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# USSR Report

ENERGY

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24 APRIL 1986

## USSR REPORT ENERGY

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OIL AND GAS

UDC 622.272.5:622.243:62.001.6

TECHNICAL PROGRESS IN OIL, GAS DRILLING IN CASPIAN SEA

Baku AZERBAYDZHANSKOYE NEFTYANOYE KHOZYAYSTVO in Russian No 11, Nov 85  
pp 1-4

[Article by K. A. Abasov, chief, Kasporneftegazprom All-Union Industrial Association: "Measures to Accelerate Scientific-Technical Progress in Offshore Oil and Gas Extraction in the Caspian"]

[Excerpts] Problems concerned with accelerated development of deep-water oil and gas fields of the Caspian Sea occupy one of the central places in the activities of the Kasporneftegazprom All-Union Industrial Association. In the next 10-15 years--that is, until the year 2000, this problem will be basically associated with accelerated exploration of the highly promising areas imeni Kaverochkin, imeni 26 Bakinskiye Komissary, Promezhutochnaya, Shakhovo-More and imeni Andreyev, situated at depths from 80 to 200 m and more, and with completion of exploration of previously revealed deposits and fields and their introduction into industrial development. This pertains chiefly to the fields imeni 28 April, Bulla-More, Bulla-Yuzhnoye Krylo Island, Livanov Bank and others.

Discovery and exploration of these fields in the period to 1990 will insure creation of a dependable raw material base for development of the republic's oil and gas industry long into the future.

The orientation of this work was the product of the tasks of developing oil and gas fields in seas up to 30-40 m deep, and of the possibilities of material-technical support, the output capacities of existing construction bases, their equipment availability and the immediate future of development.

In this connection concrete tasks were formulated in order to solve the complex of the following problems:

Creation of a new type of foundation blocks with intrinsic buoyancy permitting their transportation and installation without the use of special transportation resources;

development of the methods and technical resources of manufacturing elements of permanent offshore platforms at coastal bases and their construction at sea, including the problems of securing foundation blocks to the bottom;

development of a modular platform superstructure making it possible to sensibly locate all drilling and production equipment within a confined area; construction of special coastal installation and assembly areas at which to manufacture foundation blocks and lower them into the water;

engineering support to the design and construction of permanent offshore platforms, analysis of their structure, creation of the procedures of their design and automated design systems, analysis of the properties of sea-bed soil and of the hydrometeorological conditions in the regions of construction, exploration for new structural materials and creation of a technical standards base.

In light of decisions of the April (1985) CPSU Central Committee Plenum and the June (1985) conference of the CPSU Central Committee on accelerating scientific-technical progress, and with regard for the experience accumulated in creating deep-water permanent platforms, a program of experimental and theoretical research and of experimental design work is presently being drawn up for the 12th Five-Year Plan and the period to the year 2000. The objective of the program is to develop the scientific principles of designing and building platforms to be used in developing promising oil and gas fields at sea depths of 200 and 300 m and more.

One of the most important problems in this program is unification of the designs of foundation blocks and platform superstructures on the basis of optimization of existing technical concepts.

Solution of this problems will make it possible to arrive at optimum design concepts for individual elements, units, foundation blocks and the platform as a whole; to maximally automate design and planning; to reduce design and manufacturing time; to develop new, improved designs for permanent offshore platforms intended for deep seas.

If we are to achieve accelerated development of deep-water oil and gas fields of the Caspian Sea in the 12th Five-Year Plan, each year we would need to build three to five deep-water platforms, which will become possible after the output capacities of the Baku Deep-Water Foundations Plant are assimilated.

This task may be completed on the condition that Kaspromneftegazprom All-Union Industrial Association is supplied with the necessary quantity of high-capacity (up to 2,500 tons) crane ships, pipelaying barges to lay underwater pipelines at sea depths to 200-250 m, and construction equipment and tools.

Besides solution of the problems of building permanent offshore platforms, accelerated and effective development of deep-water oil and gas fields is associated with solution of the problems of outfitting them with modern technical resources for drilling, extraction, collection, preparation and transportation of the products of offshore wells, and so on.

The effectiveness of drilling operations carried out by the Kaspromneftegazprom All-Union Industrial Association is to be raised by implementing a complex of measures including the use of inhibitor-treated drilling mud based

on potassium chloride and gossipol resins; well mouth pressure test packers; ISM bits reinforced with ultrahard "slavutich" alloy, and new, highly effective types of rock crushing tools (with sealed oil-filled holders and an improved flushing system); high-torque spindle turbo-drills and other bottom-hole motors; the most efficient design of bottom-hole drill string assemblies to be used in drilling vertical and slanted wells and insuring greater quality of well shaft calibration, preventing seizing of the drilling tool and permitting normal lowering of the casing to its planned depth; through improvement of well strengthening procedures (preparation of the well shaft, casing cementing, use of stepped cementing couplings, use of buffer fluids and so on); procedures for revealing reservoirs and testing wells; purifying and degasifying drilling mud; preventing complications and accidents with drill pipe, seizing of tools, denting of casings, gas and oil seepages, and warping of the vertical part of the profile of slant wells.

Introduction of all these measures should insure a higher commercial drilling rate and, in the final analysis, acceleration of the development of oil and gas fields.

The Kasporneftegazprom All-Union Industrial Association is presently introducing and developing measures to raise the oil yield of the reservoirs; polymer flooding; injection of water to which surfactant has been added; acid treatment; hydroxy acid and hydraulic fracturing of formations; vibration treatment; processing with PES [not further identified] and surfactants; introduction of viscoelastic systems.

Moreover new gas-lift equipment is being used: installing periodic gas-lift; equipping wells with packers; strengthening the bottom-hole zone.

Measures are also being implemented to prevent and control deposits during oil recovery: pumping ML-72 reagent and ammophos into wells; dosing condensate and sulfanol in the reservoir, and so on.

All of these measures produce a significant increment in oil yield, compensating for the natural drop in oil yield in old areas. In recent years the activities of the Kasporneftegazprom All-Union Industrial Association in the area of outfitting offshore oil and gas fields were directed at solving problems connected with creating dependable systems for collecting, transporting and preparing well products at the imeni 28 April, Bakhar, the combined Bulla-More, Sangachaly and Duvanny-More field, and others. These fields were outfitted for the first time by industrial methods foreseeing creation of enlarged production units at specialized construction areas.

An installation preparing unstable condensate for subsequent transportation to the Azerbaijan gas processing plant was built at the Bulla-More field. This made it possible to completely eliminate importation of expensive condensate from Ukhta. Production complexes permitting a conversion to separate transportation of liquid and gas from the fields to points on shore were built at the Bakhar and Bulla-More fields.

A fundamentally new approach to solving the problems of outfitting the fields is now required in connection with development of deep-water fields.

The following basic directions of outfitting deep-water fields in the Caspian Sea, determining their accelerated development with high technical-economic indicators, were defined: drilling of wells in clusters; combination of the processes of drilling and operating wells on the same platform; multilevel positioning of production equipment for drilling wells and extracting oil and gas on the platform; increasing the number of drilling rigs on a platform; unifying and standardizing the technical concepts followed in outfitting platforms; wide use of integrated modular automated equipment.

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CSO: 1822/186

## OIL AND GAS

### BAKU OIL WORKERS CITE PRODUCTION PROBLEMS

Moscow IZVESTIYA in Russian 31 Jan 86 p 2

[Article by correspondent Sh. Medzhidov, Baku: "On Land and at Sea: Yield from Oil Reservoirs of Azerbaijan Can and Must Be Greater"]

[Text] The last five-year plan was a challenge to Azerbaijan oilmen. Despite significant efforts the Azneft Association and the Kasporneftegazprom All-Union Industrial Association found themselves indebted to the state: Azneft fell short by around 720,000 tons, while Kasporneftegazprom fell short by 1.2 million tons of oil and condensate. Nonetheless these indicators must be assessed in different ways: For the "land" oilmen, this shortfall increased like a snowball. But the marine oil drillers did manage to achieve a turning point in their work: Intensive exploration and development of new fields on the Caspian shelf made it possible to increase extraction.

What is the explanation for the fact that the shortfall is decreasing for some while on the contrary increasing for others? That the land has exhausted itself already and that a decrease in extraction is inevitable came up as an excuse. But then, how is it that the oldest administrations--imeni 26 Bakinskiye Komissary and Karadagneft--are able to successfully meet the plans in areas that have been under exploitation for decades? Obviously the problem lies not so much with depletion of the subsoil as with the ability to maximally utilize reserves. This is what was the topic of conversation in my interviews at Baku oil fields.

Hero of Socialist Labor Musa Bayramov, Shop Chief, Leninneft Administration

Our wells stand on the oldest oil fields. There are ones among them which have been there for over a hundred years, but they still produce oil, and they will continue to do so for a long time to come, assuming we use good management practices in operating them. Let me say frankly that in recent years our work has been poor. Last year we were short by almost 85,000 tons, and not a single shop was able to meet its quota.

I believe that the main reason for this is the extremely weak work done to raise pressure in the reservoirs. Those days when this task could be completed simply by pumping water in have passed. It was long ago that scientists developed in situ combustion, injection of superheated steam and wide use of surfactants and recommended these practices for deposits such as ours. But how are things going with introducing these practices here? Very slowly. Rather than utilizing these radical measures, we continue to make do basically with traditional technical geological procedures which have not produced the needed impact for a long time now. This incidentally is also the reason for the extremely short time that the wells operate between repairs--only 44 days. Imagine how much effort and resources repairs and restoration work take when our wells total a little less than 2,700 units! Our compressor operation is in a dilapidated state. This is not the first year that the association's administration has promised us to build a high capacity compressor station, but nothing goes beyond the promises. And yet, by making wide use of compressed air we could almost triple the time of well operation between repairs, and raise their productivity by a time and a half.

Knyaz Aliyev, Operator, Administration Imeni 26 Bakinskiye Komissary

Last year our collective surpassed the quota by over 1,100 tons of oil. How? There are no special secrets. We try to create the optimum conditions for each well. But we could work even better if circumstances did not slow us down. I am referring to the dependability of the equipment. Our hardest problem right now is subsurface pumps. Their sole producer--the Baku Machine Building Plant imeni Dzerzhinskiy--supplies us with pumps designed to be suspended at a depth of up to 1,500 meters. But an enormous number of our wells are 2,000 meters deep and deeper. Of course, at such loads they are breaking down all over the place. The supply of spare parts for pumping units is poor, and we are working with antiquated hoists.

There is one other problem I would like to touch upon. This is not the first year that I have been in the oil sector, but I cannot remember a time when young people were ever as reluctant to work in the oil fields as today. Yes, it is difficult to attract young persons to what is basically manual labor. We need to think seriously about improving the work of the oilmen, and about building more housing for them.

Akif Amanov, Drilling Foreman, Ali-Bayramly Administration, Hero of Socialist Labor, Deputy, Azerbaijan SSR Supreme Soviet

What more can I say? A large part of the blame for failing the extraction plan of the Azneft Association falls upon us, the drillers. During the five-year plan seven drilling organizations fell short by a total of around 90,000 meters of producing wells and 130,000 meters of exploratory wells.

True, in the five-year plan the brigade completed almost two five-year quotas. In general, many of our brigades are meeting their quotas. But alas, we also have many that are hopelessly behind. Moreover these brigades have gotten used to excusing everything by poor equipment and spare parts supply.

It cannot be denied that piping is not always supplied to us on time, that equipment is renovated too slowly, and that we are drilling in complex geological conditions. But this can in no way justify the fact that last year our association's drillers were responsible for over a dozen and a half breakdowns, owing to which about 27,000 meters of wells were lost. All of these disasters occurred due to violation of production discipline and absence of order in the work. And how many other factors of mismanagement can we find in the drilling areas? We complain of a shortage of tools, but if we take a good look around, we find that air-operated drilling tongs, serviceable pump parts and all kinds of other things are scattered around the derricks! This makes me deeply certain that before complaining about things to someone, we need to first make some strict demands upon ourselves. Here is something to think about: Were the executives of the administration and its party and trade union organizations to put discipline under tighter control, we could surpass last year's drilling quota by 8,000 meters with the same equipment and the same spare parts deliveries.

Namik Zfendiyev, Chief Engineer, All-Union Kasporneftegazprom Industrial Association

In the last five-year plan we discovered new, promising fields: imeni 28 April, imeni Kaverochkin and imeni 26 Bakinskiye Komissary, Bulla Island, Shakhovo-More, Andreyev Bank and others. Now we need to develop them as quickly as possible, though this is not all that simple. Having moved into deep waters, we encountered problems which, if not solved, would make it difficult to count on successful development of the continental shelf of the Caspian. First of all we need to develop and improve the utility network. In the near future we will have to lay power transmission lines on the seabed to distant fields. Unfortunately, we do not as yet have the specialized watercraft we need for this. It is becoming increasingly more difficult to carry out diving operations at great depth. An acute need for replacing metallic piping by flexible piping has arisen. Incidentally, such piping has recommended itself as being extremely effective in foreign offshore oil extraction.

Nor is there any justification for the presently existing repair and technical base. The available equipment and tools are intended for work with shallow wells, which is why it is becoming extremely difficult to use these tools at the depth at which around 70 percent of our total extraction occurs. Finally, we need to push even harder to rebuild the Baku Deep-Water Foundations Plant so that it could produce permanent platforms designed for water 300 meters deep. In a word, there are many problems. We anticipate that scientists, designers and the appropriate ministries and departments will provide effective assistance.

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## OIL AND GAS

### BRIEFS

**WELL RESTORATION--Neftyanyye Kamni, 11 Jul--**The collective of Shikhnabi Muradov's brigade was the first to complete its five-year quota in the well overhaul shop of the Oil and Gas Extraction Production Association imeni XXII Syezd KPSS. It is credited with 162 restored wells, as opposed to the 136 foreseen by the quota. As a rule the brigade repairs its wells ahead of schedule. Next after Shikhnabi Muradov to report completion of his five-year plan was brigade foreman Ayvaz Gazaryan. Just last year the competition leaders restored 13 inactive wells, which produced hundreds of tons of oil. Having reexamined pledges adopted previously, the shop collective promised to repair 15 wells in addition to the plan by the end of the year, and to raise labor productivity by 1 percent. [By A. Kyazimov] [Excerpts] [Baku VYSHKA in Russian 12 Jul 85 p 1] 11004

**NEW GAS DRYING METHOD --**Jointly with the Shurtangaz Gas Field Administration specialists of the Central Scientific Research Institute of the Soyuzuzbekgazprom All-Union Production Association developed a new method of preparing natural gas for transport which cheapened the gas drying process by many orders of magnitude. With its introduction, gas drying improved, pipeline corrosion decreased, and condensate extraction increased. The conditional annual economic impact for a facility with a productivity of 20 million cubic meters of gas per day is 480,000 rubles. The new method was tested and submitted for industrial use. [By S. Polynova][Excerpt][Tashkent PRAVDA VOSTOKA in Russian 10 Aug 85 p 3] 11004

**GAS DELIVERY PLAN SURPASSED --Komi ASSR--**Over a half billion cubic meters of gas extracted at fields of the autonomous republic and West Siberia have been sent in excess of the plan since the beginning of the year to the country's central regions via four lines of the Ukhtatransgaz Association's gas pipelines. The planned labor productivity level was exceeded by almost 3 percent. [Excerpt] [Moscow EKONOMICHESKAYA GAZETA in Russian No 29, Jul 85 p 4] 11004

**YAMBURG-YELETS-1 GAS PIPELINE --Kazan--**The hundredth kilometer of the Yamburg-Yelets-1 gas pipeline has been laid in a section passing through the Tatar ASSR. Despite frequent rains and oppressive heat, the collective of the Tatnefteprovodstroy Trust is working half a month ahead of schedule. The leader of the socialist competition in honor of the 50th anniversary of the Stakhanov movement is the production team of Hero of Socialist Labor

I. Shaykhutdinov, which has attained a record output in the sector--25 kilometers of completed pipeline per month. Pipeline layers of the Tatar ASSR intend to complete the central 225 kilometer section of the main from the Volga to the Vyatka ahead of schedule, by the end of the year. [Text] [Moscow SELSKAYA ZHIZN in Russian 18 Aug 85 p 1] 11004

GAS MAIN FROM MALAY--Malay (Central Karakumy, Turkmen SSR), 9 Nov--Development of a new gas-condensate field has begun here. The first integrated gas preparation facility is under construction. The site for the future pioneer in the desert is almost ready, and residential rail cars are being driven in. Working in severe conditions in two shifts, within short time A. Khadzhimukhamedov's mechanics brigade and S. Gorodezhtsev's welders and insulators brigade laid 40 kilometers of steel gas piping across the lifeless and waterless shifting dunes from Malay to the town of Uch-Adzhi. Blue fuel from Malay will enter into the gas main stretching from Central Asia to the country's center. [By PRAVDA correspondent A. Grachev] [Text] [Moscow PRAVDA in Russian 10 Nov 85 p 2] 11004

NEW GAS PURIFICATION FACILITY--A new facility removing sulfur impurities from natural gas went into operation at the Shurtan field in Karshinskaya Steppe. Its planned output is 4 billion cubic meters of fuel per year. This was the first time that brigades of the Sredazneftegazmontazh had to install such equipment, but they were able to handle their job. Experience accumulated during construction of the Mubarek Gas Refinery and use of the method of preliminary prefabrication of units and machine units helped. The apparatus, which weighed many tons, was first put together on a specially equipped assembly platform, after which it was moved into place. Supporting assemblers who came to Shurtan from supplying plants located in many of the country's republics also provided considerable assistance. The republic's principal fuel and energy base moved from Kyzylkumy to this area south of Uzbekistan in recent years. In Kashkadarya, large formations have been explored, new gas fields have arisen, the output of the Mubarek plant is rising, and hundreds of kilometers of gas mains have been laid. As a result fuel extraction grew here by two and a half times during the 10th and 11th five-year plans. [Text] [Tashkent PRAVDA VOSTOKA in Russian 13 Aug 85 p 1] 11004

MALYGINSKOYE GAS FIELD--Kharasavey (Yamalo-Nenets Autonomous Okrug)--A new gas field--Malyginskoye--was marked on the geological map of West Siberia. It was discovered in the northern part of Yamal. This discovery once again confirmed that the peninsula is rightfully believed to be one of the most promising. There are ten oil, gas and gas-condensate fields here already. [Text] [Moscow TRUD in Russian 3 Jan 86 p 1] 11004

BASHNEFT PROGRESS--(UFA)---The collective of the Bashneft Association completed its quotas for extraction of liquid fuel and gas and well drilling for the five-year plan ahead of schedule. Since the beginning of the five-year plan 179 million tons of oil were extracted from the subsoil, and 16 new deposits of "black gold" were developed. Oilmen of the Bashkir ASSR are rendering considerable assistance to their associates in West Siberia: The daily oil yield from fields in Kogalymskiy Rayon was doubled in a short time. Oilmen

of the autonomous republic pledged to surpass the extraction plan by 3 million tons of oil and 235 million cubic meters of gas in honor of the 27th CPSU Congress. [By IZVESTIYA correspondent A. Zinovyev] [Text] [Moscow IZVESTIYA in Russian 18 Dec 85 p 1] 11004

NEW STEAM GENERATOR--Nalchik, 4 Dec (TASS)--A steam generator developed by specialists of the Tatneftemash Scientific Research Institute and the Nalchik Machine Building Plant will make it possible to raise the effectiveness of oil well operation. The new device helps to accelerate the well cleaning process by a time and a half. Installed on a new cross-country chassis built by the Kremenchug Motor Vehicle Plant, the steam generator will find wide use in West Siberia and in other of the country's oil extracting regions. [Text] [Baku VYSHKA in Russian 5 Dec 85 p 1] 11004

ELECTROMECHANICAL VIBRATORS FOR EXPLORATION---Yakutsk, 15 [Aug]--A fundamentally new method of seismic prospecting was introduced in the difficult field conditions of the Arctic by specialists of the Yakutskgeofizika Trust. The traditional method of "transilluminating" the subsoil by means of seismic waves produced by explosions has been replaced by special vibrators--electromechanical devices that excite elastic waves in the rock mass. In order to insure effective operation in the severe conditions of the Far North, Yakut geophysicists made a number of design changes in the vibrators. [By PRAVDA correspondent V. Tarutin] [Text] [Moscow PRAVDA in Russian 16 Aug 85 p 3] 11004

KYRYKMASSKOYE OIL FIELD--Udmurt ASSR--Oilmen of the Udmurt ASSR have begun developing the new Kyrykmasskoye oil field. It is located in the vicinity of Sarapul, where the leading collective of oil drillers is working. This collective has produced over 5,000 tons of fuel in excess of the plan since the beginning of the year. Competently operating the existing well fund, they did everything they could to hasten introduction of yet another field, fulfilling their socialist pledges in honor of the 27th CPSU Congress ahead of schedule. Drillers are also working in harmony: They surpassed the drilling plan by 10,000 meters of rock. The highest indicators were attained by the brigades led by V. Bykov and Yu. Gausknekht, who completed the quotas of both this year and the five-year plan as a whole ahead of schedule. This insured that the Udmurtneft Association would surpass its extraction schedule by 25,000 tons. [By correspondent V. Ukolov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 18 Oct 85 p 1] 11004

NEW GAS PURIFICATION FACILITY (UzTAG)--Assembly of a new facility for removing sulfur impurities from natural gas was completed at the Shurtanskoye gas complex. Its planned output capacity is 4 billion cubic meters of fuel per year. Installers and adjusters are working with the operators to finish the tests on individual units and machine units. The facility must go into operation as early as this month. The method of preliminary prefabrication was widely used by brigades of the Glavsredazneftegazstroy Trust to erect the sulfur removing block: Structures and apparatus weighing many tons were assembled in special areas, and then installed on foundations. [Text] [Tashkent PRAVDA VOSTOKA in Russian 17 Dec 85 p 1] 11004

