

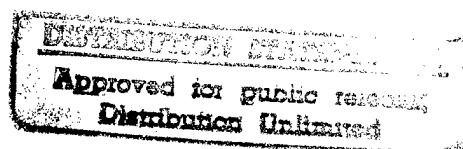
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8 August 1984

# USSR Report

CONSTRUCTION AND RELATED INDUSTRIES



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8 August 1984

## USSR REPORT

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## CONSTRUCTION PLANNING AND ECONOMICS

### GOSSTROY COLLEGIUM MEETING FOCUSES ON CONSTRUCTION DECREE

Moscow STROITEL'NAYA GAZETA in Russian 15 Jun 84 pp 1-2

[Article: "The Course Toward Improving Effectiveness and Quality; From the Meeting of the USSR Gosstroy Collegium"]

[Text] The meeting of the USSR Gosstroy collegium was held on 12 June. Problems in implementing the resolution of the CPSU Central Committee and the USSR Council of Ministers entitled "On Improving the Planning, Organization and Management of Capital Construction" were discussed.

USSR Gosstroy Chairman S. V. Bashilov presented a speech.

Minister of Construction of Petroleum and Gas Industry Enterprises V. G. Chirskov, Sector Chief of the CPSU Central Committee Construction Department V. I. Fedorov, Chief of the USSR Council of Ministers Administrative Affairs Section G. P. Klimenko, Chairman of the Professional Union of Workers in Construction and the Building Materials Industry Central Committee I. A. Lanshin, First Secretary of the USSR Union of Architects Governing Board A. T. Polyanskiy, as well as directors of USSR ministries and departments, Gosgrazhdanstroy [State Committee for Civil Construction and Architecture], the union republic gosstroys, and project design and scientific-research organizations participated in the work of the collegium.

As S. V. Bashilov noted in his speech, the development of capital construction and its transformation to a major industrial sector of the national economy is the subject of constant concern by the party and the government. The successful work of builders determines to a large degree the strengthening of the economic might of our state and the further increase in the living standard of the Soviet people.

An extensive program of capital construction, renovation and expansion of fixed capital is being implemented in our country. In the 9th and 10th Five-Year Plans and in the 3 years of the current five-year plan, over 3,000 industrial enterprises have been built and introduced into operation, and

residential housing with overall area in excess of 1.3 billion square meters has been built. The volume of construction-installation work has almost doubled during this time.

At the present time, the 11-million man army of builders is striving to ensure fulfillment of the plan assignments set for 1984 and for the 11th Five-Year Plan as a whole. The capacities for this are present -- there are many untapped reserves in the sector. This was indicated in the resolution of the CPSU Central Committee and the USSR Council of Ministers. The tasks for the operational introduction of production capacities are still not being entirely fulfilled, and the construction time for numerous enterprises and facilities exceeds the normative times. Shortcomings in planning, project-estimate work, and organization of building production are being slowly eliminated. The volumes of work on the reconstruction and technical retooling of existing enterprises are still insufficient. The dispersion of efforts and funds over numerous construction sites is allowed, and the volumes of above-norm unfinished construction are high.

The principles of cost accounting are being weakly introduced in the sector. Some construction organizations are operating at a loss. There are numerous cases of poor quality work fulfillment. The growth rate of labor productivity is slowing down.

The resolution defines a complex of measures for improving the planning, organization and management of construction. It is suggested that the USSR Gosplan [State Planning Committee], the USSR ministries and departments, and the union republic Councils of Ministers direct capital investments primarily toward the implementation of measures associated with the introduction of the latest scientific-technical achievements into the national economy and with the comprehensive development of raw materials and processing sectors. A balance of the limits of capital investments and construction-installation work with the financial and material resources, as well as with the capacities of contracting organizations must be ensured. This will provide the construction of enterprises and facilities in accordance with the construction duration standards.

It is necessary to concentrate material-technical, labor and financial resources on the most important construction sites and facilities which have a high degree of readiness. This will make it possible to accelerate work, to reduce the number of facilities being constructed at one time, and to bring the volume of finished construction down to the normative level in the next 3-4 years.

Increasing the volumes of reconstruction and technical retooling of currently operating enterprises is a very important factor in increasing the effectiveness of capital investments. This ensures a reduction in the specific capital investments by an average of 8-10 percent throughout the industry, and by 25 or more percent for individual enterprises.

However, we know that construction organizations are not eager to undertake reconstruction work. Provisions have been made for establishing an order of

project-estimate documentation for jobs associated with the reconstruction and technical retooling of currently operating enterprises according to estimates which have been coordinated with the construction organizations and worked out with consideration for the actual conditions and character of work production. The necessary additions and changes will be introduced into the standards.

The resolution makes it mandatory to take measures for improving project-estimate work. It has been determined that beginning in 1985, technical-economic substantiations for the planning and construction of major and complex enterprises and structures will be developed, and if necessary also for other facilities determined by the USSR Gosplan and the USSR Gosstroy during the plan compilation.

The computed cost of construction, determined in the TEO [technical-economic substantiation] and coordinated with the contracting organization, must become the limit for the entire period of planning and construction and must be considered in the compilation of plans for capital construction.

The task has been set to improve the quality of projects and to broadly utilize the achievements of science and technology and leading domestic and foreign experience in them. It is necessary to increase the personal responsibility of the persons in charge for the technical and economic level of the adopted decisions, for the accurate determination of estimated cost of construction, and for adherence to it during operational planning.

In evaluating the activity of project planning organizations, primary consideration should be given not to volume indicators, but to qualitative ones.

Plans have been outlined for taking measures to order the network of project planning organizations, to secure the work force, and to ensure their interest in increasing the quality of the plans. The role and responsibility of the territorial project planning organizations within the USSR Gosstroy system must be increased in fulfilling survey and project planning work in the economic regions, in selecting sites for construction of facilities, and in working out schemes for industrial centers. At the present time a large number of organizations from various ministries and departments are engaged in engineering surveys. Often they do not provide the necessary work quality and allow gross errors. At the same time, large territorial survey organizations and leading sectorial project-survey institutes, which have a highly skilled work force and the necessary technology at their disposal, often have a light work load.

The resolution provides for the development of general, departmental and territorial schemes of construction management. The main territorial administrations of the general construction ministries are given the functions of the head construction management organs which implement coordination between development of the capacities of the contracting organizations and their production bases.

Many construction-installation trusts -- general contractors -- have reduced their responsibility for ensuring the timely operational introduction of enterprises, buildings and structures, and are unsatisfactorily fulfilling their functions on coordinating work. There are plans to enlarge trusts, to provide them with better technology, as well as to increase the role of work production projects and to take measures for improving construction quality.

Much attention in the speech was given to the need for further increasing labor productivity in capital construction, including also through means of technical retooling of the contracting organizations, introduction of progressive methods of work production, and widespread application of effective materials.

At the same time it is necessary to improve the system of wages and bonus payments in construction with consideration of the need for increasing their stimulating role in improving the work of the contracting trusts. This would make it possible to achieve first of all the provision of timely operational introduction of production capacities and facilities.

Further, S. V. Bashilov presented the basic tasks set before the collectives of the structural subdivisions of the USSR Gosstroy, Gosgrazhdanstroy, and the union republic gosstroys.

For purposes of improving the application of the potential in construction science and bringing it closer to production, it is necessary to review the order of planning research so that most of it is done at the direct order of the ministries, organizations and enterprises. Here the efforts of science should be concentrated primarily on solving the problems of increasing labor productivity and economy of material and other resources.

It was noted that the recomputation of estimate documentation in accordance with the new standards and prices is proceeding very slowly. This work is being performed most unsatisfactorily at the Minnefteprom [Ministry of the Petroleum Industry], USSR Mintsvetmet [Ministry of Ferrous Metallurgy], USSR Minneftekhimprom [Ministry of the Petroleum Refining and Petrochemical Industry], Minudobreniy [Ministry of Mineral Fertilizer Production], Mintyazhmash [Ministry of Heavy and Transport Machine Building], and certain other ministries, as well as in organizations which are subordinate to the Armenian SSR Council of Ministers. It is necessary to take immediate measures to correct this situation.

The successful implementation of the resolution by the CPSU Central Committee and the USSR Council of Ministers entitled "On Improving the Planning, Organization and Management of Capital Construction," said comrade Bashilov in conclusion, will make it possible to accelerate the construction of facilities on a current technological basis and thereby to increase the effectiveness of capital investments.

Others speaking at the meeting were USSR Gosstroy First Deputy Chairman A. D. Deminov, USSR Gosstroy Deputy Chairman S. L. Dvornikov, USSR Gosstroy Chief of the Section for Standard Planning and Organization of Project-Survey

Work V. M. Spiridonov, USSR Gosstroy First Deputy Chairman and Gosgrazhdanstroy Chairman I. N. Ponomarev, RSFSR Gosstroy Chairman S. N. Sabanov, USSR Gosstroy PI-2 Director V. M. Kosogov, Ukrproyektstal'konstruktsiya Institute Chief Engineer V. N. Gordeyev, BSSR Gosstroy Chairman V. G. Yevtukh, Kazakh Promstroyniiprojekt Director V. D. Grechanichenko, and UkSSR Gosstroy Chairman G. K. Zlobin.

The speakers stressed the great significance of the resolution adopted by the CPSU Central Committee and the USSR Council of Ministers and made assurances that the sector's collectives will put forth all their efforts for the successful implementation of the outlined measures for the radical improvement of matters in capital construction.

USSR Council of Ministers Administrative Affairs Section Chief G. P. Klimenko also spoke at the collegium meeting.

The USSR Gosstroy collegium adopted a decision directed at the further improvement of capital construction, acceleration of facilities introduction, and increased quality of work in light of the tasks presented in the resolution of the CPSU Central Committee and the USSR Council of Ministers.

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## CONSTRUCTION PLANNING AND ECONOMICS

### INSPECTION IN BASHKIRIA REVEALS FINANCING IRREGULARITIES

Moscow FINANSY SSSR in Russian No 4, Apr 84 pp 49-51

[Article by V. A. Kaledin, chief of the Monitoring and Auditing Department of the Bashkir Republican Office of USSR Stroybank: "Increase the Effectiveness of Monitoring and Auditing Work"]

[Text] In 1982 40 large production facilities went on line in Bashkiria. The state contracting organizations carried out construction and installation operations in an amount worth 1.2 billion rubles, or by 3 percent more than in 1981. Labor productivity in construction increased by 5 percent. The plan for profits, the reduction of production costs for construction and installation operations, and the increase of labor productivity was fulfilled. Sharing in the work of achieving these positive results was the Bashkir Office of Stroybank, including the monitoring and auditing apparatus.

There were, however, also substantial shortcomings in capital construction. The state plan for putting fixed capital assets into operation was under-filled, and certain production capacities were not ensured of going on line. The quality of the work performed, in many cases, remained at a low level. The necessary concentration of capital investments was not attained.

In 1983 the program for construction operations in this republic was a taut one. More than 2.2 billion rubles were allocated for the further development of the national economy. Carrying out such a program required from builders, installation workers, planners, and the finance banks great efforts, a high degree of organization, and an intelligent engineering approach for the purpose of effectively utilizing the state funds.

The monitoring and auditing apparatus of the Bashkir Office of Stroybank has taken measures to eliminate the shortcomings and financial violations which were discovered in construction. The following principle is observed: for every violation of state financial discipline--there must be a financial-credit penalty. When the responsible employees of this office go out to a site, they always check up to see whether the shortcomings discovered by the audit have been eliminated. That is an obligatory condition of any inspection trip. Year after year--over the course of 15 years--the plans for conducting audits by the branches of Stroybank and inspections by the departments of Gosbank have been fulfilled. There are 12 persons in the apparatus, and a monitoring and auditing department has been created.

The senior auditor-economist, R. A. Chuprakova, has been working within the Stroybank system for more than 20 years and for 15 years in auditing work. At least twice a year she takes part in audits as a member of the brigades organized by the Administration and the Russian Republican Office of Stroybank, in audits of the republican offices of the Union republics and oblasts of the RSFSR; she generously shares her large practical experience with the department's employees and helps the young specialists. R. A. Chuprakova is an outstanding employee of USSR Stroybank, a shockworker of communist labor.

Also toiling with complete devotion is the senior auditor, an engineer by profession, T. S. Merzlyakova; her service period in Stroybank exceeds 10 years. The total economic effect as a result of the audits conducted by her in 1981--1982 has been expressed as 4.2 million rubles (discovered over-payments, implemented suggestions with regard to reducing estimated costs and economizing on metal).

After the audits the positive work experience is noted in a special reference sheet. The Sterlitamak bank branch division has created favorable financial-credit conditions for a well-operating organization--the Sterlitamakstroy Trust. It has been awarded the Challenge Red Banner of the CPSU Central Committee, the USSR Council of Ministers, the AUCCTU, and the Komsomol Central Committee. With respect to the results of the audits, production conferences are held with the groups from the institutions inspected. The minutes of these conferences are attentively examined by the management of the Office, and specific measures are adopted.

We undertake joint inspections with the republican committee of people's control, the auditing apparatus of the republic's Ministry of Finance, the Bashkir Office of Gosbank, and we exchange experience. Thus, the inspections conducted by the republican committee of people's control and the inspectors of the Stroybank Office at the Sterlitamakstroy established the facts of the additional receipt of quarterly bonuses, although the plans for the construction and installation work on environmental-protection projects and purification structures were not fulfilled. The inspection results were examined twice at sessions of the republican committee of people's control, and deficits were entered in the monetary accounts of those persons at fault. The Office mandated the bank's institutions, in paying out bonuses to the management of the contracting organizations for construction of the purification structures, to demand from the Bashkir Hydro-Chemical Laboratory of the Kama Basin Administration a certificate concerning the implementation within the established deadlines of measures to prevent pollution of the reservoirs, as well as the plan volumes of construction and installation work with regard to the purification structures. This allowed us to eliminate the unjustified receipt of bonuses.

Participating actively in the audits have been highly skilled specialists and department chiefs. If in 1980 three department chiefs were involved, in 1981 there were nine, and in 1982--10 of the Office's specialists. With the repeat inspection of the Salavat Petrochemical Combine, for example, there was an additional reduction of the estimated construction cost by 25.9 million rubles. This inspection involved an experienced specialist--the deputy chief of the Sterlitemak Department for Engineering Operations, M. M. Zamilev.

The monitoring and auditing department regularly checks up on the implementation of the directives of USSR Stroybank with regard to limiting the construction of administrative, sports, auditoriums, and other public-type projects. Capital investments, material and technical resources and capacities of the construction organizations are concentrated on the construction of production facilities having top-priority importance for the national economy, as well as apartment houses, educational and health-care facilities. In 1980 an audit by the Meleuzovsk Division of the bank established the fact that the Meleuzkhimstroy Trust, instead of a building for theoretical studies, was erecting buildings for locating the trust's apparatus. After the audit construction was halted. The construction of sports complexes in the cities of Beloretsk and Uchaly was prevented. Audits conducted in 1981--1982, however, have shown that in a number of branches the requirement about limiting the construction of administrative as well as stadium-type buildings and structures is not being observed.

