin next year; all the machinery will be checked out in action. But this is just one more test of working maturity for the team, which on the eve of the sixty-sixth anniversary of Great October expanded the competition for a meritorious celebration of the famous date, and is unremittingly striving to fulfill its socialist obligations.

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OIL AND GAS

PROGRESSIVE WORK METHODS ANALYZED

Baku VYSHKA in Russian 6 Oct 83 p 2

[Article by M. Mamedov, foreman for oil and gas production at the third field of the Administration for Oil and Gas Extraction "Ordzhonikidzeneft": "Introducing the New, the Advanced"]

[Text] It is now the fourth year since our team members, taking up the initiative of the Shirvansk oil and gas production foreman Aliyulla Nasirov, joined the competition for the fullest utilization of field reserves under the slogan "From each well: the maximum yield." It must be said that we have achieved a good deal of success. Last year, the crew won second place in the All-Union Socialist Competition of Oil Workers. And things are going well this year. In all of 1982, we produced 65 tons over the quota; in nine months of this year, above-plan production amounted to about one and a half hundred tons of oil and over a half million cubic meters of gas.

We see the main guarantee of success in that all the members of our crew, mostly young people, are joined by a common goal: to do the utmost to regain the former fame of Azerbaijan's oil industry.

And these are not idle words. Our operators confirm them with each day of their labor. Take a recent case, where four compressor wells had to go into operation quickly after underground repairs. The crew members Yuriy Vlasov, Rozak Zeletdinov, Ispendiyar Mursalov and others eagerly tackled the job. And although the work day was long over, no one said a word about going home. They were inspired to outstanding work by communists Mikhail Myshkin, Fazil' Nagiyev and party group organizer of the team, operator Kyamil' Minashev.

This is only one example, showing clearly how the crew works. Such cases are frequent. And a month ago, on the Day of Oil and Gas Industry Workers, we were thinking about how to organize the work even better when we were awarded the honorary certificates of the administration and party and union committees of the NGDU [Administration for Oil and Gas Extraction].

After once again carefully studying the directive of the party and government on improving the economic mechanism and the experience gained at other enterprises, we concluded that we are entirely capable of working using the coefficient of labor participation (KTU). The most important thing was how

to do the explanatory work, so that each person fully understands the advantages of this new approach. The management and social organizations of the NGDU provided us considerable technical assistance in doing this. A crew council was formed, including the best operators. From the beginning of the year, we switched to distributing bonuses for above-plan production, conserving compressed air, and so forth, using the coefficient of labor participation, which was established at zero to 1.5. A special log was introduced, where each team member's work is evaluated daily. The crew council uses its record to determine each person's contribution to the common cause at the end of the month.

Of course, it did not all go smoothly at first. There were arguments and disagreements. But gradually things were smoothed out. It helped that we were not the only ones doing it. Other oil and gas production crews in our NGDU switched over to the new system. We could share our experience, especially in strengthening labor and production discipline. But we feel that this is only one stage of the work to improve labor organization in the crew. Eventually, we will move to cost accounting; we are already preparing for it. An important basis in the struggle to raise oil production is the move of the underground well repair crews at our field to a non-order system of evaluating labor, according to the experience of the NGDU "Arlanneft" in Bashkiriy. The main index there is the quality of well restoration. At this point, it is difficult to draw final conclusions on the results of this experiment. We have only been doing it for a month, though the first results are encouraging. One of our most capricious wells, No 1244, exploited by the well pump method, usually broke down every three or four days; now, it operates for ten days at a stretch.

It is obvious that we would not be able to achieve such high results by limiting ourselves to work on improving the team form of labor organization. The constant introduction of advanced technology and progressive techniques of oil and gas production plays the decisive role. And here again, we have been given a good deal of assistance by the management and geological and technical services of the NGDU and the field.

For instance, the field this year produced about 5,000 additional tons of oil by using the tertiary method of affecting the stratum by foam systems. This method's effectiveness has been detailed in VYSHKA previously. Our wells account for a large share of it.

There is another major reserve that we are trying to use with maximum effectiveness. That is to switch wells exploited by the compressor and well pump methods to operation using electric submergence equipment. Expanding the use of this oil production method is provided in the Basic Directions of Economic and Social Development of the USSR for 1981-1985.

Our section now has eight such units. At least four more should be introduced by the end of the year. It should be pointed out that the quality of electric submergence pumps, serviced and repaired by a special office of the "Azneft" association, has improved substantially. This was largely due to the fact that the connecting nuts and bolts, which used to quickly fail in the aggressive medium of our wells, have started to be specially treated.

Reliable operation of the electric submergence units has enabled us to raise the average well operating time between repairs to almost 47 days, four days more than for the oil field as a whole. We have also been able to conserve tens of thousands of cubic meters of compressed air. However, there is a limit to the use of this method at our section. For example, it cannot be used in small-diameter wells. We therefore continue to devote much attention to conventional geological and technical measures, such as return to overlying strata, reperforating filters, increasing the length of the suspension of tubing and the stroke length and number of swings of the rig, acid treatment of the well face zone, etc.

We have performed 376 such measures this year, almost 50 more than planned. Correct selection of measures and their effective performance, together with the well underground and capital repair crews, helped us attain an 86 percent effectiveness rate, and produce over 1,100 tons of additional oil.

However, there are still a good deal of underused reserves. Take the electric submergence plants I mentioned above. To equip the wells with them, a good deal of work has to be done to outfit the drilling equipment. The construction and assembly section of the NGDU is loaded down by a lot of other important orders, such as repairing housing facilities, and there are not always enough men available to do the basic work at the field. I think that this service should be clearly divided into public and business areas, so that its work will be more efficient.

Or take another example. Pumping jacks obviously need to be repaired after a certain work time. But we have been searching for several years now for a seemingly minor part, the bearing unit for the lower head of the connecting rod of the SKN-6 pumping unit. We get by as best we can. We take a bearing off of one unit and put it on another so that the well is not idle. But this is inefficient.

We encounter the same problems with the supply of various sizes of valves. An example is the question of sling belts. Oil workers have long suffered from their shortage and low quality. The solution to this problem shows that a way can be found out of the situation.

There are other problems, whose solution requires the joint efforts of technicians and supply people. For instance, the field recently received well No 850, drilled by the capital repair shop. It only produces two tons of oil a day. During drilling, its face zone was filled with clay, and it is now very difficult to finish the well. This could have been avoided if the technology for drilling using effective chemical reagents had been developed.

To sum up, despite our success we still have a number of problems. Our crew members, all the oil workers of the Surakhansk oil and gas field, one of the country's oldest, are striving to overcome them, in accordance with the decisions of the November (1982) and June (1983) Plenums of the CPSU Central Committee.

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OIL AND GAS

NEW METHODS FOR EXTRACTING OIL

Baku VYSHKA in Russian 16 Nov 83 p 2

[Article by A. Bashirov, senior engineer of NPO of Space Research, Academy of Sciences of the Azerbaijan SSR, D. Tairov, senior scientific associate, candidate of technical sciences of the thermodynamics sector, AzNIPIneft', I. Kerimov, senior engineer, State Committee for Petroleum Products, Azerbaijan SSR: "A New, Efficient Method: Continuing the Discussion of Certain Problems in Intensifying Liquid Fuel Production"]

[Text] In mid-year, an article was published in VYSHKA by Distinguished Engineer of the Republic, Candidate of Technical Sciences, I. Asadov. It raised the important question of treating liquid fuel deposits with a high pressure gas to enhance oil yield. We shall recall that the author, in considering the theoretical problems of introducing this method, also spoke of measures to determine where it could be practically used. In particular, the design and construction was noted of a plant for using combustion products of the Ali-Bayramlinskaya GRES.

In this connection, we would like to discuss research that we have performed at the Special Office of Technological Design "Biosfera" of the scientific production association of space research of the Azerbaijan SSR Academy of Sciences, as part of our cooperation with AzNIPIneft'. We feel that its practical application can play a major role in implementing the tasks assigned to the republic's oil workers in conserving fuel energy resources and protecting the environment.

In spite of the measures undertaken to use secondary resources by Baku oil refineries, a good deal of the gases emitted during the technological processes are still burned off into the atmosphere. A clear example of this are the flares at the NBNZ imeni Vladimir Il'ich. With the entry into production of the catalytic reforming complex, their number has even increased. Modern oil refining technology simply does not allow their full utilization.

But our work has indicated another solution: to pump these gases (without combustion) into oil-bearing strata of the Apsheronsk fields. The essence of the method lies in creating conditions in the stratum whereby the gas is dissolved in the oil, lowering its viscosity and making it easy to extract.

We have studied the solubility of hydrocarbon torch gas in various oil types from the Balakhansk field (Koshanaur area). The basic technological design for pumping it into the strata has also been worked out. It turns out that torch gases dissolve well in these oils. The optimum ratio of these gases and the stratum fluid does not exceed 5:100.

The torch gas, by ejecting the fuel from several strata at the same time, makes it possible to raise their oil recovery to 80-85 percent, and can be reused after the process for economic needs.

It should also be pointed out that the sulfur content drops in the Koshanaur oil with the torch gas added. This further facilitates its refining, and raises the durability of equipment. Pumping refinery gas into the strata should be of great benefit to the refiners themselves.

The new, effective method also makes it possible to give new life to many exhausted, flooded and abandoned beds. According to preliminary estimates, the effect from their use at the Balakhano-Sabunchi-Ramaninsk field alone will be about six million rubles. Experiments have also indicated that the new method will allow a sharp increase in oil recovery of new beds. Under laboratory conditions, its coefficient after pumping torch gas was 0.8-0.82; using existing methods, it did not exceed 0.12-0.18.

In sum, introduction of this method should not be delayed--for instance, at the NGDU "Leninneft", where the issue of stabilizing and increasing natural fuel output is of primary importance. And Minneftekhimprom Azerbaijan SSR, the production association "Azneft" and other interested organizations should lend their weight to this.

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OIL AND GAS

GAS RESOURCES IN THE KARAKUM

Moscow IZVESTIYA in Russian 14 Sep 83 p 2

[Article by Academician A. Trofimuk: "The Wealth of the Karakum"; in the column "Competing for the USSR State Prize"]

[Text] Every year the importance of natural gas continues to grow. It largely determines the development of basic industrial sectors such as power engineering and the chemical industry.

Turkmenistan is a relatively young gas producing region of the country. The development of the gas industry here is related to fields discovered by geologists in one of the world's largest deserts: the Karakum. The most significant achievement of geological prospectors of the Geology Administration of the Turkmen SSR is the discovery of the Dauletabad-Donmezskiy field, Central Asia's largest.