TAYMYR GAS FOR NORILSK--Norilsk--Gasmen of Taymyr are preparing meticulously for winter to provide fuel for the Norilsk industrial region. They are doing everything they can to insure that consumers would obtain gas that is of high quality and, most importantly, without interruptions and in adequate quantities. A 30-kilometer gas pipeline will insure dependable supply to the city and the enterprises. A need for this pipeline appeared after introduction of a new power production unit at the Norilskaya TETs-3. By the end of the year the demand for gas will increase by another million cubic meters. The gasmen are ready for this. Owing to introduction of a number of technical innovations and more-effective procedures for extracting and preparing the gas, the collective of the Norilskgazprom Association has pledged to complete the quota for the current five-year plan by 1 December. It is already credited with 30 million cubic meters of gas in excess of the plan, and over 330 tons of additional gas-condensate. [By special corres. V. Sbitnev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 25 Sep 85 p 1] 11004

TESTING BRIGADE EXCELS --Tyumen--Foreman V. G. Vustin's well testing brigade of the Yamal Oil and Gas Prospecting Expedition of Glavtyumengeologiya adopted heightened pledges to surpass the testing plan by 67 facilities and 15 wells. Working in complex climatic and geological conditions, the labor collective carried out tests on 265 facilities, as opposed to the planned 165, fulfilling the quota for the 11th Five-Year Plan back in 1983. Today the brigade's labor calendar is reading late 1990. In all during the five-year plan, the brigade saved material resources and electric energy totaling 133,000 rubles. [Text] [Moscow TRUD in Russian 28 Dec 85 p 1] 11004

SCIENTISTS IMPROVE OIL YIELDS --Perm--Stronger ties with science helped oilmen of the Kama River region increase the yield from oil reservoirs. Around 100,000 tons of oil were obtained from fields near the city of Chernushki since the beginning of the five-year plan owing to the use of the latest methods of developing productive reservoirs. Jointly with specialists of the Soyuznefteotdacha Scientific-Production Association, Perm oilmen have begun implementing an extensive program of raising the output of the fields. [Text] [Moscow SELSKAYA ZHIZN in Russian 20 Dec 85 p 1] 11004

CORAL MINING CONSTRUCTION--Voroshilovgrad--The collective of the Voroshilovgradshakhtostroy Combine completed its five-year plan 3 months ahead of schedule. In 4 years and 9 months the mine builders completed work worth 534 million rubles and placed 82 production facilities into operation, including capacities for mining 3.75 million tons of coal per year and two concentrating mills. Ninety-seven thousand square meters of housing space and dozens of social, cultural and personal facilities were built for the miners. Labor productivity exceeded the planned level by 13 percent. [By M. Martynov] [Text] [Moscow STROITELNAYA GAZETA in Russian 20 Oct 85 p 2] 11004

NEW GAS DEPOSIT --Turkmen SSR--The new Korpedzhe field west of Turkmenistan has begun operating. Having finished drilling the first deep exploratory well, drillers and builders of the Turkmenneft Production Association connected it to the pipeline extending from Central Asia to the country's center. "The

main goal of our collective, of course, is oil extraction," said Turkmenneft Association chief engineer P. Polyubay, "but we attach no less significance to development of gas extraction in the republic's west." [By IZVESTIYA correspondent V. Kuleshov] [Text] [Moscow IZVESTIYA in Russian 24 Nov 85 p 1] 11004

TATNEFT REACHES QUOTA---The collective of the Tatneft Association reached its oil extraction quota for the five-year plan ahead of schedule. It has sent over 300 million tons to the country's refineries from fields of the autonomous republic. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 50, Dec 85 p 3] 11004

WELLS REJUVENATED---Ali-Bayramly, 21 October (Azerinform)--Well No 685 at the Severnyy Kyurovdag field was given a second life after prolonged operation and idleness following completion of efforts to isolate reservoir water. This work was carried out on the basis of a new procedure proposed by well overhaul specialists of the Shirvanneft Petroleum and Gas Extraction Administration, and it insured that "black gold" would continue to flow after surfactants were added to the plugging solution. This strengthened the walls of the shaft and bottom-hole formation zone, it became a dependable obstacle to the great flow of water, and it cleaned slotted strainers--unique valves through which the oil flows--with high quality. The well doctors of Shirvan subsoil also distinguished themselves in work on a neighboring well, where the reservoir yield was quadrupled over its previous level--to 27 tons of clean oil per day. The shaft of the well through which natural fuel reaches the ground surface was first cleaned from the bottom-hole to a depth of over 3.5 kilometers, after which a number of other operations were carried out; in particular, a high-delivery pump was installed. These and other repairs and preventive measures carried out proficiently by brigades of the oil and gas extraction administration made it possible to increase the operating life of more than 300 oil field facilities, which insured extraction of around 50,000 tons of oil from the underground treasurehouse. [Text] [Baku VYSHKA in Russian 22 Oct 85 p 2] 11004

BULLA-MORE FIELD OPERATIONAL--Exploratory well No 74 has gone into operation at the Bulla-More field. Each day it raises around half a million cubic meters of gas and condensate from a depth of 5,420 meters. The return from the Bulla-More field is increasing, and this is fully in keeping with the tasks posed in the 11th Five-Year Plan before the Kaspomorneftegazprom All-Union Production Association by the republic party organization concerned with accelerated development of the oil and gas resources of the Caspian shelf. Another five exploratory wells seeking deposits of oil and gas are now being drilled. [By R. Andreyeva] [Excerpts] [Baku VYSHKA in Russian 22 Oct 85 p 2] 11004

EXTRACTION ADMINISTRATION SURPASSES PLANS--Baku--The collective of the Azizbekovneft Oil and Gas Drilling Administration, which is developing the old Kala and Buzovny fields, is increasing its efforts with every day to successfully complete the quotas of the last year of the five-year plan. All four oil fields are meeting their liquid fuel extraction quotas. In all during the last 9 months, the administration collective extracted around

50 tons of oil and over 3 million cubic meters of gas above and beyond the program. Since the beginning of the year, oil extraction stabilized in the oil and gas extraction administration, and labor productivity enjoyed an increase of 1.1 percent. Seven new wells were drilled in both fields in order to intensify extraction of the crude hydrocarbons. Sixteen were placed into operation after a long period of inactivity. With their help, the oilmen have already extracted more than 5,000 tons of liquid fuel. Well overhaul and underground repair brigades are providing substantial assistance to oilmen in raising the end results of their labor. In 4 years and 9 months they performed 200 well repairs. Through a competent approach to the work and the high proficiency of the workers this leading brigade managed to reduce the average time of a single repair by more than 20 hours in comparison with the quota. [By VYSHKA correspondent S. Bagdiyan] [Excerpts] [Baku VYSHKA in Russian 10 Oct 85 p 1] 11004

TURKMEN SSR ATLAS --Ashkhabad--The republic's scientists are creating the first integrated atlas of the Turkmen SSR. Detailed characteristics of the natural conditions of our country's southernmost region, its natural and labor resources, national economy, population, science, culture and the history of Turkmenistan can be found on its colored pages. "This will be an interesting publication, and a learning tool in the widest sense," said Turkmen SSR Academy of Sciences President A. Babayev, chairman of the editorial council for the atlas. "We intend to reflect the enormous socio-economic transformations that have occurred in the republic during the years of Soviet rule." This story will be told persuasively and dependably with the help of maps, diagrams, various tables, reference materials, reproductions, documents, and color and black-and-white photographs. The author collectives of scientists from institutes of the republic's academy of sciences, colleagues of planning and scientific research centers and specialists from different sectors of the national economy are collecting the necessary data. [By IZVESTIYA correspondent V. Kuleshov] [Text] [Moscow IZVESTIYA in Russian 2 Sep 85 p 4] 11004

DEEP WELLS IN TURKMENISTAN --The ultrahard bits of drillers of the Turkmen-neft Association are driving ever deeper into the subsoil. Specialists of the Nebit-Dag Drilling Administration have completed drilling three wells over 50 kilometers deep in one of the exploratory areas of the Barsa-Gelmes field. Scientists of the TurkmenNIPIneft Institute provided drillers with the possibility for accelerated development of deep horizons. Owing to their "hints," the oilmen were able to exceed the drilling rate by a time and a half while reducing the drilling volume by almost a third. The now-famous fuel deposits in the republic's west lie 3-4 kilometers deep, but most of them either contain insignificant reserves of crude, or they are in their final stage of development. To intensify fuel extraction, various methods of maintaining reservoir pressure must be used, which raises their cost. Development of deep horizons, specialists affirm, will make it possible to prepare the raw material base at an accelerated rate for rhythmic and stable operation of petroleum industry for many years. This is why measures to expand the deep drilling volume are being implemented in the association. New drilling rigs intended to drill wells 6,000 meters deep are now being installed in the Nebit-Dag Drilling Administration. [By Turkmeninform correspondent B. Valiyev] [Excerpts] [Ashkhabad TURKMENSKAYA ISKRA in Russian 12 Nov 85 p 2] 11004

WELL REPAIRMEN EXCEL--Ali-Bayramly (Azerinform)--Having completed overhaul of two oil wells in the Kyurovdag field, Sarkhad Radzhabov's brigade from the Shirvanneft Oil and Gas Extraction Administration reported early fulfillment of its sixth annual quota since the beginning of the five-year plan. It is credited with the highest percent use of productive time and with economizing considerable material resources. One out of every two of 66 wells were "healed" ahead of schedule. And today a worthy rival has appeared: Alitagi Dzhavadov's brigade is working in tempo with the best. The brigade leader had learned his proficiency from S. Radzhabov. He was given command of a lagging collective, which was able to return four wells to action in short time with a good industrial flow of oil. The most substantial return in natural fuel extraction--30 tons of oil per day--was achieved by specialists headed by A. Dzhavadov after performing complex overhaul of one of the wells: Reservoir water was isolated, and the well was shifted to a higher horizon containing a productive stratum. [Excerpts] [Baku VYSHKA in Russian 7 Oct 85 p 1] 11004

NEW OIL FIELDS--Baku--Oil from a deposit discovered by Azerbaijan geologists in the republic's west has begun flowing to Baku refineries. Drilled in the Gyurzdag area between the Kura and Iora rivers, the well has produced an industrial flow of crude. The deposit is located 17 kilometers from the Tarsdallyar field presently undergoing development. It once again confirmed the high productivity of the oil reservoirs in the western zone of Azerbaijan. The republic's center of continental oil extraction is gradually moving there. However, the productive reservoirs of the deposit are located deeper than those being developed in Tarsdallyar, and this poses complex problems before the drillers. Drilling rigs now being produced by the Kishlinskiy Machine Building Plant helped them solve these problems successfully. Geologists have already explored 22 productive areas in which more than 140,000 meters of rock are to be drilled and a dozen wells are to be placed into operation in the next five-year plan. [By TASS correspondent V. Korsh] [Excerpts] [Ashkhabad TURKMENSKAYA ISKRA in Russian 19 Nov 85 p 3] 11004

LOCAL GASOLINE PRODUCTION--The path of rich Siberian oil and gas has now been clearly determined: The bulk of these valuable products are delivered by pipeline to the country's central regions, where they are refined. But the roads traveled by gas-condensate are still confused and intricate. Some of the condensate is refined into diesel fuel, while another part is refined into gasoline with a high octane rating, so greatly needed by northern aviation and Siberian Ural motor vehicles. This product is precisely what is needed so much by local vehicle operators and pilots. But to obtain gasoline, the condensate is first delivered by all forms of transportation into the European part of Russia, after which it is sent back as fuel. Of course, a plant equipped with major processing facilities could be built in Siberia. But this would take more than a year or two. And the gasoline is needed right now. Moreover were such a refinery to be built, considering the vastness of Siberia the transportation expenses would still be considerable. Then the scientists came up with this idea: Why not get gasoline right at the fields, without leaving the energy source? The Catalysis Institute of the Chita Department of the USSR Academy of Sciences developed a new catalyst. But the procedure for using the new facility had to be

developed. This job was given to the collective of the laboratory of the Grozny Scientific Research Institute of Petroleum, which deals with the problems of producing motor fuels from nontraditional raw materials. Jointly with planners of the Grozgiptoneft Institute our specialists developed two versions of a reactor, and the recommendations on starting up the facility. Consequently the possibility has appeared for locating small permanent facilities for acquisition of gasoline from gas-condensate not far from the wells, and for delivering it to Siberian truckers while still hot, as they say. [By PRAVDA correspondent V. Artemenko and KOMSOMOL-SKOYE PLEMYA associate A. Loyma] [Excerpts] [Moscow PRAVDA in Russian 27 Jan 86 p 1] 11004

OFFSHORE DRILLING PLATFORM--Neftyanyye Kamni, 22 August--A nine-story building housing a new dormitory for offshore oilmen has risen high above the waves of the Caspian in this town on stilts. The first new residents appeared today in this large and beautiful house, which has become the center of the residential microdistrict of Neftyanyye Kamni, where five stories had been the previous limit to the skyscrapers. Over 300 laborers of the imeni XXII Syezd KPSS Production Association for Oil and Gas Extraction will be able to rest in comfort after their watch in the 180 apartments. The foundation of this building, which has no analogues in the practice of residential construction, is unusual. After all, it was erected by trestle builders--a new specialization--on a fill island in the middle of the sea. Thirty-two steel piles were driven more than 30 meters into the dirt and imbedded in concrete. The lower part of the building is reserved for a personal services combine. The oilmen will also be able to steam themselves in a new bathhouse. Everything they have now is like on land--a school and a tekhnikum, a bakery and a soft drink bottling shop. Conditions for interesting leisure time have been created: There is a large club, a library and an athletic field. An object of special pride is a garden, soil for which was brought in earlier in sacks from the continent by oilmen assuming their watch. [Excerpts] [Baku VYSHKA in Russian 23 Aug 85 p 3] 11004

NEW OIL REGION--Nizhnevartovsk, Tyumen Oblast (TASS)--The collective of the Yuganskneftegaz Association has begun formation of the new Orekhovo-Yermak oil region on the Ob. A working town housing oilmen and builders has already sprung up on the left bank of the river, opposite Nizhnevartovsk, and installation of the first drilling rigs has begun. As early as in April of next year the country's refineries will receive industrial oil from this place. The Orekhovo-Yermak region is one of 16 oil regions to be developed this year by Glavtyumenneftegaz. No one has ever achieved such a volume of work in such a short time in West Siberia before. This is why the experience of accelerated introduction of a new region is to be used by the oilmen in industrial development of other natural resources. Wide use of the complete-unit method of erecting structures will become the main strategic direction in the work of the builders. For this purpose new production operations were introduced and old ones were reconstructed in the Sibkomplek-montazh Association. The Glavtyumenneftegazstroy created three installation trusts to equip the fields. In the first year of the next five-year plan Glavtyumenneftegaz plans to increase crude extraction by almost 9 million tons by introducing the new fields into operation. [Excerpts] [Moscow IZVESTIYA in Russian 22 Nov 85 p 4] 11004

**MAGNETIC FIELDS RAISE PRODUCTIVITY--Baku--**The magnetic field has turned out to be an invisible but dependable assistant to oilmen. Well productivity was raised by passing water through a magnetic field before pumping it into the subsoil for oil extraction. This unusual use of magnets was proposed by associates of the department for development and exploitation of oil fields of the Azerbaijan Institute of Petroleum and Chemistry imeni M. Azizbekov. Magnetized water cleans the bottom-hole formation zone--the place where oil enters the well from the reservoir--more effectively than ordinary water. And gas dissolved in the oil which had formerly hindered its movement is displaced away. Bubbles become unique "gas bearings" which reduce the fuel's friction against the walls of the well, accelerating its rise to the surface. Industrial tests carried out at 11 wells in Tyumen Oblast fully confirmed the results of laboratory research. The productivity of the wells increased. Just in 2 months of testing around 10,000 tons of additional fuel were extracted. Use of magnets in injection wells was also found to be effective. [By Azerinform correspondent P. Davydov] [Excerpt] [Baku VYSHKA in Russian 27 Oct 85 p 2] 11004

**HUNDREDTH PIPELINE KILOMETER--**The hundredth kilometer of the Yamburg-Yelets-1 gas pipeline was laid in the section passing through the Tatar ASSR. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 35, Aug 85 p 3] 11004

**NEW OIL FIELD DISCOVERED --**A new oil field was discovered on the Caspian Sea 15 kilometers southeast of the field on stilts at Neftyanyye Kamni. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 30, Jul 85 p 3] 11004

**ALYATY-MORE EXPLORATORY WELL--**Baku, 13 August--Exploratory well No 15 was successfully completed in the shallow-water Alyaty-More field. A flow of oil with a yield of about 100 tons per day was obtained from it at a depth of 3,443-3,397 meters. This is the second well confirming the industrial productivity of the field discovered in the 11th Five-Year Plan. The first, which was drilled in June 1983, is now being operated by the Oil and Gas Extraction Administration imeni 50-Letiye SSSR. The closeness of the Alyaty-More field to a fully equipped oil and gas extraction region creates all of the prerequisites for its effective industrial development. Three wells are presently in the drilling stage here, and one is being readied for completion. [By R. Andreyeva] [Excerpt] [Baku VYSHKA in Russian 14 Aug 85 p 1] 11004

**PROSPECTING EXPEDITION-NORILSK --**Drilling brigades led by L. Yudakov and V. Grigalchik from the Norilsk Integrated Geological Prospecting Expedition have completed six annual plans since the beginning of the five-year plan. The Arctic explorers of the subsoil are now carrying out summer field operations. The region in which they are seeking copper ore extends hundreds of kilometers--from Turukhansk to Putorana Plateau. Ten exploratory wells more than 2 kilometers deep have been drilled, and one ultradeep one has attained the 3-kilometer mark. The expedition collective completed the five-year plan's quota for increasing the reserves of copper and nickel ahead of schedule. [By K. Kolotkov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Aug 85 p 1] 11004

GAS FOR NUKUS--Nukus--The gas main has crossed to the right bank of the Amu-Darya. This made it possible to gasify towns and villages in a few more regions of the Karakalpak at a fast pace. Gas networks with a length of 512 kilometers were built and placed into operation, and over 80,000 rural apartments have already received natural fuel, which has greatly eased the housework of local residents and noticeably improved their living conditions. The gas pipeline builders moved to Turtkul'skiy, Beruniyskiy and Ellikkalinskiy rayons, in the south of the autonomous republic. A second line carrying blue fuel from Nukus to Khodzheyliyskiy Rayon has begun operating. All of this made it possible to use inexpensive fuel both in production and in the homes of kolkhoz farmers and sovkhoz workers. [By B. Kuryshv] [Text] [Moscow SELSKAYA ZHIZN in Russian 16 Jun 85 p 1] 11004

AUTOMATED WELL OPERATION --Ustinov (TASS)--Use of a unified automated well control system made it possible for oilmen of the Udmurtneft Association to beat the crude extraction schedule. A computer uses on-line information from the field to set the optimum operating conditions for the pumps, and to determine the most effective methods of raising the return from the reservoirs. Utilizing these data, the leading collectives of the Ustinov, Sarapul and other oil and gas extraction administrations increased the time of well operation between repairs and significantly reduced well idleness. As a result of acceleration of scientific-technical progress, the association's oilmen surmounted the shortfalls created in the beginning of the year and achieved a good reserve for successful completion of the annual and five-year plans. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Aug 85 p 1] 11004

MUBAREK GAS REFINERY --Mubarek (Kashka-Darya Oblast), 8 June (TASS)--A high-capacity facility for removing sulfur impurities from natural gas was turned on at the Mubarek Gas Refinery. From this moment on, deliveries of fuel from the subsoil of Karshinskaya Steppe into the industrial centers of Central Asia, the Urals and the European part of the country will increase to a million and a half cubic meters per year. The Mubarek refinery is becoming the largest supplier of energy raw materials in the country's south, and of sulfur for plants producing mineral fertilizers. Gas is piped here from fields explored in recent years by geologists of Uzbekistan. [Text] [Baku VYSHKA in Russian 9 Jun 85 p 1] 11004

OIL DRILLING PLAN SURPASSED -Laborers of the Production Association for Extraction of Oil and Gas imeni XXII Syezd KPSS are continuing with shock work in the concluding year of the five-year plan. They have already dispatched over 16,000 tons of liquid fuel to the refineries in excess of the plan. The collective of oil and gas extraction shop No 1, led by the young engineer Arif Asadov is making a substantial contribution to the overall success. Since the beginning of the year it has implemented 110 geological-technical measures, many more than planned. This made it possible to obtain an additional 15,000 tons of fuel. Thus after its transfer to a lower productive horizon, well No 2179 began producing 30 tons more oil each day than before. And the yield from another well, No 2167, where the oilmen carried out improvement operations, was raised to 90 tons of oil per day. The shop

collective is now credited with 1,400 tons of oil in excess of the plan. The shop's laborers have pledged to extract another 500 tons of oil above the quota before the end of the year. [By VYSHKA correspondent A. Kyazimov] [Excerpts] [Baku VYSHKA in Russian 11 Jun 85 p 1] 11004