Acts of the audits and proposals by the auditing department are discussed by the Office management together with the chiefs of the sectorial departments, and decisions are adopted. Thus, the results of the audit of the newly created Sibaysk Division of Stroybank were examined by the Office chief at the site. Production conferences were held with the group, with representatives of the customers for the construction projects, with the management of the contracting organizations, as well as with the CPSU gorkom and gorsovet. Skilled specialists have been sent to render practical aid for financing geological prospecting operations and to extend credit to contracting organizations. A number of organization problems have been solved with regard to improving the division's activity. The materials of the audits with respect to each year's results are analyzed and summarized; survey letters are sent out in which are set forth the negative facts revealed in the process of auditing the credit-economic, engineering-monitoring, and accounting-operational work along with a demand to improve it.

The proposal concerning intensifying the monitoring controls over the expenditure of wage funds and monies for awarding bonuses in construction has been examined in the Office council, and the following decision was taken: to draw up a plan for rendering practical assistance to branches with regard to checking up on the expenditure of monies issued for wages and bonuses, also to conduct seminar sessions with economists from the bank's divisions. Other measures have likewise been provided for. If the over-expenditure of wage funds for the republic amounted to 6.5 million rubles in 1981, it declined to 3.9 million rubles in 1982.

Frequently the engineer-auditors, by means of repeat monitoring measurements at the construction projects, establish cases of over-statement. In 1981 such over-statements were established in the amount of 120,000 rubles, and over-payments for acts of fulfilled operations amounted to 1.2 million rubles. Repeated check-ups on the quality of planning-and-estimate documentation allowed the auditors to discover an additional possibility for reducing construction costs by 4.5 million rubles and to bring about metal savings of 9 tons. All the over-statements and over-payments were contained within the established procedure, the proposals for reducing the construction costs have been implemented, and a genuine economic effect has been obtained.

The Board of USSR Stroybank is constantly directing the bank's economists to work on strengthening payments discipline, wherein a large role must be played by a differentiated approach to the organization of credit relations. It is necessary to apply banking penalties to those construction organizations which operate poorly. Unfortunately, certain of the bank's institutions rarely apply them, and in such cases the auditors have to correct this situation. As a result of audits conducted in 1982, five organizations were put onto a special schedule of crediting, two of these--for disrupting their start-up program, and three--for mismanagement, while one was removed from all types of crediting for carrying on construction outside of the plan. For erecting projects which were not accepted for financing, nine organizations were excluded from crediting on volumes of work amounting to a total of 644,000 rubles, for mismanagement another series of organizations was deprived of certain types of credits, and with the Office's permission a special credit schedule was set up for Road-Building Administration No 2 of the Bashkiravtodor Trust. After improving its financial activity in 1983, its rights to the general schedule of crediting were restored.

A great deal of attention has been accorded to auditing the work of bookkeeping in those institutions of Stroybank which are located on the territory of Bashkiria. In the divisions they are constantly conducting measures aimed at strengthening intra-banking controls, further perfecting the organization of accounting-operational work. The groups are rendered practical assistance. Positive experience is disseminated to all the institutions of the bank.

For successfully fulfilling the indicators of the All-Union Revue-Contest, for the best performance of accounting-operational work, the Ordzhonikidzevsk Division of the bank (chief, M. N. Kashirina, chief bookkeeper, R. D. Kitova) has been awarded a prize place and a Certificate of Honor by the Board of USSR Stroybank and the Central Committee of the Trade Union of State Institutions. The bookkeeping accounts have always been prepared at a high level of quality and presented to the Office on time. Such a high level of work has been achieved thanks to a good organization of follow-up inspections, the lack of personnel turnover, and an attentive attitude toward the needs of the specialists. Most of the employees in the bookkeeping apparatus are outstanding workers of USSR Stroybank and shockworkers of communist labor. The experience of this department is related in special letters addressed to the branches subordinate to the Office.

The multi-sectorial economy of this republic conditions the extensiveness of the program of audits. We are seeking more effective methods for improving the activities of the institutions of the Bashkir Republic's Stroybank.

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## CONSTRUCTION PLANNING AND ECONOMICS

### NEW SYSTEM OF FINANCING UNFINISHED CONSTRUCTION EXAMINED

Moscow FINANSY SSSR in Russian No 4, Apr 84 pp 51-55

[Article by M. A. Amstibovitskiy, chief of the Planning and Economics Administration of the KaSSR Ministry of Construction of Heavy Industry Enterprises and Honored Economist of the Republic: "Improve the System of Calculations for Construction Output and the Crediting of Outlays with regard to Unfinished Production"]

[Text] Of great importance among measures for further perfecting the economic mechanism is improvement in the use of the financial-credit levers in construction.

Experience has shown that the system of calculations for the stages of construction, as a rule, have not been linked to the technological sequence of construction production. Under such a system the right to calculate accounts was granted on condition that the construction and installation operations on a project had been finished, independently of whether or not it could turn out products or render services. This led to a situation whereby certain construction organizations were fulfilling their plans for product sales and profits by means of increasing the work volumes on projects in the turnover stages to the detriment of work on start-up projects; they attempted to carry out the less labor-intensive operations without ensuring their completion in the full amount and within the plan deadlines.

In 1980 all the construction organizations of the territorial main administration for construction in the Chimkent (Glavyugstroy), as well as a large group of organizations of Glavpavlodarstroy and Glavkustanaystroy were converted by way of experiment to a system of calculations between customers and contractors for enterprises on which construction is completely finished and which have been turned over for operation, start-up complexes, phases and facilities which are ready to turn out products and render services in accordance with the estimated cost of commercial construction output. Since 1 January 1981 all contract organizations of the KaSSR Ministry of Construction of Heavy Industry Enterprises have fully switched over to such a system of calculations.

Introduction of the new system of calculations for construction output has created the conditions for making the transition to planning and evaluating the activities of the contract organizations by the indicator of the commercial construction output constituting the volume of construction and

installation work on construction enterprises being completed, start-up complexes, stages and individual projects for production and non-production purposes, ready to turn out products or render services. The new indicator possesses the advantage, as compared with the indicator previously established, of defining the volume of work done on projects being turned over and on stages. Above all, it increases the connection between the physical indicator of the plan (the putting into operation of capacities and facilities) and the cost indicator of the end product of construction; it creates a lasting connection between the introduction of capacities and facilities and the entire system of planning and providing economic incentives for the contract organizations. In making the transition to the new indicator, the customer must determine and agree with the contract organization on the composition and the estimated operational cost for each start-up complex. This makes it possible to discover the actual volumes of work, to establish the dimensions of the inventory of unfinished projects for the following year, and to make more precise the size of the allocations.

Conversion to calculations for commercial construction output has created the necessary prerequisites for introducing a more effective system of economic incentives for construction production. The procedure for forming profits which used to be in operation did not provide economic motivation for the contract organizations to introduce facilities and production capacities in the fastest possible manner. As a rule, their profit was formed on the basis of work turned over each month, regardless of whether or not the facilities were turned over for operation, i.e., on the genuine sale of a finished construction product.

Under such a system the profit was planned and accounted for only in accordance with the work of a given period, and this was conditioned by the procedure whereby customers paid for projects. Profit formation based on intermittent payments did not economically motivate the contract organizations to speed up construction on projects and start-up complexes and put them into operation. Nor was the situation improved during the transition to planning the profit by proceeding from the volumes of construction and installation work on projects and stages to be completed during the plan year and subject to be turned over to the customer at their estimated cost. Under these conditions the construction organizations had the opportunity to fulfill and over-fulfill their assignments as to the profits and volumes of work by stages and, at the same time, allow lags with regard to start-up projects. It was frequently the case, when the plan for putting facilities into operation was not fulfilled, the assignments with regard to profits were over-fulfilled, and an above-plan profit was formed as the result of formulating work in stages without ensuring the technological sequence in building the facility.

Conversion to the new system of calculations has allowed us to eliminate discrepancies in the planning of profits. The efficacy of material incentives has been increased, and a direct dependence has been established between the profits and material incentives of employees of the contract organizations on end results.

Principled changes have also been introduced into the procedure for crediting outlays for unfinished construction production. Temporary working capital, obtained by the contract organizations from customers in the form of advances to cover expenditures for unfinished production of construction and installation operations, used to be transformed into banking credit. This sharply altered the structure of the sources of working capital of the contract organizations for unfinished construction production. Under the new conditions the principal source for covering outlays on unfinished production for the KaSSR Ministry of Construction of Heavy Industry Enterprises has become banking credits.

|                             | Proportion, in %    |                     |
|-----------------------------|---------------------|---------------------|
|                             | As of 1 Jan<br>1981 | As of 1 Jan<br>1983 |
| Total                       | 100                 | 100                 |
| Including:                  |                     |                     |
| their own operating capital | 10.6                | 12.2                |
| advances from customers     | 46.3                | ---                 |
| credits from Stroybank      | 27.5                | 74.7                |
| miscellaneous sources       | 15.6                | 13.1                |

The change in the procedure for calculating and crediting outlays has led to an increase in the unfinished construction production on the balance-sheets of the contract organizations. However, the term indebtedness on loans has significantly decreased. This is evident from the following data. The term indebtedness to the bank on loans and accounts of suppliers at the beginning of each year amounted to the following: in 1980--35.6 million rubles, in 1981--24.6 million rubles, in 1982--26 million rubles, and in 1985--11.2 million rubles.

To the changes in principle introduced into the organization of crediting outlays on unfinished production we must relegate the fact that, upon the expiration of the plan deadline for turning over enterprises, start-up complexes, stages, and facilities, crediting is continued with the levying of increased interest rates for its use (4 percent instead of 0.5 percent to the plan deadline for turnover). A differentiated percentage rate for credit constitutes a supplementary payment for production funds extended to all unfinished construction production, and it is an unavoidable economic penalty for the appearance of its above-normative amounts as a result of not turning over facilities on schedule.

Under the conditions of calculating accounts for commercial construction output and the credit method of forming sources for covering outlays for unfinished production, its volume has been decreasing. In 1982 the organizations under the jurisdiction of the KaSSR Ministry of Construction of Heavy Industry

Enterprises turned over to customers commercial construction production in amounts worth 1014 million rubles, or 26 percent more than in the preceding year. If we take into account the fact that during the year the volume of contract operations carried out was worth 887 million rubles, then the amount of unfinished construction was reduced by 127 million rubles. The quantity of uncompleted construction projects declined by 14 percent. As of 1 January 1983, the volume of unfinished production on projects being carried out by their own efforts did not exceed the established norm.

The number of projects with expired deadlines for turnovers to customers was reduced from 16.1 percent as of 1 January 1980 to 12 percent as of 1 January 1983. If in 1981 the fulfillment of the plan for construction and installation work on production-type facilities put into operation during the reporting year amounted to 85.7 percent, in 1982 this figure had reached 94.9 percent.

The volume of unfinished production on projects being carried out by their own efforts was reduced in Glavyugstroy, as compared with the norm, by 2.4 percent in 1981 and by 3.7 percent in 1982. The number of projects in a state of unfinished construction declined during the two years from 330 to 280. Concentration of material and labor resources ensured a more even fulfillment during the course of a year of the plan for putting facilities into operation. The extended deadlines for continuing construction have been substantially reduced.

During the three years of operating under the new conditions the construction organizations of Glavyugstroy have successfully coped with the plans for turning over residential space, schools, children's institutions, hospitals, clubs, and other socio-cultural types of facilities. In 1982 the output per worker engaged in construction and installation projects and in auxiliary production work increased by 3.4 percent in comparison with 1980. There was improvement in the indicators for the expenditure of wage funds. The plan for profits was fulfilled. However, Glavyugstroy fulfilled its plan for commercial construction output only by 94 percent for the years 1981--1982. This is to be explained by the fact that in 1982, because of the disruption in the delivery of engineering equipment by the customers, the Chinkent Pasta-Products Factory and production capacities at the Chinkent Chemical and Pharmaceutical Plant imeni Dzerzhinskiy were not put into operation.

In that same year the Chinkentpromstroy Trust fulfilled the plan for construction and installation operations by 105.4 percent. Moreover, on projects supposed to be put into operation during the reporting year the plan was fulfilled by 110.2 percent. Concentration of material and technical resources on facilities to be introduced made it possible for the trust to curtail the volume of unfinished production by 5 percent, as compared to the norm, and ensure the fulfillment of the basic technical and economic indicators.

Introduction of a complex of measures for improving the economic mechanism also exerted a positive influence on increasing production efficiency in the construction organizations of the territorial main administration for construction in Kustanay Oblast (Glavkustanaystroy). These measure allowed us to concentrate the attention of the groups of contract organizations on performing the basic task--turning over facilities and production capacities for operation on

schedule. In 1982 all the facilities and production capacities provided for by the plan were put into operation. The plan for putting housing, children's pre-school institutions, schools, and hospitals was fulfilled.

In 1982 the Kustanaytyazhstroy Trust fulfilled the plan for commercial construction production by 105.1 percent. All facilities of the production type were turned over to the customers within the established time periods. The plan for putting apartment houses, schools, and children's pre-school institutions was successfully carried out. Output per worker employed on construction and installation projects and auxiliary production lines increased by 10 percent over 1980. The plan for profits was over-fulfilled. The new economic mechanism exerted a favorable influence on increasing production efficiency also in the construction organizations of the territorial main administration for construction in Pavlodar Oblast (Glavpavlodarstroy).

Experience has shown that under the new conditions there has been a change in the attitude of the contract organizations toward the formulation of plans. In working them out, measures have been taken to reduce the number of projects under construction; in the first place, provisions have been made to finish up construction on carry-over projects and put the production capacities into operation at them. In necessary cases proposals have been made to exclude newly begun construction projects from the draft plan of capital construction and from the program of contract operations if the necessary conditions are not created with regard to the start-up and other extremely important construction projects for the unconditional completion of the outlined tasks for putting capacities and facilities into operation.

In the process of preparing and drawing up plans a great deal of attention is paid to determining the time periods for the beginning and end of project operations, to establishing the optimal correlations between the calculated volume of contract work and the commercial plan, as well as the amount of work at carry-over and start-up construction projects. Particular attention is accorded to the establishment by customers of the volumes of work and funds for the construction of communal structures and facilities for everyday purposes.

However, the great advantages of the new system are still far from fully being utilized. The anticipated positive influence of the new calculations-and-credit mechanism on the activity of the contract construction-and-installation organizations under the KaSSR Ministry of Construction of Heavy Industry Enterprises in achieving end results of their work has not occurred. In 1982 the organizations under this ministry did not successfully cope with the plans for putting into operation production capacities and facilities with regard to commercial construction production. As a result, many projects with expired plan deadlines for turnover remained within the body of unfinished production. Most of the ministry's organizations do not carry out their assigned tasks with regard to the growth of labor productivity; they allow over-expenditures of the wage fund and do not manage to cope with the plan assignments with regard to reducing the production costs of work.

Of course, increasing production efficiency and work quality depends on many factors. However, the leading role here is played by the new economic mechanism. Nevertheless, as experience has shown, many obstacles have arisen on the

path to introducing the new system of calculations for construction production and crediting of outlays for unfinished production; these obstacles are caused by defects in the legal inter-relationships among the participants in construction. Very frequently the customers are guilty of failing to make either an on-schedule or a full installment payment to the bank for crediting unfinished construction. Because of non-fulfillment by a customer of the plan for making a payment from their own funds to a special account from May through July 1982 credit was not granted for the Yermakovskiy Ferroalloy Plant imeni 23rd CPSU Congress. The issuance of credit was halted for failing to finish construction production re the Aktyubinsk sel'mash Plant, the Aktyubinsk Factory for Preliminary Wool Processing, the Tselinograd Spinning-Thread Factory, and a number of other construction projects. In 1983 it was necessary to extend the financing until 15 February. Then the deadline was extended until 15 March. Nevertheless, many customer-enterprises did not manage to cope with this task.