The importance of the discovery stems not only from the uniqueness of the natural gas reserves. Its scientific value is just as great: a new type of pool has been revealed, and its model defined. This opens up major possibilities for finding similar pools in analogous geological conditions, both in the Turkmen SSR and in other areas.

A highly efficient method of exploratory work was employed in prospecting the new field. It made it possible to prepare huge gas reserves for exploitation in a brief period of time, with high reliability. The development and introduction of the new technique of rational location of prospecting and exploratory wells has made it possible to reduce the amount of deep drilling at the field. Of the total number of wells constructed, 83.6 percent tapped gas or oil pools. This is one of the highest indices in the country.

Reserves for one completely constructed well in the outline of an industrial-category reservoir number over 25 billion cubic meters. This is equivalent to reserves of a medium size gas field. The cost of treating 1,000 cubic meters of explored gas reserves is only 4 kopeks. This product cost is the country's lowest, after Western Siberia.

The introduction of modern, advanced techniques and technologies of well drilling also played a certain role in enhancing the efficiency of prospecting and exploration work.

North of the Dauletabad-Donmezskiy field is the Shatlyskoye field, which feeds one of the country's largest gas mains: from Central Asia to the Center. This field's reserves are being depleted. The entry into production of the gas giant at Dauletabad-Donmez will provide a reliable gas supply to the country's central regions.

The gas resources of the Dauletabad-Donmezskiy field considerably strengthen the country's fuel-energy potential. The work "The Discovery and Fast, Highly Efficient Exploration of the Unique Dauletabad-Donmezskiy Gas-Condensate Field in the Turkmen SSR" and its authors fully merit the USSR State Prize.

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OIL AND GAS

UKRGAZPROM OFFICIALS REPRIMANDED

Kiev PRAVDA UKRAINY in Russian 26 Oct 83 p 2

[Article in the column "In the UkSSR Committee for People's Control":
"Inefficiency Cut Short"]

[Text] Instances of gross violation of state discipline, inefficiency and waste have been uncovered by a check done by the KNK USSR [UkSSR Committee for People's Control] at several enterprises of the all-union industrial association "Ukrghazprom". For example, the Poltava Drilling Company has lost 61,000 rubles due to above-normal down time of equipment and maintenance crews. But management included the loss in...the volume of production work. That is how management reported on the profit plan fulfillment in September and the fourth quarter of 1982. Employees received bonuses. In addition, 33 tons of high-grade grouting cement were written off without justification.

The conservation regime at enterprises of the trust "Ukrghazpromstroy" is being poorly implemented. In a year and a half, 90 tons of steel pipe, 100 tons of rolled metal, 150 tons of cement, and large amounts of lumber, glass and asphalt were spent above the norms. A major rise in price of construction and assembly work was tolerated. In particular, twice the budget's amount was spent on building a five-story building in Gadyan. Over 200,000 rubles extra were spent on the materials and transport alone. Six new cleaning and insulating units the trust acquired several years ago are still unused. Five new mortar-carrying trucks and two tank trucks are not being used as assigned. Tens of thousands of square meters of bituminous rubber waterproofing material are going to waste.

The wrong types of pipes for the job were laid in building the gas line to Sofiyevka, Dnepropetrovsk oblast, thanks to the directors of the trust "Ukrghazpromstroy", and the association "Kharkovtransgaz". As a result, the completed gas line has to be disassembled, and the region's gasification schedule was disrupted. The tap to the test bed in Zaporozhe was not completed on time, resulting in further waste.

Serious shortcomings were also revealed in other organizations of "Ukrghazprom". The quantity of materials spent was overstated in calculating costs for eliminating geological complications and testing wells at the Krestishchensk

Drilling Company. Standard times for individual types of work were lengthened. In this connection, 60,000 rubles were illegally obtained from the bank. Tens of tons of cement were written off for work that did not actually take place.

In outfitting his office, director of the Dashavsk Motor Transport Enterprise A.V. Gordiyenko spent about 4000 rubles above the norm.

The KNK USSR has pointed out to A.G. Tumanov, director of the all-union industrial association "Ukrgezprom", the instances of gross violation of state discipline in spending material and financial resources, and the association's poor supervision of departmental firms. Comrade Tumanov's statement has been recorded, that the inspection's materials will be reviewed at the meeting of the council of enterprise directors, and measures taken to eliminate the shortcomings revealed. In addition, the people responsible will be called to account.

The committee delivered a stern reprimand to the director of the trust "Ukrgezpromstroy", A.A. Prokopenko. Monetary penalties have been imposed on the head of the Poltava Drilling Company, S.I. Grebenyuk, and deputy director of the association "Kharkovtransgaz", Ye.L. Gronus. The Stryysk regional KNK of the Lvov oblast has been instructed to impose financial penalties on the director of the Dashavsk ATP of the association "Ukrgezprom", A.V. Gordiyenko.

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BRIEFS

RECORD COAL OUTPUT--A record monthly coal output of 702,000 tons was attained by S. Zubko's crew from the "Bogatyr'" pit. That is the highest output ever attained on the SRS(k)-2000 excavating machine. V. Mukishev's crew is also doing excellent work with this machine. Miners of the largest pit are now competing to fulfill the annual plan ahead of schedule. The goal is to produce the promised 52 million tons of fuel. The firm's workers have recently succeeded in overcoming a lag allowed in recent months. They have reached the planned level and are trying to consolidate their success. They have a million and a half tons of coal to their credit over the same period of last year. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 83 p 9] 9875

HEAVY RAIL TRANSPORT--Supporting Muscovites' initiative, Ekibastuz railroad workers have succeeded in running heavy long fuel trains for thermal electric power stations. The record for trains was recently 8,000 tons. Engineers of Ye. Krukovskiy's electric locomotive crew have gone further. In September, a train was sent to the Urals with 15,000 tons of coal. In October, engineers S. Urbanovich and D. Goncharov ran a super-heavy one, weighing 18,000 tons. The experience of the leaders is being supported. Over 7,000 trains of increased length and weight have been formed at the terminal this year, hauling an additional 5.5 million tons of cargo. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 83 p 9] 9875

ENERGY TRUST CRITICIZED--The Shidertinskiy Quarry Administration has delivered 2.3 million cubic meters of crushed rock of various fractions in this five-year plan to power engineering construction sites. The main user of the product is the trust "Ekibastuzenergostroy". Aware of a constant shortage of crushed rock to build the Ekibastuz GRES, the trust has the greatest interest in developing the production of this material. And, it was assigned the reconstruction of the quarry's facilities, particularly the crushing and sorting plant. How is the trust (E. Filatov, administrator) protecting its rear? In a little over four years of work, almost nothing has been done. The order by the Ministry of Power Engineering and Electrification clearly defined the reconstruction program. It's obviously time to ask the trust's directors about its lack of fulfillment. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 83 p 9] 9875

CONSTRUCTION MODULES--The Ekibastuz Machine Repair Shop has produced about 800 modules, which can be used to easily build houses, stores or production facilities. Collapsible buildings are a new product of the firm. They have already been rated highly by builders in Siberia, the Far North and the Far East. The steel framework of the wall panels, roof and ceiling is covered by a layer of heating material. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 83 p 9] 9875

ADMINISTRATOR RESPONDS--E. Filatov, administrator of the trust "Ekibastuz-energostroy", on this journal's comment in issue 24: "To speed up the pace of work at the start-up substation, the number of workers has been raised to 510 men. The number of assembly cranes has grown to 17. Work is now being done in three shifts, in accordance with the schedule." [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 83 p 9] 9875

WATER LINE ADMINISTRATION--The crew of the Frunze Construction Administration No 6 of Minneftegazstroy has achieved high construction rates on the water line at Mangyshlak. Of the 220 kilometers, 50 have already been laid in the complex desert conditions. [Text] [Frunze SOVETSKAYA KIRGIZIYA in Russian 16 Sep 83 p 1] 9875

MANGYSHLAK OILMEN--The oilmen of Mangyshlak are working excellently this year. They have met the planning tasks of nine months, and fulfilled their yearly fuel production obligations. On the eve of USSR Constitution Day they registered over 190,000 tons of oil over the plan. The greatest contribution to the overall success came from oilmen of Novyy Uzen. A formation pressure maintenance system is operating well in local oil fields; tens of thousands of tons of heated water are injected into the strata daily. Chemical treatment of wells is proving effective in combatting paraffin deposits. Fuel output is also rising from a crew of the "Komsomol'skneft" administration, exploiting fields on the Buzachi peninsula. The number of working wells is growing; new group units are being connected to the oil collection networks. Promising results have been obtained at experimental sections, where a technology of new production methods is being developed: injecting steam into the strata and in-situ wet combustion. [By D. Grishin, Mangyshlak oblast] [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 7 Oct 83 p 1] 9875

SHAMKHOR OIL FLOW--The first exploratory well has been drilled here at the Tarsdallyar site, providing a powerful flow of pure crude with a production rate of 250-300 tons a day. Foreman F. Mamedov's crew was the first to open up a new field in the western part of the republic, hundreds of kilometers from the traditional oil region--the Apsheron Peninsula. A diverter line is now being built here, to be connected to the former Batumi oil line. [By PRAVDA correspondent L. Tairov, Shamkhor (Azerbaijan SSR)] [Text] [Moscow PRAVDA in Russian 9 Oct 83 p 1] 9875

TRAIN CARS VANISH--As you well know, a major plant is being built in Karadag for making support parts of deep-water foundations. Part of the metal structures come from Pervo-uralsk by rail. They are assembled by a crew of the Baku section of the Volga-Donsk Construction and Installation Administration of the trust "Yuzhstal'konstruktsiya". There have been delays in delivery of them in the past for which the railroad was responsible.