SLANT WELL AT SALYMSK--Tyumen Oblast--V. Kemkin's brigade is completing the drilling of an unusual well at the Salym field: Its inclination will attain such a degree that in its last meters it will be a horizontal shaft. The event is commented on by R. Yevropeytsev, assistant chief of the drilling administration of Yuganskneftegaz: "The experiment has now reached its most important phase. The drill bit is essentially traveling parallel to the earth surface. One of the main objectives is to learn how to drill such shafts. Imagine how the oil yield could be increased if a well were to extend along a productive reservoir rather than cutting through it. This, by the way, is something for the future; for the moment scientists are working through the obtained materials." [By IZVESTIYA correspondent Yu. Perepletkin] [Text] [Moscow IZVESTIYA in Russian 29 Jan 86 p 1] 11004

AUTOMATIC DRILLING--A turn of a knob on an instrument panel, and instantaneously the work rhythm of three diesel engines turning the drill string changes. Automatic drilling is being tested at one of the gas fields in Turkmenistan. The testing is being carried out by scientists of the Institute of Control Problems. The electronic system transmits commands to the engines simultaneously. Small actuating devices on the diesel engines "decode" these commands. Here also, in the drilling area headed by I. Gladkiy, the work of solving the next, more complex problem has begun--automating change in load on the drill bit depending on the hardness of the rock. Next in line is the third stage of introducing the electronic system--automatic control of the optimum operating conditions of the diesel generator providing electric energy to the drilling rig. This development of the scientists is interesting in that the electronic control blocks are outfitted with series-produced instruments used in industrial automatic systems. This will make it possible to minimize the time it takes to introduce the innovations into wide practice. [By Yu. Shakhnazarov] [Excerpts] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 25 Jun 85 p 1] 11004

MIRNENSKOYE DRILLING ADMINISTRATION --Tyumen Oblast--The collective of the Mirnenskoye Drilling Administration of the Kuybyshevneft Association is working in Tyumen Oblast by the shift-expedition method. On 20 October the administration completed its five-year plan. And on 10 December the collective adopted socialist pledges for 1985 to tunnel a million meters of oil wells. These are substantial labor gifts to the 27th CPSU Congress, and a significant contribution to raising oil extraction in the rapidly developing Kogalymskiy oil extraction region in Tyumen Oblast. In order to fulfill the 11th Five-Year Plan with the given labor productivity, the number of drilling brigades had to be increased to 25. But 16 brigades of the 25 were found to be enough. They are all drilling in the Povkhovskoye oil field. The depth of the wells is reaching 3,000 meters. Moreover they are also carrying out a complex of jobs involving installation of the drilling rigs, drilling and completing the wells, fitting them out and turning them over to the oilmen fully ready. The well construction cycle has been halved. The average drilling distance

per drilling brigade was 34,000 meters in 1981, 40,500 in 1982, 51,800 in 1983 and 57,800 meters in 1984, while the anticipated distance in 1985 is 63,000 meters. The drilling distance in excess of the plan since the beginning of the five-year plan will be increased to 150,000 meters. In 1985 the oilmen will receive 396 new wells from the Mirnenskoye Administration fully ready to operate, as opposed to the 345 planned. In 1986 the administration plans to drill 1,025,000 meters of producing wells and 13,000 more labor-intensive exploratory wells in the Povkhovskoye and Vat-Yeganskoye fields. Considering the planning indicators, the administration should increase the number of drilling brigades to 19. But the administration collective decided not to increase its size, and to fulfill the quota only through growth of labor productivity, and surpass the drilling plan by 21,000 meters. In January-February the administration plans to place 54 wells into operation, as compared to the 51 planned. [By engineer I. Nikolayev] [Excerpts] [Moscow EKONOMICHESKAYA GAZETA in Russian No 52, Dec 85 p 9] 11004

GAS DEVELOPMENT IN TURKMENISTAN --Today Turkmenistan occupies a strong second place in the country--after the RSFSR--in fuel extraction volume. Dozens of large-capacity fields are operating in the desert, dispatching hundreds of millions of cubic meters of gas each day along the gas main extending from Central Asia to the country's center. Explorations are continuing in many promising areas. In the 11th Five-Year Plan the collective of the Turkmengazprom All-Union Industrial Association began extracting fuel from large fields such as Dovletabadskoye, Sovetabadskoye, Uch-Adzhi, Seyrab and many others. Today the gasmen are credited with more than 650 billion cubic meters of fuel in excess of the plan in the concluding year of the five-year plan. "Raise gas extraction to 86 billion cubic meters"--this is the task posed before Turkmen gasmen in the draft Basic Directions. Development of the natural resources of the Karakumy is continuing. One of the "hot projects" in the desert today is that of outfitting the Malay field. The first millions of cubic meters of blue fuel will be sent from here to the country's central regions in the first year of the 12th Five-Year Plan. A gas pipeline is now being laid from the construction site to the Karakumskaya compressor station, and the wells and areas of the gas field are being fitted out. [Excerpt] [Moscow IZVESTIYA in Russian 1 Dec 85 p 1] 11004

OFFSHORE EXPLORATORY WELL --Great is the joy of offshore explorers working with special technical resources for the offshore exploratory drilling administration. In the morning of 7 November--the Great October holiday--exploratory well No 15 went into operation in the Livanova-Vostochnaya Bank field in the Turkmen sector of the Caspian Sea. A daily flow rate of 300,000 cubic meters of gas and 100 tons of condensate was recorded from a depth of 4,140 meters--from the eighth horizon of the red stratum. The Livanova-Vostochnaya Bank field was discovered in 1973, and it was left undeveloped for a long time. Well No 15 was drilled in order to accelerate assessment of the reserves of crude hydrocarbons and to begin outfitting this field. The present success made it possible to widen the contours of the gas-bearing region in the previously discovered deposit. The collective of the special floating drilling rig XXVI Syezd KPSS is remaining at this place in order to drill a second slant well. [By R. Kender] [Excerpts] [Baku VYSHKA in Russian 12 Nov 85 p 1] 11004

SEVERNYY KYURSANGYA OIL FIELD -Salyany (Azerinform)--New managers--oilmen of the Salyanyneft Oil and Gas Extraction Administration--have come to well No 298 successfully drilled at the end of the year by the Kyursangya Drilling Administration. Operators of Ibadad Abdullayev's brigade competently finished their important tasks of tapping the energy of the reservoirs. According to preliminary data the well will deliver around 20 tons of pure oil from a depth of 3,400 meters. The new drilling area once again confirmed the promise of lower horizons in the productive stratum of the Severnyy Kyursangya field. Five wells are now being drilled at an accelerated rate. Drillers of the Kyursangya Drilling Administration developing the central part of the Kura basin successfully completed their annual drilling plan. Salyany oilmen were given 18 wells, which in many ways promoted stabilization and growth of extraction of liquid fuel in the Kyursangya and Karabagly areas. [Excerpts] [Baku VYSHKA in Russian 8 Jan 86 p 1] 11004

SOVETABAD GAS-CONDENSATE FIELD--Turkmen SSR--Next year the volume of exploratory drilling carried out by the collective of the Turkmenyuzburgaz Production Association, which is now located principally in the Sovetabad gas-condensate field, will grow by more than 30,000 meters. New powerful drilling rigs capable of drilling wells to a depth of over 5,000 meters will be used to carry out subsequent exploratory operations. These rigs were supplied to the drillers by the Uralsk Heavy Machine Building Plant. The volume of blue fuel extracted by the collective of Turkmengazprom has already exceeded 780 billion cubic meters. Moreover the rate is increasing. While last year over 70 billion cubic meters of gas were extracted in the republic, this year over 77.2 billion cubic meters of natural fuel will be obtained. Raising natural gas extraction to 86 billion cubic meters per year in the 12th Five-Year Plan is the objective posed before collectives of the republic's gas extracting sector in the draft Basic Directions. And a significant share of the total volume of gas extraction falls upon Sovetabad--the pride of Turkmen gas industry. [By IZVESTIYA correspondent V. Kuleshov] [Excerpt] [Moscow IZVESTIYA in Russian 24 Dec 85 p 1] 11004

CSO: 1822/153

COAL

MEETING REVIEWS INFORMATION EXCHANGE SYSTEM FOR CEMA COAL PRODUCERS

Kiev UGOL UKRAINY in Russian No 11, Nov 85 p [not shown]

[Article: "The 'Informugol' System for CEMA Countries"]

[Text] The "Informugol" international sectorial system for scientific and technical information on the coal industry is a set of functionally and organizationally interacting scientific-technical information systems of the CEMA countries for the corresponding sectors. Functioning and development of the system is supported by the national sectorial systems of Bulgaria, Hungary, the GDR, Mongolia, Poland, Romania, the USSR, and Czechoslovakia, represented by identified national organs (VNO's). The head organ is TsNIEIugol [Central Scientific Research Institute of Economics and Scientific-Technical Information of the Coal Industry, USSR].

The documentary automated information system "AIS Informugol," including national parts of the sectorial automated systems of the GDR, Czechoslovakia, and the USSR is in industrial use.

The system tasks are: improve the efficiency and comprehensive information support of coal industry specialists through shared use of information resources; eliminate duplication in data processing by international division of labor and cooperation; promote the development of national sectorial information systems and introduction of highly efficient information and document retrieval-display technology; support mutual communication for fuller use of the information services of the International Specialized and Sectorial information systems.

The base organs of the system are: GDR -- open-cut working of coal and shale deposits; Poland -- design and construction of mine shafts; USSR -- underground working of coal and shale deposits; Czechoslovakia -- coal enrichment and processing.

The topical areas of the system are: geology of coal deposits and mine surveying; design, construction, and reconstruction of coal enterprises; working coal and shale deposits by the underground and open-cut methods; coal machine building; enrichment, briquetting, and processing of coal; mechanization and automation in the coal industry; environmental protection in open-cut and underground working of coal and shale reserves; economics, organization, and management; safety procedures and labor protection at coal industry enterprises.

System users are: working organs of the CEMA Standing Commission on cooperation in the field of the coal industry; international sectorial scientific-technical

information systems; international organizations of the CEMA countries identified by the national organs of the system; information organs of the national sectorial scientific-technical information systems; national enterprises and organizations.

The information publications of the system are: analytic surveys; catalogues; bulletins under the title "Zarubezhnyy opyt" [Foreign Know-How] in series for extraction and processing of coal, mechanization and automation of production, economics, and general sectorial questions; special information on anniversary dates; problem-oriented collections (jointly with MTsNTI [International Center for Scientific-Technical Information]).

The classes of mutually submitted information materials are: bibliographic and reference documents as received according to the plan for completing the "Informugol" automated information system; topical bibliographic indexes; descriptions of records and progressive know-how; efficiency proposals; passports [industrial descriptions] of progressive design concepts; information on sectorial scientific-technical conferences and exhibitions; surveys, bulletins, catalogues, and prospectuses on equipment, published by the VNO's; motion picture information.

Procedure for obtaining information: national users can use the information services of the system through the VNO's of their own countries; information service to international organizations and organs is rendered by the head organ and the base organs.

The regular 22nd session of the Council of the "Informugol" System was held in Donetsk on 9-13 September 1985. Attending the session were: members of the Council and specialists of the VNO's of the "Informugol" system (Bulgaria, Hungary, the GDR, Poland, Romania, the USSR, and Czechoslovakia); the chief editors and associates of mining journals of the CEMA countries; an advisor from the CEMA secretariat.

P. N. Ivanov, deputy UkSSR minister of coal industry, and Zh. T. Lysenko, deputy chairman of the Donetsk City Soviet, spoke to welcome participants in the session of the system Council. After reviewing the preliminary agenda and suggestions for modifying it, the system Council approved the following agenda for the 22nd session:

1. Information on the decisions of the regular session of the KPP [Committee of Authorized Representatives] of the MTsNTI members concerning the activity of the "Informugol" system and the decisions of the regular session of delegation chiefs at the CEMA Standing Commission on cooperation in the field of coal industry.
2. Progress on work planned for 1985 and the current situation with preparation of catalogues.
3. Experience giving information support to specialists using automated information systems.

4. Information on work being done on linguistic support and on the results of introducing automatic indexing.
5. The "Methodology for Evaluating the Efficiency of Functioning of the 'Informugol' Automated Information System" and the "Temporary Statute on Staff and Equipment Schedules for the 'Informugol' Automated Information System Reference Library."
6. Transfer of the "Informugol" system cooperative data base for use in the MSNTI [International System of Scientific-Technical Information] network.
7. Basic directions of information activity of the Head Organ and proposals on improving information support to users on the topic "Open-cut coal extraction."
8. Proposals on strengthening the contacts of the Council of the "Informugol" system with the editorial offices of the mining journals of the CEMA countries.
9. Information from the Polish VNO on the Silesian international fair of mining equipment and metallurgy, called "Sinmeks-85."
10. Preliminary agenda of the 23rd session of the Council of the "Informugol" system and meeting of its specialists.

A decision was made to form two editorial groups to prepare drafts of the protocol of the session of the system Council and the "Program for Cooperation among the Council of the 'Informugol' System and the Editorial Offices of the Mining Journals of the CEMA Countries."

After hearing and discussing information on the question of strengthening contacts with the editorial offices of the mining journals, the system Council considered it necessary to take official note of the communication by representatives of the editorial offices on this question and acknowledge as advisable cooperation between the mining journals of the CEMA countries and the Council of the "Informugol" system in the following areas:

- information service by the "Informugol" system to the editorial offices of the sectorial mining journals (submitting copies of documents and results of machine retrieval on one-time and standing queries);
- preparation by the VNO of the "Informugol" system on request by the editorial offices of the sectorial mining journals of materials (articles) for their publication;
- publication in the sectorial mining journals of information on publications of the "Informugol" system, international meetings of CEMA countries, communiques on sessions of the Commission and its working organs, the results of bilateral and multilateral

scientific-technical cooperation and other similar matters; regular treatment in the mining journals of information on the coal industry of the CEMA countries and individual basins, of achievements by enterprises and collectives, and of scientific-technical measures that promote acceleration of technical progress.

The participants in the session of representatives of the mining scientific-technical journals published in the CEMA countries approved the Agreement on Cooperation by the Coal Technical Journals of the Socialist Countries which was signed on 11 April 1985 in Katowice, Poland, and adopted a decision to join this agreement.

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COAL

UDC 061.3:661:622.33

# LONG-RANGE PROSPECTS OF COAL INDUSTRY UNDER STUDY

Moscow UGOL in Russian No 12, Dec 85 pp 51-53

[Article by L. V. Semenov, candidate of economic sciences, Institute of Combustible Minerals: "Chemical Technology and Rational Use of Coal"]

[Text] The country's coal industry is a highly developed, multisectorial system with an intricate network of external ties. Faster development of coal processing is becoming increasingly important to supply national economic needs for coal fuel and raw material of the necessary quality and insure economical use of it. The planning for construction and expansion of coal extracting enterprises of promising basins and deposits where fuel-energy and territorial-production complexes are being built is done in close coordination with the development of coal users. Advisable scales of development and use of coal resources in the future are reviewed and technical-economic substantiation is done for enrichment and comprehensive processing of coals on the basis of the latest scientific-technical advances for the purpose of receiving various modifications of carbon, synthetic liquid fuel, gas and chemical products, and high-quality domestic fuel. Industrial extraction of certain rare elements has been done from coal, and the possibilities of broader utilization of mineral components -- enrichment waste, shaft rock, and overburden -- are being evaluated. By their work, based on thorough study of the composition, structure, and properties of highly complex coal substance, to develop new low-waste and no-waste technologies for using this mineral fuel, the most important one in terms of reserves in the earth, coal chemical scientists are making a significant contribution to future development and raising the efficiency of the coal industry.

The long-range USSR energy program envisions large-scale use of coal, which is to replace the natural hydrocarbon resources whose reserves are much smaller.

In conformity with the USSR Academy of Sciences' research program on the most important fundamental problems in the period 1978-1990 in the section "Solid Mineral Fuel," intensive study is underway of the processes of formation and the composition and structure of solid mineral fuels, above all coal, and the theory of breakdown of solid fuel is being elaborated. These studies were undertaken at 25 Academy institutes and 22 VUZes of the country during the 11th Five-Year Plan.

To further work in the areas of coal chemistry and the technology of its rational use, in 1981 the USSR Ministry of Coal Industry established the KATEKNIUgol Institute in Krasnoyarsk in 1981, and in 1983 the Siberian Department of the USSR Academy of Sciences founded the Coal Institute in Kemerovo.

At the present time 96 scientific research, educational, planning-design, and other institutes and organizations are working on problems of the chemistry and chemical technology of solid fuel.

The methodological and coordinating center of this major research field is the Scientific Council on the Chemistry of Solid Mineral Fuel of the Department of General and Technical Chemistry of the USSR Academy of Sciences, which bases its work in the laboratories of the Institute of Combustible Minerals. One of the forms of its multifaceted activity has been regular all-Union conferences of scientists and specialists at which studies are summarized and promising lines of development are determined.

New developments in coal science. It is unquestionably both interesting and important for every person engaged in mining and extracting the "solar rock" to know what truly unlimited possibilities are hidden in the chemical potential of coal. This article gives a brief presentation of certain results of development work by coal chemists which were reported at the conference on the chemistry and technology of receiving liquid and gaseous fuels from coal, shales, and petroleum residue, which was held in October 1985. This scientific forum was one of the most significant ones in terms of number of participants and range of problems reviewed. Thirty plenary reports and 138 exhibit communications were presented at it. And this is a natural reflection of the increased scale of research during the 11th Five-Year Plan. The summary report of the Scientific Council (A. A. Krichko and G. S. Golovin) observed, for example, that the coordinating plan for 1981-1985 envisioned 33 projects on just the problem "Study of Structure, Texture, and Reaction Capacity: Classification of Solid Fuel." The speakers called attention to the fact that in the study of coal and combustible shales there has been wide use of modern physicochemical techniques as well as the techniques of mathematical modeling, which have made it possible to formulate a number of new working hypotheses and ideas about their structure and have proved useful for directed searching for new technological methods of processing. A new conception of the structure of an organic mass of coal (OMU) as a self-associated multimer with three-dimensional texture is being developed. Scientists at IGI [Institute of Combustible Minerals] view such a coal mass as a set of macromolecules (or oligomers) of different chemical composition, interconnected by many nonvalent bonds. Research has shown that the primary role among them is played by electron-donor/acceptor (EDA) interactions, including hydrogen bonds. The use of this conception made it possible to take a new approach to the problem of obtaining liquid products from coal and to find more efficient technical solutions. The report "Coals as Raw Material for the Production of Synthetic Liquid Fuel" by IGI associates I. V. Yereimin and M. N. Zharovaya reviewed the questions of evaluating and selecting coals as raw material for hydrogenation liquefaction. The authors state that directed chemical and physicalchemical studies enabled them to establish the influence of degree of coal liquefaction exercised by a number of textural characteristics of OMU which are reflected by the

distribution of primary elements, among different types of bonds. For coals of the Kansk-Achinsk basin, for example, which are similar in stage of metamorphosis, petrographic composition, and ash content, it was established that the degree of conversion during hydrogenation is directly linked to presence in their texture of hydrolyzable complex-ethyl bonds and unstable carbonyl groups and C-C bonds polarized by acid-containing substituents. A relationship was established between the solubility of coals in active solvents, which characterizes the presence of hydrogen and other weak donor-acceptor bonds in them, and the formation of liquid products during hydrogenation. These and other characteristics of OMU and also of the mineral part of Kansk-Achinsk coals are illustrated in the report by the results of their hydrogenation in an autoclave with an initial hydrogen pressure of 5 megapascal and a temperature of 425 degrees C. using a catalyst and IGI inhibitor (see table below).

| Месторождение, участок<br>(1) | Выход жидких продуктов, % на органическую массу пасты<br>(2) |                                                | Преобразование органической массы угля,<br>(5)% |
|-------------------------------|--------------------------------------------------------------|------------------------------------------------|-------------------------------------------------|
|                               | всего<br>(3)                                                 | выкипающих до<br>(4) $t = 300^{\circ}\text{C}$ |                                                 |
| Назаровское (6)               | 87,2                                                         | 42,1                                           | 92,4                                            |
| Ирша-Бородинское (7)          | 85,4                                                         | 29,3                                           | 89,0                                            |
| Березовское (8)               | 62—81                                                        | 17—34                                          | 81—90                                           |
| Барандатское (9)              | 72,6                                                         | 32,0                                           | 84,8                                            |
| Итатский-6 (10)               |                                                              |                                                |                                                 |
| Итатский-2 (11)               | 61,1                                                         | 27,8                                           | 80,2                                            |
| Итатское (12)                 | 71,0                                                         | 25,0                                           | 90,0                                            |
| Итатский-10 (13)              | 62—80                                                        | 19—44                                          | 76—91                                           |

- Key: (1) Deposit, Sector;  
 (2) Yield of Liquid Fuel, Percentage of Organic Mass of Compound;  
 (3) Total;  
 (4) Boiling out Before Temperature of 300 Degrees C.;  
 (5) Conversion of OMU (Organic Mass of Coal).  
 (6) Nazarovskoye;  
 (7) Irsha-Borodinskoye;  
 (8) Berezovskoye;  
 (9) Barandatskoye;  
 (10) Itatskiy-6;  
 (11) Itatskiy-2;  
 (12) Itatskoye;  
 (13) Itatskiy-10.