Inasmuch as a contract organization must carry out its plan tasks and cannot anticipate the formation of financing from a customer, it seems necessary to credit the plan outlays for unfinished construction production constantly within the limits of the amounts provided for by the estimate. For this purpose the contract organizations can be granted credit by means of the over-all limits of the bank, without waiting for the customers' funds to accumulate.

Also requiring solution is the problem of crediting carry-over projects for which, because of limitations on funds, capital investments have not been allocated for a continuation of construction. There are now quite a few projects which the customers have excluded from the plan, despite the fact that their construction has begun. The bank has ceased to issue credit for such projects and is holding up the loans which have been granted. As a result, in the contract organizations uncredited outlays are beginning to show up re unfinished production with a lack of plan sources to cover them. We consider it inequitable to make a contract organization dependent on deficits in the planning of capital investments for a customer and, on this basis, to deprive it of credit.

Recently observed in the construction process has been an exaggeration of the estimated cost of many enterprises and projects. In a number of cases this has been caused by the fact that, during the period of preparing for the start-up there begin to appear a large number of supply authorizations for additional work. Thus, at the Chinkent Fosfor Production Association for introducing capacities of sodium tripolyphosphate 2,867,000 rubles were allocated. The actual expenditures amounted to 4,084,000 rubles. Thus, the cost of operations was incorrectly pegged at 1,217,000 rubles.

Operations carried out by supply authorizations are paid for by the customers within the bounds of the total limit. However, the re-approval of the composite estimate, as a rule, is delayed. This occurs already after the facility has been put into operation, when the customer is no longer interested in re-approving the estimate. As a result, the contract organizations experience great financial difficulties.

We must also re-examine the practice of applying increased interest rates for credits. At present the institutions of USSR Srobybank, in delaying the

putting of facilities into operation, impose an increased interest rate on the general contracting organizations (4 percent per annum), proceeding from the initially established deadline for completing the construction in accordance with the title list. But in many instances the original terms prove to be unrealistic, for which the customers, planning organizations, and suppliers of equipment and materials are to blame. Analysis of the work of the construction organizations under the KaSSR Ministry of Construction of Heavy Enterprises shows that many violations of the plan terms for putting facilities and production capacities into operation occur because of the delivery by customers of engineering equipment without taking into account the time necessary for its installation.

Because of the non-observance by the customers of the agreed-upon conditions re the delivery of engineering equipment, the deadlines for putting the projects into operation are being made more exact every year. Thus, the deadline for putting the Chinkent Pasta-Products Factory into operation was set for the 4th quarter of 1982. Because of the customer's failure to deliver engineering equipment, a new deadline for this introduction was set for September 1983. With the imposition of higher interest rates by the bank for credit, however, the new deadlines are not taken into account, and, if they are not met, the credit mechanism operates automatically, regardless of the degree of guilt of the contract organization.

It seems feasible to impose the increased interest rates on credits for the outlays spent on the unfinished production of construction and installation work, based on the total credit received by the contract organizations after the deadline for turning over the finished construction projects, as provided in the plan for the current year, rather than from the initially established deadline according to the title list.

Great harm is inflicted on matters by the practice of unevenly putting projects and production facilities into operation. According to the plan for 1981, the republic's Ministry of Construction of Heavy Industry Enterprises was supposed to put into operation during the first quarter 3 percent, during the second quarter--13 percent, during the third quarter--24 percent, and during the fourth quarter--60 percent of the total number of major production capacities and projects. Uneven planning affected the plan for producing commercial construction output: for the second six months it amounted to 83 percent of the one-year plan, including 63 percent for the fourth quarter. In 1982 80 percent of the commercial construction production was planned for the second six months, including 59 percent for the fourth quarter. Nor has there been any noticeable improvement in 1983.

Uneven planning for the introduction into operation of facilities and production capacities has created exceptional difficulties in the question of providing manpower for the contract organizations. Many construction projects are frantic because of a shortage of workers--finishing workers and plumbers, electricians, and installers. Crash work leads to an increase in production expenditures. All this lowers the quality of construction and has a negative effect on labor productivity and profits.

According to the accounting data of the KaSSR Ministry of Construction of Heavy Industry Enterprises for the years 1972--1982 the level of production costs for operations during the first quarter was higher than during the second and third quarters by 8--12 percent. This was brought about by losses on the part of the construction-and-installation organizations due to a lack of smoothness in construction production. These are to be explained by the low labor productivity of workers, who do not have a prepared operational front over the extent of the first half-year, by the under-utilization of construction equipment, by non-productive outlays in connection with the low quality of the work, by an increase in the length of time required for construction, and by a rise in the level of standard-constant expenditures, as well as by a growth in unfinished construction.

Practical experience has demonstrated that the deadlines for introducing production capacities and facilities in most cases are affected by the deadlines for delivering the basic engineering equipment. This has to be taken into consideration in formulating the orders for the delivery of equipment to the ministries, customers, and suppliers. Then it will be possible to achieve smoothness in putting capacities and facilities into operation during the course of a year. At the same time it is necessary to improve the production organization of construction-and-installation work, to introduce scientific methods of labor organization, eliminating losses of work time, to raise the level of labor mechanization, to make better use of construction machinery and transport means.

And there is yet another problem. In recent times the financial-credit system has paid a great deal of attention to increasing the effectiveness of capital construction by assisting with credit the carrying out of plans for putting into operation enterprises, start-up complexes, and facilities, by applying limiting measures to those contract organizations which fail to cope with their assigned tasks.

The economic penalties applied by USSR Stroybank have yielded positive results. But it is impossible to agree with such a penalty when the granting of credit in the case of unfinished production is decreased by the total of the non-fulfillment of the plan on start-up projects (when it is over-fulfilled on non-start-up projects). In the bank's opinion, the intent of this penalty lies in providing incentives for the construction organizations to carry out work on start-up projects. The contract organization itself is motivated to turn over construction output on schedule, since the formation of profit and the formation of the economic-incentive funds depend on this. Experience has shown that very frequently construction organizations have been compelled to temporarily halt work on start-up projects because customers or closely allied organizations are to blame. In order not to remain idle, they continue working on carry-over projects. That is why, in our opinion, reduction of the credit issued because of unfinished production in the total amount of plan under-fulfillment of the plan on start-up projects does not provide incentives for conducting work on start-up projects; it worsens the financial status of the contract organizations, undermining their ability to make payments.

In order to further improve the calculation-credit mechanism, it is important to ensure the equal responsibility of all the participants in construction for

putting production capacities and projects into operation on schedule. It would be incorrect, however, to assert that the financial difficulties of contract organizations are caused solely by the payment of interest for the use of credit. The fact of the matter is that there are a great many shortcomings in their financial-economic activities. The contract organizations under the jurisdiction of the KaSSR Ministry of Construction of Heavy Industry Enterprises have large reserves for ensuring the on-schedule turnover of capacities and projects for operation.

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## CONSTRUCTION PLANNING AND ECONOMICS

### STROYBANK OPERATIONS COMPUTERIZED

Moscow FINANSY SSSR in Russian No 4, Apr 84 pp 55-56

[Article by S. I. Mayevskiy, chief of the Computer Center, Lithuanian Republican Office of USSR Stroybank: "Automated Processing and Analysis of the Indicators of Title Lists of Construction Projects"]

[Text] Of great importance for carrying out the tasks confronting the republican Office are the principle of administering it as a system and the reciprocal actions with various links of administering the national economy (Gosplan, Ministry of Finance, Gosbank, Gosstnab, etc.). The problem of administering the republican offices and increasing the influence of the finance-crediting mechanism on the effectiveness of capital construction is being solved by the creation or improvement of automated control systems (ASU) by the republican offices of USSR Stroybank. The ASU is being created to solve administrative problems on the basis of up-to-date methods, processing and analysis of banking information.

In order to concentrate capital investments and material resources in the most important construction projects, to limit the number of projects under construction at any one time, and to shorten the construction time periods, we must step up the bank's control work already in the initial stage of the cycle. Important phases in the bank's work are the review of the draft plan and the official registration of the construction financing. Both processes are very responsible, since it is precisely during this period that the most effective influence can be exerted on reducing the number of projects under construction at any one time, on the allocation of funds for completing unfinished construction, on providing construction with the necessary monetary and material resources.

The process of officially registering the financing requires very intensive work on the part of practically all the principal departments of this office--a large amount of data is examined and analyzed within a limited time period. And the most important work in this process is analyzing the indicators of the title lists of the construction projects. The RVTs [Republican Computer Center] of the Lithuanian Republican Office of USSR Stroybank has developed a complex of assignments for the automated processing and analysis of the title list indicators. The indicators are analyzed individually with regard to construction projects and facilities not included within construction projects, the principal sectors, the construction projects under Union and republican jurisdiction, as well as the contracting ministries. This allows us to determine

the possibility of concentrating capital investments for each ministry, department, ispolkom, and region as a whole (republic, oblast) both with regard to sectors as well as ministries and departments under different administrations. Such data is necessary for adopting decisions on reducing the number of newly begun construction projects and allocating funds in short supply in order to complete unfinished construction.

In order to solve this problem, use is made of information coming into the departments of this office's sectors, as well as certain supplementary data. The basic documents to be included are the title of the newly begun construction project with the Document Code 60364 and the title of the carry-over construction projects with Document Codes 60356 and 63452. Use is also made of normative-reference information--the classifier of the construction projects, the code dictionaries, and data from the so-called "supplementary table." It indicates the following: for the newly begun construction projects--the length of construction time by monthly norms, the necessary amount of capital investments by norms, including that for construction-and-installation work by norms for the first year of construction, as well as the presence of plan-estimate documentation; for carry-over construction projects (if the indicators have changes as compared to the initial title list)--an altered time period for the length of the construction, the presence of plan-estimate documentation, and the amount of production losses in connection with the postponement of the deadline for finishing construction. As a result of processing the derived information, 20 analytical output tables have been formed.

A complex of problems is being solved as the titles come in. The output tables are being given out to the ministries. Results tables for the office are being formulated after all the titles have come in. In the process of processing the information of the titles, analyses are made of the indicators with regard to construction projects of production and non-production types. Moreover, among the production type projects a distinction is made between those which are being built on a compensation basis with the participation of the CEMA member countries, based on a set of imported equipment, and those which have a particular importance for the national economy. In the results tables, in accordance with the analysis of the newly begun construction projects and facilities, construction projects are grouped by sectors; within the production sectors the construction projects with an estimated cost of below 3 million rubles are singled out. If in a sector not enough capital investments have been allocated to carry-over and start-up projects, then those which are newly begun, with the exception of those started up during the given year, are entered onto a special tabular graph as not subject to financing or inclusion in the plan. Likewise included on the same graph are construction projects for which capital investments have been allocated not by norms, nor have they been provided with plan-estimate documentation. The concentration of capital investments is analyzed with respect to sectors, ministries, and departments of various jurisdiction, as well as by ispolkoms.

Information concerning the reproductive structure of production-type capital investments is issued to the sectorial departments of the ministries and departments, and, in composite form--to the planning and economic administration and to the office management. Tables characterizing the general-contracting organizations are formulated for production-type and non-production-type

construction projects of the trusts of the ministry-contractors. They single out those projects for which the deadlines for finishing construction have expired, as well as those for which the deadline is still not close. In connection with the introduction into the title of the indicator of "commercial-construction output," programs have been worked out which take this into account in the process of analyzing the data. There is the possibility of expanding such an analysis. The solution is being produced on computer complexes of the M5000, M5100, and SM1600 types. With their help we can analyze the draft plan of capital construction for the next few years.

The practical experience of machine data processing has shown that the original document must be completely and accurately filled out. Inasmuch as, in the given case, it is filled out not in the Stroybank Office but rather in the ministry and department, the specialists of the Office's sectorial departments must meticulously check out its quality. Certain ministries and departments sometimes present a title in an unestablished form, while sometimes the lists, in which certain indicators or amounts of capital investments are lacking, are expressed in some titles (or lists) in millions of rubles, and in others--in thousands, a factor which complicates the solution of the problem. When the titles come into the Office, all the inaccuracies in them can be eliminated. The title list of a construction project has still not been fully adapted to the requirements of machine processing; hence it requires further improvement. In order to alleviate the work of Stroybank, USSR Gosplan should, in our view, approve a standardized form of title, with all the necessary indicators.

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## CONSTRUCTION PLANNING AND ECONOMICS

### TIGHTER BANK CONTROL OVER CONSTRUCTION ORGANIZATIONS ADVOCATED

Moscow FINANSY SSSR in Russian No 4, Apr 84 pp 47-49

[Article by L. G. Raspopova, administrator of Stroybank USSR Khabarovsk Kray office; P. V. Perekrestenko, senior teacher of Khabarovsk Institute of People's Economy; and Yu. V. Rozhkov, prorektor of the institute and candidate of economic sciences: "To Strengthen Bank Control Over the Economic-Financial Activity of the Construction-Assembly Organizations"]

[Text] One of the basic directions on which the Stroybank USSR Khabarovsk Kray office focuses its attention is strengthening control over the economic-financial activity of primarily those organizations that do not fulfill the plan assignments. In particular, solution to this problem lies in the integrated as well as target-oriented audits dealing with individual aspects of the construction-assembly organizations' activity in order to uncover and implement the reserves of decreased expenditures for materials, wages, and the utilization of machines and mechanisms. For example, in 1982, this office carried out integrated audits at 17 percent of the organizations.

Special attention is addressed to perfecting control over construction materials utilization and fulfilling the measures on economic utilization of material resources. Together with this, in those construction trusts where the original audits uncovered serious shortcomings in the storage and utilization of physical assets, the office carried out follow-up audits.

Parallel to auditing construction organizations, the office analyzes the activity of the plants-suppliers of construction structures and parts which had often disrupted supply schedules and did not fulfill the plans regarding the quality and assortment of supplied products.

The bank addresses a great deal of attention to strengthening the economizing regime in construction. For instance, the Ministry of Construction in the Far East and Baykal Area determined the 1981-1982 task for Glavdal'sstroy that deals with investing the above-norm and unutilized physical assets worth 2.5 million rubles, into economic circulation. The association obliged the trusts to work out and implement specific measures on fulfilling the posited tasks. However, the bank's audits showed that the association did not carry out its control in the course of one year. Even though the measures dealing with the economic and rational utilization of material resources were worked out in all trusts

of Glavdal'sstroy, not all of them were realized, due to the absence of control. For example, Stroytrust No 508 fulfilled only one-half of the 35 plan items. In order to eliminate the uncovered shortcomings, financial-credit measures are applied to the organizations that regularly violate the regime of economizing, do not provide for safe-keeping, permit sales on the side and do not take measures for the timely realization of unnecessary materials. At a number of organizations, they stopped providing credit to cover suppliers' bills for material assets, limited the disbursement of loans or collected in full payments on loans for the above-norm material reserves.

For example, at the 23 Glavdal'sstroy contracting organizations where they permitted violations of the economy regime for construction materials and did not take measures for the timely realization of unnecessary materials, the bank stopped providing credit to cover their suppliers' bills for material assets; the above-norm reserves loans in the sum of 203,200 rubles to 16 organizations were restricted because of their unsatisfactory storing of physical assets, and accumulation of unnecessary and excessive material assets in warehouses.