But the latest case has completely stymied the crew members, since they have nothing to do--there are no structures. The supplier shipped them on August 12. The car arrived at the Karadag station September 4. The deputy station director for commercial operations, A. Kotsyubskiy, did not inform the customer until September 15. But the railroad workers did not unload it. The deputy chief engineer of "Yuzhstal'konstruktsiya", V. Pilipishin, has informed VYSHKA that the car, with twenty tons of metal, was sent several days later to...an unknown destination. So because of the railroad workers, assembly has stopped on the warehouse of the plant's main building, forming the start-up complex of this year. To help in the search for the missing cargo, we report that it was in car No 6364597. Steps must be taken immediately to help the builders. [Text] [Baku VYSHKA in Russian 6 Oct 83 p 1] 9875

NEW DRILLING RIG--At the Agansk field, drilling was completed today of the first cluster of oil wells using a new drilling rig, manufactured by Volgograd machine builders. Over 14,000 meters of rock were drilled by M. Rabchenyuk's crew, one and a half times faster than normal. The unit came to the field from Volgograd in modular units, needing only to be assembled. The rig is equipped with automatic machines, requiring one and a half times less time for adding a length of drill pipe to the drilling tool. Such technology has enabled the Glavtyumenneftegaz crew to drill a record number of well this year: over 15 million meters. [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 31 May 83 p 1] 9875

BASHKIR OIL DEVELOPMENT--The oilmen of Bashkir are fast developing the mineral wealth. They have sent the 300,000th ton of raw material over the plan for treatment. That was as much as they were planned to extract from the earth above the quota for the entire year. Their commitments for above-plan gas production and rock drilling have also been overfulfilled. This success is especially significant since it has been achieved at fields entering their natural aging phase. Stratum output is enhanced by injecting effective reagents into the underground horizons. New oil sources have been put into production faster. Socialist competition has been widely implemented in all fields of the autonomous republic. A crew of the "Arlanneft'" administration has found one more important reserve for increasing raw materials production. Advanced well restoration methods have raised their service life between repairs to 340 days. The experience of these leaders is being widely emulated. Bashkir oilmen have resolved to produce another 85,000 tons of oil and 5 million cubic meters of gas over the plan by the end of the year. [TASS] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Oct 83 p 1] 9875

CENTRAL ASIAN EXPLORATORY WELL--In the Central Kyzylkum, near the settlement of Muruntau, assembly has started of a drilling tower for the deepest exploratory well in Central Asia, to go six kilometers into the earth. The well is a research one. It will answer many questions posed by scientists. Geochemists, physicists and hydrogeologists will carefully analyze rock samples from each of the 6,000 meters drilled. Data will also be obtained on temperatures, gravitation features, magnetic properties of rock, and others. This will help determine the future of geological and

geophysical prospecting in this region, which is rich in mineral resources. The "Uzbekneftegazgeologiya" association has entrusted assembly of the drilling tower to its best team: D. Atayev's crew. A settlement with hotels, laboratories and warehouses is being built next to the drill site. [Tashkent] [Text] [Moscow IZVESTIYA in Russian 11 Oct 83 p 1] 9875

TURKMENISTAN GAS DEVELOPMENT--The gas fields in Turkmenistan are being developed ahead of schedule. The Dovletabadsk field, the republic's largest, has reached design output in the southeastern desert of Karakum. The boundary was reached ahead of schedule. Five billion cubic meters of fuel will now be sent from here to the central regions of the country each year. The builders and assemblers worked smoothly from the very beginning of field construction. Under complex conditions, they put into operation facilities for preliminary and thorough treatment of gas for transport six months ahead of the plan. This year, the republic's gas men have undertaken the commitment to put five new fields into operation. This will largely depend on the boundary set for the end of the five-year plan: to bring Turkmenistan's raw material output to 81-83 billion cubic meters a year. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 15 Oct 83] 9875

SECOND LIFE FOR WELLS--The output of several wells at the Kirpichli gas field in the eastern Karakum will increase by almost a third. They have been given a second life by introduction of the recommendations of scientists from the Turkmen branch of the All-Union Scientific Research Institute for Gas. After extended exploitation of a field, the formation pressure in the wells drops sharply, and the gas influx declines. It turns out that rock in the productive stratum becomes compacted from the long-term exploitation. Scientists have suggested breaking up the critical zone of the wells, making them porous, by using special substances and perforations. The productive stratum near the well becomes a good filter, and the gas flows without interruption. Introduction of the scientific innovations last year alone yielded a savings of almost two million rubles at the republic's gas fields. [By L. Lopatina, correspondent of TurkenrenINFORM] [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 16 Sep 83 p 2] 9875

TURKMEN DEEP RESERVOIRS--Turkmen fieldmen have begun developing deep fuel reservoirs. Natural gas has been obtained from a depth of over five kilometers recently from a well drilled at the Kara-Tepe field in the west of the republic. The fuel goes to the trunk pipeline Central Asia-Center. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 40, Oct 83 p 3] 9875

DEEP TURKMEN NATURAL GAS--Natural gas has been obtained from a depth of over five kilometers at the Kara-Tepe field in western Turkmen SSR. The fuel goes to the trunk pipeline Central Asia-Center. Development of the deep reserves near existing fields and gas lines will help raise gas production in the republic to 81-83 billion cubic meters by the end of the five-year plan. [Text] [Moscow TRUD in Russian 24 Sep 83 p 1] 9875

BASHKIR RAW MATERIAL OUTPUT--Ufa-- The oilmen of Bashkir are developing the earth's resources at a fast rate. Yesterday, they sent the 300,000th above-plan ton of raw material for treatment. They have resolved to produce

another 85,000 tons of oil and 5 million cubic meters of gas over the plan by the end of the year. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 6 Oct 83 p 1] 9875

YABLUNOVSKIY FIELD DRILLERS' SUCCESS--When drillers reached the five-kilometer mark at the Yablunovsk field (Lokhvitskiy rayon at Poltavshchin) a powerful gas jet blew. The fuel reserves turned out to be considerable: just one of the strata is yielding over a million cubic meters of gas a day. [By I. Kulik, senior editor, Poltava oblast TV and radio] [Text] [Kiev PRAVDA UKRAINY in Russian 27 Sep 83 p 1] 9875

NOVYY PORT OIL WELL--Novyy Port (Tyumen oblast)--Drilling has been completed of the first operating oil well at the Novyy Port field. Development of this underground reserve on the Yamal peninsula marks the beginning of a new oil and gas producing region in far northern Western Siberia. Work to explore additional raw material reserves and drill operating wells will go on at the same time. Construction has begun several kilometers from the well sites of a housing area for construction men and field workers. The housing and administrative building structures were delivered here via the Northern Seaway. The Yamal forest tundra has been transformed into a reliable oil supplier in record time. For example, one of the youngest oil and gas producing associations in the region, Noyabr'skoye, has produced over six million tons of raw material since the beginning of the year. Deliveries of Yamal oil will grow considerably with entry into operation of the Novyy Port field. [Text] [Baku VYSHKA in Russian 2 Sep 83 p 1] 9875

DEEP KYZYLKUM EXPLORATORY WELL--In the Central Kyzylkum, near the settlement of Muruntau, assembly has started of a drilling tower for the deepest exploratory well in Central Asia, to go six kilometers into the earth. The well is a research one. It will answer many questions posed by scientists. Geochemists, physicists and hydrogeologists will carefully analyze rock samples from each of the 6,000 meters drilled. Data will also be obtained on temperatures, gravitation features, magnetic properties of rock, and others. The "Uzbekneftegazgeologiya" association has entrusted assembly of the drilling tower to its best crew: D. Atayev's team. A settlement with hotels, laboratories and warehouses is being built next to the drill site. The biography of Muruntau-Gluboki is beginning. [By V. Chernomorskiy, TASS correspondent, Tashkent] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Oct 83 p 1] 9875

NEW OIL GUSHER--It took only ten days for the crew of foremen Sh. Aliyev and V. Latyshev, from the exploratory well testing office of the "Kaspiyeftegazprom" association, to finish all the completion work for another well, number 17 drilled at the promising "April 28" site. According to initial measurements, the well will yield 350 tons of pure crude a day. The new well was drilled well ahead of schedule by the MURB "Bukhta Il'icha" team headed by D. Abdurakhmanov and drill foremen M. Sultanov and V. Tarnovskiy. It is the fourth well successfully drilled by exploratory oil crews from the stationary platform No 2. [By N. Mushailov, VYSHKA correspondent] [Baku VYSHKA in Russian 27 Sep 83 p 1] 9875

COAL

DIRECTOR OUTLINES FUTURE DEVELOPMENTS AT KUZBASSUGOL'

Moscow UGOL' in Russian No 10, Oct 83 pp 8-11

[Article by A. I. Petrov, candidate of technical science, general director of VPO [All-Union Production Association] Kuzbassugol' [Kuznetsk Basin Coal] : Prospects for the Development of the VPO Kuzbassugol' "]

[Text] Almost 99 percent of West Siberia's total explored coal reserves are located in the Kuzbass. In recent years VPO Kuzbass enterprises have improved their work. Thus, in 1982 coal extraction increased 2.2 million tons compared to 1981. At the same time the coal extraction plans remain taut. Thus, mines in Prokop'yevsko-Kiselevskiy Rayon and the Leninskugol' Association under-fulfilled the 1982 plan by 400,000 and 500,000 tons respectively. This is not only due to organizational and technical reasons (untimely preparation of working faces, emergencies in tunnels and equipment and fire dangers), but also to lagging in mine reconstruction work. Seven out of 19 mines in Prokop'yevsko-Kiselevskiy Rayon have practically no reserves at operating horizons. Mining work in 57 percent of the basin's mines is being conducted on inclined fields, often using temporary arrangements. This leads to complications in technology, ventilation and transportation, as well as to increased labor intensity. As a consequence of insufficient reserves at 15 mines of the VPO Kuzbassugol', coal extraction is under way at the cutting [prirezayemye] sections of other mines extracting 6 million tons of coal annually. At some mines there have been sharp reductions in the number of faces and reductions in coal extraction.

In view of the mine reconstruction situation, individual sections in nearby coal fields are being developed to increase extraction volume. Eight such sections with an annual extraction of about 5 million tons have already been introduced and construction is under way on another 7 with an equal capacity. The following is being done: preparation, using the enterprises' own resources, of lower horizons using inclined headings at seven mines; the redistribution of reserves and the extension of operating time at mines such as the Novokuznetskaya, Zyryanovskaya and others; the supplementary exploration of reserves for strip mining and the allocation of additional equipment to maintain extraction at a level of 4-5 million tons annually.

Implementing this complex of measures to improve and modernize mines has made it possible to stop the reduction in underground extraction which has taken

place since 1979. In 1982 extraction was 87 million tons, compared to 86 million in 1981. In 1982 extraction from comprehensively mechanized faces reached 55 million tons, 1.6 million tons more than in 1980. During this period the level of comprehensive mechanization reached 72.5 percent; the plan was 72 percent. Daily loadings at comprehensively mechanized working faces increased to 917 tons, exceeding the planned level.

In 1982 32 mines extracted coal using complexes, at 3 such complexes accounted for 70-95 percent of extraction, at 8 mines 25-70 percent, and at 5 mines, up to 25 percent. Complexes are not used at 19 mines working steeply dipping seams under difficult mining geological conditions. By 1985 it is planned to increase extraction from comprehensively mechanized faces to 59 million tons.

Much attention is given to problems of development operations at associations and mines in the VPO Kuzbassugol'. During 1982-1983 the average size of a tunneling brigade increased from 18 to 23 people, extensive work was done to expand socialist competition between tunneling brigades, there was an increase, from 79 to 94, of the number of high speed brigades, which have driven 347 km of entries, and an All-Union school of progressive experience in high speed mining operations was conducted. Such schools were also conducted at production associations and permanently operating schools were created, based on the better tunneling brigades. This made it possible to complete the developmental work plan in 1982 and to ensure 47 km increase in developmental entries compared to 1980 and a 53 km increase in opening and preparatory entries.