In their report V. D. Butkin, G. G. Bruyev, and V. M. Kirilets treated the current state and prospects of development work by the KATEKNIIlugol Institute in the field of comprehensive processing of Kansk-Achinsk coals. At the conference significant interest was aroused by studies done at the institute which attempted to combine the principal advantages of the processes of supercritical gas extraction and thermal dissolution, taking account of the specific nature of Kansk-Achinsk coal, which contains 25 percent oxygen of OMU. As solvents they used polar compounds which, being in a gaseous state under conditions of the process, are capable of acting as hydrogen donors. The coal processing

scheme based on the supercritical dissolution technique consists of four basic blocks: liquefaction with coal preparation; gasification of the undissolved coal residue; synthesis of the solvent from synthesis-gas; processing the resulting liquid products. Studies were made in autoclaves on liquefaction of Kansk-Achinsk coals in different solvents in a broad range of temperatures (300-450 degrees C.), pressures (5-70 megapascal), dispersion of coal particles (10 microns - 5 millimeters), moisture content of the coal (1-30 percent), and coal-solvent ratio. The conversion of OMU with the use of different solvents was 17-47 percent. The SKR-10 semiflow-type consolidated laboratory unit was built at KATEKNIUgol. It works according to a scheme proposed for industrial realization of the process.

Expansion of the coal base of coking. The report of the Scientific Council on the chemistry of solid mineral fuel for the 1981-1985 period of work discussed the emergence, as the result of research conducted at IGI, INKhS [Institute of Petrochemical Synthesis imeni A. V. Topchiyev of the USSR Academy of Sciences], and GrozNII [Groznyy Scientific Research Petroleum Institute], of an original way to use coal resources more rationally in the coke chemical industry. This is adding high-molecular products of petroleum origin that have gone through heat treatment to the coal charge. Studies showed that introducing a series of these products, which by their reactivity are close to plastic bulk coal which forms from sintering coals during coking, to the charge makes it possible to considerably expand the use of weakly sintering coals, which are not scarce, at operating coke chemical plants. These studies\* are especially important because the challenge is not just to expand the raw material base for coking but also to create conditions that will permit a marked increase in the strength of coke, which will lead to a decrease in consumption of it and a rise in the productivity of blast furnaces. We should observe that this technological area as well as numerous others are based on development of the theory of sintering hard coals. This topic was the subject of the report by M. G. Sklyar of the Ukrainian Coal Chemistry Institute. The speaker observed that the main result of the research done in recent years is that coke chemists have been able to move from qualitative descriptions and purely technological characterizations of the process of sintering coals not only to disclosing the physicochemical essence of this phenomenon but also to giving quantitative estimates of the kinematic parameters of the processes of conversion of coals to a plastic state and the hardening of the plastic mass. It was shown here that coal sintering takes place in the presence of a significant number of liquid products that form as a result of thermal breakdown and, spreading through the entire mass of the coal grain, interact with "mother" substance by type of internal structural plastification, which ultimately makes the coal grains deformable. In mildly metamorphosed coals the force of interaction among liquid products and the remaining mass of decomposing coal grain is not as significant as it is in coal in the middle stage of metamorphosis. Overall a plastic mass of coals in a low stage of metamorphosis is more polydispersed by molecular masses, which makes it, in a sense, more uniform.

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\* A. I. Olfert and Ye. M. Tayts, "Expanding the Raw Material Base of Coking," in the collection, "Razvitiye uglekhiimi za 50 let" [The development of Coal Chemistry in the Last 50 Years], Moscow, Nedra, 1984, pp 162-171.

During thermal breakdown of highly metamorphosed coals the thermochemical transformations that take place in them are qualitatively like those that occur in other grades of coals. The difference is only in the quantitative evaluation. During the breakdown of lean sintering coals few liquid products form; relative to the remaining mass of decomposing coal grain they are the plastifier. So less "loosening" of the grain and deformation occurs. Thus the contact surface between grains is small. Whereas in medium volatile and coking coals the drop in viscosity of coal grains is so strong that they completely merge with one another as the result of the phenomenon of intrastructural plastification, with lean sintering coals the individual grains do not merge but, so to speak, stick together while preserving their dividing surfaces.

X-rays were used to trace the dynamics of change in the macrostructure of a coal charge being heated, both with a series of sequential (roughly every 2-2.5 minutes) pictures and using the Introskop X-ray television. Taking into account these and other research results, during the 11th Five-Year Plan existing coke production technology was refined and new technology was developed. Experimental industrial testing confirmed the efficiency of partial briquetting of the coke charge with a binder or briquetting the entire charge without a binder, which makes it possible to increase the proportion of weakly sintering coals in charges to 55-60 percent and receive high-quality blast furnace coke. Preliminary thermal treatment of the charge at temperatures of 150-250 degrees C. before loading it into the coking furnaces at the Kharkov coke chemical plant demonstrated the possibility of using up to 70 percent weakly sintering coals. The use of charge ramming and then loading a coal "pastry" with a density of 1.1-1.15 tons per cubic meter into the coking furnace made it possible to raise the proportion of weakly sintering, gaseous, and lean coals to 70 percent and receive blast furnace coke of the required quality. All these technologies, M. G. Sklyar observed, are to be introduced at coke chemical enterprises in the country in the near future, which will make it possible to conserve more than 6 million tons of sintering coals.

According to data from the report "Study and Reworking in the Processes of Coal Coking" by N. D. Rusyanova (Eastern Coal Chemical Institute), about 13 percent of the coke obtained from scarce coals in the layered process of coking is not used in blast production, and its quality often does not meet consumers' needs. For example, screenings of casting coke are significant (30 percent and more) as a result of its poor mechanical properties. The speaker observed that VUKhIN [Eastern Scientific Research Coal Chemical Institute] together with other organizations worked out a technology for obtaining coke briquette casting fuel that meets current quality requirements using non-scarce highly metamorphosed coals. Industrial tests of the coke briquettes showed that their consumption is 30-40 percent lower than coke and the temperature of the pig iron is 30-50 degrees C. higher, which leads to a reduction in defective castings. After consideration of domestic and foreign experience and the program of experimental industrial testing and incorporation, the possibility has now been confirmed of using 400,000 tons of high-grade Donets anthracite and 1 million tons of high-grade Donets lean coals instead of coke to roast limestone and dolomite and in other production facilities. The construction of the enriching factory at the Krasnogorskiy strip mine is very important for conserving Kuznets coking coals. According to the plan of Sibgiproshakht [possibly Siberian State Planning Institute for Mine Construction] it will turn out 2 million tons of high-grade concentrate for technological uses in place of coke.

Considerable attention at the conference was devoted not only to broadening the raw material base of the coke chemical industry but also to increasing the production of industrial carbon and carbon-graphite materials. Thus, the report by IGI associates V. V. Malkova and M. I. Rogaylin drew conclusions on the possibility of getting them from a promising raw material -- the hydrocarbon products of hydrogenated brown coals.

It is noted that as the result of the destruction of the oxygen and other hetero-bonds and the addition of hydrogen these products have great lability of the molecular structure, go through the stage of mesophasal transformations, and with carbonization produce anisotropic, well-graphited coke.

In conclusion it should be emphasized that it seems practically impossible in a single article to reflect even partially all the results of new developments by coal chemists that were reported at the conference. Vigorous discussion developed around many reports and exhibit communications. Of theoretical and applied importance were the survey-analytic report by academician A. Ye. Sheydlin and doctors of chemical sciences V. G. Lipovich and I. V. Kalechits (USSR Academy of Sciences' IVT [expansion unknown]) on the use of new, non-traditional methods of processing mineral fuels; the reports of A. A. Krichko, G. B. Skripchenko, and N. K. Larina (IGI) on results of study of the texture of coals and liquid products of their hydrogenation under soft conditions; the report of K. G. Ione (Institute of Catalysis of the Siberian Department of the USSR Academy of Sciences) devoted to synthesis of hydrocarbons from CO and H<sub>2</sub> in bifunctional catalyzers; the report of V. I. Saranchuk, chairman of the Ukrainian section of the Scientific Council of the Chemistry of Solid Mineral Fuel, in which he reviewed the prospects for development of the extraction and rational use of the so-called "saline" coals occurring in the Donets Basin in the most favorable mining geological conditions; the report "Mathematical Modeling in Industrial Coal Chemistry, which was presented by S. G. Gagarin (IGI), and others.

One of the most senior scientists in the field of the chemical technology of solid fuel is corresponding member of the BSSR Academy of Sciences V. Ye. Rakovskiy. Speaking during the discussion at the conference, he attempted to give a historical periodization of the raw material orientation of organic synthesis industry. Its development in the 19th Century was based on using chemical by-products from coking hard coals. The current century has become a time of preferential use of petrochemical raw material and natural gas. In the scientist's opinion, we must step up the development on an experimental industrial scale today of the processes of converting the entire organic mass of hard and brown coals in the raw products used in organic synthesis. For the transition of this sector to coal chemical raw material in the 21st Century may be carried out very intensively. There is no question that scientific-technical progress in the field of the chemical technology of solid fuel is opening up broad prospects for rational use of coal reserves to produce the high-quality fuels, chemical products, and coal-graphite materials that the economy needs.

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COAL

JOURNAL UGOL REVIEWS BOOK ON VIBRATION SCREENS

Moscow UGOL in Russian No 12, Dec 85 p 53

[Review of book "Proyektirovaniye i raschet vibratsionnykh grokhotov" [Design and Calculation of Vibration Screens] by L. A. Vaysberg, Izdatelstvo "Nedra", place and date of publication not given, 11 printer's sheets, 55 kopecks]

[Text] The Izdatelstvo "Nedra" is preparing a new book for publication.

The work covers questions of the theory, design, calculation, and use of vibration screens. The author gives new techniques for technological, dynamic, and strength calculations. The design diagrams of domestic and foreign machines are reviewed. The work treats promising new directions in building equipment for screening.

The book is intended for engineering-technical personnel at enriching plants, scientific research organizations, and planning organizations.

The book can be purchased at local bookstores which distribute scientific-technical literature or ordered through the mail order department of Store No 17 at 199178, Leningrad, V. O., Sredniy prospekt, 61.

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COAL

SYNOPSIS OF ARTICLES IN UGOL UKRAINY, NOVEMBER 1985

Kiev UGOL UKRAINY in Russian No 11, Nov 85 pp 47-48

GREETING THE 68th ANNIVERSARY OF GREAT OCTOBER

[Synopsis of article, pp 1-4]

[Text] The achievements of the Ukrainian coal industry. Socialist competition and scientific-technical progress. Tasks.

UDC 622.232.65.011.54/.56 "Ukrzapadugol"

TECHNICAL RE-EQUIPPING OF UNDERGROUND MINES AT THE UKRZAPADUGOL ASSOCIATION

[Synopsis of article by Ye. Ya. Dikolenko and F. P. Beda, pp 6-7]

[Text] The association's experience with comprehensive mechanization. Technical-economic indicators. The "Ugol" program.

UDC 622.232.8.001.86:551.2/.3

HIGHLY PRODUCTIVE WORK OF THE COMPREHENSIVE CUTTING-PREPARATORY SECTION

[Synopsis of article by Ye. I. Ivanova, pp 7-8]

[Text] Experience with the work of a comprehensive cutting-preparatory section. Organization of labor. Technical-economic indicators.

UDC 622.3.658.387/4 "sh. Gorskaya"

SUPPORTING THE HIGHLY PRODUCTIVE WORK OF THE EXTRACTION BRIGADE

[Synopsis of article by A. G. Tatarenko, pp 8-9]

[Text] Working conditions of the GROZ brigade at the Gorskaya mine. Organization of labor. New passport [industrial description] of longwall supports, and technical-economic indicators. Obligations and their fulfillment.

UDC 621.31.213.34:622.232

IMPROVING BLAST-PROTECTIVE ELECTRICAL EQUIPMENT AND ELECTRICITY SUPPLY IN UNDERGROUND COAL MINES

[Synopsis of article by A. I. Parkhomenko, pp 10-12]

[Text] Development of promising electrical equipment, and its preliminary evaluation. Conclusions and proposals. 4 illustrations.

UDC (621.315.616.66.046.42):621.313.13:622.333

STUDY OF THE TECHNOLOGY OF THERMAL DESTRUCTION OF MONOLIT-2 INSULATION

[Synopsis of article by B. P. Zernov, V. P. Kharkhota, and E. I. Braynin, pp 12-13]

[Text] Results of a study of thermal destruction of Monolit-2 insulation for repairing the windings of electric motors. Recommended regime for roasting the stator in a furnace.

UDC 621.313.333-213.34.019.3:622.64.21

RELIABILITY OF VR-250 ELECTRIC MOTOR IN THE DRIVE SYSTEM OF MINE BELT CONVEYOR

[Synopsis of article by B. N. Vaneyev, V. M. Gostishchev, and A. G. Ruchkin, pp 13-14]

[Text] Results of operating tests of the reliability of 28 VR-250S4 electric motors used in the drive systems of mine belt conveyors at five mines in the Donets Basin. Recommendations.

UDC 622.27.031.25:622.831.322

SELECTING THE LOCATION OF DRIFTS IN A PROTECTED LAYER WITH OUTBURST DANGER

[Synopsis of article by A. F. Filimonov and O. I. Melnikov, pp 14-16]

[Text] Analytic expressions of the necessary lead for cutting work in a protected layer relative to phenomena that cause outburst danger and insure protection against gas dynamic phenomena and the location of excavations outside the zone of harmful influence of cutting work in neighboring layers. 3 tables, 3 illustrations, 1 reference.

UDC 622.23.023:624.042.3

THE EFFECT OF A VARIABLE-STRUCTURE ROOF ON LONGWALL WORK

[Synopsis of article by A. F. Borzykh and I. A. Gorbunov, pp 16-17]

[Text] Variations of a variable-structure immediate roof in gently sloping layers of the Donets Basin. Evaluation of the effect of the roof where the

lower stratum is composed of unstable rock on the magnitude of the load on the cutting face using a proportionality factor established by statistical technique. 2 illustrations.

UDC 622.267.33

#### OPENING UP OUTBURST-DANGEROUS LAYERS IN ZONES INFLUENCED BY GEOLOGICAL DISTURBANCES

[Synopsis of article by V. Ye. Zabigaylo, V. V. Repka, and M. F. Malyuga, pp 17-18]

[Text] Results of mine experiments on the use of physicochemical treatment in opening up layers in zones influenced by geological disturbances. 1 reference.

UDC 622.013:65.011.46:658.2

#### IMPROVING THE ORGANIZATION OF MANAGEMENT AND RESERVES FOR RAISING THE EFFICIENCY OF COAL EXTRACTION

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[Text] Results of an analysis of the intensity of development of coal extraction according to the method proposed. 1 table, 3 references.

UDC 658.012:622.33.022

#### ACTUAL KNOWLEDGE OF CHIEF MINE ENGINEERS

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[Text] Some results of a questionnaire survey done by the Donets branch of the Institute for Raising Qualifications of the USSR Ministry of Coal Industry among chief mine engineers.

UDC 622.232.002.7:65.011.54

#### MECHANIZATION OF END OPERATIONS IN LONGWALLS OF GENTLY SLOPING LAYERS

[Synopsis of article by V. P. Sokhatskiy and R. K. Khansivarov, p 23]

[Text] Steps to reduce labor-intensiveness in performing end operations in cutting faces equipped with mechanized complexes, on gently sloping layers, with analysis of their applications. 2 illustrations.

UDC 622.33.012

#### STANDARDIZATION AND MODERNIZATION OF SUPPORTS -- THE BASIS FOR GROWTH IN MECHANIZED COAL EXTRACTION

[Synopsis of article by V. N. Khorin, V. I. Kravtsov, and V. Ya. Sporykhin, pp 24-25]

[Text] Results of standardization and modernization of mechanized supports. Lines of action to improve their design and technology of manufacture.

UDC 622.232.8:658.53

#### NORMATIVE SERVICE LIFE OF MECHANIZED COMPLEXES

[Synopsis of article by S. N. Komissarov and V. A. Zuyev, p 25]

[Text] The dependence of volume of coal extracted and load on the face on the service life of complexes in mines of the Vorkutaugol Association. 1 illustration.

UDC 62-137[621.635+621.671+621.51]004.67:622.333

#### OPERATION, SERVICING, AND REPAIR OF MINE TURBOMACHINERY

[Synopsis of article by V. P. Parshintsev, A. I. Zakharchenko, and V. V. Makhniya, pp 26-27]

[Text] State of servicing and repair work on mine turbomachinery. Formulation of a servicing and repair system based on the technical condition of the equipment. 4 references.

UDC 677.721.004.6:622.678.5

#### BASIC CAUSES OF BREAKDOWNS OF MINE UNDERGROUND CABLE

[Synopsis of article by B. A. Igmstov and N. T. Melnikov, pp 27-28]

[Text] Analysis of the chief reasons for removal of mine cables. Optimal decision to protect cable metal against corrosion. Practical recommendations on increasing the durability of steel cables. 1 illustration.

UDC 622.82:550.7:620.19

#### THE USE OF NEW METHODS OF EXTINGUISHING DUMP HEAPS

[Synopsis of article by M. P. Zborshchik, V. V. Osokin, A. M. Rud, and V. M. Varakin, pp 30-32]

[Text] Analysis of various methods of preventing spontaneous combustion of rock and putting out dump heaps. The effectiveness and wisdom of treating bulk rock with a lime suspension. 2 illustrations, 2 references.

UDC 622.413.4:622.003

#### SUBSTANTIATING THE SIZE OF MINE AIR CONDITIONING SERVICES

[Synopsis of article by A. I. Bobrov, V. K. Chernichenko, and S. M. Barakov, p 33]

[Text] Substantiation of the size of air conditioning services for conditions of deep mines undergoing reconstruction in the Donets Basin.

UDC 622.232.72-52.519.2

#### PREDICTING MALFUNCTIONS IN CONTROL EQUIPMENT FOR CUTTING FACE MACHINERY

[Synopsis of article by L. A. Mufel, R. L. Veytsman, and V. V. Didenko, pp 33-34]

[Text] The chief types of failures that occur in steps of the control system for cutting face equipment and recommendations on predicting them. 1 table.

UDC 622.232.8:622.5

#### EXPERIENCE WITH PREDICTING THE DEGREE OF FLOODING OF CUTTING FACES

[Synopsis of article by A. G. Skvortsov, G. F. Basakin, and S. S. Sivashov, pp 35-36]

[Text] Predicting conditions of the entry of underground water into cutting faces at anthracite mines of the Donets Basin based on observations of water phenomena at existing longwalls. Prediction can be used to select the technological parameters of excavation of coal seams, precluding flooding of the working space of the longwalls. 2 illustrations, 1 reference.

UDC 622.001.5:550.83

#### CONDITIONS AND TASKS OF GEOPHYSICAL PROGNOSIS FOR SEGMENTS OF DIFFICULT-TO-CONTROL ROOF

[Synopsis of article by G. I. Kokchin, Yu. I. Nikolayev, and V. M. Shakhnova, pp 38-39]

[Text] Results of analysis of mine geological conditions by mines working seams with difficult-to-control roofs. Tasks facing mining geophysics in connection with final exploration of seams from preparatory excavations. Description of the most typical objects for certain coal basins. 1 illustration, 2 references.

UDC 622.834.001.5

#### PRINCIPLES OF PREDICTING DEFORMATION OF THE SURFACE WHERE THERE ARE TECTONIC DISLOCATIONS IN THE STRATUM BEING WORKED

[Synopsis of article by S. A. Medyantsev and Yu. F. Krenida, pp 39-40]

[Text] Predicting the occurrence and magnitude of deformations of the surface at the outcroppings of tectonic dislocations based on varied geological data and geomechanical charts of the shifting of the dislocated mass (bypassing the calculation of anticipated deformations). 2 illustrations, 1 reference.

UDC 662.6:622.7.017

CALCULATION METHOD OF DETERMINING THE GRANULOMETRIC COMPOSITION OF COAL

[Synopsis of article by A. M. Kotkin, M. N. Yampolskiy, and K. D. Gerashchenko, pp 41-42]

[Text] Analytic and graphic methods of calculating the granulometric composition of coal. Recommendations on their use. 3 tables, 1 illustration.

UDC 622.8:539.4

INCREASING THE STRENGTH OF COAL BRIQUETTES BY HYDROPHOBIZING ADDITIVES

[Synopsis of article by Sh. Zh. Kurmankulov, A. T. Yelishovich, and Ye. A. Pilipenko, pp 43-44]

[Text] Factors that determine the texture formation of hard coal briquettes. The effectiveness of the action of agents, hydrophobizers, on the strength of briquettes when the coal surface is treated with them. 1 illustration.

UDC 622.256:622.25.002.5

PREDICTING INCREASE IN THE EFFECTIVENESS OF DEEPENING VERTICAL MINE SHAFTS

[Synopsis of article by Yu. P. Shutko and P. N. Stilmashenko, p 44]

[Text] Results of an elaborated prognosis of refining the machinery and technology of deepening vertical shafts and methods of protecting drillers.

UDC 620.197:624.014:622.01

THE USE OF EFFECTIVE MATERIALS FOR ANTICORROSION PROTECTION OF METAL CONSTRUCTION ELEMENTS OF MINES

[Synopsis of article by L. A. Filatov, P. I. Muchnik, I. P. Moiseyeva, and L. G. Sidorova, p 45]

[Text] Results of laboratory and mine experiments of anticorrosion coatings based on effective paint-lacquer materials. Recommendations on their use.

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CSO: 1822/150

## NUCLEAR POWER

UDC 536.33:621.039

### ACADEMICIANS ON ROLE OF NUCLEAR POWER IN CENTRAL HEAT SUPPLY

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 12, Dec 85 pp 30-42

[Article by USSR Academy of Sciences Corresponding Member L. S. Popyrin and USSR Academy of Sciences Corresponding Member V. A. Sidorenko: "The Role of Nuclear Heat Sources in Central Heat Supply"]

[Text] Advances in development of nuclear science and technology are pre-determining the need for restructuring our country's energy balance in the direction of utilizing nuclear power within economically justified limits not only in the sphere of electric power supply but also in central heat supply.