Also, the office takes measures to influence the contracting organizations which permit material and labor resources to be side-tracked from construction approaching completion. For example, during the first half year of 1983, the disbursement of account-payment credits to 20 contracting organizations was stopped, a special crediting regime to 4 contracting organizations was assigned and a fine of 15,000 rubles from 1 contracting organization was collected via Gosarbitrazh [State Arbitration Board]; in accordance with the Stroybank USSR directives, at 19 organizations, disbursing of loans to cover their expenditures for uncompleted productions was restricted.

The significance of this work is determined by the fact that materials over-expenditure is one of the main causes for an increase in SMR [Construction Assembly Work] cost. In 1982 alone, such over-expenditure reached 3.4 million rubles or 32 percent of the uncovered excess expenditures. The measures undertaken by the bank assisted in enforcing the economy regime in the utilization of material resources at the construction organizations. However, this problem has not been fully solved.

Serious attention is addressed to enforcing control over the fulfillment of the start-up construction program. The office begins such work as early as during the stage of formation of the capital construction and the contracting work plans. Previous to 1981, the activity of the office during this stage was limited to analyzing plans directly at customer and contracting organizations, making conclusions, onesided to some extent, and making suggestions; however, since 1982, the bank also participates in the examination of plans together with the plan commission at the krayispolkom. On the basis of examining Glavdal'sstroy's work plan in 1983, the office proposed to exclude from the plan 95 new industrial purpose constructions with their SMR cost of 31.9 million rubles and to include in the plan 25 new non-industrial purpose constructions with an SMR cost of 11.4 million rubles.

As a result of the audits carried out by the bank, it was determined that in the majority of trusts, work programs are planned without consideration of

their real possibilities. The main increase in work volume is planned at the expense of increasing the number of workers by 5,400 which is hardly justified.

Activity of every contracting organization is controlled and analyzed by the office and its branches by way of systematic accumulation and month-by-month analysis of the main technical-economic indicators. For this purpose, in daily economic work, the main composite indicators of the organization's activities are utilized. Every month an analysis of work results at construction organizations is carried out, both in the entire kray and in the bank branches. The results of this analysis are taken into consideration when they apply financial-credit measures to contracting organizations and study the effect of sanctions.

In 1982, in the Khabarovsk Kray Stroybank office, methodological assistance was provided both through travelling to its branches in connection with solving specific problems associated with contracting organizations' credit, and through travelling directly to the contracting organizations which were served by its branches. The most qualified workers of the kray office's contracting department participated in comprehensive revisions of the branches as the contingent of the office revising brigades; also, they carried out the subject-oriented branch audits dealing with the questions of organization of economic work. Thus, they audited the Stroybank offices of the Jewish Autonomous Oblast and the city of Khabarovsk administration in connection with organizing the audits dealing with the state plan and finance discipline in construction; at the Industrial and Kirov departments in the city of Khabarovsk, they carried out the economic work audits dealing with contracting organizations crediting, and, at the city administration, a similar audit was carried out twice.

The results of the audits carried out at the branches were discussed at the expanded technical councils subordinate to the administrator and at the office party bureau sessions, where specific decisions were made regarding the discussed questions. Measures were worked out to eliminate the shortcomings uncovered by the audits and the office workers established control over their fulfillment.

In the course of 1982, regular target-oriented meetings with the leaders of contracting organizations were held concerning the questions of payments to the bank and their suppliers, the organizations' accounts dealing with the reasons for payment defaults were heard, the situation of the return funds proper was considered, and the make-up of customer debts for the fulfilled work was analyzed.

The kray office of the bank established special control over the question dealing with the causes of forming and ways for liquidating the uncredited expenditures for uncompleted SMR production. As a result of work that they carried out, the value of uncredited expenditures in the kray decreased by 11.2 million rubles and, as of 1 January 1982, it constituted 8.9 million rubles.

An important direction of the bank work is the control and analysis of fulfillment of assignments in regard to labor productivity growth and the wage

fund utilization in construction. This aspect of control has an important significance, since almost one-half of construction organizations do not fulfill the assignments dealing with labor productivity growth, and, in a number of organizations, they still plan the rate of wage growth higher than the rate of output growth.

In 1982, the kray bank institutions analyzed the labor plans in all primary organizations which allowed them to uncover violations in 65 out of 240 organizations. According to the bank's demands, 35 organizations implemented changes in their labor plans. In 1982, this allowed them to prevent the wage fund over-expenditure in the sum of 651,000 rubles. In 189 organizations, they checked the existence and accuracy of the developed organizing-technical measures, which provide for labor productivity growth. Together with this, they uncovered that in 146 organizations such plans did not exist or were developed in a formal manner. The bank's demand concerning working out and final developing of such plans was fulfilled in 57.5 percent of the organizations.

In 1982, in 47 organizations, in connection with nonfulfillment of the posited tasks regarding labor productivity growth and, due to the fact that wage fund over-expenditures were allowed to happen, they implemented financial-credit sanctions, which, however, did not always have a positive result. In basic production, the output per one worker constituted 99.6 percent of the planned level; taking into account payments from the material incentive fund, the overpayment monthly average wages constituted 1.2 points compared to the output.

In the first quarter of 1983, with the participation of its branch representatives, the kray office held a conference dedicated to the questions of improving the audits dealing with the organizing-technical measures for increasing labor productivity growth, analyzing labor plans, and compiling the corresponding accounting forms. Eliminating shortcomings in economic-financial planning of trusts and contracting organizations activity, achieving, first of all, a balanced program of work and production capacities, accurate accounting for the factors which influence the cost and the correct planning of the contracting organizations' financial results, as well as taking measures for decreasing and eliminating unproductive expenditures at the expense of improving construction production organizing, observing the rules for construction material, products and structures storage, and increasing the quality of fulfilled work will allow contracting construction organizations to improve the final results of their economic-financial activity.

Undoubtedly, perfecting bank control and solving the problems associated with improving the situation in construction, together with the party and soviet organs and organs of people's control will strengthen its effectiveness.

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## CONSTRUCTION PLANNING AND ECONOMICS

### METHODS FOR EVALUATING UNFINISHED CONSTRUCTION

Moscow VESTNIK STATISTIKI in Russian No 5, May 84, pp 13-23

[Article by I. Perepechin, section chief, Statistics of Capital Construction Administration, USSR Central Statistical Administration: "On Methods of Analyzing Unfinished Construction and Concentration of Capital Investments"]

[Text] At the present time, capital construction is faced with an extremely important task -- to bring (reduce) the volume of unfinished construction to the established standards, to increase the concentration of capital investments, and as a result to accelerate the operational introduction of fixed capital.

Unfinished construction is usually analyzed, planned and standardized in percentages of annual capital investments. This indicator is relative, but it could rightfully be called specific unfinished construction ( $H_y$ ).

$$H_y = H : K_r \times 100,$$

where  $H$  is the absolute value of unfinished construction (in actual practice -- by state at the end of the year; however, it would be more correct to consider value " $H$ " as the yearly average);

$K_r$  is the annual capital investment (in the same units of measure as value " $H$ ").

Let us also introduce into the make-up of the initial data the total estimated cost of simultaneously implemented construction (for a certain date -- the same for which value " $H$ " is taken). Then we may write the following expression:

$$H_y = (C : K_r) \times (H : C) \times 100,$$

where  $C$  is the total estimated cost of simultaneously performed construction (in the same units of measure as values " $H$ " and " $K_r$ ").

We will assume that construction is being performed WITHOUT INTERMEDIATE (PARTIAL) OPERATIONAL INTRODUCTION OF FIXED CAPITAL\*. Then the first of the

\* This is equivalent to examining only the remaining portion of construction (if there is intermediate introduction), when the expenditures for already introduced fixed capital are excluded from the estimated cost.

obtained cofactors will indicate the average time of construction (or a value very close to this time), while the second will indicate the average readiness of construction.

The formulas and discussions presented in this article relate to the national economy as a whole, its sectors, sectors of industry, ministries, departments, and regions. At the same time, the analyzed dependences are to a certain degree also applicable to the level of individual construction sites and facilities.

The construction time for individual enterprises and facilities as well as for any combination thereof is equal to the quotient from dividing the cost of construction (C) by the average annual capital investments ( $K_{rc}$ ). For example, if construction lasts for 3 years with annual capital expenditures in the amounts of 1 million rubles, 5 million rubles and 6 million rubles, then the cost of construction is equal to 12 million rubles ( $C = 1+5+6=12$ ), and the average annual expenditures comprise 4 million rubles ( $K_{rc} = \frac{1+5+6}{3} = 4$ ), while the construction time is equal to  $\frac{C}{K_{rc}}$ , i.e., it comprises  $\frac{12}{4} = 3$  years.

If only the annual expenditures are used in the indicated computation instead of the average annual expenditures for an individual enterprise or facility, then the result will be erroneous (too high if the annual expenditures are less than the average annual, or too low if the annual capital investments exceed the average annual).

The case is different if we speak of a rather large combination of enterprises and facilities. Then, in accordance with the law of large numbers, the deviations of annual expenditures from average annual will multidirected (for some enterprises and facilities the annual capital investments will be larger, and in others smaller than the average annual), and in general will balance each other out. This is clearly indicated by the absence, as a rule, of any significant fluctuations in capital investments by year at the macrolevel\*. Therefore, the expression  $\frac{C}{K_r}$  on the whole throughout the national economy, by sectors, ministries, etc., i.e., for the great totality of enterprises and facilities, corresponds or is quite close to the expression  $\frac{C}{K_{rc}}$  and may be viewed as the average construction time within the given  $K_r$  year (i.e., as the average time of construction of enterprises and facilities which are in the state of unfinished construction within the given year).

As concerns indicator  $\frac{H \times 100}{C}$ , i.e., the relation of unfinished construction

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\* If such fluctuations are nevertheless present, then instead of the annual expenditures ( $K_r$ ), the average annual capital investments accrued during this period for which these fluctuations are observed should be used. (Unlike the average time of construction, the duration of this period is easily determined).

and estimated cost, in the absence of intermediate operational introduction it characterizes the degree of readiness of construction (which under this condition coincides with the stockpile readiness).

Thus, the specific unfinished construction may be viewed (in the absence of intermediate operational introduction) as the product of the average construction time to its average degree readiness.

$$H_y = T_n \times \Gamma_c,$$

where  $T_n$  is the average construction time in years;

$\Gamma_c$  is the average degree of readiness of construction, %.

The value of the specific unfinished construction ( $H_y$ ) may increase due to an increase in the duration of construction ( $T_n$ ) or due to an increase in its readiness ( $\Gamma_c$ ). In this case, the same increase in specific unfinished construction may be caused by different reasons.

Let us say, for example, that it is equal to 80 percent with an average construction time of 4 years and an average readiness of 20 percent. The relation presented above is equal to  $80\% = 4 \times 20\%$ .

Then the specific unfinished construction has increased to 100 percent. This might have taken place due to different factors. There is an infinite multitude of possible variants here. Let us examine three of them.

First -- the average construction time has increased to 5 years, while the degree of readiness remained as before  $100\% = 5 \times 20\%$ .

Second -- the degree of readiness of construction has increased to 25 percent, while the construction time remained unchanged  $100\% = 4 \times 25\%$ .

Third -- the average construction duration increased to 4.2 years, while the degree of readiness increased to 23.8 percent. Or, in other words,  $100\% = 4.2 \times 23.8\%$ .

If we analyze the change in specific unfinished construction in a purely QUANTITATIVE manner (focusing attention ONLY on the change in its value, regardless of the causes), then the conclusion is the same for all three variants: the situation has taken a turn for the worse. However, this is not entirely the case.

In examining the first variant, we may agree with the conclusion obtained from the quantitative analysis. The construction time has increased by an entire year, and there has been a corresponding delay in the operational introduction of the fixed capital.

In the second variant the conclusion as to worsening of the situation is incorrect. With the same construction time, the degree of its readiness has increased, and the time to its operational introduction is shorter. With an increase in unfinished construction from 80 percent to 100 percent, the fixed capital will be introduced sooner and the return on capital will begin sooner.

In the third variant there are simultaneously positive as well as negative factors. The total construction time ( $T_n$ ) computed at the macrolevel by the method presented above includes the already mastered ( $T_{oc}$ ) as well as the forthcoming ( $T_{nc}$ ) times ( $T = T_{oc} + T_{nc}$ ). The relation between the mastered time ( $T_{oc}$ ) and the full construction time ( $T_n$ ) is determined by the degree

of readiness ( $\Gamma_c$ ), i.e.,  $T_n = C : K_r = (H + O_c) : K_r = \frac{H}{K_r} + \frac{O_c}{K_r} = T_{oc} + T_{nc}$ , where  $O_c$  is the remainder of the estimated cost of construction subject to fulfillment;  $\frac{O_c}{K_r}$  is the remaining time of construction. Then  $T_{oc} : T_n = \frac{H}{K_r} : \frac{C}{K_r} = H : C = \Gamma_c : 100$ .

Thus, in the example presented above, with the base situation, a 20 percent degree of readiness means that out of 4 years of construction the mastered time on the average comprises 20 percent, i.e., 0.8 years.

After increasing the specific unfinished construction from 80 percent to 100 percent, the indicators turned out to be as follows:

Mastered time: in the first variant 20 percent of 5 years, i.e., 1 year; in the second -- 25 percent of 4 years, also 1 year; in the third -- 23.8 percent of 4.2 years, or 1 year;

remaining time: in the first variant  $5-1=4$  years; in the second  $4-1=3$  years, and in the third  $4.2-1=3.2$  years.

Thus, with the same change in specific unfinished construction (from 80 percent to 100 percent), the average time remaining until operational introduction increased in the first variant, decreased in the second, and remained unchanged in the third.

In our opinion, it is specifically the average time remaining until the operational introduction which characterizes the CONCENTRATION of capital investments. If it increases, then the concentration is reduced. If it decreases -- it grows.

As evident from the example, the growth in specific unfinished construction may lead to a reduction as well as to an increase in the concentration of capital investments. The case is quite analogous also with reduction of the specific unfinished construction. There are possible cases where concentration grows or declines with unchanged volume of specific unfinished construction (for example with transition from the second variant to the first it remains at a level of 100 percent, while the concentration declines).

Based on the facts presented, we believe that, first of all, a purely qualitative analysis of the specific unfinished construction is insufficient. Secondly, the qualitative factor -- the readiness of construction (or the degree of readiness of the construction stockpile) must necessarily be examined along with the quantitative.

Let us draw certain conclusions relating to the model of capital construction examined above without intermediate operational introduction.

The average time remaining to the operational introduction (remaining construction time), is equal to:

$$T_{nc} = T_n \times \left( \frac{100 - H_y}{100} \right) = \frac{C}{K_r} \left( 1 - \frac{H}{C} \right) = \frac{C}{K_r} - \frac{H}{K_r} = T_n - H_y : 100.$$

A reduction in value  $T_{nc}$  is evidence of an increase in the concentration of capital investments and of an acceleration in the operational introduction of the fixed capital.

The remaining time may be reduced by reducing the total time of construction ( $T_n$ ) or by increasing the specific unfinished construction ( $H_y$ ).

In reality, the remaining time of construction represents, as we can see from the formula, the difference between the full construction time ( $T_n$ ) and the specific unfinished construction ( $H_y$ ) divided by 100. And the value of the difference, as we know, drops with reduction in the value of a reduced ( $T_n$ ) or with the growth in values of the subtracted ( $H_y$ ).

According to formula  $T_{nc} = T_n - H_y : 100$  it would seem to be that to accelerate the operational introduction it is necessary to increase the specific unfinished construction.