However, the target for driving entries by combines is not being completed. In 1982 35 km of the plan were not completed, although the volume of combine driving increased by 26 km compared to the 1980 level and reached 533 km, or 51 percent of the entries driven where loading is required. In spite of increases in the amounts of entry driving and the number of high speed brigades, the pace of entry driving has not increased in 2 years and remains at 83 meters per month. In addition, 34 out of 67 mines were not completely staffed with tunnel drivers, and in 1982 21 mines and almost half of the tunneling brigades did not fulfill entry driving plans.

Between 1980 and 1982 there was an increase in the equipment available at working and developmental faces. The number of mechanized complexes increased from 260 to 273, tunneling combines from 447 to 496, working face machines from 471 to 506 and loaders from 427 to 451. The technical characteristics of the majority of mechanized complexes correspond to the mining geological conditions of their use. However, at 56 faces complexes are used in difficult conditions beyond the limits of their rational application. USSR Minugleprom [Ministry of the Coal Industry] and associations are taking measures to replace equipment on such faces with complexes meeting new technical standards: the 2UKP, 1UKP, KMT, KM-130, 4KM-130, and MK-75. In 2 years the number of such complexes has increased 2.5 fold. However, VPO Kuzbassugol's requirements are not being completely met for complexes to work 1.4 - 4.2 meter seams with weak and difficult to collapse roofs (OKP-70, 2UKP, KM-130).

While there are definite achievements in the mechanization and automation of the basic technological processes, the mechanization level of auxiliary work

in developmental entries remains low and the labor intensity high. Machinery for removing supports when mines are exhausted is not manufactured in sufficient quantities, winches for 2 km and longer inclined shafts are lacking, machinery for assembling and disassembling many types of supports has not been built, even though one section of a new support weighs 10-16 tons.

Due to the high labor intensity of work to maintain entries, for transport and auxiliary processes, labor productivity here is lower than at comprehensively mechanized faces. During 1981-1985 it was planned to develop and manufacture experimental models and master the production of new types of equipment and materials, including mechanized complexes for seams up to 4.2 meters thick with difficult to collapse roofs, UKP and KMT type mechanized complexes 4PP-5 tunneling combines and MPK-3 rock loaders with side loaders; master the series production of conveyors made from standardized units, PS-3.5 unit trains and VDK-2.5 bottom dump mine cars.

In order to mechanize developmental and extraction operations in steep seams, KuzNIUI [Kuznetsk Scientific Research Institute of Coal] has, jointly with Sibgiprogormash and Giprouglemash, developed and transferred to series production, the AK-2 unit, the KPK and KNK complexes, the KS-4 and KSO tunnel driving complexes, the PLSH personnel lift and other units. However, until recently their production has not been organized at plants of the VPO Soyuzuglemash. While Prokop'yevsko-Kiselevskiy Rayon needs a dozen AK-3 units, only 1 is in operation and the 1984 plan calls for the manufacture of only 1 more. The use of the KS-4 complex doubles the speed of driving inclines downward. The association needs 30 such complexes, but in 1983 it is planned to produce only 2. Work is under way slowly on the KVS, KGSZ, KTZ, and AK-3 complexes for tunnel driving work with the solidified filling in of worked out spaces.

The planning and development of mining operations at Kuzbass mines are done in accordance with general schemes for the layout of minefields. Stopping fields are worked using progressive systems with long pillars along the strike and up and down the dip. In 1982, pillar free technology extracted 41 percent of the coal, compared to 31 percent in 1980. As a result, there were substantial reductions in operating losses of coal and in the unit volume of mining operations.

Seven mines have completely conveyORIZED underground transportation, and 8 are close to completing this. Highly productive conveyors meeting new technical standards are being installed on main haulageways. There are increases in the amount of support work using metal and substitutes for wood. In 1982 86 percent of total tunnel length used such types of supports.

Together with mine workers, associates at KuzNIUI have developed and widely introduced bolt supports. They have now become the basic type of support at 15 mines in the basin, and they are the only type used at the Abashevskaya, Nagornaya and Zarechnaya mines. The maximum annual use of bolts is 360 km and the total length of workings so supported during the introduction period has reached more than 5,000 km.

In order to further increase the use of bolts it is planned to disseminate the work experience of the Tomskaya, Shushtalepskaya and imeni V. I. Lenin Mines

in the mechanization of bolt hole drilling, to conduct extensive industrial testing in retaining bolts in squeezed out coal at working faces, ensure the manufacture and widespread introduction of small diameter bolts, standardized component cross supports, large dimension, lattice and multilaminar tie bars.

It must be noted that order is still only very slowly being brought into mining operations. Some mines are not driving wing inclines for transferring to a direct system for ventilating working faces and delivering equipment. The length of the working face and stoping field and the cross section of openings are not being increased in accordance with the requirements of progressive technological systems. The opening of reserves by using temporary layouts on dipping fields and extracting sections from neighboring mine fields has increased the distance of supported horizontal workings.

In the past 5 years, VPO Kuzbassugol' requirements for equipment capital repairs have only been 55-60 percent met, while for mechanized supports, breakage and tunnel driving combines, belt and scraper conveyors the figure is 57-72 percent. Due to a shortage of repair capacity and a lack of spare parts, repair work on the UKP and KM-130 complexes meeting the new technical standards and the 4PP-2 combines has not been organized in the basin. Repair enterprises are being rebuilt through the use of the enterprises own resources. In order to eliminate the backlog in capital repairs in 1983 it was intended to operationally introduce the Belovo plant for the repair of mechanized supports and a number of shops at existing repair enterprises. In the long term it is planned to build and introduce the Mysky TsEMM for the repair of enrichment equipment and the Belovo plant for repairing explosion proof electric motors and equipment.

Special significance is placed upon growth in labor productivity as the most important direction for increasing production efficiency. In 1982 the majority of industrial enterprises in the association fulfilled and overfulfilled plan targets for labor productivity and are successfully working in 1983.

In socialist competition in honor of the 113th anniversary of V. I. Lenin's birth, some extraction and developmental brigades attained very high indicators. On April 21st at the Rapsadskaya Mine, the extraction brigade led by P. I. Frolov, using a 2UKP complex extracted 11,350 tons of coal, and throughout April extracted 97,300 tons. Labor productivity per worker was 41 tons per shift. Prior to the holiday and under difficult mining geological conditions, in 31 working days the extraction brigade of V. S. Kostin at the Ziminka Mine extracted 35,400 tons of coal from a steeply dipping seam using a 1ASHchM unit. Labor productivity per worker was 35 tons per shift.

However, in spite of positive results from some brigades, mines and production associations, there is still substantial lagging in the completion of labor productivity plans.

During 1980-1982 the number of coal extraction workers at mines in the Kuzbass increased by 6,000. At the basic processes -- development and extraction work -- the number of workers has increased by 1,600, at the other underground operations it has also increased by 1,600, while the number of workers on the surface

has risen by 2,800. This distribution in their numbers is due to the growing labor intensity of work at these other underground operations and at the surface. This is because of the lagging in mine reconstruction, the transition to working inclined fields and the increased work volumes in the servicing and repair of general mine machinery and stationary facilities, as well as ensuring safe working conditions for miners. For these reasons substantial increases in labor productivity at extraction operations attained through comprehensive mechanization have not, in recent years, increased general labor productivity at mines.

The VPO Kuzbassugol' is taking measures to increase the number of workers in the basic professions. In 1982 2,500 people were trained to be tunnel drivers and 1,500 were trained to be working face miners. During 1980-1982 the plan for admitting students into the professional and technical school was 115 percent fulfilled.

Not all mines are seeing that labor productivity growth outpaces increases in earnings. In 1982 compared to 1980 labor productivity for output per industrial and production worker at Kuzbassugol' increased 2.9 percent in monetary terms. Earnings increased by 1 percent if higher wage rates are not taken into consideration, and by 11.2 percent if they are.

The new conditions for the payment of labor were introduced at mines in the basin in the first quarter of 1982. Considerable work was simultaneously done to improve work organization, combine jobs and expand service zones. As a result output norms at extraction operations increased by 3.5 percent and at development operations by 3 percent. There were sizable reductions in additional wage payments not involving the output of final products.

The CPSU and the Soviet government show constant concern about improving the housing and social service conditions of miners in the Kuzbass. In the 11th Five-Year Plan it is intended to introduce 1,466,000 square meters of housing, preschool institutions for 5,600 children, general educational schools for 10,000 pupils, hospitals with a total of 1,310 beds, outpatient clinics with a capacity of 2,160, clubs for 1,200 and a number of other cultural, service and communal facilities. Great attention has been given to the installation of construction industry enterprises.

In order to improve the technical standards of production at the VPO Kuzbassugol' during 1983-1985 it is intended to implement the following:

Meet established targets for comprehensively mechanized extraction and combine driven development entries on the basis of further expansions in the movement for 1,000 ton brigades and high speed tunneling brigades, reduce idle time by staffing brigades with workers and improving work organization, reduce the time needed for installation and dismantling work and improve the quality of mining equipment repair;

Improve mining operations and ensure a stable front for extraction work on the basis of general mine field layouts, increase the volume of development entry driving;

Increase (up to 400 km) the amount of bolt support, introduce new types of clamped on units for metal supports in order to increase their carrying capacity, use new types of materials, improve the removal of metal supports from openings being caved in and increase the coefficient of repeated use of supports;

Concentrate the efforts of sector scientific-research and planning-design institutes, and institutes in the Siberian Department of the USSR Academy of Sciences on the solution of problems in the technology and mechanization of working steeply dipping seams in Prokop'yevsko-Kiselevskiy Rayon.

To ensure meeting five-year plant targets for improving technical standards at VPO Kuzbassugol' mines it is necessary to take measures for creating and organizing the production, during 1983-1985, of the ZOKP-70, 4OKP-70, UKP, and KMT mechanized complexes for working seams up to 5 m thick with weak and difficult to collapse roofs, KVZ, KTZ, KGSZ filling complexes, RKU and KShE type extraction combines with thyristor controls, 4PP-2M, 4PP-5, Soyuz-19 and GPK tunnel driving combines and low alloy rolled steel and polyurethane components for consolidating unstable rock.

The following is necessary in order to meet the five-year plan targets for capital construction in the VPO Kuzbassugo' during 1983-1985:

Increase the capacity of mine construction organizations at association projects to ensure the completion of work at approved start-up complexes and of five-year plan targets;

Concentrate the efforts of mine construction organizations upon the construction of coal industry projects;

More widely enlist other ministries into the construction of Coal Industry projects in Prokop'yevsko-Kiselevskiy and Yerunakovskiy Rayons, and, beginning in 1984, allocate additional contract work to these ministries.