Wide use of nuclear heat sources requires significant changes in the network of main and transit heat pipelines within cities, and in the role and operating schedules of existing heat sources. Nuclear sources of thermal energy are themselves significantly more expensive than sources based on fossil fuels. Thus this restructuring of heat supply requires considerable material outlays. This is why substantiating the effectiveness of erecting nuclear heat supply plants (AST) and nuclear heat and electric power plants (ATETs) and the basic technical concepts concerned with their utilization is an important task.

It would not be possible to examine all aspects of this problem in a single report. Only the following basic problems are discussed below: formation of the country's fuel balance; trends in heat consumption in the USSR national economy; the types and characteristics of nuclear heat sources; optimization of heat supply systems; the areas of use of nuclear heat sources.

#### Formation of the USSR Fuel Balance

The Soviet Union is the sole large industrially developed country with explored fossil fuel reserves capable of supporting development of the national economy even into the distant future. But the distribution of fuel and energy consumers that has evolved over the country's territory corresponds very little to the distribution of energy resources. In the European USSR (including the Urals), where over three-fourths of all energy consumption occurs, extraction of fossil fuels is generally experiencing a decreasing trend. This is making it necessary to create unique channels of energy

transport (oil, natural gas, coal, electric power) from the country's eastern regions into its European part.

This is illustrated by the data in Table 1. It follows from the table that energy resources transferred from eastern regions replenish about two-thirds of the energy balance of European regions (taking account of exports). By the end of the century the absolute volume of all forms of energy resources transported from east to west should grow.

Table 1. Some Indicators of the USSR's Energy Balance, Million Tons of Standard Fuel Units

| <u>Indicator</u>                                                                                           | <u>1960</u> | <u>1970</u> | <u>1980</u> | <u>1985</u><br><u>(Estimate)</u> |
|------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|----------------------------------|
| Production of all forms of energy resources                                                                | 760         | 1,270       | 1,960       | 2,250                            |
| Consumption of all forms of energy resources                                                               | 700         | 1,160       | 1,670       | 1,880                            |
| Including in the European USSR                                                                             | 550         | 930         | 1,310       | 1,430                            |
| Volume of energy resources transmitted from eastern regions to the European USSR (with regard for exports) | -           | 130         | 700         | 950                              |
| Consumption of energy resources in production of                                                           |             |             |             |                                  |
| electric power                                                                                             | 110         | 230         | 370         | 450                              |
| steam and hot water                                                                                        | 105         | 260         | 440         | 510                              |
| high-potential thermal energy                                                                              | 130         | 205         | 270         | 320                              |

Given the colossal volume of energy resources, their movement over a distance of 3,000-4,000 km requires considerable resources for developing the transportation network, which raises their cost. Thus the final outlays on coal to be used in power production are 20 rubles per ton of standard fuel in Krasnoyarsk Kray, and they grow to 50 rubles per ton of standard fuel in the central European part of the country.

These features and the complexity of formation of the energy balance of the European USSR predetermine the suitability of using nuclear power here, chiefly with the purpose of electrifying the national economy. In the regions named above, nuclear power plants (AES) are capable of supporting the entire increase in the basic electricity load. At the end of the century the proportion of these electric power plants may attain 25-30 percent in the structure of the country's generating capacities, which will make it possible to significantly reduce consumption of fuel oil and natural gas to produce electric power.

It should be kept in mind, however, that only a fourth of the primary energy resources are expended to produce electric power today (Table 1). And although this proportion will rise in the future, we cannot solve all problems of the energy balance of the European USSR only by erecting new nuclear power plants.

Use of nuclear power for the purposes of heat supply may become a significant contribution to improving energy availability in European regions. It is evident from Table 1 that more energy resources are expended to produce steam and hot water--that is, thermal energy of medium and low potential--than to obtain electric power. Consumption of energy resources to produce high potential heat is also rather great.\* This pertains to high temperature processes in ferrous metallurgy, in construction materials industry, in machine building and so on.

Efforts are presently under way to create nuclear power facilities for obtaining thermal energy of both medium and low potential on one hand and high potential on the other. This report will examine basically the first direction of use of nuclear power for the purposes of heat supply.

#### Heat Consumption Trends in the USSR National Economy

To determine the prospects of using nuclear power facilities to obtain medium and low potential thermal energy, we need to account for the objective trends in development of the country's entire energy complex. Analysis of its dynamics over the last 25 years revealed some extremely important trends in the change of heat consumption indicators in our national economy (Table 2):

Table 2. Some Indicators of the Heat Consumption Structure in the USSR National Economy, %

| <u>Indicator</u>                                                                             | <u>1960</u> | <u>1970</u> | <u>1980</u> | <u>1985</u><br><u>(Estimate)</u> |
|----------------------------------------------------------------------------------------------|-------------|-------------|-------------|----------------------------------|
| Proportion of medium and low potential thermal energy in the total consumption of net energy | 54          | 55          | 55          | 56                               |
| Medium and low potential thermal energy consumption structure                                |             |             |             |                                  |
| in material production                                                                       | 50          | 56          | 61          | 61                               |
| in the home and in personal services                                                         | 50          | 44          | 39          | 39                               |

[Continued on following page]

\*Thermal energy is conditionally divided in relation to temperature into low potential (from 30-40 to 100-120°C), medium potential (from 100-120 to 300-400°C) and high potential (over 300-400°C).

|                                                                                        |    |    |    |    |
|----------------------------------------------------------------------------------------|----|----|----|----|
| Proportion of steam and<br>hot water as medium<br>and low potential energy<br>carriers | 47 | 63 | 70 | 73 |
| Consumption structure of<br>net thermal energy                                         |    |    |    |    |
| medium potential                                                                       | 51 | 45 | 43 | 41 |
| low potential                                                                          | 49 | 55 | 57 | 49 |

relative stabilization of the proportion of medium and low potential thermal energy in total consumption of net energy\* at the 54-56 percent level, though in conjunction with noticeable change in its internal structure, and namely, reduction of heat consumption in the housing and public sector and in personal services coupled with growth of its consumption in material production (predominantly in industry);

growth of the proportion of steam and hot water as medium and low potential energy carriers from 47 to 73 percent;

growth of the proportion of low potential thermal energy from 49 to 59 percent coupled with a corresponding decrease in the proportion of medium potential heat in the total consumption of both types of energy.

There are all grounds for anticipating that these trends will persist into the future. Extensive possibilities of utilizing existing types of nuclear reactors for heat supply purposes open up in this connection, inasmuch as they generate thermal energy of basically relatively low potential.

This is also promoted by the significant concentration of thermal loads typical of the Soviet Union. According to data acquired by Academician L. A. Melentyev, the proportion contributed to heat consumption by cities and towns has risen to 80 percent, in which case the proportion of cities with a thermal load greater than 2,000 GJ/hr increased to 70 percent.\*\* Growth of the concentration of thermal loads is causing an increase in the proportion of centralized heat supply in the country in general from 50 percent in 1980 to 60-65 percent in the future. In this case the degree of centralization of heat supply in cities should grow to 75-80 percent.

These circumstances create favorable prerequisites for using large heat sources, which include nuclear sources.

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\*Net energy as defined as the energy of all forms (mechanical, thermal etc) transmitted directly to the national economy after subtraction of all losses in power systems and facilities.

\*\*See Melentyev, L. A., "Sistemnyye issledovaniya v energetike" [Systems Analysis in Power Engineering], Moscow, Nauka, 1983.

## Types and Characteristics of Nuclear Heat Sources

Three variants of nuclear heat sources based on fission reactors may be imagined.

### The Nuclear Heat and Electric Power Plant (ATETs)

This is one of the variants of combined use of a nuclear energy source to produce electric power and heat, where all or part of the electric power is generated by steam. Such a power production facility utilizes a conventional heat flow system. Its practical realization began with the use of a type TK (heat and power supply and condensation) turbine. Only part of the steam is picked off from such a turbine for heat supply needs, while the rest passes through the condenser. In this case the more primary heat expended on heat supply, the lower the parameters of the withdrawn steam and the higher the initial parameters of steam entering the turbine, the greater is the effectiveness with which the primary heat is used.

Of course, primary analysis of ATETs systems emphasized the merits of high temperature reactors providing for high parameters of generated steam close to parameters attained with units operating with fossil fuel. But high temperature gas-cooled reactors have not enjoyed development in our country for the purposes of electric power supply (and thus in ATETs). Fast sodium-cooled reactors are being planned as a means of breeding (accumulating) nuclear fuel, and they are also not being considered today as an energy source for mass use in ATETs. In this connection ATETs based on water-cooled reactors (Figure 1) generating saturated steam characterized by moderate parameters, and therefore characterized by relatively low production of electric power from steam and low utilization of primary heat, are now being developed and placed into operation.

### Nuclear Power Source with Separate Heat Withdrawal for Heat Supply

The unique features of a nuclear reactor can make another variant of combined utilization of a nuclear energy source effective: acquisition of steam for a condensational steam turbine cycle with the purpose of generating electric power and providing for separate withdrawal of heat from the primary heat carrier for heat supply (Figure 2). For a water-cooled boiling-water reactor to be used in such a system, additional cooling of water at its input may produce a sufficiently noticeable economic impact owing to an increase in the extent of fuel combustion. The parameters of the obtained steam or hot water are suitable for the purposes of household or low temperature industrial heat supply. The merits of such a system must be considered in specific designs.

A system for heat withdrawal at the level of exhaust gas temperatures (800-1000°C) for heat supply to high temperature production processes is being examined in application to promising high temperature gas-cooled reactors. The parameters of partially cooled gas are sufficient to generate superheated steam in a standard steam power cycle (Figure 3).

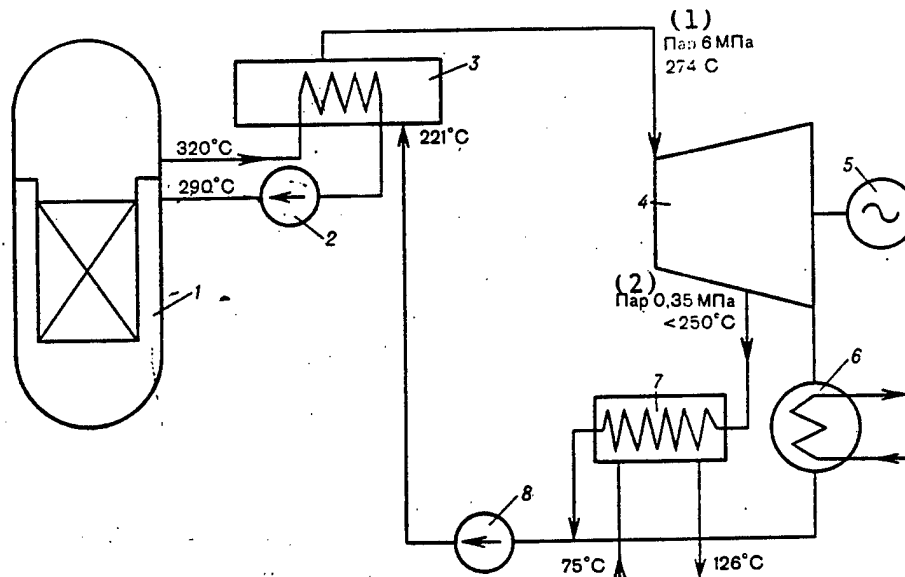


Figure 1. Heat Flow of an ATETs Based on a VVER-1000 Reactor:  
1--reactor, 2--circulating pump, 3--steam generator,  
4--steam turbine, 5--electric generator, 6--condenser,  
7--water heater for heat supply, 8--supply pump

Key:

1. 6 MPa steam

2. 0.35 MPa steam

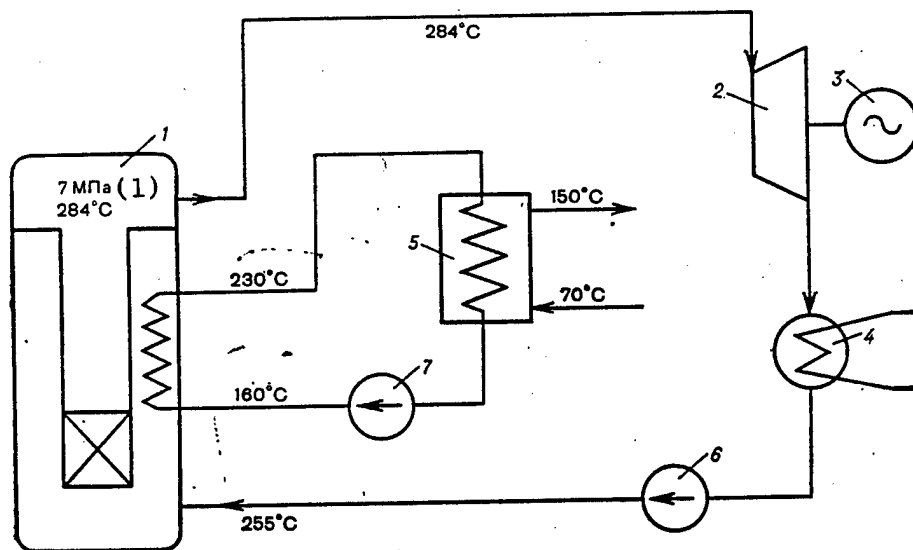


Figure 2. Heat Flow of a Nuclear Power Source with Separate Heat Withdrawal Based on a VK-500 Reactor: 1--reactor, 2--steam turbine, 3--electric generator, 4--condenser, 5--water heater for heat supply, 6--supply pump; 7--circulating pump

Key:

1. MPa

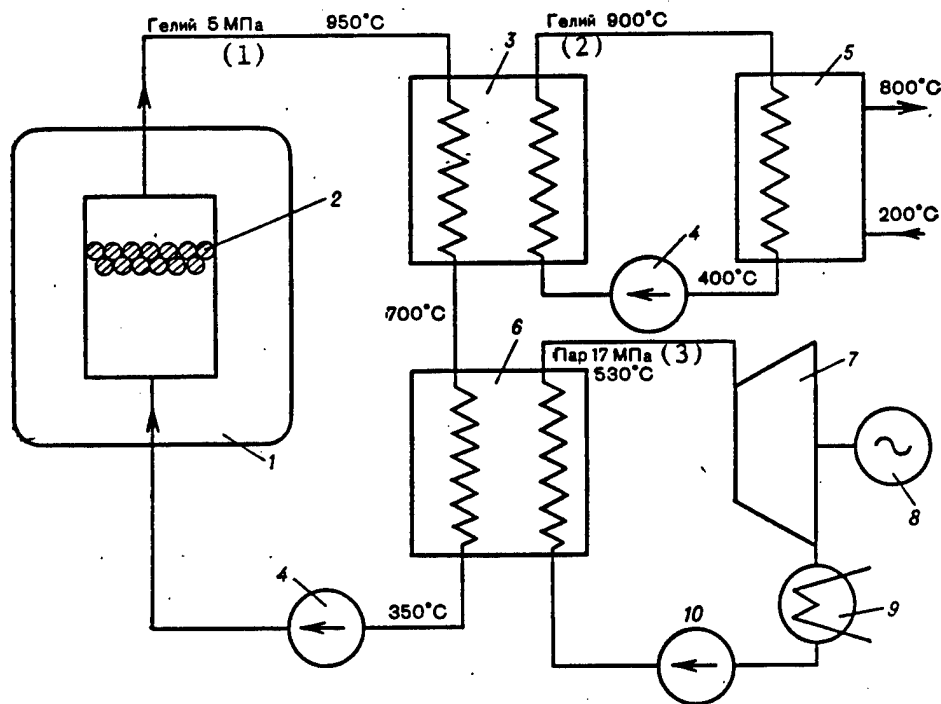


Figure 3. Heat Flow of a Nuclear Power Source with a High Temperature Reactor: 1--reactor, 2--spherical vessel [not further identified], 3--helium-helium heat exchanger, 4--compressor, 5--helium-product heat exchanger, 6--helium-water (steam) heat exchanger, 7--steam turbine, 8--electric generator, 9--condenser, 10--supply pump

Key:

- 1. 5 MPa helium
- 2. Helium

- 3. 17 MPa steam

### Nuclear Heat Supply Plant (AST)

This is the third variant of a nuclear heat source based on a single-purpose generator of heat having the required parameters. Nuclear heat supply plants intended to provide heat in the household consumption sphere are now being developed (Figure 4). Research is being conducted on the planning and design concepts applied to nuclear industrial or industrial-household heat supply plants (ASPT) oriented on steam and water of higher potential; research is being conducted on the possibility of utilizing heat from a high temperature gas-cooled reactor for chemothermal long-distance heat supply, and the scientific and technical principles of such use are being developed. This method is based on the reversibility of the reaction of vapor conversion of methane. Oxygen and carbon monoxide obtained from methane using the heat of a nuclear reactor are transported via gas pipelines over long distances. The reverse reaction is carried out at the consumer's end, where heat is liberated and utilized.

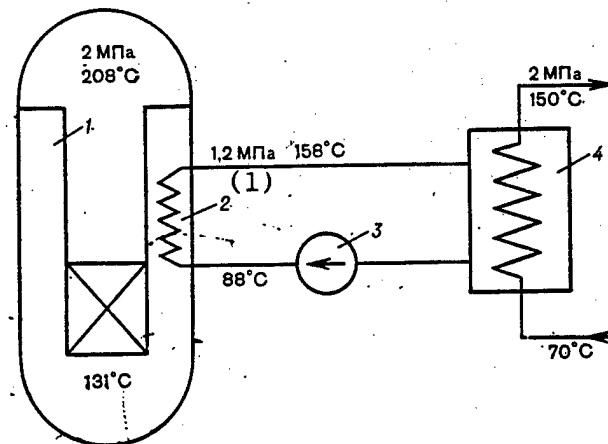


Figure 4. Heat Flow of a Nuclear Heat Supply Plant with a Water-Cooled Reactor: 1--reactor, 2--water-water heat exchanger, 3--circulating pump, 4--water heater for heat supply

Key:

1. MPa

A water-cooled shell-type reactor unified with the facilities of condensation AES is now used in the modern generation of nuclear heat and electric power plants. Because the design concepts are consistent, an identical approach can be taken to the problems of nuclear and radiation safety in relation to these ATETs and AES, and they can be located under practically identical conditions on the basis of corresponding criteria. As far as the AST is concerned, its creation was subordinated to the task of bringing the facility as close as possible to a major population center, and this predetermined another set of technical concepts insuring its heightened safety.

As we know, the necessary radiation safety measures are provided for in all nuclear power production facilities. The nature of these measures and the corresponding technical concepts depend on the type of facility and the conditions of its location in relation to the consumer. Special technical measures preventing penetration of radioactive substances into the heating network or into an industrial heat carrier are foreseen in reactor facilities intended for heat supply. Further development of this direction of nuclear power engineering foresees extensive technical and economic optimization of facilities, to include radiation safety resources and measures. A fundamental increase in safety at an acceptable level of outlays was attained for AST oriented on household heat networks with standard parameters (water with temperature up to 150°C at the network intake) through the development of a specialized low temperature shell-type reactor.

Additional safety requirements basically reduce to the need for accounting in the design concepts for the possibility of such improbable events as damage to the reactor shell, crashing of an airplane into the plant, and the

influence of an explosion shock wave; special measures must also be foreseen for removing solid and liquid radioactive wastes from the plant, and so on. Heating of the network heat carrier is permitted only by an intermediate heating medium, the pressure of which must be less than the pressure of the heat carrier in the network. A number of additional more-stringent limitations have been established on the radioactivity of industrial media, on the level of radiation exposure and so on.

Fulfillment of heightened requirements on the safety of AST is insured through combination of the following design and operational factors: An integral reactor layout without an external circulating loop employing natural circulation in all operating conditions is used. Low pressure of the heat carrier in the main loop (approximately an order of magnitude less than in modern water-cooled power reactors) significantly reduces the potential energy of the heat carrier and predetermines the calm nature of emergency processes associated with leaks; the low temperature of the heat carrier and the moderate energy intensity of the core raise the operating reliability of the reactor; the main shell of the reactor is housed inside a safety shell (with a small gap) which completely excludes overheating of the core in emergency situations; a number of design concepts promoting dependable cooling of the reactor and containment of radioactive substances are employed.

Some of the technical concepts listed here may be utilized in creating a single-purpose reactor of greater safety for industrial heat supply (ASPT). Such a reactor is now under development.

There appears to be a possibility for significantly reducing the relative cost characteristics of AST reactors in comparison with reactors for condensation AES and ATETs. This predetermines the positive economic impact of bringing the energy source closer to the consumer even in compliance with heightened safety requirements.

The relative natural indicators are improved even with regard for significantly lower output capacities of AST facilities in comparison with AES (500 MW of heat as opposed to 1,375 or 3,000 MW of heat respectively for a VVER-440 and a VVER-1000). For example the weight of the equipment per unit heat capacity is 2.22 tons/MW for the VVER-440 (the reactor and the first loop), 1.64 tons/MW for the VVER-1000 (the reactor and the first loop), and 1.18 tons/MW for the AST-500 (the reactor and the first and second loops), or with the safety shell, 1.72 tons/MW.