However, this is not entirely the case. Increasing the specific unfinished construction is expedient only with the condition that the construction time ( $T_n$ ) either does not increase at all, or at least its absolute growth does not exceed the absolute increase in the specific unfinished construction divided by 100, i.e., indicator  $H_y : 100$ .

This type of increase is possible due to the implementation of capital investments primarily at stockpile construction sites and at facilities having an especially high degree of readiness. If, however, the specific unfinished construction increases due to new construction starts, then the average construction time is not only not reduced, but may increase sharply.

Consequently, it is by far not any increase in the specific unfinished construction which leads to an increase in the concentration of capital investments, but only, we repeat, under certain conditions. This is equivalent to the affirmation that in some cases the reduction in specific unfinished construction ensures an increase in the concentration of capital investments, while in other cases it leads to the opposite result.

In reality, if  $T_{nc1} = T_{n1} - H_{y1} : 100$ ,  $T_{nc2} = T_{n2} - H_{y2} : 100$ , then  $T_{nc2} < T_{nc1}$

(reduction of time remaining until operational introduction, i.e., an increase in the concentration of capital investments) is ensured only with the condition that  $T_{n2} - T_{n1} > \frac{H_{y2} - H_{y1}}{100}$  where the indicators with the index "1" are base and those with the index "2" are comparable with the base indicators.

Data from the previous year or those computed on the basis of norms, plan computations, etc. may be used as the base. The corresponding actual indicators or computed plan indicators may be compared with them.

Since specific unfinished construction and degree of readiness are associated with each other by the time of construction ( $H_y = T_n \times \Gamma_c$ ), the condition of increase in the concentration of capital investments may also be represented in the form of the following formula:

$$(T_{n2} : T_{n1}) < [(100 - \Gamma_{c1}) : (100 - \Gamma_{c2})].$$

In reality, if  $T_{nc} = T_n(100 - \Gamma_c) : 100$  then  $T_{nc2} < T_{nc1}$  with the condition that  $(T_{nc2} : T_{nc1}) < 1$  or  $[(T_{n2}(100 - \Gamma_{c2})] : [T_{n1}(100 - \Gamma_{c1})]) < 1$ , i.e.,  $T_{n2} : T_{n1}$  must be less than  $(100 - \Gamma_{c1}) : (100 - \Gamma_{c2})$ .

Let us summarize the facts which have been presented. In the absence of intermediate operational introduction:

a) with growth of the specific unfinished construction and increase in the construction time, the concentration increases if  $\frac{H_{y2} - H_{y1}}{100} > (T_{n2} - T_{n1})$ ;

it decreases if  $\frac{H_{y2} - H_{y1}}{100} < (T_{n2} - T_{n1})$ ;

it remains the same if  $\frac{H_{y2} - H_{y1}}{100} = (T_{n2} - T_{n1})$ ;

b) with growth in the specific unfinished construction and reduction in the construction time, the concentration always increases;

c) with reduction in the specific unfinished construction and reduction in the construction time the concentration

increases if  $\frac{H_{y1} - H_{y2}}{100} < (T_{n1} - T_{n2})$ ;

decreases if  $\frac{H_{y1} - H_{y2}}{100} > (T_{n1} - T_{n2})$ ;

remains the same if  $\frac{H_{y1} - H_{y2}}{100} = (T_{n1} - T_{n2})$ ;

d) with reduction in the specific unfinished construction and increase in the construction time, the concentration never increases;

e) with a stable value of specific unfinished construction the concentration

increases if  $T_{n1} > T_{n2}$ ;

decreases if  $T_{n1} < T_{n2}$ ;

remains the same if  $T_{n1} = T_{n2}$ .

The quantitative measure of increased or decreased concentration of capital investments must, based on what has been said, be determined by the degree of change in the average time remaining until operational introduction, i.e. by value:

$$K_K = \frac{T_{nc1} - T_{nc2}}{T_{nc1}},$$

where  $K_k$  is the coefficient of change in the concentration of the capital investments.

If this coefficient is greater than zero, then the concentration has increased. If it is less -- it has decreased. The greater the positive or negative value of this indicator, the higher the degree of change in the concentration of capital investments.

Let us present an example.

| Indicators                                                                                                                    | First<br>year | Second<br>year | Third<br>year | Fourth<br>year | Fifth<br>year |
|-------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|---------------|----------------|---------------|
| 1. Time remaining until operational introduction (in years).....                                                              | 4.2           | 4.1            | 4.2           | 4.3            | 4.1           |
| 2. Its reduction to the previous year (in years) (line 1 of the previous year-line 1 of the present year).....                | -0.2          | 0.1            | -0.1          | -0.1           | 0.2           |
| 3. Coefficient of change in concentration of capital investments (line 2 of the given year: line 1 of the previous year)..... | -0.05         | 0.02           | -0.02         | -0.02          | 0.05          |

In this example the concentration of capital investments has increased in the second and fifth years, with the greatest degree of increase (by 5 percent) occurring in the fifth year.

\* \* \*

Let us now deal with construction conditions having intermediate (partial) operational introduction of fixed capital. In this case the construction time and the degree of readiness become non-synonymous.

We must distinguish between the readiness of construction and the readiness of the stockpile. The readiness of construction ( $\Gamma_c$ ) may be characterized as the degree of mastery of the entire estimated cost, including that which has already been transferred to the fixed capital which has partially introduced into operation (before final completion of construction). The readiness of the stockpile ( $\Gamma_s$ ) is the degree of mastery of only that part of the estimated cost which corresponds to the fixed capital subject to operational introduction. These indicators are usually figured in percentages.

$$\Gamma_c = \frac{H + \Phi_q}{C} \times 100; \quad \Gamma_s = \frac{H}{C - \Phi_q} \times 100,$$

where  $\Phi_q$  is the fixed capital partially introduced into operation.

If  $\Phi_q = 0$ , then  $\Gamma_c = \Gamma_3$ .

We should distinguish between the total and the net time of construction. The total time ( $T_n$ ) characterizes the duration of the period from the start of construction until its full completion, including the time of operation of partially introduced fixed capital.

The net time ( $T_q$ ) characterizes the average duration of construction alone, and does not include the time of partial operation of the fixed capital. It represents the period from the start of construction until the AVERAGE moment of operational introduction of all the fixed capital (of which a significant part may be introduced into operation before final completion of construction). Indicators  $T_n$  and  $T_q$  are computed in years.

$$T_n = C : K_r; \quad T_q = (C - \Phi_q) : K_r.$$

If  $\Phi_q = 0$ , to  $T_n = T_q$ .

Considering the non-uniformity of times and readiness levels of construction, the transformations performed earlier for simpler conditions take on the following appearance:

a) in using the net time of construction ( $T_q$ ) and stockpile readiness ( $\Gamma_3$ )

$$H_y = \frac{C}{K_r} \times \frac{H}{C} \times 100 = \frac{C - \Phi_q}{K_r} \times \frac{H}{C - \Phi_q} \times 100 = T_q \times \Gamma_3;$$

b) in using the total time of construction ( $T_n$ ) and construction readiness ( $\Gamma_c$ )

$$H_y = \frac{C}{K_r} \times \frac{H}{C} \times 100 = \frac{C}{K_r} \times \left( \frac{H + \Phi_q}{C} - \frac{\Phi_q}{C} \right) \times 100 = T_n \times (\Gamma_c - \Delta_{q3}) =$$

$$= \frac{C}{K_r} \times \frac{H + \Phi_q}{C} \times 100 - \frac{\Phi_q}{K_r} \times 100 = T_n \times \Gamma_c - T_{q3} \times 100,$$

where  $\Delta_{q3}$  is the portion (relative share) of partial operational introduction of the fixed capital (on the average for the period of construction),  
% ( $\Delta_{q3} = \Phi_q : C \times 100$ );

$T_{q3}$  is the average duration of partial operation of the fixed capital, years ( $T_{q3} = \Phi_q : K_r$ ).

Let us say, for example, that the total cost of simultaneously performed construction ( $C$ ) is equal to 1 billion rubles, the annual capital investments ( $K_r$ ) are 200 million rubles, the fixed capital partially introduced into operation ( $\Phi_q$ ) is 400 million rubles, and the absolute value of unfinished construction is 300 million rubles.

Then the total construction time ( $T_n$ ) comprises  $\frac{1000}{200} = 5$  years, the net construction time ( $T_q$ ) is equal to  $\frac{1000-400}{200} = 3$  years, the construction readiness ( $\Gamma_c$ ) is  $\frac{300+400}{1000} \times 100 = 70\%$ , the stockpile readiness ( $\Gamma_3$ ) is  $\frac{300}{1000-400} \times 100 = 50\%$ , and the value of specific unfinished construction ( $H_y$ ) is equal to  $\frac{300}{200} \times 100 = 150\%$ .

The portion of partial operational introduction of the fixed capital ( $\Delta_{qB}$ ) under these conditions comprises  $\frac{400}{1000} \times 100 = 40\%$ , and the average time of partial operation of the fixed capital ( $T_{q3}$ ) is  $\frac{400}{200} = 2$  years.

$$\begin{aligned} H_y &= T_q \times \Gamma_3 = 3 \times 50\% = 150\%; \\ H_y &= T_n \times (\Gamma_c - \Delta_{qB}) = 5 \times (70\% - 40\%) = 150\%; \\ H_y &= T_n \times \Gamma_c - T_{q3} \times 100 = 5 \times 70\% - 2 \times 100 = 150\%. \end{aligned}$$

Thus, the specific unfinished construction is reduced not only with reduction of the total and net times of construction and not only with reduction of the stockpile readiness and construction readiness, but also with an increase in the relative share of fixed capital which is partially introduced into operation and the average time of its application.

With all other conditions being equal, a reduction in the specific unfinished construction due to reduction of the construction time and do to an increase in the relative share of the fixed capital introduced into operation should be viewed as a positive occurrence, while the same reduction in the specific unfinished construction due to reduction in the level of readiness should be viewed as a negative occurrence.

The forthcoming (remaining to operational introduction) construction time is a criterion for the concentration of capital investments, even under conditions where fixed capital has been partially introduced into operation. However, here we must distinguish the full remaining time ( $T_{nc}$ ) and the net remaining time of construction ( $T_{qnc}$ ).

$$T_{nc} = \frac{O_c}{K_r}; \quad T_{qnc} = T_{nc} \frac{T_q}{T_n} = \frac{C - H - \Phi_q}{K_r} \times \left(1 - \frac{\Delta_{qB}}{100}\right).$$

The computation of net remaining construction time is based on the principle of proportionality — the relation of the net remaining construction time ( $T_{qnc}$ ) to the full remaining time ( $T_{nc}$ ) is taken to be equal to the relation between the net ( $T_q$ ) and full ( $T_n$ ) times of construction.

In the example presented above, the full remaining time ( $T_{nc}$ ) is equal to  $\frac{100-300-400}{200} = 1.5$  years, while the net remaining time ( $T_{qnc}$ ) comprises  $1.5 \times 3 : 5 = 0.9$  years.

In most cases the dynamics of the full remaining time and the net remaining time of construction is uniform (unidirectional). Therefore, the conclusion as to increase or reduction in the concentration of capital investments may be drawn on the basis of any of these indicators. At the same time, situations cannot be excluded whereby the total and net remaining construction times proceed in different directions. An evaluation according to remaining net construction time is correct under these conditions.

As concerns the quantitative measure of increasing or decreasing the concentration of capital investments, it will often diverge in the computation of

coefficients of change in concentration based on total and net remaining construction times. Since the latter more fully characterizes the processes taking place in capital construction, the indicated coefficients should be determined only on the basis of net remaining times.

As evident from the formula for computation of the average remaining net construction time, an increase in the concentration of capital investments may be achieved by means of: reducing the total estimated cost of simultaneously performed construction (C); a growth in the volume of fixed production capital partially introduced into operation ( $\Phi_y$ ); an increase in the annual capital investments ( $K_p$ ); a growth in the absolute value of unfinished construction (H).

With different directions of change in these indicators, the increase or reduction of concentration may be determined only on the basis of net remaining construction time.

Thus, the growth of the absolute value of unfinished construction may lead, as quite often happens, not to an increase, but to a reduction in the concentration of capital investments if the total estimated cost of construction (C) simultaneously increases in larger volumes. However, in order to understand the processes taking place, it is necessary to compute the remaining construction time.

In practical application, as we have indicated before, in most cases it is not the absolute (H) value of unfinished construction which is analyzed, but rather the relative ( $H_y$ ). The reduction of this relative value ( $H_y$ ) is economically expedient, in our opinion, in the presence of two simultaneous conditions: increased stockpile readiness (quality of unfinished construction) and positive value of coefficient for change in the concentration of capital investments ( $K_k$ ).

If with reduction of the specific unfinished construction the stockpile readiness has increased but the indicated coefficient is negative, the increase in the quality of the unfinished construction has turned out to be insufficient for growth in the concentration of capital investments.

If, however, with reduction in the value of the specific unfinished construction the stockpile readiness has decreased, while the coefficient of change in concentration is greater than zero, then the concentration has increased not due to reduction in the unfinished construction, but for other reasons (as for example in connection with reduction in the total estimated cost of construction).

The case is analogous also in the opposite situation -- with growth in specific unfinished construction. Such growth is expedient if the stockpile readiness increases and at the same time the coefficient for change in concentration ( $K_k$ ) is greater than zero.