Kuzbass workers enthusiastically greeted the decisions of the July (1983) CPSU Central Committee Plenum and fervently support measures for strengthening labor discipline, further improving organization and order in production and the growth in workers' communist consciousness. These are the basis for highly productive labor for the good of our Motherland.

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NON-NUCLEAR POWER

CONSTRUCTION PLANS FOR SREDNE-YENISEYSKAYA GES OUTLINED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Oct 83 p 4

[Article by B. Isayev: "New Star of Yenisey"]

[Text] They say that a decision was made to build another large hydroelectric power plant on the Yenisey. Is this really the case? Why is it needed, when there are already many of them in our region? Can't the newspaper go into greater detail about the new Siberian GES?

At the USSR Ministry of Power and Electrification, our correspondent was informed that it is true, there is such a decision. Recently, there was technical-economic substantiation for building a 6 million kilowatt hydraulic electric power plant at the middle reaches of the Yenisey. Ye. Smirnov, deputy chief engineer of the "Gidroproyekt" Institute imeni S. Ya. Zhuk and chief engineer of the Sredneyeniseyskaya GES, tells us about the new power giant of Siberia.

The location of the new GES was selected after a thorough analysis of competing versions. The chosen site was near the city of Lesosibirsk where the Yenisey, cutting through a mountain range, narrows into the so-called Burmakinskiy rapids. The river bed is comparatively narrow here (naturally, according to Yenisey scales) -- about one-and-a-half kilometers. The banks and the bed of the river are composed of gneiss rock which will serve as a good foundation for the concrete structures. True, it will first be necessary to remove a layer of coarse gravel several meters thick from the river bed.

Not far from the future GES, the Angara, the main tributary of the Yenisey, flows into it. Thus, the electric power plant turbines will be turned by the waters of two famous Siberian rivers. Finally, there is still another very important circumstance, availability of transportation facilities. It may also be said here that Lesosibirsk was lucky. There is a waterway to the city along the river, as well as a RR which is connected to the Transsiberian mainline, and the ancient Yenisey highway passes by the future construction site.

The following figures give one an idea of the hydraulic resources of the Middle Yenisey. According to measurements for many years, the annual discharge of the river near the GES is equal to 250 cubic kilometers. The water flows at a rate of 7900 cubic meters per second and during the maximum high water, above 55,000 cubic meters per second. The level drop between the upper and lower reaches of the river after the water reservoir is filled will be 45 to 54 meters depending upon the amount of water that has passed through the hydraulic system.

Sixteen 375,000 kilowatt hydraulic turbogenerator units will be installed in the building of the plant. The average output of inexpensive electric power will be more than 30 billion kilowatt-hours per year. This is considerably more than any existing GES or any GES being built in the country. The long-range plan specifies expanding the plant and increasing the installed capacity from 6 to 7.5 million kilowatts.

As is well known, the Yenisey is a working river. In order to bypass the hydraulic system, ships and lumber rafts will use the reservoir and the lower reaches which will be connected by an artificial "channel," dug along the right bank. The water transportation structures are two-stage, i.e., they will consist of two locks divided by an intermediate passing channel. Each stage will have two compartments through which ships and rafts can pass through the locks simultaneously either to one or to different sides.

For a long time, the idea of building the Sredneyeniseyskaya GES was not considered practical due to a seemingly insurmountable difficulty: the large Gorevskoye deposit of nonferrous metals would be submerged. Specialists of "Gidroproyekt," "SibtsvetmetNIIproyekt" and other institutes were able to solve this very complicated problem. The deposit will be reliably protected from the flooded Angara and from the seepage waters by a dam about 50 meters high and by a system of underground drainage galleries with special unloading wells, and by ground-reinforcing screens and drainage pump stations.

Several rural settlements will be in the flooding zone. Modern villages at new sites are being designed for their inhabitants. These villages will have well-built houses, a full set of social-cultural and personal service facilities, as well as the necessary farming structures. The following detail says a lot: costs for relocating one man here will be more than ten-fold than in the years of building the Bratskaya GES.

Large forests in the bed of the water reservoir will have to be cut down earlier by industrial lumber enterprises operating in the region. Part of the commercial timber of valuable conifers will be exported. The deciduous trees will serve as raw material for lumber processing organizations which are planned to be built in Lesosibirsk. One would like only to note that the lumber people should prepare for this large job in advance. It is a necessary lesson learned from the sad experience of past years where considerable sections of Siberian forests were left to rot under water.

As far as arable agricultural land that will be covered by the reservoir is concerned, it will be restored on new, virgin land in full volume with respect to area, as well as productivity.

The Sredneyeniseyskaya GES, like its predecessors --the Ust'-Ilimskaya, Bratskaya, Krasnoyarskaya and Sayano-Shushenskaya hydroelectric power plants -- will serve the industrial assimilation of the natural riches of Eastern Siberia. It is planned to create a large territorial-production complex on its basis in the region of the Middle Yenisey and the Lower Angara. A deep-water transportation route will be opened up along rivers hundreds of kilometers long. Lesosibirsk, where the builders and the plant operators will live, will be developed further.

2291

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NON-NUCLEAR POWER

PLANS TO DEVELOP EAST SIBERIAN GES AT BOGUCHANSK

Moscow EKONOMICHESKAYA GAZETA in Russian No 45, Nov 83 p 7

[Article by A. Marchuk, candidate of technical sciences: "Boguchanskaya GES -- the New Power Giant in the East"]

[Text] The Irkutskaya, Bratskaya and Ust'-Ilimskaya hydroelectric power plants have proved convincingly their high economic efficiency. By producing cheap electric power, they not only returned to the state the money spent on them many times over, but also made it possible to form powerful industrial complexes and have considerable economic effect in such sectors as nonferrous metallurgy, wood chemistry and wood reprocessing, mining and water transportation. New well-built cities such as Bratsk, Ust'-Ilimsk and Zheleznogorsk-Ilimskiy have arisen on the banks of the Angara.

The rapid growth of the economic potential of Siberia made it necessary to provide continuously for high rates of electric consumption. During the 11th Five-Year Plan period, the increase in the output of electric power in the consolidated power system of Siberia will be 75 billion kilowatt-hours and will increase further in the 12th Five-Year Plan period. One of the most powerful and effective sources in meeting these rapidly increasing requirements in electric power will be the Boguchanskaya Electric Power Plant.

The rated capacity of the GES is four million kilowatts, including three million in the first stage. The average long-term electric power output will be 17.6 billion kilowatt-hours.

The Boguchanskaya GES, like all GES of the Angara series, is highly efficient economically. The production cost of one kilowatt-hour of power it produces will be, according to calculations of the "Gidroyekt" Institute, 0.11 kopecks, which is one-sixth that at thermal electric power plants.

Specialists of this institute analyzed the experience in building the Bratskaya and Ust'-Ilimskaya GES and incorporated a number of new ideas into the project of the new power giant. The comprehensive interests of the national economy, modern requirements of saving scarce materials, a reduction in ecological harm, an increase in the degree of compensation for losses of agricultural output due to flooding -- all this was taken more fully into account.

Thus, a large part of the Boguchanskaya GES dam will be filled with local stone from the central antiseepage asphalt-concrete diaphragm. A dam of this type is among the largest similar structures in the world and is the first in our country.

A 756-meter concrete dam will occupy an area slightly larger than one-third of the pressure front on the left bank of the river. Behind this part of the dam, there will rise the GES building where 12 hydraulic turbogenerator units with a capacity of 333,000 kilowatts each will be located.

For the first time at Angara, among the basic structures of the hydraulic system, there will be a temporary navigation lock for timber rafts and ships to pass through and to discharge high waters during the construction period.

One of the most difficult problems in building the Boguchanskaya GES was the timely fulfillment of large volumes of work on clearing the forest and moving the timber from the zone of the reservoir. From the territory being flooded, it is necessary to remove about 11 million cubic meters of commercial wood with extremely poor transportation facilities. Considerable amounts of money were allotted to the USSR Minlesbumprom [Ministry of Timber, Pulp and Paper, and Wood Processing Industry] for this purpose.

In spite of similar volumes and working conditions, the cost of building the Boguchanskaya GES reservoir are 2.6 times greater than that for the Ust'-Ilinskaya GES. This is due to the fact that fuller consideration was given to modern requirements for protecting the environment and natural resources. For example, the cost of assimilating new arable farming land to replace that covered by the water reservoir was specified on the average as 5000 rubles per hectare as against 1200 rubles when building the Ust'-Ilinskaya GES. Capital investments on moving people from the flooded zone were assumed to be about 8000 rubles per person as compared to 3000 rubles when building the Ust'-Ilinskaya GES.

In the Boguchanskaya GES, an estimated 9 million rubles of capital investments were specified for building fish spawning and breeding pools.

Auxiliary production enterprises in the Boguchanskaya GES region are designed to do construction and installation work to an amount of 140 million rubles per year. It is planned to use modular major buildings in the further development of the Boguchanskiy territorial-power-industrial complex. It is proposed that this new complex contain wood-processing and cellulose enterprises, a mining-enriching plant, alumina and aluminum production facilities, etc.

Over 5000 builders of the Boguchanskaya GES, many of whom participated in building the Bratskaya and Ust'-Ilinskaya GES, have already completed work to an amount of 238 million rubles. The construction site has a reliable power supply and is connected to Bratsk by the Sedanovo-Boguchany motor vehicle highway. There are almost 60,000 square meters of well-built housing in the Postoyanny settlement, as well as social and cultural-personal service facilities.

A pioneering construction base was created which will be able to do construction-installation work to an amount of up to 30 million rubles per year.

Some 3,820,000 cubic meters of rock and soft earth, of the total planned volume of 5,100,000 cubic meters, were already removed from the foundation pit for the concrete structures of the hydraulic development on the left bank of the river. Some 55,400 cubic meters of concrete have been poured.

At present, the builders are preparing for an important stage -- spanning the Angara which is planned for October 1984.

Therefore, only a year remains until the significant event. During the preparation period, a number of large unsolved problems was detected. The main one was starting the first section of a large concrete plant in June of 1984. Before spanning the Angara, it is necessary to pour 250,000 cubic meters of concrete, but the available plant can produce only 160,000 cubic meters, while the remaining 90,000 cubic meters must be produced by the new plant.

To fill the foundation pit of the stone rubble dam on the right bank, it is necessary to reprocess over a million cubic meters of rock on the right bank of the river. But, there is still no source of constant electric power and no repair base for devices and motor vehicle transport.

The most difficult problem is providing the construction site with additional working personnel. The collective of the construction administration of the Boguchanskaya GES is fulfilling the tasks on increasing the productivity of labor, but the planned sharp increase in the volume of work in 1984 urgently demands an increase of over 2000 people in the builders collective.