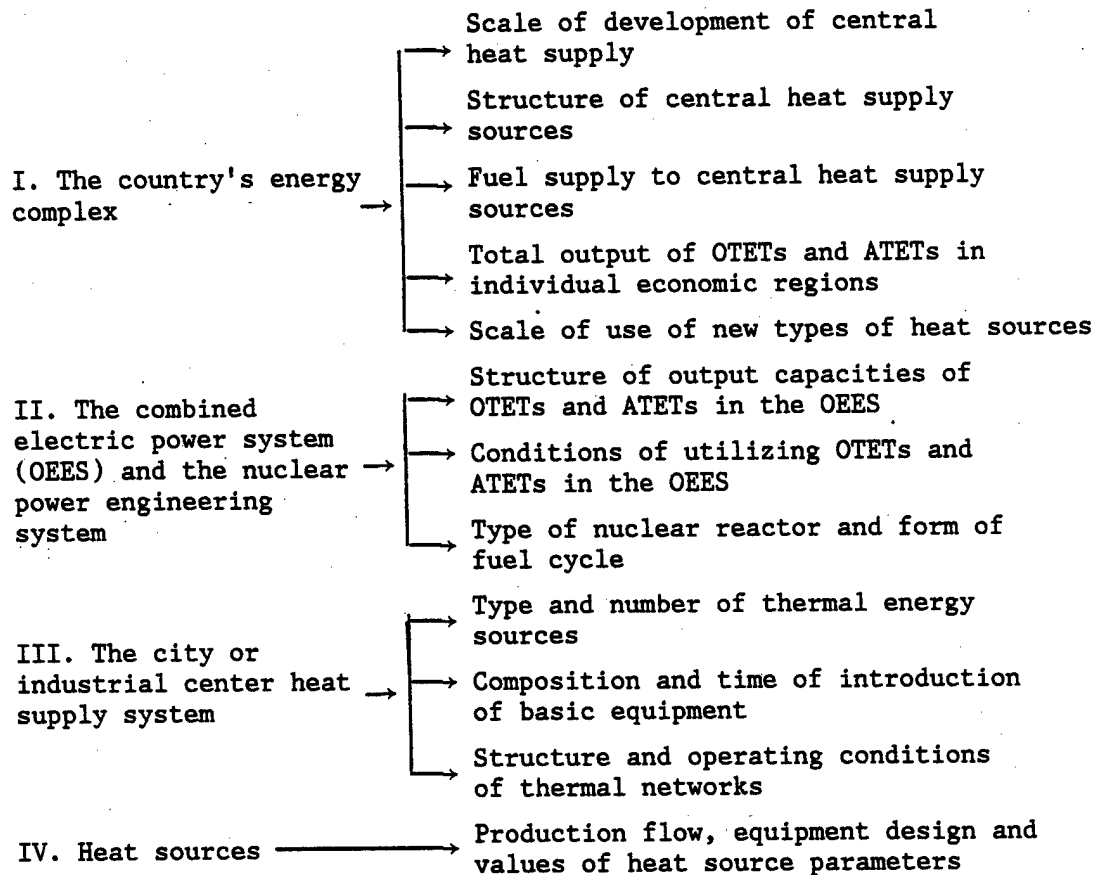
#### Optimization of Heat Supply Systems

In the new stage of development of power engineering, central heat supply may be achieved by the following types of facilities: a TETs burning fossil fuel; nuclear TETs and condensation AES (AKES); regional boiler plants burning fossil fuel; boiler plants using nuclear fuel--that is, nuclear heat supply plants and nuclear industrial heat supply plants.

In order to optimize the structure of central heat supply sources, it would be important to correctly determine the areas of use of these facilities.

The basic tasks associated with optimizing heat supply systems may be subdivided--conditionally to a certain extent--into four hierarchical levels: the country's energy complex; the combined electric power system (OEES) and the nuclear power engineering system; the city or industrial center heat supply system; heat sources (see diagram).

#### Interconnections Between Hierarchical Levels (I-IV) and the Principal Technical-Economic Concepts Associated with Development of Heat Supply Systems



The appropriate methods and models have been developed to solve the problems pertaining to each of these levels.

In the first hierarchical level, optimization of central heat supply in the country as a whole and in individual regions is effected within the framework of the energy complex. As a result the optimum levels of development of central heat supply based on nuclear fuel and the scale of use of ATETs, AST and ASPT are determined.

Two groups of problems are solved at the second hierarchical level: Total output capacities and conditions of use of ATETs are determined in application to the OEEs, and the basic characteristics of the nuclear reactors of ATETs, AST and ASPT are determined over the long range in application to the nuclear power engineering system.

At the third hierarchical level--that is, analysis of the city heat supply system, the strategy of optimum development of heat supply systems using organic and nuclear fuel is selected, and the optimum unit output capacities, composition and times of introduction of the principal equipment of ATETs, AST and ASPT are determined.

The fourth hierarchical level includes optimization of nuclear heat supply sources (ATETs, AST, ASPT). Sensible production flows, the best equipment design concepts and optimum parameter values are sought at this level.

Considering the inertia of the development of power engineering, these problems are solved with the necessary lead time--from 5-7 to 20-30 years. They are solved with the participation of scientific research, planning and design organizations of the USSR Academy of Sciences, the USSR State Committee for Utilization of Atomic Energy, the USSR Ministry of Power and Electrification, the USSR Ministry of Power Machine Building and others.

#### Areas of Application of Nuclear Heat Sources

Research shows that wide use of nuclear fuel for heat supply purposes is effective in European regions of the country. Effectiveness is achieved through sensible combination of ATETs, AST, ASPT and AKES, as well as versatile TETs burning fossil fuel.

Technical and economic comparison of traditional basic TETs and ATETs leads to the conclusion that the latter are preferable to TETs burning fossil fuel if the thermal loads exceed 6,000-7,000 GJ/hr. This does not pertain to TETs of a new type--highly versatile heat and electric power plants burning fossil fuel; operating in periods of half the full load of the OEEs, they do not compete with ATETs. The possibility of reducing electric output while keeping the heat supply load constant is insured at such TETs by installing additional water heaters intended for heat supply; steam is fed to them from boilers by way of a reduction-cooling device, bypassing the turbines.

The suitable area of application of AST can be determined today only tentatively due to uncertainties concerning a number of the basic technical and economic indicators. AST compete with ATETs when the thermal load of the nuclear heat source per se is relatively low--1,800-3,500 GJ/hr--that is, in the case where one or two reactors producing 500 MW of heat are installed at an AST. The technical and economic indicators of ATETs equipped with VVER-1000 reactors worsen significantly at such relatively low loads.

The results of technical and economic comparison of AST with regional boiler plants burning fossil fuels in relation to the conditions of the European

USSR show that AST become more economical than regional boiler plants when the thermal load per AST is 2,000 GJ/hr and more.

When selecting the characteristics of ATETs, AST and other types of nuclear sources described above and ones still on the drawing boards, we must account for the basic differences in development of heat supply based on nuclear and fossil fuel associated with the particular features of the structure of the outlays. Thus in view of the low fuel component of outlays on central heating units of ATETs (in contrast to TETs burning fossil fuel), to economize on fossil fuel it would be suitable to produce the maximum possible amount of electric and thermal energy at such plants. Moreover inasmuch as the relative cost of a nuclear reactor depends significantly on its productivity, reactors with maximum capacity should be installed chiefly at ATETs. Thus it may be concluded that it would be suitable to erect ATETs equipped with maximum-output reactors and turbines designed for constant expenditure of live steam, insuring maximum release of electric and thermal energy. The ratio of the proportions of thermal and electric loads in the region of construction of an ATETs predetermines the type of turbines installed, as related to the amount of steam withdrawn for heat supply purposes. Given moderate thermal loads, it would be suitable to install a type TK turbine, while at larger thermal loads it would be better to install type T (central heat supply) turbines capable of supporting considerable withdrawal of heat and reducing privyazannaya [attached, hooked-up] electric power output.

The calculated power and heat generation coefficient--the ratio of the hourly release of thermal energy from the heat and power supply turbines of an ATETs to the total thermal load of the heat supply system--is one of the most important indicators affecting the choice of the profile of ATETs equipment. Calculations showed that maximum annual withdrawal of steam from turbines of an ATETs--the source of the most inexpensive heat--is the most economical. This corresponds in our estimates to the optimum value of this coefficient (around 0.4-0.6). Under these operating conditions an ATETs can cover the basic schedule of thermal loads experienced by heat supply systems in the entire heating period--that is, in the larger part of the year. The peak in the schedule must be covered by boiler plants using fossil fuel. A similar premise is valid in relation to heat supply systems in which an AST is the principal source of heat.

The existing plans for ATETs and AST do not foresee delivery of steam to industrial consumers. Preliminary studies have been made directed at creating 500 MW nuclear industrial heat supply plants producing heat at not very high pressure (around 2 MPa). Steam with such parameters can satisfy the bulk of industrial consumers.

Mass erection of AKES opens up possibilities for wide development of heat supply to consumers located within the radius of economically justified transportation of hot water. Up to 800-1,600 and more GJ/hr of heat from withdrawn steam may be obtained from condensation turbines of an AKES for every 1 million kW of AKES output capacity.

The relatively high unit capital investments and the low fuel component of outlays at nuclear heat sources predetermine the suitability of covering these outlays not only by an increase in the thermal heat load in heat supply systems but also by a significant fraction of existing loads. Existing small boiler plants would be eliminated, and medium and large boiler plants would be operated at peak loads. All of this would insure maximum economization of fossil fuel.

The suitable relationship between different sources in central heat supply systems was determined with regard for the ideas presented above concerning the effectiveness and profile of individual types of nuclear heat sources. The results of this research indicate the need for sharply reducing the proportion of decentralized sources, increasing the level of central heating and rapidly increasing the proportion of heat sources based on nuclear fuel--ATETs, AST, ASPT.

We can formulate the following basic conclusions.

Significant growth of heat consumption and concentration of the heat loads of USSR cities and industrial centers are creating the preconditions for formation of large central heat supply systems using high-output sources run with nuclear fuel. Organization of central heat supply based on nuclear sources must be looked at as one of the most important areas of the country's power production economy, as a means of achieving a considerable savings in fuel used for power production and in high quality heat supply to cities, and as a method of increasing the dependability of heat supply.

The highly dynamic nature of power engineering insistently requires prompt and correct determination of the conditions and prospects of development of central heat supply systems. Solution of this problem requires a high level of forecasting methodology. The basic premises of such a methodology based on a systems approach to power engineering have been developed.

Research results show that wide use of nuclear fuel for heat supply purposes is effective in the European regions of the country. Effectiveness is attained on the basis of a sensible combination of ATETs, AST, ASPT and AKES, as well as versatile TETs and boiler plants burning fossil fuel at peak periods. Parallel erection and experimental operation of nuclear heat sources of different types must be carried out in the immediate future in order to develop pilot models of the equipment and refine its characteristics.

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As a supplement to the scientific report, one of its coauthors, USSR Academy of Sciences Corresponding Member V. A. Sidorenko dwelled on the important economic aspect of the problem under discussion. This aspect of the matter deserves special attention on the part of scientists of the Academy of Sciences. There is no need to explain the necessity of selecting justified, optimum solutions in the area of developing nuclear heat supply systems. And yet in this case optimization is encountering serious obstacles. The problem is that the relative cost of reactors for nuclear heat supply plants,

calculated per kilowatt of sustained thermal power in accordance with adopted economic indicators, is significantly greater than that of VVER-440 reactors of nuclear power plants. And this is true despite the fact that the relative materials-intensiveness of such facilities is significantly lower, articles of a certain level of technical complexity are required for them in quantities an order of magnitude smaller, and so on. In these conditions, where the economic indicators correspond so little with actual indicators, it is extremely difficult to guarantee optimum, justified selection of technical and economic concepts.

Speaking in the course of the discussion of the scientific report, A. S. Kochanov (Nuclear Energy Institute imeni I. V. Kurchatov) turned attention to the problem of reaching an optimum relationship between heat supply sources such as ATETs and AST. Besides the ideas that were formulated in this report, there is one other circumstance that must be considered--the prospects of providing fuel to nuclear power engineering itself. If sufficiently effective breeders capable of accumulating large quantities of plutonium and thermal reactors consuming little fuel are created, such that nuclear power engineering could convert to complete self-support of its demand for fissionable material, in this situation ATETs would essentially have no advantages over AST, which could then provide heat to all relatively small consumers, down to economically justified limits. But if it is found that converting to complete self-satisfaction of demand is impossible, then the proportion of breeders would have to be increased significantly, and they would displace a quantity of thermal reactors of equivalent electrical output, including at ATETs. In this case the role of AST in heat production would grow.

Thus the optimum structure of nuclear heat supply sources in the future would depend to a significant degree on solution of the problem of supplying fuel to nuclear power engineering.

The calculations presented in this report, said Academician L. A. Melentyev, persuasively show that the savings in fossil fuel in heat supply in the case where nuclear heat sources are used could be a sizable amount in the not-to-distant future--about half of the energy equivalent of electric power generated today by nuclear power plants. Practical implementation of these possibilities would require solution of a number of serious problems described in the report. It would be useful to dwell in a little greater detail on some specific difficulties in this area. At an ATETs for example, it would be economically feasible to use reactors of sufficiently high output, and as a rule the real thermal load is such that on the order of 15 percent of this output is utilized in the heat and power supply cycle of steam turbines; the remaining 85 percent of the output is produced by the conventional condensation cycle. Thus ATETs should be erected only where it is possible to locate conventional condensation AES, including with regard for the requirements of ecology, water supply and so on. In this respect there are significantly fewer limitations on nuclear heat supply plants (AST) at which reactors of lower output can be installed. However, when an AST is operated solely to produce heat, its effectiveness decreases in connection with the sharply pronounced seasonal nature of the heat load. For the heat supply system to be effective, peak and half-peak heat supply plants (boiler plants)

burning fossil fuel must be present; despite this, it would still be necessary to solve a number of additional complex practical problems.

The idea of making nuclear heat supply systems less expensive by utilizing heat pumps deserves a great deal of attention. Modern heat supply lines consist chiefly of two pipelines. Hot water is delivered to the consumer by one pipeline, and cooled but still sufficiently hot water (around 50°C on the average) is returned by the second to the TETs, where it is reheated. Inasmuch as nuclear heat supply sources, and especially ATETs, must be located much farther away from consumers than heat plants burning fossil fuel, the length and consequently the cost of the heat supply lines increases dramatically. Heat pumps, which make it possible to extract considerable heat from water, can reduce its temperature to about 25°C. Such water could either be simply dumped into a sewage system, or if a closed cycle is necessary, it could be returned to the TETs by way of the ordinary cold water supply line, without any kind of insulation and compensation, which would reduce the cost considerably.

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## NUCLEAR POWER

### CONSTRUCTION OF NUCLEAR HEATING FACILITIES IN VOLGA REGION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Feb 86 p 1

[Unattributed article: "Nuclear Reactors for Heat and Light"]

[Text] Reactor vessel assembly has begun at the Gorkovskaya Nuclear Heating Plant, the first of its kind in the country. The collective there has assumed the duty of performing assembly and pre-start up work at an accelerated pace. And experts from the local branch of the Atomteploeletk-troyekt All-Union Institute have already begun designing new nuclear heat and power stations for several of the Volga region's large cities.

As G. Kutuyurin, deputy chief of the USSR Ministry of Power and Electrification's Main Capital Construction Administration, told TASS correspondent R. Akhmetov: "For both economic and ecological reasons, nuclear energy has a great future as a means of providing cities with heat. This is because only 20% of conventional fuel reserves are located in the European part of the USSR, while nearly 80% of the consumers of energy can be found there. Transporting a huge amount of fuel several thousands of kilometers from east to west increases its cost by a considerable amount.

Another advantage of nuclear heat supply plants (ASTs) is that they are very "clean". Currently operating boilers and heating plants dump a great deal of smoke, ash, sulfuric gases, and other harmful substances into the air. These pollutants are absent from nuclear power facilities.

Nuclear-produced heat had its beginning at the V.I. Lenin Nuclear Reactor Scientific Research Institute in Dimitrovgrad, Ulyanov oblast, where a mere 5,000 kilowatt experimental nuclear heat supply station manages to heat manufacturing facilities and a residential area.

The first industrial nuclear heat and power station was the Bilibinskaya ATETs in the Chukotsky area. With a capacity of 48,000 kilowatts, it provides mining enterprises with electricity and the arctic settlement of Bilibino with heat.

Experience gained in the field of energy production has resulted in a shift toward building more heat supply plants during this Five-Year Plan. In both

Gorky and Voronezh, million kilowatt heat plants will be put into operation and construction of a station with the same capacity will begin soon in Arkhangelsk. Each of the stations is able to handle an urban area of 350,000 persons. Standard boilers would have to burn a million tons of conventional fuel to produce the same amount of heat.

Nuclear heat supply facilities are built near cities. This means that the main factor governing the operation of a nuclear heat supply plant is maximal radiation safety. The Gorky station is a good example of how to ensure radiation safety. Its reactor, which is hermetically contained in a vessel weighing more than 200 tons, will be located in a mine shaft. Engineering and design features preclude any possibility of radioactive contamination of the city heating system.

The so-called three-circuit nuclear heat supply plant system is the means envisaged for ensuring that no such contamination takes place. In it, reactor water is carefully isolated from the hot water that goes to houses. This safety measure made an excellent account of itself in Bilibino.

Another kind of plant--nuclear heat and power station (ATETs)--is a good prospect for the European part of the USSR. These plants can produce energy and heat simultaneously for industrial and domestic use. On the Dnestr not far from Odessa, a nuclear heat and power plant with two one-million kilowatt reactors is under construction. Currently, the city is obtaining its electricity from the Krivorozhskaya and Zaporozhskaya GRESs. At its design capacity, the new plant will provide Odessa and its one million residents with all their heat and hot water; surplus energy will go into the unified power system. More than 400 small boilers will be eliminated in this way.

In the 12th Five-Year Plan, the first million kilowatt power unit at the Minskaya ATETs will begin working, and construction will begin on large nuclear heat and power plants at Bolgograd and Kharkov. Design work is underway for building nuclear heat and power plants in Gorky, Kuubyshev, Leningrad, and Kiev. Builders are determined to implement the program from extensive development of nuclear heat supply and heat and power plants. Doing so represents an important contribution to improving the country's fuel and energy balance.

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## NUCLEAR POWER

### PROGRESS AT LENINGRAD ELEKTROSILA NUCLEAR PARTS PLANT

Moscow PRAVDA in Russian 12 Feb 86 p 2

[Article by V. Gerasimov, Pravda correspondent from Leningrad: "There are million kilowatt units!"]

[Text] The following is one of the obligations the people of Leningrad have assumed for 1986: "To manufacture and deliver power production equipment to the Balakovskoya, Rovenskaya, and Zaporozhskaya Nuclear Power Plants and to the Tokamak-15 nuclear fusion facility and to begin extensive testing of the world's first 300,000 kilowatt cryogenic turbogenerator." And have they kept their word? This question can best be answered by the personnel of the Elektrosila Association, since they are the ones producing almost all of the equipment mentioned above.

B. Fomin, the association's general director, informed us that, "Million-kilowatt units have already been sent to the Balakovskoya, Rovenskaya, and Zaporozhskaya plants. And one was sent to the Khmel'nitskaya nuclear plant a month ahead of schedule. Work on the cryogenic turbogenerator is in full swing. Also, we are providing the power plant for a nuclear powered ice breaker."

Basically, the Elektrosila personnel are maintaining contract discipline, but if their clients can put a unit on line early, Elektrosila tries to beat its schedule and meet them half way.

You might think from this that Elektrosila has an easy schedule and a surplus of workers, but this is not the case. In five years, the association's output has risen by 31.1 percent, and a rise in output of the same amount is planned for the 12th Five-Year Plan. Nonetheless, the association has no more machinery than before in its shops, and the number of workers has even been reduced.

How can this be explained? The answer is that qualitative changes in manufacturing have been effected. Among these are an automated forecasting system for the engineering offices and advanced equipment. This system and equipment are replacing outdated machinery. A final change is that time and resources are used more parsimoniously.

The final result is that there are fewer engineers (210 fewer!) and that their productivity has risen by 20 percent. The development cycle for 20 major world-class pieces of electrical equipment was reduced by a year, while industrial robots, automatic tools, and digital control equipment have helped increase the amount of work that is mechanized to 65%. There were also more individual contributions to economy in the workplace. During the last Five-Year Plan, 12,000 tons of metal were saved; evidently all in-house "sources" of metal were exploited. But this year, the workers have undertaken to reduce metal usage by another 2,300 tons.

The million kilowatt units mentioned earlier have preferential status in the 12th Five-Year Plan and are an example of a place where savings have been made. The prevailing opinion used to be that since everything used to make them was accounted for down to the last gram, there was little in the way of savings to be obtained from eliminating waste. But an engineering inquiry disproved this. The engineers developed a rapid double-pole machine whose rotor performs 3,000 rpm but weighs 100 tons less than the previous model. The rotor has another advantage: the higher the output capacity of the power unit, the lower the cost of building the plant.

But what is a cryogenic turbogenerator? The answer is that it is a new type of machine in which the phenomenon of superconductivity is used. Its rotor, a cryostat, as well as the rest of the machine are half (!) the size and weight of machines with comparable output. Carousel foreman P. Khamin notes that, "Work has become more complicated and more interesting. We've learned to work titanium, and if a way can be devised to alternate the incoming metal blanks, two machine tools will be enough for the whole job."

The schedule has been carefully planned out. After a precisely calculated period of time, tests of the new generator will begin here.

The secretary of the Leningrad CPSU Gorkom S. Petrov commented, "We feel with good reason that orders from electric power engineers are especially important. After all, personnel from more than 40 of our enterprises and organizations--more than 200,000 people--are doing work in fields connected with energy development. We are building a large number of stream turbines and turbogenerators, quite a few gas turbine devices and pieces of electrophysical equipment, and about 60% of all hydroturbines and hydrogenerators, nuclear reactors, diesel units, etc. Leningrad is making a considerable contribution to improving the energy position of the country. But the responsibility is considerable too."