In all these variants the positive or negative value of the coefficient of change in concentration indicates the end result, while the growth or reduction

INDICATORS CHARACTERIZING THE CONCENTRATION OF CAPITAL INVESTMENTS\*  
According to \_\_\_\_\_

(name of ministry, department, sector etc.)

| Line<br>no.                                                                            | Name of indicators                                                                                    | units<br>of<br>measure | Years  |        |        |      |      |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------|--------|--------|--------|------|------|
|                                                                                        |                                                                                                       |                        | 1981   | 1982   | 1983   | 1984 | 1985 |
| A. Actual indicators                                                                   |                                                                                                       |                        |        |        |        |      |      |
| 1                                                                                      | Volume of capital invest-<br>ments .....                                                              | million<br>rubles      | 2,964  | 3,107  | 2,929  |      |      |
| 2                                                                                      | Total estimated cost<br>of construction.....                                                          | "                      | 51,053 | 54,148 | 56,505 |      |      |
| 3                                                                                      | Volume of unfinished con-<br>struction (at start of yr)                                               | "                      | 4,851  | 4,458  | 4,529  |      |      |
| 4                                                                                      | Fixed capital introduced<br>into operation (from<br>start of construction to<br>the given year)       | "                      | 20,882 | 25,316 | 26,833 |      |      |
| 5                                                                                      | Volume of capital invest-<br>ments subject to fulfill-<br>ment prior to completion<br>of construction | "                      | 25,320 | 24,369 | 25,113 |      |      |
| 6                                                                                      | Construction readiness<br>[(ln2-ln5): ln 2 x 100]                                                     | %                      | 50.4   | 55.0   | 55.6   |      |      |
| 7                                                                                      | Stockpile readiness [ln 3:<br>(ln 3+ln 5) x 100].....                                                 | "                      | 16.1   | 15.5   | 15.3   |      |      |
| 8                                                                                      | Average total construction<br>time (ln 2 : ln 1).....                                                 | years                  | 17.2   | 17.4   | 19.2   |      |      |
| 9                                                                                      | Average net construction<br>time [(ln2-ln4): ln 1]...                                                 | "                      | 10.2   | 9.3    | 10.1   |      |      |
| 10                                                                                     | Average total time remain-<br>ing before operational<br>introduction (ln 5 : ln 1)                    | "                      | 8.5    | 7.8    | 8.5    |      |      |
| 11                                                                                     | Average net time remain-<br>ing before operational in-<br>troduction (ln 9:ln 10:ln 8)                | "                      | 5.0    | 4.2    | 4.5    |      |      |
| 12                                                                                     | Specific unfinished con-<br>struction (ln 3:ln 1 x 100)                                               | %                      | 163.7  | 143.5  | 154.1  |      |      |
| B. Normative indicators (from standards manuals and computed on the<br>basis of norms) |                                                                                                       |                        |        |        |        |      |      |
| 13                                                                                     | Stockpile readiness                                                                                   | %                      | 41     | 41     | 41     |      |      |
| 14                                                                                     | Specific unfinished con-<br>struction                                                                 | "                      | 102    | 102    | 102    |      |      |
| 15                                                                                     | Average net construction<br>time (ln 14 : ln 13)                                                      | years                  | 2.5    | 2.5    | 2.5    |      |      |
| 16                                                                                     | Average total con-<br>struction time (ln 15 x<br>ln 8 : ln 9).....                                    | "                      | 4.2    | 4.7    | 4.8    |      |      |

TABLE (continued)

| Line<br>no.                                                   | Name of indicators                                                                                               | units<br>of<br>measure | Years |      |       |      |      |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------|-------|------|-------|------|------|
|                                                               |                                                                                                                  |                        | 1981  | 1982 | 1983  | 1984 | 1985 |
| 17                                                            | Average total time remaining before operational introduction [ln 15 x (100 - ln 13) : 100].....                  | years                  | 1.5   | 1.5  | 1.5   |      |      |
| 18                                                            | Average net time remaining before operational introduction (ln 17 x ln 15 : ln 16).....                          | "                      | 0.9   | 0.8  | 0.8   |      |      |
| C. Summary evaluation of concentration of capital investments |                                                                                                                  |                        |       |      |       |      |      |
| 19                                                            | Coefficient of change in concentration<br>(1- $\frac{\ln 11 \text{ present year}}{\ln 11 \text{ past year}}$ ) ) |                        | x     | 0.16 | -0.07 |      |      |

\* Data are conditional

in stockpile readiness makes it possible to establish the effect that the change in value of specific unfinished construction has had on this result.

A special table is recommended for the practical application of the methods for analyzing the concentration of capital investments presented above. A sample of this table (containing a conditional numerical example) has been presented. The table consists of three sections. The first section contains a computation of the actual indicators associated with concentration — construction and stockpile readiness, specific unfinished construction, and different variants of construction times. The second section covers the complex of normative indicators. Only the stockpile readiness and the specific unfinished construction are taken from standards manuals, and the other normative positions are computed on the basis of these. This is associated with the fact that most of the indicators in this section are absent from the standards manuals, while the construction time presented in the indicated manuals is essentially mixed, since in some cases intermediate operational introduction of fixed capital is excluded in its computation on the basis of title lists, and in other cases it is not. Concentration, as we have indicated, is characterized by the value of the average net construction time remaining before operational introduction. A comparison of the corresponding actual indicators with the standard ones makes it possible to determine the degree to which the actual concentration of expenditures lags behind the normative level. The other indicators (stockpile readiness, specific unfinished construction and others) make it possible to determine the factors affecting the final evaluation of the concentration. The dynamics of the

concentration (coefficient of change in concentration) is isolated in the third section of the table. The basis for its tabulation is reporting according to form No. 8-ks.

We believe that such an analysis makes it possible to avoid unilateral and incomplete evaluations and to take comprehensive measures aimed at accelerating the operational introduction of fixed capital and at the overall improvement of capital construction in the country.

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## CONSTRUCTION PLANNING AND ECONOMICS

### PLANNING COORDINATION BETWEEN CONSTRUCTION ORGANIZATIONS NEEDED

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 5, May 84 pp 103-106

[Article by B. Kostrikov, deputy chairman of the Kaliningrad Oblispolkom, chairman of the planning board, candidate of economic sciences: "Several Problems Of Improving Construction Planning"]

[Text] In order to further increase construction efficiency, it is necessary to improve its plan indicators. At present, much attention is being paid to this problem.

In accordance with the decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Strengthening the Effect of the Management Mechanism on Production Efficiency and Work Quality Improvement," a new system of indicators has been put into effect in the construction sector. Under this system, all indicators, especially those based upon which the activity of construction organizations can be evaluated, are interdependent and give a fairly complete picture of the results of this activity. They are also oriented toward planned and normative time periods for putting construction projects and new capacity into operation. It is to this end that a switch was made to settlements between contractors and buyers for completely finished and operational enterprises, complexes under construction, phases and projects that are ready to produce goods or provide services.

The indicator for putting new productive capacity and production sites into operation is linked with the traditional concept of the end results of construction work: enterprises, complexes under construction, phases and sites that are ready to produce goods or provide services. The use of these criteria still does not completely facilitate efficiency in construction and public production. It allows construction organizations to drag out the process of correcting defects and completing unfinished work. It allows the operators to drag out their preparations for producing goods and providing services at their enterprises and projects. In our opinion, the end result of construction activity must be enterprises, complexes under construction, phases and projects that are producing goods or providing services.

In this regard it is also important to rethink critically the essence of the process of putting projects into operation and, in particular, the initial level of putting new installed operating capacity into operation. The USSR

Gosplan decree "On Time Standards for Putting Into Production the Design Capacity of Enterprises and Projects Built After 1 January 1978" notes several things. First, the time standard for putting design capacity into operation does not include any time for preparing the enterprises or project for the output of products (assembling the workforce; ensuring a supply of raw materials, other materials and energy; getting the necessary inventory of parts, etc.). The norm also does not include start-up and run-in work, including testing the equipment under both no-load and operating conditions. Another item not included in the standard is the completion of unfinished construction and installation work and the rectification of equipment defects. All of this must be done before the acceptance document for the project can be signed.

This system is appropriate for the current evaluation indicators and the method used to achieve them. However, considering the proposed end result of construction activity, it requires considerable changes.

Experience has confirmed that, in the initial period of putting production capacity into operation, the above work must, as much as possible, be done simultaneously in order to significantly reduce the length of the investment cycle. Thus, with the present situation, the run-in of production lines, putting production capacity into operation and the production of goods are the responsibility of the buyer. The latter usually brings in a start-up and run-in organization after the project has been accepted from the general contractor--that is, after the construction workers have left the site. During start-up and run-in work, it is not uncommon for unfinished construction work, design mistakes and the incompatibility of individual process units to be uncovered; these items make up three-fourths of the time overruns for putting capacity into operation. At the same time, it is practically impossible to get the construction workers back from their next projects to rectify the defects. This makes the start-up and run-in process more lengthy and difficult.

Considering the fact that start-up and run-in work is really a continuation of the construction process, this work, in our opinion, can be done by the proper specialized organizations, under contract with the general contractor, before the project is turned over to the buyer, not afterward. The costs of this work should be planned and paid for from capital investments provided in the estimated construction costs, and not at the expense of current production delays, as presently takes place. It is important to include the volume of start-up and run-in work in the construction output, according to the method established for executing contractor work.

The appropriateness of the proposed measures is also confirmed by the experience of building a number of very large projects. For instance, at the Volzhskiy Truck Plant, the process of putting truck production technology into operation began 10 months before the projects were accepted for operation. As a result, the time it took to put the first phase of the plant into operation was greatly reduced, and it was up to design capacity within seven months after it was commissioned.

A similar method was used in Kaliningrad Oblast' during the construction of the Guryevskaya, Kaliningradskaya and Prebrezhnaya poultry factories. For instance, the run-in and putting into operation of projects - built at the Kaliningradskaya Poultry Factory were carried out to the extent that the projects were accepted for production by a working commission. Under this system, the construction technology was closely tied in with production technology. This provided the motivation to train operating personnel and do other preparatory work in a timely fashion. Thus, by the time that the poultry factory was completed and accepted by the government commission, 4.3 million eggs and 200 tons of meat (live weight) had been produced.

In the same period, construction was completed on all of the auxiliary structures and the permanent water and sewer system, purification structures, the water intake, etc. were finished. This made it possible in 1981 (the first year of operation) to produce 60 million eggs and 1036 tons of meat. This means that 46 percent of the egg capacity and 28 percent of the meat capacity had been put into operation, while the established standard is to put 5 percent into operation during the first year of operation.

The implementation of the proposal to begin the process of putting capacity into operation before it is accepted for operation involves partially combining the processes of putting the basic funds into operation, using the funds and turning them over to a government commission. If the initial level of the period of putting capacity into operation is roughly estimated to be 25 percent of rated capacity, this would provide additional production of about 10 billion rubles a year for newly built enterprises alone.

In this regard, turnkey projects are suited only for residential buildings and some cultural and service facilities, such as houses of culture and sports structures. Productive capacity and projects in the service sector must be put into operation during construction--that is, according to a program.

It is very obvious that such a solution to the problem will become more realistic. In addition, one can agree with the scholars who think that the stage of "putting into operation" will eventually disappear as a phase of the production renewal process. This will occur because of the influence of scientific and technical progress and the further improving of the entire investment cycle.

An analysis of the fulfillment of construction plans shows that the achievement of the main indicators, most importantly putting the basic funds into operation on time, depends to a large extent on the coordination of the buyer's and the contractors' plans, both in the area of deadlines and of volumes of construction and installation work. Although this is obvious, many buyers and contractors were not in practice able to coordinate their plans. Thus, when checking the plan balance of contractor work on projects under construction alone in 1982 for the Kaliningradstroy Production Association of the USSR Ministry of Construction, a discrepancy of 400,000 rubles was found with the buyers' plans for 8 projects. There was a similar situation for construction work at the Kaliningradsel'stroy Trust, where the gap between the buyers' plans and the trust's program was 440,000

rubles for 9 projects. In other words, the buyers' plans showed capital investments by this much greater than the trust's program.

This discrepancy between the capital investment plans of buyers and contractor organizations extends into 1983. The Kaliningradstroy Production Association showed such a discrepancy on 38 projects. For instance, the Kaliningradbumprom Production Association provided for a total of 1 million rubles of construction and installation work in rebuilding their in-plant sewage system, while the Kaliningradstroy Production Association agreed to perform only 570,000 rubles of work. The situation is not improving with other contractor organizations.

This lack of coordination between buyer and contractor plans leads to a situation where the construction participants do not have a common goal and are not working together. As a result, the completion of several projects under construction has been delayed. Another obstacle is that the buyers do not face strict sanctions for non-fulfillment of capital construction plans.

Practice has shown that the present rules on contractor agreements for capital construction, due to imperfections in them, do not ensure unity in plans. The fact is that the ministries (departments) of both the buyers and contractors, which are obliged to settle disputes within 15 days of receiving a dispute report and inform the buyer and contractor of their decision, often, like their subordinates, stick to their guns and fail to reach an agreement.

In this regard, it would be advisable to allow the planning organizations of the oblast', kray, autonomous and union republics to make the final decision, depending on the limits of the construction work. USSR Gosplan should make such decisions for construction work within the limits of the USSR Council of Ministers.

An established practice that negatively affects construction efficiency is when the capital investments provided by local councils for construction projects do not completely fulfill the limits of contractor work. Over the past years, the organizations of the USSR Ministry of Construction have compiled contractor work plans for construction projects of the Kaliningrad Oblispolkom that are 2-3.5 million rubles below the volumes planned by the buyer. In other words, the annual difference is 10-15 percent of the limit established for the local councils. The other contractor organizations in the oblast'--the Kaliningradsel'stroy Trust and Oblmezhkolkhozstroyob" yedineniye--do construction work in rural areas in accordance with goals for the development of the RSFSR Non-Black-Earth Zone. The oblispolkom does not have contractor organizations under its authority, and the repair-and-construction organization is not even able to provide for the major repairs of housing, schools, hospitals and other social and service facilities.

As a result of the shortfall in contractor work limits, the oblispolkom must provide about 3 million rubles in supplementary contracts for the Kaliningradstroy Association of the USSR Ministry of Construction. The limits given to the oblispolkom for USSR Ministry of Construction contractor

work provide only for the construction of current projects. Residential construction slated for the next year is included in the association's program under an additional target. This leads to double planning and is also the main reason that local council plans are not fulfilled, since the contractor considers such projects as above-plan and does not fulfill the target volume completely. In this regard, the capacity of the residential construction combines of the USSR Ministry of Construction is being under-utilized.

Another complicating factor is that the Russian Republic Office of USSR Stroybank, starting in 1983, forbade the oblast offices to finance construction work included in the additional tasks of contractor organizations. They considered this work to be above-plan, while for the buyer this work was confirmed in the plan.

Practice and statistical data show that plans for implementing basic funds would be fulfilled much more successfully, and unfinished construction work would be greatly reduced, if buyers and contractors had unified construction volume and deadline plans for building new production capacity, residential buildings and social and cultural facility projects. It would also be reduced if the limits for construction-installation work were completely backed up by the limits for contractor work.

The economics literature has not paid enough attention to the practice of developing, approving, stimulating and implementing counterplans for construction. A probable reason for this is the opinion of many scholars and managers that the unbalanced plans, the imperfect management mechanism and other shortcomings hinder the creation of the necessary conditions for counterplanning in construction. Some specialists think that construction organizations have tight enough schedules, according to the indicators, without the counterplans. However, one cannot completely agree with that. A large body of facts, showing that projects and productive capacity were built ahead of schedule when all participants in the construction were properly mobilized, confirm the workability of counterplans in this sector.

Construction organizations have different work capacities and variations in other factors affecting operational capabilities: concentration and specialization of production, adequacy of energy resources and funds, preparation of personnel, etc. These are the main causes of uneven reserves and capabilities (when the intensity level of plans is imperfectly determined) that allow some organizations to accept and fulfill counterplans.

It is also important to consider the particulars of developing and fulfilling the separate indicators of counterplans in construction. For instance, putting new productive capacity into operation ahead of the government schedule requires additional material and labor resources for construction in particular. In addition, new productive capacity often sits idle because of a lack of raw materials or complementary parts. In other cases, the above-plan production is not sold immediately.

These shortcomings could be largely overcome if counterplans were coordinated with material resources while still ensuring a balanced condition,

which is a factor of the functional planning of production. As a result, labor competition could be more completely integrated into the mechanism of socialist management.

In recent years, a number of construction organizations in Kaliningrad Oblast' have taken the initiative in accepting counterplans which involve implementing projects and productive capacity over and above the government plan. Construction-Installation Administration No. 4 of the Kaliningradstroy Production Association, Mobile Mechanized Column No. 200 of the Kaliningradsel'stroy Trust, Repair-Construction Administration No. 13 of the Oblremstroy Association and the Guryev Interkolkhoz Mobile Mechanized Column had counterplans. The plans were reviewed by the trusts and associations which provided the basic material resources. Part of the counterplans was covered by the internal reserves of the contractor organizations. The necessary work was done in the collectives to explain the importance of achieving intensified plans. All of this has produced some positive results in implementing resources ahead of schedule and in completing above-plan projects.

In preparing counterplans, problems have arisen that prevent them from being more widely used in construction. The sector has no practical management mechanism that could combine the interests of all the participants in construction projects in order to achieve the best end results in fulfilling counterplans. In particular, no group of indicators for developing counterplans has been determined. Neither has an incentive system been created for implementing these plans. Also, there is no statistical accounting for counterplans.