All these problems may be solved by the attentive attitude of the "Bratskgesstroy" and USSR Minenergo [Ministry of Power and Electrification] workers.

In planning capital investments, it is more than ever necessary to take into account the requirements in creating, in this region, a territorial-industrial complex. Thus, for example, a delay is already in the construction of a RR from the Karabula Station to the Boguchanskaya GES, which can delay work on removing the timber from the water reservoir zone. The construction of a large house-building panel plant on the construction site of the GES has been delayed greatly, although its construction is considerably more advantageous than transporting large panel house-building products from Bratsk over a motor vehicle highway 330 kilometers long.

The construction of the new GES on the Angara is gaining speed, but it also needs greater attention.

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NON-NUCLEAR POWER

DEVELOPMENT OF HEAT, THERMAL POWER ENGINEERING

Moscow EKONOMICHESKAYA GAZETA in Russian No 46, Nov 83 p 2

[Survey by the department of power engineering and electrical engineering of the USSR State Committee for Science and Technology]

[Text]"To achieve high rates of construction of thermal power plants, using coals of the Ekibastuz and Kansk-Achinsk basins, as well as natural and associated gas of West Siberian fields". The 26th Party Congress posed this task in the area of electrical power engineering. Its resolution is intimately connected with another decision of the congress--by using the achievements of science and technology to achieve a maximum increase in the unit capacity of machinery and equipment, while at the same time lowering their size, metal content and power consumption, and lowering the unit cost of final product.

The comprehensive scientific and technical program "Creating New Types of Equipment for Producing Electrical and Thermal Power" should help to solve this problem, and aid in successfully realizing the country's energy program.

It is Solved in an Integrated Manner

Building powerful thermal power plants at the Kansk-Achinsk and Ekibastuz fuel-energy complexes and the Tyumen oil and gas region based on large power units will allow solution of a major economic problem--to substantially increase the proportion of the East's cheap fuel, and thus improve the power supply of other regions.

This involves introducing power units with a capacity of 500 and 800 thousand kilowatts at the Ekibasluyskaya, Berezhovskaya, Permskaya and other GRES's. Their use in place of conventional "three hundred thousands" will enable a reduction in specific capital investments by 8-10%; in labor costs for construction, by 15-20%; and in the number of operating personnel, by 40-50%.

Fundamentally new boiler devices using Kansk-Achinsk coals are being developed to reduce the size of boilers and their metal content. They will first be tested on boilers designed for TETs [heat and electric power plants].

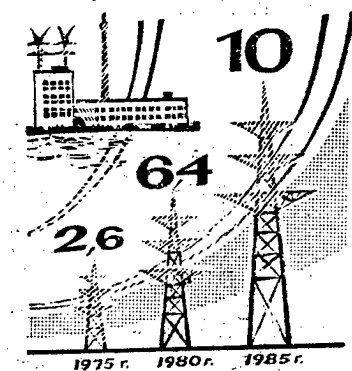
At the same time, questions are being solved of protecting trunk heat lines from inner and outer corrosion, and lowering their heat loss by using new, highly efficient thermal insulation materials. The use of polymer concretes will enable a 40% reduction in specific capital investments over presently used insulation. The savings in 1985 will exceed 3 million rubles for 50 kilometers of heat pipes built that way in this five-year plan.

One of the program's tasks is to introduce a pilot steam compression, heat pump 200 gigacalorie/hr plant at the Lyuberetskaya aeration station in the Moscow area. Low-potential waste heat from the firm is regenerated here.

Creation of new, maneuverable equipment for thermal power plants for regulating the electricity load schedule according to the program is very important. Under current conditions, the share of such units in the total capacity of power plants has become inadequate. A particularly unfavorable situation exists in the European part of the country, where atomic power plants are playing an increasing role in electric power generation. They should not be used in sharply fluctuating conditions. For now, the load schedule is regulated by basic equipment (including units at supercritical steam parameters) that has not been adapted for such purposes. The result is increased wear, a drop in efficiency and greater repair work.

To eliminate this problem, construction and assimilation are planned of prototypes of peak gas turbines at 150-200,000 kW units, high-efficiency steam and 250,000 kW gas plants using the natural and casing-head gas of Western Siberia, and an air storage gas turbine power plant.

Fig. 1. Share of Large Power Units (500 Megawatt and More) in the Installed Capacity of Thermal Power Plants (In Percentages)



An important task of the program is to create a steam-gas plant with intra-cyclic gasification of solid fuel. Its module should be created by 1985. The special feature of the plant is the presence of a gas generator in the technological design, where the solid fuel is gasified. The synthetic gas obtained is used in a high-pressure steam generator. From there, the combustion products go to the gas turbine at 750-800 degrees. The plant thus requires no scarce gas turbine fuel, while being very efficient.

The air storage gas turbine power plant (VAGTE) is designed to control electricity loads during the day. At night, it uses power from the network to drive the compressor group pumping air to the underground storage area. This balances the electric load schedule during the night and improves the operating equipment of the basic thermal power equipment in the system. During the morning and evening hours, the plant generates electricity, when its consumption rises sharply. The compressor group does not take part in the work. The VAGTE uses air to burn the fuel, stored in the reservoir at a pressure of 50-60 atmospheres. The gas turbine plant's power is thus tripled.

Advantages of the MHD

As is known, Soviet science and technology occupies the leading position in direct conversion of thermal power to electrical. Our specialists have moved from research and experimental design work to practical realization of the advantages of the magnetohydrodynamic (MHD) effect.

The program includes creation of a 500,000 kilowatt MHD gas power unit at the Ryazanskaya GES, and preparation work on a solid-fuel, million-kilowatt MHD power unit.

General future introduction of MHD plants in power engineering will allow a major increase in the efficiency of electric power generation. The efficiency factor of MHD power units is 50%, compared with 40-42% for thermal electric power plants.

The program devotes much attention to modernization and reconstruction of existing equipment. In particular, there will be an improvement in efficiency, increase in operating resources and reduction in repair costs for 160, 200 and 300 thousand kilowatt units.

During the five-year period, 88 boiler units and 85 turbines are being rebuilt, with individual replacement units and parts. The intermediate steam heating system will be modernized in 80 boilers, to raise the temperature from 545 to 565 degrees. Units of 160 and 200 thousand kilowatts, with a total power of 20 million kilowatts, are being switched to a half-peak operating

mode. This is being done on equipment where modernization and reconstruction costs are the greatest, and at power stations in areas with a particularly dispersed schedule of electricity loads.

Done on Time

A great deal has already been done since the beginning of the five-year plan on the tasks of the comprehensive program. For example, a unique boiler with a steam output of 2,650 tons/hr has been made for the Berezovskaya GRES-1--a first for KATEK. It will produce steam of supercritical parameters using Kansk-Achinsk brown coal, with a heat producing capacity of about 3,500 kilocalories per kilogram, putting it in the strongly slagging group; it is considered low-grade fuel. In this connection, the focus of designers and scientists has been on ensuring reliable, non-slag operation of the boiler unit, at acceptable efficiency.

In spite of the boiler's considerable size (over 100 meters high) and high metal content, the main goal has been achieved: a prototype has been created that will enable use in the near future of inexpensive Kansk-Achinsk basin coal for the country's fuel-energy balance. Of course, the problem of improving basic efficiency will not be neglected.

Research work has been completed at the Moldavskaya GRES to bring the technical and economic indices up to the rated level of 250,000 kW steam gas plants with gas discharge to the boiler. A spreader-type low-temperature furnace with a steam output of 420 tons/hr, developed by the Leningrad Polytechnical Institute, has gone on line at the Ust'-Ilinskaya TETs. This boiler was made to work using coarse-ground Kansk-Achinsk brown coals. As a result, it will be possible to determine its operating capability without dust preparing equipment, thus reducing capital investments for the plant and lowering the use of electric power for the TETs' internal needs.

Make Up For Lost Ground

Unfortunately, not all the tasks are being completed successfully. Entry into production is behind schedule of the large power units at the Berezovskaya GRES-1, Ekibastuzskaya GRES-2 and Permskaya GRES due to the considerable lag in construction and assembly work. The priority tasks of the program should stimulate the work of Minenergo and Minenergomash organizations in the final years of the five-year plan.

The 150,000 kW gas turbine power plant for the GRES-3 "Mosenergo" is a source of major concern. This plant is much more efficient than currently operating ones, but construction and assembly work hasn't begun on schedule at the power plant, nor preparation of

the turbine for production at the production association "Leningrad Metal Plant" (general director A. Ogurtsov).

The plan should provide for producing a boiler with a "fluidized" bed furnace for the Barnaul'skaya TETs-3 (manufactured by the production association "Sibenergomash"). The creation and introduction of such boilers in the economy will solve the urgent problem of using low-grade fuels, lowering the metal content of units, and reducing emissions of sulfur oxides into the atmosphere. Minenergomash is not paying enough attention to this. The prototypes of such boilers installed 2-3 years ago at the TETs of various enterprises of the sector have not been adjusted, and are working unsatisfactorily. This prevents important technical results from being obtained.

The fate of the 500,000 kW gas-residual oil half-peak power unit for the Lukoml'skaya GRES is uncertain. Minenergo has not issued the order for its equipment to be manufactured in 1984, as provided for by the program. Yet the unit is very important. It is to be used to test new techniques and define ways of improving such equipment and its operating possibilities with solid fuel.

There is uncertainty regarding the financing of design work to create an air storage, gas turbine electric plant, though the plan calls for equipment to be created for the VAGTE in 1986.

Complications have also arisen with the steam-gas plant with intra-cyclic gasification of solid fuel.

The coordination council for the program, headed by the deputy minister of power engineering and electrification of the USSR, F. Sapozhnikov, could be more effective in eliminating these problems.

The tasks of one of the most important comprehensive programs must be reflected in the plans of its participants in the succeeding years of the five-year plan. The issue of thermal power engineering will be further developed in the 12th Five-Year Plan, mainly in the area of switching power plants from liquid petroleum fuel to coal and gas.

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NON-NUCLEAR POWER

ZAGORSKAYA GATES, OTHERS PLANNED TO SUPPLEMENT MOSCOW ENERGY SYSTEM

Moscow MOSKOVSKAYA PRAVDA in Russian 1 Nov 83 pp 1-2

[Article by S. Dorogin, "A Storeroom of Energy"]

[Text] A major operation has been performed on the construction program of a unique structure: the country's first hydroelectric pumped storage power plant.