Quality is the key item. Elektrosila, for example, has been producing new machines with the state seal of quality for years, and 99.7% of its merchandise passes its first in-shop inspection. And its power units compete successfully in the world marketplace with comparable foreign models. The Izhorsky Plant is another example. It sent out the upper reactor unit for the Balakovskaya nuclear power plant a month early. There are still more examples. The Surgutskaya GRES-2 will be receiving its second feed pump from the Proletarian Plant ahead of time, and work underway to build Tokamak-15's has been stepped up.

Elektropult is delivering the last lots of equipment to the Kalininskaya AES, while the Elektroapparat Association is doing the same with the power complex for the Zaporozhskaya plant. And a steam turbine from the "Metal Plant" will be on its way to the Novosibirskaya TETs before the CPSU congress begins.

There are many more examples that could be cited. The people of Leningrad feel a great sense of duty to perform their pre-congress obligations.

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## NUCLEAR POWER

### BRIEFS

NEWSPAPER CONTENTS REPORTED--The end of the year is approaching. A report on progress by builders and operators in fulfilling their pledges in honor of the forthcoming 27th CPSU Congress is published in "SOTSIALISTICHESKAYA INDUSTRIYA" in Atommashe, No 50 (362). The newspaper carries a report by T. Alekseyeva headlined "Address: Zaporozhskaya AES." This week a steamship left Volgodonsk harbor with an unusual cargo. Its holds contained three steam generators manufactured by plant workers for the Zaporozhskaya Nuclear Power Plant. This is the first time such articles are being delivered to the place of construction of a nuclear power plant by water and not by railroad. Atommashe workers completed an important order from builders at Zaporozhye. Low quality of small mechanized tools is significantly reducing the work rate of builders of the Volgodonsk power production complex. This issue carries an open letter from L. Rud, plasterer-painter brigade leader at Grazhdanstroy Trust of Volgodonskenergostroy, to Minister of Construction, Road and Municipal Machine Building Ye. Varnachev. Noting that enterprises of this ministry produce a significant share of the mechanisms intended to reduce the manual labor of finish workers, the author makes an appeal for a decisive improvement in quality and design, which would raise the labor productivity of builders. The issue carries the articles "In a Machine Version" by T. Makarova, "'First Aid' for a Crane" by V. Lobachev, chief engineer of the concrete slurry plant of Volgodonskenergostroy Trust, and the report "Apples" by A. Zornin. The newspaper's "Postscript to a Sentence" rubric carries an article by V. Navorzov "Possessed by Dope." Kuzma Volgodonskiy offers the satire "A Search Is Announced" to the readers. News on culture and people is published in the issue. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Dec 85 p 2] 11004

POWER PLANT HOUSING--To Azgosproyekt Institute director T. Abdullayev and S. Lyatifov, director of the Azerbaydzhanskaya Nuclear Power Plant, under construction: "As we know, the Basic Directions of the USSR's Economic and Social Development in 1986-1990 and in the Period to the Year 2000 foresee initiation of construction of a nuclear power plant in the Azerbaijan SSR. Its construction was assigned to the collective of the Azenergostroy Trust. Recognizing their responsibility for prompt erection of this huge facility, power plant builders formed a new subdivision--the Azerbaydzhanskaya AES Construction and Installation Trust. Its erection begins with creation of a pioneer base, and with housing construction. Erection of a permanent residential settlement for 40,000-45,000 persons is foreseen. While

planning estimates are available for construction and installation operations proceeding on facilities of the production base, and while the work there is proceeding at an intense pace as a result, this cannot be said for housing construction. Our brigades cannot begin erecting housing either on the planned territory of the residential settlement, or for workers of the future housing construction combine and the metallic structures plant. They cannot, because their clients--the power plant's governing board and the Azgosproyekt Institute--have not submitted planning estimates for a single house. How can we seriously talk about erecting a nuclear power plant without housing? And after all, the deadlines are close, and what we fail to do today would be difficult to finish later. We cannot permit delays in the very first weeks of the initial stage of construction. We need to accelerate submission of the technical documents, so that we could work without delays." [By G. Khalfayev, fitter-installer, Azerbaydzhanskaya AES Construction and Installation Trust] [Text] [Baku VYSHKA in Russian 18 Jan 86 p 3] 11004

REACTOR PARTS PLANT--Volgodonsk--A unique production flow manufacturing equipment for nuclear power plants has begun operating at Atomash. The scale of the plant is astounding--for example, reactor parts journey 8 kilometers from shop to shop, from operation to operation before leaving the plant territory and traveling to clients. Complex equipment, ultrahigh precision equipment and progressive procedures have been placed in the service of nuclear machine building. A press stamping the floor of a reactor shell out of heated 60-ton blanks can be seen in shops of the plant. After the plant's production potential is fully assimilated, eight outfits of equipment for nuclear power plants will begin to roll off of its conveyers each year. [Text] [Moscow IZVESTIYA in Russian 27 Jan 86 p 1] 11004

NUCLEAR POWER INSTITUTE OPENS--This institute is but 3 months old. The smell of paint and fresh plaster is still present in the spacious halls of the training building. Students heading in the direction of the institute's town mingle with builders: 120 hectares of land were allocated to the construction site of the country's first Institute of Nuclear Power, founded on the basis of the Obninsk Affiliate of the Moscow Engineering Physics Institute. The beautiful school building, in which all of the conditions for study have been created, is surrounded by white-bark birches. A dormitory with a personal services block and an athletic complex will become operational before the end of the five-year plan. The first students admitted to the school are in their first session. They nervously read through their course schedules and meet with advisers in all three faculties--nuclear power plants, cybernetics and night school. In a few years, graduates of the Nuclear Power Institute will be carrying out great tasks: Atomic power production is already making a significant contribution to accelerating scientific-technical progress. In the next five-year plan its share will become even more substantial. [Text] [Moscow IZVESTIYA in Russian 20 Jan 86 p 3] 11004

SMOLENSKAYA AES--The collective of the Smolenskaya AES completed its annual electric power production plan ahead of schedule. The power engineers marked the last year of the five-year plan with the commissioning of the first generation of the second power production unit. According to the standards it takes 6 months to reach the total planned capacity of 1 million kilowatts.

But the AES collective completed this task in 2 months. This made it possible to carry out planned preventive repairs on the first power production unit without reducing production of electric power. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 22 Dec 85 p 1] 11004

ATOMMASH SHIPS NUCLEAR REACTOR--Volgodonsk (Rostov Oblast)--A nuclear reactor for the Gorkiy heat supply plant, presently under construction, was shipped by water from the moorings of Atomash. A new phase has begun in the development of the Volgodonsk Plant--assimilation of series production of "boilers" operating off of nuclear fuel. Atomash workers successfully fulfilled one of the main items of their pledges in honor of the forthcoming 27th CPSU Congress. [Text] [Moscow SELSKAYA ZHIZN in Russian 8 Dec 85 p 1] 11004

ROLLING MILL OPERATIONAL--Leningrad (TASS)--The collective of the country's largest "5000" rolling mill, which was placed into operation at the end of last year in the Izhorskiy Zavod Association, has begun working on orders from power plant construction projects of the 12th Five-Year Plan. It has begun rolling metal to be used to make the shells of million kilowatt reactors for nuclear power plants. [Text] [Moscow SELSKAYA ZHIZN in Russian 4 Jan 86 p 1] 11004

SMOLENSK NUCLEAR POWER PLANT--Desnogorsk (Smolensk Oblast), 25 [Jan]--The first generation of the Smolensk Nuclear Power Plant has attained its planned operating conditions. Today, both of its power production units, each producing a million kilowatts, are operating at full power, which will improve the supply of electric power to industrial regions in the country's center. [By correspondent N. Popinako] [Text] [Moscow PRAVDA in Russian 26 Jan 86 p 1] 11004

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NON-NUCLEAR POWER

DELAYS IN GES, GRES CONSTRUCTION IN KAZAKHSTAN EXAMINED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Dec 85 p 2

[Letter to the editor by assistant chief engineer of the Irtyshgesstroy Administration V. Stopychev, Shulbinsk, Kazakh SSR, and comments on the letter by correspondent V. Burenkov, Alma-Ata: "Holes in the Plan and Breakdowns in the Foundation Pit"]

[Text] Construction of the Shulbinskaya GES has been carried in the plans of the Irtyshgesstroy [not further identified] Administration for 10 years. And in all of these years the work has been going very badly. Last year's plan was not met, nor will the present year's plan be satisfied. Many reasons for this have accumulated.

First of all, the preparatory period, and first of all creation of the production bases, has dragged on for a long time. Today as a result, having worked for 9 years, for practical purposes we have not yet completely finished a single auxiliary production enterprise. We were not even chastized overmuch for failing to meet the schedule for filling the foundation pit and starting up the first power production unit. Sometimes the impression has been created that we are erecting not a facility of primary importance, but rather some inconsequential pumping station. Each year we submitted statements and ordered equipment, and it was allocated to us in parts, in dribbles.

It will take a little more than a year to get the first power production unit going. The draft Basic Directions call for completion of erection of the Shulbinskaya GES. But even at present we are barely able to fulfill 60 percent of the annual quota. Up to a thousand persons were supposed to be laying concrete in the foundation pit today, but only 300 worked. Why? True, we built a fabulous town, but there is still not enough housing. There is nowhere to put the people. Planners from the Moscow Gidroyekt Institute and from the Kazgidroyekt institute made mistakes in their time, failing to account for today's demographic features. They estimated that a fourth of the town's population would consist of persons without families. In fact, however, they represent only 7 percent. Today there are more than 2,000 children in the town, and up to 500 retired persons and housewives. After receiving housing, 400 builders specializing in hydraulic facilities left for other places--there was no work for them to do here. And so, 750 construction and installation workers remained at the construction site.

A thousand persons are working in the auxiliary enterprises. The rest are employed in town services.

We were able to make some headway: We were allocated another 20,000 square meters of housing space. But this will not solve the problem either. After all, the second generation of the power plant still lies ahead. As of 1987 we will have to begin erecting the Semipalatinskaya GES. We intend to erect it by the watch method, because the site reserved for it is 40 kilometers from Shulbinsk, down the Irtysh. Where are we supposed to get the people? How do we house them? How do we interest them in working there?

Hydraulic power plant builders must see their future clearly before them. Construction of both the Shulbinskaya and the Semipalatinskaya GES must be accelerated.

Comments on the letter by correspondent by V. Burenkov

The Shulbinskaya GES is a classical example of construction dragging on for many long years. The USSR Ministry of Power and Electrification has evolved the practice of concentrating construction work in the year in which the facility under construction is to go into operation.

This practice is encountered not only in Soyuzgidroenergostroy or in the Main Supply Administration of the USSR Ministry of Power and Electrification, but also in many of the ministry's main construction administrations. We can include among them with full justification the Glavvostokenenergostroy, Glavvostokelektrosetstroy and the main administration of Dalniye Elektroperedachi. As an example the Kustanay substation of the Ekibastuz-Kustanay VL 1150 overhead line was planned to become operational in December of this year (note once again that this is right at the end of the year). But on 15 August of this year the governing board of the USSR Ministry of Power and Electrification directed: "Glavvostokenenergostroy (comrades Skripnikov, Fuk), Dalniye Elektroperedachi (Comrade Semenov) and the Kazakh SSR Ministry of Power and Electrification (Comrade Kazachkov) are to insure that the substation becomes operational at nominal voltage in August (?) of 1985." It was as if they had just woken up. The miracle never did occur. Installation of the equipment has still not been completed at the Kustanay substation, and it is difficult to even imagine when it can become operational, and all the more so transmit electric power at nominal voltage. And in the meantime the work is being forced on at a feverish pace.

Here is another example. The gap between production of electric power and growth of its consumption in the East and in the Center of the country can be surmounted only by accelerating the commissioning of output capacities of the Ekibastuzskaya GRES-2 and the Yuzhno-Kazakhstanskaya GRES. And yet construction of these plants is proceeding impermissibly slowly. For example if we are to place the first power production unit of the Ekibastuzskaya GRES-2 into operation as foreseen, in 1986-1987 we would have to finish construction and installation work worth over 280 million rubles just in relation to the production facilities alone. But the total plan for this year is

but 36 million rubles. What miracle will make it possible for us to increase the work volume by eight times? Even the most massive campaign would hardly help.

The effort is also being retarded by the fact that all large construction subdivisions erecting power production facilities in Kazakhstan are subordinated to different main administrations of the ministry. It is quite difficult for these organizations to control them from Moscow. Would it not be simpler to transfer subdivisions of the union ministry to the Kazakh SSR Ministry of Power and Electrification, and to create a single main construction administration? Then the funds would be concentrated in one place, personnel would become more permanent, and there would be fewer workers at the construction sites recruited from elsewhere, upon whom we unfortunately must rely upon mainly today.

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## NON-NUCLEAR POWER

### POWER-LINE DESIGN INSTITUTE OFFICIAL ON UHV LEP SYSTEM

Frunze SOVETSKAYA KIRGIZIYA in Russian 27 Dec 85 p 2

[Article by Yu. Lyskov, All-Union State Planning, Surveying and Scientific Research Institute of Power Systems and Electric Power Networks: "The Unified System Today and Tomorrow"]

[Text] Transmission of electric energy on a large scale is not a simple problem for any state. It is especially complex in the conditions of our country, with its vast territory. Today the USSR Unified Power System (YeES)--a complex of power plants and power networks sharing common production conditions and unified operational control--embraces an area of over 10 million square kilometers spanning seven time zones. No other power system in the world operates in such conditions (for comparison, there are four time zones in the USA). This is why the magnitude and direction of the flows of electric power change dramatically in the course of the day in networks of the USSR YeES.

Growth of electric power production (1.295 billion kW·hr were produced in 1980, and as much as 1.493 billion kW·hr were produced in 1984), the need for its transportation over long distances and growth of the output capacities of the power production units of power plants are all compelling us to convert to higher classes of voltages making it possible to raise the carrying capacity of high voltage lines. Thus the LEP-750 kV, a branched ring system connecting new, high-capacity nuclear power plants with large regions of energy consumption, is being created in the European part of the country. It would also strengthen the ties between the USSR YeES and the combined power systems of other European CEMA countries.

Assimilation of the largest coal basins--Ekibastuz and Kansk-Achinsk--is one of the priority tasks of Soviet power engineering. It is economically unfeasible to transport fuel from these basins to consumers over long distances. It would be much more advantageous to produce electric power here at thermal power plants and transport this power via high voltage lines. The first 4 million kW thermal power plant is now operating in the Ekibastuz basin, and a second one with the same capacity is under construction. Even larger power plants will be built in the Kansk-Achinsk basin: The 6.4 million kW Berezovskaya TES-1 [Thermal Power Plant No 1] is already under construction.

But 500 and 750 kV lines cannot solve the problem of ultralong-range transportation of electric power. This is why unique ultrahigh voltage power transmission lines are being built (1,150 kV alternating and 1,500 kV direct current). These lines will be able to transfer part of the electric power produced by the Ekibastuz thermal power plants to the Urals and into the center of the European part of the country. Erection of the first line is nearing completion.

Research has shown that in terms of carrying capacity, five LEP-500 kV systems can be replaced by a single 1,150 kV line. In this case consumption of material resources is more than halved. Concurrently losses of electric power during its transmission are decreased by about 20 percent, and the unit cost of transmission itself decreases by an average of 10 percent. All of this attests to the effectiveness of such lines.

The length of the Ekibastuz-Ural LEP-1150 kV exceeds 1,200 km. Since 1984, two of its sections--from Ekibastuz to Kustanay (a total length of 900 km)--have been operating temporarily at a voltage of 500 kV. And recently the first section of this line, 500 km long (Ekibastuz-Kokchetav) was tested at a nominal voltage of 1,150 kV. The efforts to prepare it for constant operation at this voltage are now nearing completion.

Erection of the LEP-1150 kV will continue in the future. There are plans for building and placing a number of such lines into operation in 1986-1990 with a total length of about 1,500 km. This will make it possible to complete the Siberia-Kazakhstan-Ural interconnected system. The carrying capacity, economy and reliability of these lines will be increased owing to the LEP-1150 kV and introduction of new types of electrical equipment.

Transportation of electric power from the Asian part of the country into its European part requires power transmission lines of greater voltage; moreover they must carry direct current. Research has shown that when 1 million kW are transmitted a distance of 1,500 km and more, direct current lines are significantly more economical than alternating current lines. The Ekibastuz-Center power transmission line (2,400 km) should become the first long-distance direct current transmission system. Its carrying capacity is 6 million kW. And later on lines are to be erected from the Kansk-Achinsk basin into the European part of the country.

The USSR YeES presently consists of 220, 330, 500 and 750 kV networks. Formation of the unified power system is continuing. Thus over 32,000 km of high voltage lines were introduced into operation in 1984, and now the USSR YeES brings together over 700 of the country's power plants with a total capacity of around 260 million kW.

Let me present some of the results of its work. Creation of the USSR YeES within its present boundaries has already produced a savings of over 2.5 billion rubles of capital investments into electric power engineering. Moreover in comparison with isolated operation of power systems, we can get by with power plant capacities that are 12 million kW lower.

Peak power loads occur at different times in different parts of the country. Work of power systems within the composition of the YeES makes it possible

to satisfy peak demands by transferring electric power from one region to another. As a result an optimum operating schedule is insured for the power plants.

In the next 5 to 7 years the unified power system will embrace practically all of the inhabited area of the country: The combined power systems of Central Asia and the Far East will be connected to it. The territory occupied by YeES networks is up to 15 million square kilometers, and the capacity of power plants working in parallel exceeds 300 million kW.

In the foreseeable future the principal network of the USSR YeES will be formed out of 220, 500 and 1,150 kV lines in the larger part of the country, and 330 and 750 kV lines in the western and southern regions. The carrying capacity of the main network is to grow by a factor of 2-3 in comparison with the present level.

In the eastern part of the country, where high capacity energy complexes will develop, the distances between the principal regions of energy consumption are significantly greater than in the European part of the country. This is why alternating current power transmission lines carrying 1,150 kV will be erected to carry electric power and to reinforce the ties between individual power systems.

11004

CSO: 1822/176

NON-NUCLEAR POWER

ACADEMICIANS ON ECONOMICS OF EKIBASTUZ-CENTER UHV POWER

Moscow PRAVDA in Russian 5 Feb 86 p 2

[Article by academicians A. Aleksandrov, I. Glebov and L. Melentyev:  
"Siberia-Center Power Bridge: The Opinion of Scientists"]

[Text] In the "Fuel and Energy Complex" subdivision of the draft of the Basic Directions of Economic and Social Development, where it speaks of electric power, it provides--along with the extensive construction of nuclear, thermal, and hydroelectric power stations--as one of the tasks of technical progress, for the "continuation of the formation of the country's Unified Power System and the completion of the construction of intersystem electric transmission lines with voltages of 500, 750 and 1,150 kilovolts of alternating current, a line of 1,500 kilovolts of direct current, and electric distribution networks."

From this point, it is essential, in our view, to make special note of the problem of the construction of the electric power transmission line with a voltage of 1,500 kilovolts of direct current, a length of 2,414 kilometers, and a capacity of 6 million kilowatts, which is to link the Ekibastuz Fuel and Energy Complex and through it the entire eastern part of the Unified Electric Power System (YeEES) of the USSR with the center of the country. In its parameters, economic effect and scale of tasks being resolved, this line has no equal in the world. The building of the Ekibastuz-Center (LEP-1500) line is an important and fundamentally new direction in the technical progress of domestic electric power and the electrotechnical industry in the area of the transmission of electric power over great distances. This direction is called upon to play an important role in the further formation of the YeEES USSR, in increasing the reliability and efficiency of the power supply, in the establishment of the preconditions for the improvement of the structure of the country's power balance, and in the resolution of the problem of the lack of balance in the distribution of basic fuel and water-power resources on the one hand and productive forces on the other.

The YeEES USSR covers an enormous territory in the country, stretching from the Trans-Baykal region to the western borders of the Soviet Union, where it is linked through 750-kilovolt electric transmission lines with the unified power systems of the CEMA member countries. At the beginning of 1986, the USSR YeEES connected power stations with a total capacity of about 270 million

kilowatts. For such a huge power association to work stably, it is necessary to have reliable electric links between its separate elements. Calculations show that for the electric ties in the east-west direction, it is essential to have direct-current electric transmission lines, which are noticeably more efficient than alternating-current lines of analogous capacity.

The Ekibastuz-Center line will ensure a substantial increase in the stability of the work of the YeEES USSR and will reduce the risk of a possible intersystem breakdown. The LEP-1500 will make it possible, when necessary, to transfer large quantities of electric power in both directions. All of this will lead to a substantial increase in the reliability of the power supply to the national economy and to the population of the country and will contribute to the further improvement in the quality of electric power for consumers.

Recent studies and the specification of the directions in the development of the YeEES USSR in the 12th Five-Year Plan and beyond have very clearly demonstrated the necessity of bringing in the LEP-1500 precisely in the upcoming five-year plan. As early as 1990, this line, in combination with the Ekibastuz-Siberia LEP-1150 for alternating current now under construction, will make possible the resolution of important national economic tasks. Thus, this will make it possible to make fuller use of the capacities built into the AES's [nuclear power stations] in the European part of the country by means of the transmission of some of the electric power produced by them during the night but for which there are no customers in the central regions to eastern regions, where at the end of the 12th Five-Year Plan and beginning of the 13th Five-Year Plan it will not be possible to meet all of the requirements for electric power through local electric power stations. This line will substantially reduce the need for introduction of maneuverable capacities for work at times of peak load in the European regions of the country and will help to make more efficient use of the thermal electric power stations of the Ekibastuz Fuel and Energy Complex as well as of Siberian hydroelectric power stations, especially in high-water years.