The basic directions of social production development in the coming years are to increase the productivity of labor and strengthen economizing measures. Presently, counterplans incorporate tasks for achieving an above-plan increase in labor productivity of 1 percent and a reduction of production costs by 0.5 percent. However, as before, there are no specific recommendations on counterplanning in the industry. Accordingly, it is now necessary to prepare a statute on the development, approval, incentives and completion assurance of counterplans.

Solving these and other problems of capital construction responds to the demands of the February 1984 CPSU Central Committee Planum. In a speech at the Plenum, CPSU Central Committee General Secretary K. U. Chernenko noted that the economy's management system and our entire operational mechanism need to be significantly restructured. This will do much to promote the full usage of the sector's reserves.

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## CONSTRUCTION MACHINERY AND EQUIPMENT

### PRODUCTION OF EXCAVATORS BUILT ON MODULAR PRINCIPLE PLANNED

Moscow STROITEL'NIYE I DOROZHNIYE MASHINY in Russian No 5, May 84 pp 8-10

[Article by V. F. Korelin, general director, and Z. Ye. Garbuzov, laboratory director, NPO VNIIzemmach [Scientific Production Association All-Union Scientific-Research Institute on Earthwork Machinery]: "A Prospective Series of Land Reclamation Machines Based on Modular Unified Chassis"]

[Text] One of the basic means of reducing the cost and increasing the reliability of machines is the application of the modular principle in formulating their structural schemes with the application of design perfected and tested units and aggregates of large series production. This reduces the time for planning and developing new machines, since no time is spent on the development, technological equipment, and organization of production of the utilized series modules.

The application of the modular principle takes on particular importance in the creation of high productivity earth digging and land reclamation machines of continuous action. The narrow specialization and high productivity of these machines determines their relatively small series, while continuous development of the technology of building production necessitates a frequent change in parameters and even types of their working organs. Under these conditions with traditional design methods, the time for the development and mastery of new machines which perform previously unknown technological processes requiring a high precision in fulfillment of earthwork, concrete finishing and installation work with the application of automation and robotization elements is extended.

The nomenclature of specialized machines is rather broad and has a tendency toward further expansion.

For the development of specialized machines based on the modular principle, the NPO VNIIzemmach, working in conjunction with the USSR Minvodkhoz [Ministry of Land Reclamation and Water Resources] VNIIGiM [All-Union Scientific-Research Institute on Hydrotechnology and Land Reclamation imeni A. N. Kostyakov], has concluded the scientific-research work entitled "Determination of a Series of Unified Continuous Action Land Reclamation Machines Based on Modules of Tow Vehicles and Tractors with Capacity of 150-220 kW for Construction of Trenches and Channels of Various Profiles."

At the same time, the NPO VNIIZemmach performed work on defining the nomenclature of land reclamation machines based on prospective tractors with capacity of 150-160 kW being developed by Minsel'khoz mash [Ministry of Tractor and Agricultural Machine Building].

The work performed made it possible to establish the fact that the greatest economic effect from the application of unified chasses (USh) of increased unit capacity is achieved on machines with active working organs on which the capacity of the primary engine is realized, by-passing the propelling agent. On machines with a passive working organ the realized capacity is limited by the tow-hitch properties of the machine and its mass. Thus, for non-trenching drain-laying machines weighing 35 tons, a capacity of 220 kW is realized at rates of drain laying over 1 km/hr.

Machines for soil improvement work (stump removers, shrub cutters, earth bank levellers) are more economically expedient when they are built not on special chassis, but on series manufactured tractors with prospects of their transition to 150-160 kW capacity tractors currently being developed. For machines with active working organs which do not require significant towing force, as well as for field graders with an operating speed of up to 7 km/hr, it is expedient to use K-701 wheeled tractors with overall hydraulic drive of the working organs as the base vehicle.

An analysis of the structural schemes has shown the possibility of broad unification (Figure 1) of various land reclamation and earth digging machines of continuous action with the use of assembled units and aggregates from tractors K-701 and T-130 and prospective tractors T-200, as well as unified assemblies manufactured by plants in the sector (hydraulic drive stations, final reduction gears and speed reducers).

The development of the following high-energy and high productivity machines is planned:

on a wheeled chassis — a plow-rotor channel digger with excavation depth of up to 1 meter, machines for deep shrub cutting with grab width of 3.2 meters, rotor stump removers with storage bin, semi-suspended maneuverable graders, and automated short-base graders.

On a caterpillar-track unified chassis with the application of assembled units from tractors K-701 and T-130 — non-trenching drain layers for high-speed placement of plastic drain pipes, screw-rotor excavators for the construction of channels up to 2.5 meters in depth by the single-pass method and up to 5 meters in depth by the multi-pass method, trenching rotor semi-hitch excavators for digging trenches up to 2.5 meters deep and up to 2.1 meters wide for large pipes and water lines and with suspended apparatus variant for digging trenches 2.2 meters deep and 0.85, 1.2 or 1.5 meters wide, drain layers for the construction of ceramic drainage systems to a depth of up to 4 meters, and narrow-trench drain layers for placement of plastic drain pipes to a depth of up to 4 meters.

There are also plans for the development of machines for soil improvement work based on prospective types of tractors with the application of unified series modules.

The scheme of unification (see Figure 1) encompasses 18 types of machines based on the application of 15 basic modules. The base caterpillar-track unified chassis may be manufactured in different modifications depending on the allowable pressures exerted on the soil and the methods of suspending the working organs.

The advantages of modular type machines may be illustrated by individual examples.

The PLOW-ROTOR CHANNEL DIGGER (Figure 2) based on the K-701 tractor is capable of laying irrigation channels to a depth of up to 1 meter at a passage rate of up to 400 m/hr. The machine's high productivity is combined with maneuverability and a transport speed which make it possible to relocate the machine from one site to another within a short time.

The DZ-603 FIELD GRADER (Figure 3), which is semi-suspended from a wheeled tractor, thanks to the use of a standard agricultural suspension fitting resting on the rear wheels, ensures a high grading capacity corresponding to a base of 12 meters with a physical base of only 6 meters. The productivity of this machine is almost double that of graders of the traditional hitch design on caterpillar tractors.

The new non-trenching MD-12 DRAIN LAYER (Figure 4), which replaces the set of two machines MD-4 and MD-5, is capable of laying plastic drain pipes at a rate of up to 1.4 km/hr. The machine structurally combines the power assembly with the systems of steering, gear box, and rear axle of the K-701 tractor and the clutch and caterpillar drive elements of the T-130 tractor. The application of the modular principle with the use of assemblies of large series production has made it possible to spend less than 9 months on the design and development of the first prototype of this machine.

The new ETR-208 EXCAVATOR-CHANNEL DIGGER was developed by VNIIZemmach in accordance with a joint directive by the Minstroydormash [Ministry of Construction, Road and Municipal Machine Building] and the USSR Minvudkhkh. It is built on the same unified chassis with the application of assembled units from the K-701 and T-130 tractors. The modular principle is used in its design, making it possible to obtain modifications of continuous action excavators for digging trenches 2.1 and 1.5 meters in width and up to 2.5 meters in depth from the assembled units of the above-mentioned tractors.

The MD-12 drain layer and the rotor trench excavator ETR-208 have passed acceptance testing and have been recommended for series production.

The development of four machines to replace nine which are being manufactured at the present time is being planned on the basis of unified chasses.



Key to Figure 1:

A - on base of K-701 wheeled tractor; B and C -- on base of caterpillar track unified chassis with ten- and twelve-roller modification respectively, and with the application of assemblies from tractor T-130 and K-701; D - on base of prospective caterpillar tractor T-200; I -- power installation with cab and steering systems of tractor K-701; II-gearbox and transmission assemblies of tractor K-701; III - front and rear axles of tractor K-701; IV - pneumatic tires of tractor K-701; V - suspension system of tractor K-701; VI - overall hydraulic drive power installation; VII - hydraulic speed reducing gear; VIII - caterpillar tread of tractor T-130; IX - drive star wheel of tractor T-130; X - idle wheel and tension system of tractor T-130; XI- support rollers of tractor T-130; XII - friction clutch and drive components of tractor T-130; XIII - final drive; XIV - turning device; XV - rear support wheel.

Names of machines whose indices are presented in the figure: ETR and ETTs - trenching excavators, rotor and chain-driven, respectively; MD and ME - non-trenching and narrow-trenching land reclamation drainpipe layers; MTP - machines for deep cutting of shrubbery.

a - MK-22 plow-rotor excavator-channel digger; b - Type ETR-124; c - stump remover; d - DZ-603 grader; e - DZ-605 grader; f - ETR-208; g - ETR-223; h - Type ETR-204; i - Type ETR-224; j - MD-12; k - ETTs-406; l - ME-302; m - ETR-126; ETR-172; n - Stump removal unit type MP-11; o - Stump remover; p - Type MTP-44A; q - Planer-shrub cutter type MP-9; Double-blade shrub cutter.

The level of unification of assemblies in the machines under review with the assemblies in large-series production is reaching 70 percent. The overall economic effect from the application of new machines built on caterpillar track unified chasses comprises over 10 million rubles.

CONCLUSIONS. Work in the sphere of application of the modular principle for the design and development of new machines has only just begun. Broad unification must be performed for all machines manufactured by the plants of the all-union production organization "Soyuzmeliormash," with the specification and centralized manufacture of basic modules: motor reduction gears, speed reducers, steering elements, elements of automation, etc. The prospects for the application of motor wheels unified with caterpillar drive hydraulic motor star wheels as the basic propeller module for a number of land reclamation machines have been clarified. At the same time it is necessary to ensure interspecific unification of the basic elements of land reclamation and earth digging machines of continuous operation with the elements of such large-series machines as single bucket excavators, bulldozers, scrapers, motor graders, and loaders.

The study of the possibility of changing over the basic types of machines to multi-motor overall hydraulic drive is of particular significance. This transition may yield a great economic effect due to the autonomous nature of such drive and the large-series output of hydraulic machines and hydraulic assemblies by Minstroydormash plants.

The solution to the current problems is envisioned by the comprehensive program developed by the NPO VNIIZemmmash in conjunction with the VNIIGiM. The realization of this program is planned for the next decade.

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## CONSTRUCTION METHODS AND MATERIALS

### ENERGY CONSERVATION STRATEGIES FOR CEMENT INDUSTRY OUTLINED

Leningrad TSEMENT in Russian No 4, Apr 84 pp 1-3

[Article by V. M. Belogurov, Glavzapadtsement director: "Fuel Economy -- The Requirement of Our Time"]

[Text] It was stated at the November (1982) Plenum of the CPSU Central Committee that economy and a zealous attitude toward the national good is a question of reality of our plans.

As applied to the cement industry, without detracting from the importance of a careful attitude toward raw goods and materials, we must particularly stress the primary importance of the economy of fuel-energy resources.

The enterprises of the USSR Minstroyaterial [Ministry of the Construction Materials Industry] cement industry annually consume around 23 million tons of specified boiler-furnace fuel and around 14 billion kW·hr of electrical energy.

The expenditures for fuel-energy resources within the structure of the production cost of cement reach up to 43 percent, which comprises approximately 750 million rubles per year. Therefore, a 1 percent reduction in the consumption of these resources is equal to a savings of 7.5 million rubles.

Of the 23 million tons of specified fuel consumed at our enterprises, 21.7 million tons (or 95 percent) is spent for roasting clinker, around 300,000 tons for drying additives, over 600,000 tons for the output of thermal energy, and about 300,000 tons for other purposes. Therefore, we must concentrate our attention on analyzing work on fuel economy in the furnace shops. It is specifically here that we find all our cares and all our reserves!

For the period from 1975 through 1982, the specific fuel consumption for roasting clinker at the ministry's cement enterprises was reduced by 2.2 percent. This made it possible to save around 500,000 tons of specified fuel in 1982.

The greatest reductions in fuel expenditure for roasting clinker during this period were realized by the enterprises of the Uzbek SST sectorial ministries (by 3.0 percent), the Lithuanian SSR (by 3.8 percent) and the Azerbaijan SSR

(by 2.6 percent), as well as by Glavvostoktsement [Main Administration for Cement Industry in the Eastern Regions] (by 3.2 percent) and Glavzapadtsement [Main Administration for Cement Industry in the Western Regions] (by 1.5 percent).

Thus, the rates of reduction in specific fuel consumption as compared with the average sectorial values were significantly higher throughout the Ministries of the Construction Materials Industry of the Uzbek and Lithuanian republics, somewhat higher for Glavvostoktsement, and lower for Glavzapadtsement. This was determined primarily by the structure of the newly introduced production capacities and their raw material bases.

However, we must note that a number of enterprises of republic sectorial ministries increased the specific fuel expenditure as compared with 1975: throughout the Belorussian SSR (Krichevskiy Combine) -- by 1.8 kg/ton of clinker; throughout the Latvian SSR (Brotzenskiy Combine) -- by 10.1 kg/ton; for the Tadjik SSR (Dushanabe Plant) -- by 2.2 kg/ton, and for the Estonian SSR ("Punane Kunda" Plant) -- by 6.9 kg/ton.

This occurred due to the reduction in the furnace use factor, which was caused by a deterioration of their mechanical state, as well as to a weakening of technological discipline, untimely restoration of heat-exchange devices, and other subjective reasons.

For 1982 and the first half of 1983, an overexpenditure of specified fuel for roasting clinker in the amount of 109,000 tons over the established norms was allowed throughout the ministry. In 1982, 20 enterprises did not meet the established norms, and 18 in the first half of 1983.

The Razdanskiy and Araratskiy Plants in Armenia allowed a great fuel overexpenditure (41,300 tons), as did the Amvroseyevskiy and Nikolayevskiy Combines as well as the Ol'shanskiy and other plants in the Ukraine (55,000 tons), the Kuvasayskiy, Navoiyskiy and other plants in Uzbekistan (36,000 tons), the Kant, Dushanabe and "Novorostsement" Combines, as well as the Chernorechenskiy Plant.

The leading enterprise in the sector, the "Novorostsement" Combine, operated intensively in 1982. The high equipment accident rate, the unplanned equipment stoppages, the unstable gas pressure, and the disruption of production, labor and technological discipline all led to the overexpenditure of 18,000 tons of specified fuel. However, this overexpenditure was covered by the "Bryansktssement" Production Organization, and the Lipetsk, Karachayevo-Cherkess and Bezmeyinsk Plants. According to the totals for the 9 months of 1983, the combine was able to meet the established norms and achieved fulfillment of the plan for fuel economy.

Despite the presence of objective factors such as limited supply and variance in gas pressure, the disproportions between the basic production shops, equipment wear, etc., which have developed at a number of enterprises, the overexpenditure of fuel at most of the enterprises is allowed due to shortcomings in the organization of production, weak control over rational fuel expenditure, poor standardization and absence of incentives for economy.

For example, the Ararat Plant allows fuel overexpenditure year after year. An investigation has shown that the stability of the fettling at the plant is low due to the unsatisfactory condition of the furnace support foundations, the coarse grind of the slurry and the sharp fluctuations in its chemical compositions, and the low temperature of the fuel oil (only 60-75°C) used as fuel. The elimination of these causes depends on the management and the enterprise collective.

Aside from the achievement of established fuel expenditure norms for roasting clinker, another indicator which characterizes our work is the fulfillment of tasks on fuel economy.

We must save 103,000 tons of specified fuel per year throughout Glavzapadtsement and Glavvostoktsement.