The waterfall will go through pipes. But such pipelines are not ordinary ones. Their size is commensurate with that of the entire plant. Wide corridors over seven meters in diameter will be built for the waterfall. The wall of water will hit the turbine blades not as a quiet flow, but as a powerful current. With the valves open, the energy of the falling water will be converted to electricity, lighting up the evening streets. The plant's capacity will be equal to that of many plants together. In one year, the unique structure will produce 1,200,000 kW of electric power. Specialists calculate that such a supply will suffice not only for Moscow. The plant will be able to provide additional power to many other areas of the oblast.

Morning, the very beginning of the work day, and evening, after the work shift, are the busiest times, the peak hours for the specialists of "Mosenergo", all those working on the city's electricity supply.

A huge city can't live on a meager energy ration. Power engineers are thus taking urgent steps: electric rivers are diverted; additional thousands of kilowatt-hours flow to the city from central power systems. The direction of the power flows must then be changed again at night. Excess must be sent elsewhere, to other regions of the country. The conclusion drawn from this situation is understandable: there must be a stable power reserve "on hand". How is such a storehouse of electricity to be created? The answer lies in the name of the unusual site: the hydroelectric pumped storage power plant.

The panorama of a large construction site opens up at the mouth of the Moscow region river Kun'i, in the Zagorsk rayon. The bowl of a vast ditch can be seen from the high shore. It is one of the plant's two reservoirs, holding a huge reserve of water. The 27 million cubic meters are almost a lake. Filling has already started. The Kun'i's water has gone into a new channel, and begun flowing into the reservoir. The ordinary operation of overlapping channels was used to change the river's course. Although the Kun'i is a small river, the technology used was the same as with large water arteries. A concrete bridge was built across the current, cutting off the water's escape. A special road was built for it, straight into the reservoir. The lower reservoir is filling up slowly, collecting 9,000 cubic meters of water per hour. The spring flood will add its share, and the level of one of the lakes will already reach the planned mark in a year.

Meanwhile, the builders are laying the pipelines. They will connect the two reservoirs, creating a second water storage area. The first section of the giant pipe has already been shipped to the site over a special steel track. It took up the entire railroad platform. The first ring has already been installed. The schedule calls for the water conduit units to be delivered at the rate of one a day.

The two reservoirs will be the storage facilities. During peak hours, when power consumption is the highest, the falls will provide additional current through the turbines. This will supplement Moscow's power supply. At night, the water will go in the opposite direction, being pumped from the lower reservoir to the upper one. Specialists calculate that when the Zagorskaya GAES goes on line it will enable a savings of over 700,000 tons of equivalent fuel units a year. That's how much would be needed to generate the power to meet the Moscow network's load in peak hours.

The plant is the first such unusual structure. Future construction is planned of several GAES's in the power system supplying the central portion of the country. Power storerooms are a direct savings of fuel reserves.

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NON-NUCLEAR POWER

PROJECT PLANS AND PROBLEMS AT TURUKHANSKAYA GES

Leningrad LENINGRADSKAYA PRAVDA in Russian 27 Oct 83 p 1

[Article by V. Tveritina, "It's Not Yet on the Map", in the column "Meeting October"]

[Text] "To produce substantiating materials on the Turukhanskaya GES in 1983" (From socialist obligations of the institute Lengidroproyekt).

The unique complex of structures at the Turukhanskaya GES still isn't on the map. Unless it be on one in the office of senior project engineer N. A. Ovdiyenko. The red circle of the anticipated GES was on a tributary of the Yenisey--the Nizhnaya Tunguska river, not far from the settlement of Turukhansk. They say it's only a stone's throw from here to the North Pole, some two parallels.

"Of course the climate is harsh around here," says N.A. Ovdiyenko, who recently returned from a business trip to the north. "In the winter, the mercury column sometimes gets down to 63 degrees below zero. But despite the weather "minus", this area has one major advantage: the high, powerful current of the river, as if created for erection of a hydroelectric dam."

The birth of any GES starts with the prospecting section. That was true here as well. Over 100 people, an entire expedition led by A.P. Ovchinnikov, went to the marshy, uninhabited area to find the answers to the questions posed by designers. And there were many such questions. About five years were spent on studying the conditions of Nizhnaya Tunguska, the ice situation, and the engineering-geological conditions of the region.

"We were fully aware that the success of the first part of the design work depended on the expedition's results," states senior expedition specialist V.A. Baskov. "A correctly chosen site for building the hydro plant makes the designer's job almost twice as easy. Because of this, we carefully studied the data obtained before sending them to Leningrad. We paid special attention to the choice of transport routes to the construction site."

As early as the prospecting stage, conditions appeared that later determined the uniqueness of the Turukhanskaya GES. The designers understood that this site requires new, unconventional engineering solutions, which will require much time. The institute's best specialists were called in to meet the deadline and fulfill the obligations assumed. Specialists from 15 sections worked on the technical and economic verification of the project. They drew up blueprints and processed prospectors' data. Specialists from the associations "Elektrosila" and "Leningrad Metal Plant" offered a good deal of assistance.

Despite the fact that the Lengidroproyekt people had considerable experience in designing complex hydro installations such as the Ust'-Ilimskaya, Krasnoyarskaya, Sayano-Shushenskaya and Kolymskaya GES's, each day of work brought new surprises. The first spring flood on the Nizhnaya Tunguska posed an apparently insoluble problem: how to handle passage of the flood waters during construction of the dam if their pressure head reaches 70 cubic meters per second. Previous designs were unsuitable, since designers had never before encountered such a water speed in hydroelectric construction. For comparison, consider that the same parameter for the Sayano-Shushenskaya GES is a third as much. The answer wasn't easy. Experienced specialists such as Yu.I. Ivanov and M.V. Shalman had to spend a good deal of time on it. Their solution was bold, but the only correct one: to let part of the flood water through the incomplete dam, after completing the appropriate engineering measures.

"This problem led to a number of other related ones," states senior specialist for hydraulic plant outfitting Yu.I. Ivanov. "For example, the dam was chosen considering the unique amounts of water flow during the construction period. We looked at dozens of versions before settling on one: to build a concrete spillover wall in the body of the dam."

Working on the Turukanskaya GES design, the institute's specialists also had to consider the important factor of the distance from the site to transport lines. Delivery of construction materials will not be cheap. After conferring, they decided to make the 200-meter body of the dam out of dirt. Other local materials will also be used.

To sum up, when creating on paper this unique, 20-million kW hydroelectric power plant the designers were fully aware of the importance of their task. The unit capacity of just one unit of this hydro plant is one million kilowatts.

A new, reliable power base will soon appear on our country's maps. Members of the Leningrad institute Gidroproyekt are working on its early completion, having promised to finish the first design stage this year. They are already ahead of schedule. The result of their work: 19 heavy volumes of calculations and findings. The first, most important step toward erecting the Turukhanskaya GES has been made.

NON-NUCLEAR POWER

BRIEFS

KUPSAYSKAYA GES -- Machines of the Kupsayskaya hydroelectric power plant produced the second billion kilowatt-hours of electric power since the start of the year. The high-mountain GES operates stably and will produce over half a billion kilowatt-hours of electric power for the national economy. The power is sent to the cities and villages of South Kirgizia, as well as to neighboring Uzbekistan over high-voltage transmission lines. The Kupsayskaya GES is very efficient. The cost of producing each kilowatt-hour here is only 0.13 kopecks. It is necessary to stress the fact that the designers were fortunate in selecting a place for the water reservoir. It did not use even one hectare of arable land and this is very important in mountainous Kirgizia. [By N. Kopytov] [Text] [Frunze SOVETSKSYA KIRGIZIYA in Russian 1 Nov 83 p 4] 2291

LIPETSKAYA TETS-2 -- Lipetsk -- A figure shows up on the main control board of the Lipetskaya TETS-2: 3 billion. These are the kilowatt-hours of electric power produced since the start-up of the heat and electric power plant which operates on the cheap blast furnace gas of the Novolipetsk Metallurgical Plant. The electric power plant collective is achieving higher rates of electric power production. The capacity of the heat and electric power plant will double by the end of the five-year plan period. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 5 Oct 83 p 1] 2291

KREMENCHUGSKAYA GES -- Since the start of the year, the Kremenchugskaya GES produced 7 million kilowatt-hours of electric power above the plan. Due to efficient operation, energy consumption at the plant itself was reduced by 350,000 kilowatt-hours. [Text] [Kiev PRAVDA UKRAINY in Russian 27 Sep 83 p 1] 2291

NIZHNEKAMSKAYA GES -- Brezhnev, Tatarskaya ASSR -- The installation of the 13th unit of the Nizhnekamskaya GES being built has begun. Countless hours were required to place the first unit, the working wheel of a turbine weighing 250 tons, into the pit. G. Minnakhmetov's brigade from the "Spetsgidroenergomontazh" Trust was able to gain time by using consolidated units. The installers, not waiting for the work front, assembled units of the electric machine on a special stand. This raised the productivity of labor by a third. "In the course of construction, the collective exposed another essential reserve," -- stated A. Baykov, section chief of the trust. -- "It was found that if specialized brigades are needed to assemble the

units, the installation and adjustment require a technological flow aimed at the final result. We were convinced of this when assembling the previous machine. Then, the collective was able to put the 12th machine in operation on schedule and free 20 workers for other sections." [Text] [Moscow IZVESTIYA in Russian 14 Sep 83 p 2] 2291

VOLZHSKAYA GES -- The Volzhskaya GES imeni 22nd Party Congress produced the 250 billionth kilowatt-hour of electric power. This required less than a quarter of a century. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 40, Oct 83 p 3] 2291

CHEBOKSARSKAYA GES -- The ninth unit was placed in commercial operation at the Cheboksarskaya GES. With its start, the construction of the plant reached its "equator" -- half of its units produce current. Some 150,000 tons of oil above the plan were sent from the "Kombineft" fields for reprocessing since the start of the year. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 39, Sep 83 p 3] 2291

KATUNSKAYA GES -- Barnaul -- Builders who built the largest GES's--the Krasnoyarskaya and Sayano-Shushenskaya in Krasnoyarskiy Kray arrived in Altai on the banks of the Katun. Now, they will build the Katunskaya GES in mountainous Altai. The first working collectives that arrived with the equipment and motor vehicle transport are located in Mayma, the rayon center. They set up their wagons and began building warehouses, shops and housing. They will erect a concrete making plant, a large-panel house building plant, an electric shop, repair shops and garages. The second pioneering base will be built directly near the building site of the dam for the Katunskaya GES -- in Yelanda village. There are planned a reinforced concrete products plant, a motor vehicle enterprise and a settlement which, in time, will become the city of Katunsk. Further down the Katun river, near Chemal village where, in the twenties, the first Chemal'skaya Station was built in mountainous Altai (still in operation), the construction of the second GES will begin. But, this is in the future. Today, it is necessary to build good roads to Yelanda, do a large amount of blasting, build communications lines and send electric power there. The basic team of hydraulic builders will arrive at the site of the future Katunskaya GES after 1985 when they will start the last units at the Sayano-Shushenskaya GES. [By L. Parshukova] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 2 Sep 83 p 1] 2291