Calculations show that all of these advantages created with the timely putting into operation of the LEP-1500 will more quickly reimburse the outlays linked with its construction, which will amount to about 1 billion rubles. At the same time, the creation of 4 million kilowatts in maneuverable capacity through the building of pumped storage electric power stations in the European regions requires 1.4 billion rubles in capital investments.

The LEP-1500 is to be a prototype for even more powerful direct-current electric transmission lines intended for the future conveyance of large quantities of electric power over long distances. Analyses and studies carried out by scientific and planning organizations indicate that for the distribution of current from the large power complexes beyond the year 2000 it will be necessary to build new direct-current electric transmission lines, the capacity of which will be analogous to or even exceed that of the LEP-1500. In addition, the direct-current lines are efficient for the subsequent unification of the systems in the country's northeast in the YeEES USSR.

Studies carried out by a number of organizations showed that in the future direct-current lines with voltages of 1,500 kilovolts or more will be the main

regulated connections forming the system of the YeEES USSR. This determines to a still greater extent the importance of the construction of the line, for it will be the basis for the working out of a whole series of fundamentally new tasks.

In the light of what has been presented, the position of the USSR Gosstroy, which proposed the rejection of the Ekibastuz-Center LEP-1500 in the 12th Five-Year Plan, is surprising. The USSR Gosstroy justifies this proposal by the changed power situation in the country. At the same time, it does not dismiss the question of the necessity of building this line after the 12th Five-Year Plan. The essence of the proposal thus amounts to postponing for at least another 5 years the resolution of this important scientific-technical and economic task.

Fifteen years ago, when the question of the construction of LEP-1500 was first being decided, it was a matter only of using it to transmit electric power in one direction--from Ekibastuz to the Center--but even then its intersystem role was taken into consideration. In the time that has passed, much has changed in the power situation. Large consumers of electric power appeared in Kazakhstan and in adjoining regions. But there have been other changes as well. Neither should one forget that in the past 15 years the scope of the production and consumption of electric power increased by a factor of more than 2.2, the structure of the production of electric power changed substantially, and the territory covered by the YeEES USSR multiplied several times over. The share of GES's [hydroelectric power stations] in the overall production of electric power in the country declined from 17 percent in 1970 to 13 percent at the present time. There was a significant increase in that part of the generating capacity (AES's and TES's [thermal electric power stations] with large-scale power units at supercritical steam parameters) that can be efficiently used only with no interruptions in the work and no load reduction. There was a substantial increase in the average and maximum unit capacity of power units and electric power stations.

All of this noticeably reduced the maneuverable characteristics of the YeEES and increased the risk of a cascading intersystem breakdown. One of the tasks resolved by the LEP-1500 is linked precisely with the increase in the maneuverability of the YeEES USSR that is already so necessary. In recent years, Soviet scientists, engineers and workers have created new types of equipment for this line that make possible its efficient utilization in a reversible system.

The postponement of the introduction of the LEP-1500 into operation, as is being proposed by the USSR Gosstroy, would mean irreparable damage to scientific-technical progress in electric power. Substantial monetary and material resources will be frozen for prolonged periods of time. Expenditures for the establishment and organization of the production of equipment for the LEP-1500 have already reached 200 million rubles. The Ministry of the Electrical Equipment Industry, the main developer and producer of the equipment for this line, will be forced to cut back on the work done by its numerous organizations in the area of direct-current power transmission and to reorient the established collectives of workers and specialists as well as production capacities toward other directions. A return to the work on

equipment for the LEP-1500 after the 12th Five-Year Plan will mean that it will practically have to be reorganized from the start.

One must not fail to take into account the fact that the construction of the LEP-1500 Ekibastuz-Center, for which Soviet workers, scientists and engineers have created a complex of unique equipment with no equal in the world in its technical and economic indicators, will make it possible to give back to the Soviet Union the role of leader in this area of power engineering, which it lost several years ago as a result of the extremely slow pace of line construction.

Under today's conditions, the construction of powerful lines as well as direct-current installation must be counted among the strategic tasks in the development of the entire power economy of the country. In the 12th Five-Year Plan, along with the construction of the LEP-1500 Ekibastuz-Center, it is essential to work on ensuring the broader application of direct-current electric transmission in the country's YeEES.

9746

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NON-NUCLEAR POWER

BRIEFS

TRANSCARPATHIAN POWER PLANTS--Uzhgorod--Symbols representing several hydro-electric power plants have appeared on the map of production facilities belonging to the Ust-Chernyanskiy logging and sawmill operation. Although the output of each of them is quite small, uninterrupted delivery of electric power to the work huts and dormitories of loggers working in the mountains at altitudes from 500 to 1,200 meters above sea level has become possible. [By IZVESTIYA special correspondent V. Vukovich] [Excerpt] [Moscow IZVESTIYA in Russian 19 Jan 86 p 1] 11004

MOSCOW HOT WATER MAIN--Moscow--Erection of a hot water main which will deliver hot water to the vicinity of the Moskva River from the Yuzhnaya TETs has been completed. "Introduction of the new main makes regional boiler plants unnecessary, meaning that the capital's air will become cleaner," said Glavmosinzhstroy chief V. Resin. "Moreover there will be better prospects for developing the industrial zone south of Moscow further. Delivery of heat to residential buildings will become more dependable." [By V. Sudakov] [Excerpt] [Moscow PRAVDA in Russian 9 Jan 86 p 1] 11004

EXPERIMENTAL POWER PRODUCTION--Kokhtla-Yarve, Estonian SSR--Scientists of the State Scientific Research Institute of Power Engineering imeni G. M. Krzhizhanovskiy have put low-calorie lignite to work in the furnaces of an MGD [not further identified] unit. The Kokhtla-Yarveskaya TETs in Estonia, where research is being conducted on an experimental 10 megawatt MGD unit, has become the proving ground for these tests. This one differs fundamentally from previous models in that solid fuel is used in place of gas. The group of scientists at Kokhtla-Yarve are gathering raw data with which to design electric power plants of the future. They will promote wider and more effective use of low-calorie forms of solid fuel in power engineering. The new high-capacity unit is being erected with the purpose of expanding the research. With its help, scientists intend to obtain results they need for designing electric power plants of the future. [Text] [Moscow SELSKAYA ZHIZN in Russian 25 Dec 85 p 1] 11004

POWER SUBSTATION ON LINE--Komsomolsk-on-Amur--The developing industrial center of the Far East has now received a stable power supply. Having placed the Komsomolskaya substation on line with an industrial load ahead of schedule, power engineers have raised the 1,000 kilometer line connecting the Zeyskaya GES to Khabarovsk and Komsomolsk-on-Amur to its planned carrying capacity.

with the "Siyanie Severa" gas main, which starts in the Komi ASSR. This made it possible to convert the Konakovskaya GRES, one of the country's largest thermal power plants, to economic fuel. The savings of thousands of tons of fuel oil, the decrease in rail shipments and improvement of the environment are the advantages which gasification of the GRES has produced. The new pipeline will also make it possible to supply nearby towns with gas. [Text] [Moscow SELSKAYA ZHIZN in Russian 18 Jan 86 p 1] 11004

EXPERIMENTAL DESALINIZATION--Ali-Bayramly--An experimental industrial drinking water softening and desalinizing plant designed by specialists of an Azerbaijan construction engineering institute jointly with workers of the Ali-Bayramlinskaya GRES imeni Ilich was placed into operation at the plant. It can significantly reduce pollution of the environment and economize on expensive chemical reagents. The technical innovation successfully passed the period of test operation. A decision was made by Azglavenergo to introduce it on an extensive basis. Here also a new modular 180,000 kilowatt-ampere transformer was tested for the first time in the country. It raises the reliability of power production systems and reduces losses of electric power. [By Azglavenergo engineer T. Ibragimov] [Text] [Baku VYSHKA in Russian 21 Dec 85 p 2] 11004

CONSTRUCTION OF TASH-KUMYRSKAYA GES--A workers relay race promoted discovery of reserves for hastening construction of the Tash-Kumyrskaya GES on the Naryn River. Kirghiz hydraulic construction engineers and their associates successfully satisfied their joint pledge in honor of the 27th CPSU Congress, having completed installation of the first machine unit ahead of schedule. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 3, Jan 86 p 3] 11004

NEW KAZAKHSTAN POWER LINE--The Barshino-Otarbay high voltage power transmission line has gone into operation in Tengizskiy Rayon, Tselinograd Oblast. Kazakhstan's electricians have planned to increase the length of rural power transmission lines by almost 15,000 kilometers in the starting year of the 12th Five-Year Plan. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 3, Jan 86 p 3] 11004

MARYYSKAYA GRES INCREASES POWER--The Maryyskaya GRES has increased production of electric power. A seventh power production unit with a capacity of 210,000 kilowatts was placed into operation at this thermal power plant, the republic's largest. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 3, Jan 86 p 3] 11004

NEW TURBOGENERATOR FOR MUBAREK--Kashka-Darya Oblast (UzTAG)--Installation of a 60,000 kilowatt turbogenerator for the second power production unit of the Mubarekskaya Heat and Electric Power Plant, presently under construction, has been completed. The equipment is presently undergoing testing, and the monitoring and measuring instruments and automatic systems are being adjusted. The generator should begin producing electric power as early as this month. Concurrently builders of Uzbekgidroenergostroy are erecting the third power production unit of the power plant. The walls of the gigantic building have risen to a height of nine stories, and installation of the highly complex equipment has begun. This will be yet another factory producing

Owing to this, delivery of electric current to the large territorial industrial complex where a metallurgical plant and new mining and logging enterprises are being built has been increased by a factor of 10. In the future five-year plan the substation will supply electricity to enterprises of the region by way of a new 500 kV power transmission line, which will connect Komsomolsk-on-Amur to the Primorskaya GRES. This huge power production center will also be able to absorb high voltage from the Bureyskaya GES, presently under construction, without any additional expansion. [Text] [Moscow SELSKAYA ZHIZN in Russian 15 Dec 85 p 1] 11004

CONSTRUCTION PROGRESS IN VILNIUS--One of the main machine units--the boiler--has been installed in the second power production unit of the Vilnyusskaya TETs-3. This work was completed ahead of schedule. Now specialists of the Sevzapenergomontazh Administration have started assembling the turbine. The second power production unit of the TETs-3 will go on line at the end of the present year. Then its output capacity will attain 360 megawatts--twice more than today. The TETs-3 will supply heat and power to new residential districts of Vilnius. [Excerpts] [Vilnius SOVETSKAYA LITVA in Russian 9 Jan 86 p 1] 11004

ACCOMPLISHMENTS OF ZEYSKAYA GES--Zeya, Amur Oblast--By the end of the year the Zeyskaya GES, the first local hydroelectric power plant, will have transmitted not less than 20 million kilowatt-hours into the combined power system of the Far East in excess of the plan. "Recently economists estimated that our power plant has already fully compensated for the cost of its construction," said V. Val, secretary of the hydroelectric power plant's party committee. "In the last 5 years over a hundred measures for scientific organization of labor and 80 proposals for introducing new equipment were introduced, with an economic impact of 500,000 rubles." [By SOTSIALISTICHESKAYA INDUSTRIYA correspondent S. Glukhov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Dec 85 p 1] 11004

TURBINE FOR KANSK-ACHINSK--Leningrad--The collective of the Leningradskiy Metallicheskiy Zavod Association initiated its production program for the new five-year plan by dispatching the first turbine for the "constellation" of thermal power plants to be built in Krasnoyarsk Kray at the Kansk-Achinsk coal field. In the final days of the last year this 800,000 kilowatt power production machine for the Berezhovskaya GRES-1 successfully passed tests at the enterprise. In comparison with previous models, the machine unit's efficiency was raised by almost 1 percent. [Text] [Minsk SELSKAYA GAZETA in Russian 5 Jan 86 p 1] 11004

DAGESTAN HYDROELECTRIC POWER--Makhachkala--The first power production unit of the Miatlinskaya GES, the third power plant of the Sulak cascade, has begun producing an industrial load. Next in line is the second hydraulic turbine. After it is placed into operation this year, the plant's output capacity will attain 220,000 kilowatts. [Excerpt] [Moscow SELSKAYA ZHIZN in Russian 4 Jan 86 p 1] 11004

KONAKOVSKAYA GRES CONVERTS TO GAS--Konakovo (Kalinin Oblast) (TASS)--A gas pipeline now connects Konakovo, the city of power production engineers,

thermal power. After the third power production unit is placed into operation, the heat and electric power plant will be able to produce 1,500 tons of steam per hour. This will significantly improve supply of power to the Mubarek Gas Refinery, and consequently it will stabilize its operation and make it possible to raise deliveries of "blue fuel" to the republic's national economy. [Text] [Tashkent PRAVDA VOSTOKA in Russian 21 Dec 85 p 1] 11004

MARYYSKAYA GRES EXPANDED--Mary, 9 January (Turkmeninform)--Energy produced by the seventh power production unit of the Maryyskaya GRES imeni 50-Letiye SSSR--210,000 kilowatts--entered the Unified Power System of Central Asia in the first days of the five-year plan. Now the daily output capacity of the republic's first power plant has attained 1,470,000 kilowatts. Construction of the eighth power production unit is to be completed in the present five-year plan. With this, erection of the Maryyskaya GRES will be completed, and its output capacity will attain 1,680,000 kilowatts. [Excerpts] [Ashkhabad TURKMENSKAYA ISKRA in Russian 10 Jan 86 p 1] 11004

CASPIAN POWER LINE CONSTRUCTION--Alma-Ata--New power transmission lines and substations are being erected in the vicinity of the Caspian oil and gas complex. More than 2,500 kilometers of power transmission lines are to be strung in this area. Supply of power to the oil and gas fields has promoted dependable supply to the most remote rural points as well: sovkhos departments, farms, herdsman's camps and pumping stations. Just in Guryev Oblast alone the number of such small rural objects of centralized power supply will more than double. The new stage of power network construction in the republic is typified by creation of closed rural power supply systems. For example in Taldy-Kurgan Oblast, a high voltage line between the towns of Glinovka and Koktuma has linked together the 200 kilometer power supply "belt" around 30 remote farms. Such redundant lines will insure dependable winter operation of the farms. In the last five-year plan the length of rural power transmission lines in Kazakhstan was increased by 65,000 kilometers. [By correspondent E. Matskevich] [Text] [Moscow IZVESTIYA in Russian 15 Jan 86 p 3] 11004

POLAR GES PLANT RENOVATION--Murmansk--The capacity of the Iovskaya GES [Hydroelectric Power Station], one of 15 hydroelectric power stations built on the small rivers of Kola Peninsula, has been increased by almost 20 percent. The replacement of turbines and the modernization of the main station transformers helped to achieve this. "There are reserve water resources on almost all of the small rivers of the Polar Regions where GES's have been built," said V. Krivtsov, deputy manager of the Kola Power System. "As long as it was more advantageous to build new GES's, we did not use this reserve. We began to carry out a large-scale program for the renovation of northern hydroelectric plants a few years. This work will continue in the new five-year plan as well." It has been calculated that in the reconstruction of GES's in the Polar Regions the expenditures per kilowatt of additional capacity amount to only 50 rubles. This is one-seventh as much as in the construction of new stations. The technical reequipment of the hydroelectric power stations of Kola Peninsula will take place in accordance with the special features of each particular station. Whereas at the Iovskaya GES, for example, it was enough to replace the turbines and modernize the main transformers, at the Nizhne-Tulomskaya GES, built under the GOELRO [State Commission for the Electrification of Russia] Plan, it is planned to build a second engine room and to install additional machine units. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Jan 86 p 2] 9746

24 April 1986

**SOLID FUEL MHD EXPERIMENT**--Kokhtla-Yarve, Estonian SSR--Scientists of the State Energy Institute imeni G.M. Krzhizhanovskiy made low-calorie brown coal "work" in the furnaces of the MHD [magnetohydrodynamic] installation. The Kokhtla-Yarveskaya TETs [Thermal Electric Power Station] in Estonia, where research is being done at the experimental MGD installation with a capacity of 10 megawatts, became the proving ground for these tests. Its fundamental difference from the previous models is that solid fuel is used here instead of gas. The group of scientists in Kokhtla-Yarve is working to obtain initial data for the planning of the electric power stations of the future. They will provide for the more complete and efficient application of solid low-calorie types of fuel in energetics. A new high-power installation is being built to expand the research work. With its help, the scientists intend to obtain the results needed for the planning of the electric power stations of the future. [Text] [Moscow SELSKAYA ZHIZH in Russian 25 Dec 85 p 1] 9746

**NEW HEATING SYSTEM**--These Kiev houses are equipped with a unique system of water heating with a graduated regeneration of heat that provides for a significant saving of material, labor, and fuel and energy resources. The credit for this belongs to specialists from KievZNIIEP, the Kievspetsstroy Trust, and a number of other organizations. The system of the graduated regeneration of heat was first applied in the practice of housing construction. In essence, this is a new direction in the development of heating technology. The restoration of the temperature of the water occurs in heat exchangers of the type "tube in a tube." In the process, the expenditure of water is reduced by half and there is also a sharp reduction in the need for tubing. The innovation is already in use in 35 cities. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 4, Jan 86 p 19] 9746

**SAYANY-KUZBASS LEP**--At the beginning of the past five-year plan, the trusts of Krasnoyarskelektrostroy and Sibelektrosetstroy put into operation the first high-voltage transmission line extending 400 kilometers from the Sayano-Shushenskaya GES [Hydroelectric Power Station] to Novokuznetsk. And now the same contractors have put a second, parallel LEP-500 line under working voltage. Assembly of the lep required eight months, thanks to advanced labor methods. [By N. Domozhirev] [Excerpts] [Moscow STROITELNAYA GAZETA in Russian 8 Jan 86 p 3] 9746

**LEP DE-ICING SYSTEM**--An innovation by specialists of the Taldy-Kurgan enterprise for electric power networks helped to avoid interruptions in the supply of electricity to enterprises of southern Pribalkhashye when glaze ice forms. When a layer of ice formed on the wires of the LEP-110 from Taldy-Kurgan to Ushtobe, a special electronic system was turned on at the command of the dispatcher. It caused a shorting on the line, which heated the wires. The ice melted and the threat of a break of the electric transmission line was eliminated. [Text] [Alma-ATA KAZAKHSTANSKAYA PRAVDA in Russian 26 Jan 86 p 3] 9746

GENERAL

DEPUTY POWER MINISTER MAKUKHIN HITS SLOW POWER PLANT CONSTRUCTION

Moscow SOTSLIALISTICHESKAYA INDUSTRIYA in Russian 22 Dec 85 p 1

[Article by A. Makukhin, first deputy minister of power and electrification of the USSR: "Time Governs Pace"]

[Excerpts] The peaceful atom brings people not only light but heat as well. Construction has already started on the first major ATETs -- nuclear heat and electric power plants -- in Minsk and Odessa, and of nuclear heat-supply plants (AST) in Voronezh and Gorkiy. A single ATETs will make it possible to save more than two million tons of gas and oil fuel per year, and to shut down up to 500 low-efficiency boiler plants, which pollute the environment. The construction of just one AST yields an economy in organic fuel up to 800,000 tons per year.

In a word, the power industry is now undergoing a period of major structural transformations, and the conditions of its development are radically changing. This explains to some extent why the scale of electrification has not yet matched present-day requirements. The pace of putting new capacity into service would be far higher if there was fuller utilization of the advanced experience of organizing work at all stages of plant construction. Take the Zaporozhskaya AES as an example. The first power generator there was put up in 63 months, and the second one in 58, which surpasses the best indicators in the developed capitalist countries. No less impressive example is the turnkey delivery of the Baypazinskaya GES, where construction time was reduced two years below normal, and estimated construction was reduced by three million rubles. So there are possibilities for growth!

Unfortunately, there are also many examples of the other kind. For example, construction of the first 800,000 kW power generator at the Berezovskaya GRES has been inexcusably prolonged, and the hydraulic turbogenerator units and other facilities have not been put into operation on time at the Zagorskaya GAES [pumped-storage electric power plant].

I will deal particularly with the construction of the GAES. This is a new and very promising matter. The pumped-water plants (three of them are now under construction and another five are being designed) will make it possible to greatly improve the reliability of the power supply. They will receive the excess power from nuclear and thermal plants, and play the role of load regulators.

We keenly sense the need for this regulation during the introduction of new capacity. It sometimes happens that the customers are simply not able to receive the power generated -- whether electrical or thermal -- and excess exists in the midst of shortage. Suffice it to say that as a result of this lack of coordination about 3.5 million kW of the existing capacities of power plants is not utilized.

The country's power engineers have much to do so that what we have already built is utilized rationally and with maximum efficiency and all equipment is used to capacity.

Much of the solution of this problem depends on the engineers themselves. Much but not everything. We are wasting more than two million kW of capacity because more than 40 major power plants are receiving non-design fuel and inferior quality coal with low-calorie combustion and a high content of moisture and ash. USSR Minenergo [Ministry of Power and Electrification] has proposed that the Main Directions for the Country's Economic and Social Development include specific measures to improve the fuel supply to the power industry.

The draft of the Main Directions provides a broad program for the technical reequipping of the sector. This work has already begun.

The Soviet power industry is not just eliminating obsolete technology. Life urgently requires another approach to the solution of many problems, and a constant search for the optimum solutions. The sector's specialists well understand the importance and responsibility of the problems, and are doing everything to solve them.

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