In 1983 for the first time in our practical application, assignments on fuel economy and the achievement of its expenditure norms for technological needs were included in the list of basic indicators for summarizing the results of socialist competition. However, despite this fact, in 1983 there were serious and annoying omissions. A number of enterprises, among them Glavzapadtsement, did not place and were not even given the chance of participating in the summaries of competition because their indicators turned out to be lower than the corresponding indicators for the base year 1980, while a number of the enterprises did not achieve the assigned savings.

The resolution adopted by the CPSU Central Committee in 1983, "On Improving the Organization and Practice of Summarizing the Results of Socialist Competition and Encouraging its Winners" will undoubtedly make it possible to improve order in this matter.

We must also consider the fact that today the allocation of fuel-energy resources is no longer a function of the production plan. On the contrary, the plan depends on the allocated fuel and electrical energy resources.

For 1984 the plan provides for a reduction in the fuel expenditure by an average of 1.7 kg per ton of clinker averaged throughout the ministry as compared with 1983. We have become accustomed to reducing this expenditure by tenths of kilogram per year.

The enterprise managers must themselves change their way of thinking and aim their collectives toward the fulfillment of this task, as well as dealing with questions of economy of resources on a daily basis. It is necessary to instill a careful attitude toward material resources in enterprise specialists and, most important, to apprise each worker and employee of the norms for expenditure of resources and of the tasks on their economy which must be fulfilled on a shift, monthly and annual basis. Workers must also be apprised of the amounts of material rewards payable for fulfillment of norms and assignments. It is this organizational work which, in my opinion, holds our main reserves.

It is important to involve party, professional union, komsomol and social organizations in this work, as well as the largest possible of workers. Tasks and specific measures for economy of resources should also be included in the responsibilities of the collectives.

A central commission for the control of material resource expenditure has been created at Glavzapadtsement, as well as subcommissions for the economy of fuel, electrical energy, sheet metal and refractory materials and for the economy of raw material resources, petroleum products and other materials; for the economy of building materials and for reduction of above-norm reserves of uninstalled equipment.

These organs, with the participation of the enterprise managers, examine the reports on the course of task fulfillment on the economy of resources, make the appropriate decisions and implement control over their fulfillment.

For example, in reviewing the report by the management of the Bryansktssement Production Association on the fulfillment of the established norms, the commission pointed out in particular the need for intensifying material stimulation towards the economy of fuel-energy resources. Thus, in 1982 the association collective achieved a savings of 7,500 tons of specified fuel at a cost of around 200,000 rubles. As a prize, the collective could have been paid up to 60 percent of the cost of the economized fuel, i.e., around 120,000 rubles, regardless of the wage fund. However, a significantly smaller sum was paid out, i.e., the role of material stimulation was reduced.

In the technical aspect, the main reserves for fuel economy towards which our current work must be directed consist of the following:

the reduction of slurry moisture content;

the equipment of furnaces with effective heat exchangers and regulatable injectors;

the stabilization of slurry supply to furnaces in a quantitative as well as in a qualitative sense;

the improved equipment of enterprises with control-measurement devices.

Unfortunately, the Soyuzavtomatstrom VNPO [All-Union Production Association] at one time took a wrong turn in creating complex ASUTP [Automated System for the Management of the Technological Process], forgetting the need for equipping the plants with modern means of control and remote control.

There are also a number of other, more promising, directions and methods of fuel economy. Among these is the reconstruction of cement enterprises for the purpose of changing them over to the dry, semi-dry and other energy-saving methods of production.

The application of scientific developments (for example, mineralizers for roasting clinker, charging furnaces with technogenic products, etc.) which

have been repeatedly examined in the pages of the journal TSEMENT, also provide us with a great reserve.

Rotating furnaces must be better equipped with effective heat exchange devices and supplied with quality slurry.

We must note that the condition of furnace heat exchangers is on the whole unsatisfactory. At most of the plants, chain screens of insufficient weight are used, and for this reason the furnaces operate with increased temperature of exhaust gases.

For example, in the 185-meter furnaces of the Akmyantsementas Production Association and the Sebryakovskiy and Sukholozhskiy Plants, the mass of the chain screens is always within the limits of 160-212 tons with a slurry moisture content of 37-39 percent. At the same time, the temperature of the exhaust gases does not exceed 250°C, while the fuel expenditure per ton of clinker comprises 217-220 kilograms. Meanwhile, at such plants as the Karachayevo-Cherkesskiy, Shchurovskiy, Staroskol'skiy and others the mass of the chain screens in the same types of furnaces and with significantly higher moisture content does not exceed 120 tons. Naturally, the temperature of the exhaust gases at these plants reaches 280-290°C, while the fuel expenditure is extremely high.

Computations show that if the plants equipped with 185-meter furnaces were to reduce their specific fuel expenditure to the level of the indicated leading enterprises, it would be possible to obtain a significant additional fuel economy.

A strict order has been established at Glavzapadtsement, according to which all the projects for introduction of new chain screens must necessarily be reviewed at the glavk, and only after this do the enterprises of the Tsementremont Trust have the right to hang them.

The sectorial institutes must present a systemic analysis of the heat exchange devices of furnaces. They must also develop a mathematical program for computing chain screens using electronic computers and must give more in-depth attention to questions of the development and introduction of effective heat exchangers.

At the directive of the glavk, the NIItsement [State All-Union Scientific-Research Institute on the Cement Industry] has developed a scientifically substantiated methodology for computing the need for chains for individual standard sizes of furnace units, including those made of carbon and stainless steel. We hope that the ratification of this methodology and of the chain expenditure norms will make it possible to improve their provision to cement plants.

The next important direction in fuel economy is the intensification of technological discipline. Although this may sound banal, we will tirelessly and repeatedly say: the slurry must correspond to the technological chart in its quality and quantity!

According to the results of investigations conducted by sectorial institutes on the state of fuel application at cement plants, in most cases the documents contain entries of the following character: "There is not enough slurry," "Slurry does not correspond to requirements of the technological chart by its chemical composition."

In the Glavzapadtsement measures for fuel economy, which are ratified for each enterprise individually, the primary importance is given to measures for strengthening technological discipline. We have planned reports by directors, chief engineers and directors of laboratories on the measures taken to strengthen technological discipline.

The plan indicators for fuel expenditure envisioned for 1985 are presently being fulfilled by only 20 plants, or about one-fourth of all the enterprises in the sector.

I would like to stress the fact that the order issued by the USSR Minstroy-material dated 11 May 1983 must be used as the reference manual for managers of enterprises, main administrations and republic sectorial ministries. This order defines the basic technical measures for fuel economy specifically for each of the enterprises and establishes the corresponding tasks.

The results on the economy of electrical energy also give no cause for celebration. On the whole throughout the ministry in 1982 and in the first half of 1983, an overexpenditure of electrical energy in the amount of around 60 million kW·hrs was allowed. The state of affairs at enterprises of the UkSSR Minstroy-material, which allowed an overexpenditure of 64 million kW·hrs, and at the UzSSR Minstroy-material, particularly at the Navoyskiy Plant which allowed an overexpenditure of around 30 million kW·hr, gives particular cause for alarm. The Nikolayevskiy Combine, the Krivo-rozhskiy, Kuvasayskiy, Checheng-Ingushskiy, Katav-Ivanovskiy, Slantsevskiy, Kuznetskiy and other plants are showing an unsatisfactory expenditure of electrical energy.

By 1985 the specific norms for the expenditure of electrical energy in cement production must be reduced by 2.2 percent as compared with 1980, and by 1990 they must be reduced by 1.6 percent as compared with 1985.

This is a most complicated task, since the analysis indicates that in the past 10 years there has been an increase in the specific energy consumption rather than a decrease. This increase is caused by changes in the structure of production by methods and in the complement of utilized equipment, by an overall increase in the power-worker ratio, as well as by the implementation of an extensive work program for environmental protection.

However, we must stress the fact that even with these factors, the tasks set for the economy of electrical energy can be fulfilled, which is evidenced by the work of the leading enterprises. Thus, according to the summaries for 1982 and the first half of 1983, the Glavzapadtsement plants have saved around 30 million kW·hr of electrical energy. The Bezmeyinskiy, Karachayevo-Cherkesskiy, Starooskol'skiy, Lipetskiy and other plants have made the

largest contribution to this effort.

The most effective and approbated measures are not complex and must be implemented everywhere. These measures include, for example, the change-over of rotating furnace supports to roller bearings, which makes it possible to install engines with a 20 percent lower capacity on the main furnace drive as compared with those used previously.

An effective measure is the renovation of the enterprise compressor pool. This is especially necessary since a significant portion of this pool has become obsolete and works at low efficiency. Moreover, cement producers expend around 20 percent of all consumed electrical energy for the output of compressed air.

The questions of economy of electrical energy were examined in detail in the leading article published in TSEMENT, No 11 for 1983.

There can be no doubt that the managers of enterprises and party, professional union, komsomol and social organizations, based on the directives of the November (1982) and the December (1983) Plenums of the CPSU Central Committee, will take all necessary measures to reduce the expenditure of fuel-energy resources.

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## CONSTRUCTION METHODS AND MATERIALS

### CEMA COOPERATION IN INSULATING, ACOUSTIC MATERIALS

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 2, Feb 84 pp 44-46

[Article: CEMA Cooperation in Area of Industrialization of Construction"]

[Text] Technical progress in construction is impossible without expanding the production of effective heat-insulating materials. Today its development is especially urgent in connection with the problem of fuel-energy resources facing all countries. Indeed, the qualitative insulation of buildings and pipelines provides for a significant savings of fuel. Research has shown that each cubic meter of materials used for the insulation of the enclosing structures of heated buildings makes it possible to save an average of 2.5 tons of conventional fuel in a year.

Now the requirements for the thermal and acoustical insulation of buildings have been reexamined and raised in all the member countries of CEMA. Thus in the USSR they have been made considerably more strict in accordance with construction standards and regulations. Considering the growing scale of construction and the renovation of existing installations the need for heat-insulating and acoustical materials will increase approximately two-fold by 1990.

CEMA-member countries are approaching the intensification of production in this sector from a unified position -- the maximum utilization of each country's own as well as the council's scientific-technical and production potential on the basis of equal rights and mutual benefit. The combined efforts of fraternal countries will make it possible to raise the level of the industrialization of construction, to reduce the mass of building structures, to organize their manufacture in production plants, to increase the prefabricated content of buildings, to reduce labor expenditures for their erection, and to reduce the need for cement, bricks, lumber, metal, and so on. Moreover, the evaluation and utilization of the experience accumulated by the countries will assist in determining the optimal directions of technical development in this sector. Thus specialists of the CEMA-member countries have come to the conclusion that the production of slag cotton and products from it has the most prospects.

In 1971--1980 the Soviet VNIITeploizolyatsiya [All-Union Scientific-Research Institute of Heat-Insulation], the Hungarian SIKKTI [not further identified],

the Cement Plants in the City of Karsdorf (GDR), the Research Center of the Building Insulation Industry of IPTs PSI [not further identified] in Katowice, Poland, and the PROZEMAK Organization (Poland) conducted a joint study of heat-insulating and acoustical materials made from slag cotton. Its results confirmed the effectiveness and benefits of such cooperation. There was an exchange of useful information and research methods with respect to the properties and technical characteristics of raw materials and the finished products. Manufacturing methods and equipment were developed and improved for the production of traditional materials on the basis of slag cotton as well as new -- light and textured composition sheets and shells with vertically arranged fibers, which provide for a significant improvement of the mechanical properties of products and thereby increasing their compression strength many-fold. New forms of phenol-formaldehyde cements were obtained.

The manufacturing method for the production of hard slag cotton sheets on a synthetic binding was developed by VNIITeploizolyatsiya. It was developed on the LTMP [not further identified]-20 line, which is significantly superior to similar foreign production lines with respect to its technical-economic indicators. PROZEMAK developed new equipment with a productivity of 40,000--50,000 cubic meters of hard slag cotton sheets per year on the basis of developments in this manufacturing process and technical requirements for the equipment acquired by contract from the institute. It has already been introduced in Poland and two units have been delivered to the USSR.

The application of such sheets has a significant economic effect by reducing the mass of enclosing structures and lowering the cost of construction-installation work. Thus the annual savings from the utilization of hard sheets, manufactured at the Vilnius Silicate Products Production Association, amounts to more than 0.5 million rubles.

Other energy and material saving methods have also been developed by the institute and are of considerable interest to our partners in scientific-technical cooperation, for example, the manufacturing method of obtaining slag cotton sheets with a greater rigidity.

As a result of the cooperation of our institute with SIKKTI (Hungary) and also with enterprises of the petrochemical industry, a new type of phenol-formaldehyde binding -- phenol alcohol type D -- was developed for heat-insulating materials. It possesses a greater strength and stability in a humid environment and a smaller content of volatile substances. Its application in the production of slag cotton sheets makes it possible to lower the specific expenditure norms of scarce phenol alcohol by 25-30 percent. Moreover, the physical and mechanical properties of the products are not worsened. Also the manufacturing process of this type of binding is simpler in comparison with the traditional adhesives.

In connection with the sharp increase in the requirements for heat-insulating and acoustical materials, Bulgaria, Hungary, GDR, Poland, Czechoslovakia, and the USSR have jointly worked out a program of scientific-technical cooperation with respect to overall problems in this sector. A corresponding agreement was signed on 28 October 1982 in Halle, GDR. The function of coordinator was

assigned to the All-Union Scientific Research Institute of Heat-Insulation. The agreement provides for:

- a technical-economic analysis of the heat-insulation and acoustical materials industry of CEMA-member countries and a definition of the basic directions of its development;

- research on the expansion of a raw materials base for the output of construction materials on the basis of slag cotton and an optimization of the manufacturing process in the preparation of raw materials under production conditions;

- the development of more effective methods for controlling the composition of mixtures and the quality of fiber;

- an improvement of the manufacturing processes and equipment for the production of slag cotton, glass fiber, intumescent perlite, and products made on their basis;

- the development of essentially new output, and also progressive manufacturing methods and equipment for its production;

- the preparation of technical solutions in the area of environmental protection.

There are plans to carry out measures for accomplishing the program on the basis of agreements (contracts) concluded between the competent organizations, and also with respect to cooperation. A Council of Commissioners was established for regulating basic questions and overall management.

The first session of the Council of Commissioners from the cooperating countries was held in Vilnius from 17 through 20 May 1983. It examined, elaborated, and reached agreement on detailed programs for accomplishing individual themes and subthemes, which were worked out by key executives. A draft agreement on their accomplishment was also discussed and accepted. This document will regulate relations between executives, the conditions for conducting the work, the order of their acceptance and utilization, and also the legal protection of results and the means to guarantee their confidentiality. Moreover, questionnaires for evaluating the condition and basic trends of the development of heat-insulating and acoustical building materials and also the effectiveness of the applied raw material components were approved.

For the purpose of accelerating the accomplishment of the scientific-technical developments envisaged by the program, the Council of Commissioners decided that the interested organizations will set about accomplishing them immediately without waiting for the conclusion of agreements (contracts) on individual themes and subthemes, and the agreements will be examined and signed at a session of specialists from the CEMA-member countries.

The beginning of the accomplishment of the program on overall problems in the area of heat-insulating and acoustical building materials has convincingly

confirmed that the sphere of interaction between fraternal countries can no longer be limited just to production itself and bilateral scientific-technical ties. It is being more and more extended to the preproduction stage at the same time that a preference is being given to multilateral cooperation. This is a new approach to the distribution of available production resources and scientific-technical potential. Their growing role is beginning to function in the interest of individual countries as well as the entire council on the whole.

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