SEL ON THE PL AND
ADMINISTRATION OF SOVIET RESEARCH AND DEVELOPMENT

JPRS L/8894

30 January 1980

Translation

Selected Translations on the Planning and Administration of Soviet Research and Development

FBIS FOREIGN BROADCAST INFORMATION SERVICE

JPRS L/8894

30 January 1980

SELECTED TRANSLATIONS ON THE PLANNING AND ADMINISTRATION OF SOVIET RESEARCH AND DEVELOPMENT

This ad hoc report contains selected translations of Russian articles on the planning and administration of Soviet research and development and the introduction of scientific achievements into industry.

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EXPANSION OF LEGAL POWERS OF GKNT OVER SCIENCE POLICY ADVOCATED

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 11, Nov 79 pp 43-53

[Article by Candidate of Legal Sciences V. I. Rassokhin: "Law, the Organization of Science and the Introduction of Its Achievements Into Production"]

[Text] In recent years ever more attention has been given to the legal aspect of the present-day forms of the organization of science and the introduction of its achievements into production. In this sphere the basic legislative enactment is the Decree of the CPSU Central Committee and the USSR Council of Ministers of 24 September 1968 "On Measures to Increase the Efficiency of Scientific Organizations and Accelerate the Use of Scientific and Technical Achievements in the National Economy."

The ratification of this decree and certain other related legal enactments undoubtedly was a step ahead in organizing scientific research and in instituting ties between science and production. The procedure and the legal organizational structure of forecasting were defined as well as for the planning of scientific activities and scientific and technical progress in the national economy and management on the basis of comprehensive specific scientific and technical programs. The duties of the scientific organizations were established in the area of ties with production, the incentives for scientific research and development were strengthened as well as for the use of scientific and technical results aimed primarily at the modernization of equipment and production methods.

But still important problems which would require legal solution have remained outside legal regulation. These would include, for example, the creation of an effective system of relationships between the USSR Academy of Sciences and the national economic sectors. It is a question of opening up ways for its real influence on technical policy in the sectors and on raising the level of sectorial research and the prompt introduction of major achievements of academy science into practice, as well as one of determining the powers of the USSR Academy of Sciences as the coordinator of all scientific work in the nation. Among the unsolved problems are also: the elaboration and instituting of an effective legal organizational mechanism which would provide for the carrying out of a truly uniform state

scientific and technical policy and capable of overcoming the negative consequences of the departmental isolation in the national economy; the creation of organizational forms for intersectorial cooperation in science and the effective solution to intersectorial scientific and technical problems; the organizing of the expert evaluation of developed equipment and production methods which would be objective and conform to the level of the highest scientific competence; the clear definition of the legal forms of the actual liability of the scientific organizations, production enterprises and their leaders for the nonfulfillment of the quotas of the state plans for the development of science and technology and the introduction of their results into production, and much else.

The improving of the system of organization and management cannot occur otherwise than in legal normative forms. Under the conditions of the mootness of many general fundamental legal problems there have been attempts to apply legal regulation by the ad hoc method, that is, the solving of these problems solely for special, individual instances. Typical examples of such regulation are the solution to certain legal organizational questions concerning the uniform policy in the development of electric welding, in the area of the development and use of new catalysts and in researching the problems of metal corrosion.

Many legislative standards which could provide a legal solution to a number of key questions in essence remain appeals of a general nature. For example, the instructions to provide a reorganization in the work of the design, scientific research, planning and engineering organizations in such a manner that the newly designed enterprises, by the time they were put into operation, would significantly surpass analogous existing Soviet or foreign enterprises, have not been reinforced either by specific legal prescripts or by sanctions for their nonfulfillment.[1]

The absence of forms of real liability in the sphere of organizing research and development and the introduction of their results into production has led to a situation where even the specific standards of an imperative nature are far from always carried out, but this does not entail any consequences for the institutions and the leaders formally responsible for their fulfillment. Thus, the direct prescript of Point 5 "b" of the Decree of the CPSU Central Committee and the USSR Council of Ministers of 24 September 1968 to give first priority in providing the required monetary and material-technical resources for work stipulated by the coordinating plans for solving basic scientific and technical problems[2] is often not carried out. After converting from the system of coordinating plans to a system of comprehensive scientific and technical programs, certain additional measures of an operational nature were undertaken to secure the observing of this provision. However up to now no legal organizational mechanism has been created which would incorporate compulsory forms of liability and guarantee the unconditional fulfillment of the designated provision, nor are there also any other important standards which would define the procedure for carrying out work to solve basic scientific and technical problems.

Here we would be wise to recall the statement of V. I. Lenin that "law is nothing without an apparatus capable of *compelling* the observance of the provisions of the law."[3]

One of the most serious defects of the legal provisions concerning the most acute "introduction problem" is that they are basically oriented solely at establishing the various *duties of the scientific organizations* in the process of introducing the research and development results, and virtually do not involve the actual system of obligations, incentives and liability of the production associations, enterprises and their leaders. Of course it is easy to say that introduction cannot be implemented except in a two-way process of developing ties between science and production. But coming after this elementary general truth with inexorable logic is another, much more profound and concrete truth: the "center of gravity" in the problem of introduction rests not in the sphere of the duties of science but rather in the sphere of the duties of production.

At the same time, in leaving aside the central, key questions of utilizing scientific and technical achievements in the national economy, in discussing the problem very often up to now basic attention has been given to the duties of the scientific organizations and their employees, and further opportunities have been sought to strengthen the demands placed on them. For example, for these purposes it has been proposed that a certain "introduction indicator" be introduced for the results of research and development as perhaps the main indicator for planning and evaluating the activities of the scientific workers, and not only in the sectorial institutes but also in the academy institutes. It is not difficult to imagine what the introduction of such an indicator could lead to when this indicator does not depend either upon the creative abilities or upon the activity of the scientific worker confronted with production which is interested primarily in the steady output of a well developed product and its gradual (in small doses) modernization which would not involve the basic technical principle.