SAYNO-SHUSHENSKAYA GES -- Dudinka, Krasnoyarskiy Kray -- A ship with the working wheel for the Sayano-Shushenskaya GES, one of the last in river navigation this year, left the port of Dudinskiy yesterday. It would not be simple even for the powerful diesel ship "Pomor'ye" to deliver this load from Leningrad over northern seas to the polar region. At Dudinka, the 146-ton wheel was reloaded on to the dock of a river barge. The Yenisey rivermen are sure that this huge part for the last unit of the Sayano-Shushenskaya GES, manufactured ahead of schedule by the Leningrad workers, will also arrive at the construction site ahead of schedule. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Oct 83 p 1] 2291

DNESTROVSKAYA GES--Novodnestrovsk, Chernovitsk Oblast--Dnestrovskaya GES builders have reached a milestone. Yesterday, a week ahead of schedule, the fifth, penultimate, unit of the GES began operating. Its rated capacity is 117,000 kilowatts. The Dneprovskaya hydraulic development will serve not only to increase the power potential of the country, but will also aid in taming the river whose flooding caused considerable harm, and will irrigate over half a million hectares in Southern Ukraine and in Moldavia. [Text] [Moscow TRUD in Russian 27 Sep 83 p 1] 2291

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ENERGY CONSERVATION

DEVELOPMENT OF WASTELESS, ENERGY-SAVING TECHNOLOGY FOR OIL INDUSTRY

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 11, Nov 83 pp 8-11

[Article by M. M. Khushnulyan of VNIIOENG [All-Union Scientific Research Institute on the Organization of the Administration and Economic Structure of the Oil and Gas Industry]: "Problems in the Creation of an Energy-Saving Technology for the Petroleum Industry".]

[Text] From the editorial staff. By inserting this article, the editorial staff acquaints readers with one possible approach to realizing the important task of creating an energy-saving technology and making the most efficient use of fuel and energy resources in the production of oil and gas. At the same time, the editorial staff invites readers to send in their proposals about saving energy in the production processes of the petroleum industry.

The petroleum industry - one of the basic sectors of heavy industry - is not only the producer of an important part of the fuel and energy resources in the country but also a consumer of them in its production processes. Electricity, traditionally, has been the predominant form of energy consumed as it is the most convenient for practical use in the production processes of drilling wells, extracting oil and gas, pipeline transport, and so on. A major part of the energy consumed is in the extraction of oil with gas condensate and gas.

The problem of energy conservation in petroleum industry production processes is important. Its solution should be directed toward both conserving fuel and energy in general and obtaining additional oil and gas resources. The urgency of the problem is growing every year because of certain fundamental features in the development of the petroleum industry which are leading to an increase in the specific energy expenditures for drilling wells, for extracting and transporting oil and other production needs.

This is caused primarily by the entry of many deposits into a late stage of development characterized by a growth in the water invasion of wells and the withdrawal of the liquid from them, by an increase in the volumes of water injected to sustain formation pressure, and by a reduction in the

proportion of production by natural flow. Deposits of high-viscosity oil, whose extraction is distinguished by high energy consumption, are being drawn into development. Heating methods for increasing oil recovery, the use of which undoubtedly will grow, are energy consumptive. In addition, the number and depth of the wells being drilled are increasing, and the distance for transporting oil to refineries also is increasing.

Thus, the urgency of the problem of energy conservation is becoming all the more obvious. In the petroleum industry its solution requires a comprehensive approach. Up to now, the measures for saving fuel and energy in the sector have been carried out independently and not in connection with comprehensive industrial solutions. Their effectiveness, therefore, on the whole has not had a decisive effect on reducing the energy consumption of petroleum industry production nor on stopping the loss of well products. Thus, the great work carried out from 1970 to 1982 on sealing internal oil field piping systems for the collection and transport of oil and gas and, in particular, the introduction of the single-pipe system for collecting well product and transporting it to central points, permitted the reduction of losses of hydrocarbons in oil fields. In this, however, losses in the raw material and production reservoirs were substantially increased because of unperfected methods of stabilizing the oil. As a result, the work done to conserve well product did not reach its logical conclusion.

Domestic and foreign experience has shown that the most effective method of eliminating hydrocarbon losses is vacuum stabilization using modern installations equipped with propeller or rotary units capable of operating as vacuum, compressor, or turbo-expander machines. When included in central collection point systems having the depths of vacuum processing programmed in accordance with the specific conditions of a deposit, they provide for the withdrawal of the gas and its compression to a pressure necessary either for delivery into the receiver of compressor stations or into other auxiliaries depending on the objectives of the use. These highly versatile installations are of small size, are produced in unitized form, and are fully automated. Domestic industry is producing such machines and the components of the installations.

The efficient use of excess well-head pressure is of no small importance especially in the naturally-flowing and gas-lifting periods of the operation of wells. In surface oil field systems, excess well-head pressure is consumed in successive bleed-offs during stepped separation. In modern oil field engineering it is well known that there are thermal separators which, working in a two-phase zone of the thermodynamic diagram, provide a high degree of oil stabilization and preserve well-head pressure for subsequent use in energy conserving systems.

Not dwelling on the individual ways for developing an energy-saving technology, let us show one of the seemingly most efficient and achievable variants for integrated, multipurpose, wasteless energy-saving installations based on domestic equipment; namely, the gas turbine.

Before formulating the proposed principle of the solution of the problem of energy saving, let us define the specific requirements the solution must satisfy.

1. An acute problem exists in utilizing petroleum-associated gas, the resources of which appear at the very beginning of the extraction of oil at a deposit and, for a prolonged period, are not used because of the significant time lag in setting up equipment for the processing and long-distance transport of the gas. Consequently, a radical solution must be found for using, as a source of energy, the petroleum-associated gas obtained directly in the field and sometimes burned in flares, especially in the early stages of development.
2. In the initial period of exploiting a deposit, electrical energy is required for primary production and for domestic needs. Frequently, however, an electric power station is far away and the construction of an electric transmission line requires time and significant material resources. The use in these circumstances of petroleum-associated gas to fuel local electrical plants of the unitized type is the most efficient way, at least until the processing and long-distance transport of the products of gas processing and of dry gas can be implemented.
3. Oil fields require rather substantial amounts of heat energy for oil treatment processes, for the heating of oil incidental to its transport, for the heating of water for injection into formations, for the generating of steam of high temperature and pressure for well treatments and injection into formations, and for other production needs. For these purposes, of course, the power system of an oil field must involve the provision of heat energy.
4. It is necessary to solve completely the ecological problems which arise in the introduction of a new technology.
5. Proposed comprehensive systems must be flexible, allowing for the optimization of production processes over the wide range of changing conditions in the development of deposits.

The alternative being considered satisfies these requirements. It is based on the use as the principal form of power in oil fields of gas turbine installations fueled by petroleum-associated gas. These installations, in the form of self-contained units, are incorporated into gas-lifting compressor stations, into pumping stations for injecting water into formations and for the transfer of oil into mobile electrical plants and other energy consuming production installations. They can operate on hydrocarbon gas of any consistency and, in critical situations, even on liquid fuel. By utilizing the heat of the exhaust gases of a gas turbine unit, the thermal efficiency of the plant can reach 60-70 percent which, in comparison with electric drive installations (because of the overall efficiency of generation, transmission, and utilization of electrical energy) reduces by many fold the consumption of fuel and energy resources for production needs.

Domestic industry produces a number of different sizes of gas turbine units that make it possible to put together from them self-contained units having as much power as required for a specific purpose and equipped with automatic control for their operation.

The purpose of the gas turbine units, however, is not only to provide driving power, but also assumes the utilizing of the immense source of heat in the exhaust gases which have temperatures of 450-500 C. This will furnish an oil field with heat energy without a supplementary consumption of fuel and with minimal capital investment and operational expenditures.

One of the most important ways of using the exhaust gas heat is in the generation of steam of any temperature and pressure for a wide range of uses - from the cyclic treatment of wells and the injection of steam into formations, to the technology of recovering highly viscous oils. In addition, heat is required for a variety of other production needs which it is unnecessary to list in this article.

Let us point out two important facts about the use of the exhaust gas heat. First, if it is necessary to increase the temperature of the exhaust gases by an additional 150-200 C or higher (for instance for the generation of steam of the highest temperature and pressure, or for increasing the output of steam generators), the processes and equipment which are well known in the industry for the direct or catalytic reheating based on the free oxygen in the exhaust gases can be applied. Second, for heating water with exhaust gases, the foam contact heat exchangers which have been successfully tested at the "Mangyshlakneft" [Mangyshlak Petroleum] association can be used. They have a thermal efficiency of 90 to 95 percent and they permit an additional saving in fuel and energy resources.

After the fullest use of the heat of the exhaust gases, the latter acquire yet another important purpose; namely, they are used as a working substance for injection into wells to increase oil recovery. The exhaust gases contain carbon dioxide gas and nitrogen which, in modern oil recovery processes, are recognized as effective substances. Much is known about the foreign industrial experience, which is rather well grounded scientifically, in the injection of stack gas into formations. The gases can be injected independently or together with steam. Such installations are simple in design, are well known in the industry, and are described in the literature. Stack gas also can be added to water being injected into formations. In so doing, an important ecological problem is solved at the same time - the prevention of air pollution.

In our opinion, special attention should be given to the advisability of using the integrated, wasteless, energy-saving technology for gas-lifting operations inasmuch as the scale of the gas-lifting method of oil recovery will grow significantly. As is known, such a problem was posed by the 26th CPSU Congress. The proposed energy-saving technology unquestionably is effective and fully achievable since it is based on equipment which is serially produced domestically. If the necessity for gas-lifting falls off in

a given petroleum region, the gas-lifting compressor can be converted for the long-distance transport of petroleum-associated gas, the resources of which will be available in an oil field up to the very last stages of its development.

There are important potentials in using an energy-saving technology based on such a principle for the energy consumptive production processes of the industrial sector such as the injection of water and other working substances into formations and also at gas processing enterprises where, with the integrated technical solution, a many-fold reduction in fuel and energy consumption can be made, the metal consumption in the plants can be reduced sharply, and the area they occupy can be lowered.

The proposed principles for creating an integrated energy-saving technology should naturally be subjected to a more detailed engineering and economic development. In so doing alternative variants may crop up depending on the specific conditions for the exploitation of individual deposits.

Without doubt, however, the technology which has been considered most completely satisfies the decisions of the June 1983 Plenum of the CPSU Central Committee about the development of a wasteless, flexible, energy-saving technology which simultaneously saves material resources and substantially raises the efficiency of production.

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