The carrying out of the demand of personal involvement by a scientist in all stages of introduction for the coworker of a sectorial institute would in fact mean the virtually complete changing over to serving the current needs of production and a focusing on the introduction of those minor improvements (particularly those which reduce labor intensiveness and the costs of a mass produced unchanged product) which would willingly be accepted by production. For a scientist from an academy institute the carrying out of this requirement would involve the wasting of his basic time and energies in working through various administrative planning decisions, searching for the way out from extremely involved situations of material and technical supply for production which has begun to develop a new product, and on resolving a heap of production and technological problems which with a different organizing of the question could be fully settled at the enterprise by the middle-level engineers and technicians.

Of course, a scientist who has developed an original major invention without any "introduction indicators" would naturally endeavor to do everything possible for its practical utilization. And the legal conditions should ensure the use of the creative forces of scientific workers in accord with their main purpose, and namely for solving truly scientific problems which inevitably arise in the introduction process. Unfortunately the principle that each person is to be concerned with his own work and to bear full responsibility for this, no matter now strange it may seem, is not considered when it is a question of the "introduction problem."

The paradox of the present legal regulation of scientific and production relations consists in the fact that the more the one-sided orientation of scientists "on introduction" is strengthened (certainly from the noblest of motives), the more duties relating to this that are transferred to them and the more the actual resolving of the problem is drawn out.

The production workers are actually released from the duties of overcoming the organizational-planning, financial, material-technical and other well-known difficulties of introduction. As a result, not an active but rather a waiting stance by both the ministries and the enterprises is encouraged, to put it mildly, and this often predetermines the failure of introducing scientific and technical achievements. And this impels the scientists themselves to follow a path of a demonstrative (for the report) "introduction" of the greatest possible number of unimportant improvements and allows him to escape from the truly difficult struggle for introducing the most important achievements on a large scale.

In our times there has been a sharp rise in the need for intersectorial integration both in the sphere of scientific and technical progress as well as in the economic system as a whole. This need has been adequately reflected in Article 16 of the USSR Constitution which proclaims the idea of an "unified national economic complex" as that form of economic organization which meets the requirements of mature socialism. The center of gravity is shifting from the extensive to the intensive development of production, and this has necessitated the moving of essentially new (fundamental in the precise sense of this word) scientific and technical achievements which revolutionize the production process to the entire "forefront of introduction." In scientific and technical progress an ever more significant role is being played by its comprehensiveness and by a transition to unified production systems (on the basis of introducing systems of machines, integrated equipment, waste-free production methods and automatic control systems). It is impossible to provide such fundamental changes in the system of organizing scientific and technical progress without centralized state leadership. And all of this can be effectively realized solely on the basis of carrying out a truly *unified state scientific and technical policy*.

As yet such a policy is quite often divided into independent departmental and sectorial area. In commenting on this fact, the USSR minister of nonferrous metallurgy P. F. Lomako emphasized in an article that the State

Committee for Science and Technology must organize its work "strictly according to the sectorial principle."[4]

It is becoming vitally essential to set up a statewide system for organizing research, developments and the introduction of scientific and technical achievements where this system would not be reduced to a simple aggregate of the departmental and sectorial systems, but rather could concentrate on fundamentally new pioneering scientific and technical achievements of an intersectorial importance.

The very logic of fundamental pioneering scientific and technical achievements and departmental-sectorial logic, strictly speaking, are incompatible. This is particularly apparent in the negative consequences of a monopoly by a "head institute" which almost always is a scientific institution of a producer sector.

The sectors which consume metalworking equipment require primarily the development and output of machine tools which embody new production principles that exclude cutting such as pressure working, explosive shaping, precision casting, electrophysical and electrochemical methods, and so forth. And regardless of this the rule has been rigidly reinforced in the law that all research and development in the area of electrophysical and electrochemical methods, and likewise the decisions to introduce their results into machine tool building, should be coordinated with the Minstankinprom [Ministry of Machine Tool and Tool Building Industry], and actually with the Experimental Scientific Research Institute for Metal Cutting Machines (ENIMS). The monopolistic legal status of the ENIMS which gives absolute preference to metal cutting methods has undoubtedly played a very definite role (along with other factors) in the fact that the "production" of metal chips in the nation has exceeded 8 million tons a year, and the lag is increasing behind the technically advanced countries in the area of new methods which provide an enormous savings of metal.

Obviously the necessity has arisen of redistributing rights in the specific activities related to carrying out scientific and technical policy. In this area the decisive rights should belong not to the head institutes of the producer sectors, but rather to scientific institutions that do not depend upon them and are capable of rising above departmental interests and proceeding from the objective logic of scientific and technical progress as well as from the higher interests of the national economy. Such rights could be granted above all to the special intersectorial (non-departmental) scientific centers under the aegis of the State Committee for Science and Technology [GKNT]. An example of this would be the decision to set up an all-Union intersectorial institute on the problems of metal corrosion directly under the GKNT.

Of course, the creation of an entire system of such institutes "out of the air" would be too expensive and unrealistic a matter. Rather it is a question of something else. Under the ministries and departments there are a number of large leading scientific institutions the potential of which

cannot be completely and efficiently used within the narrow departmental confines. It would be advisable to put such institutes directly under the GKNT in order to focus their forces on solving the most important intersectorial problems related to the long-range development of technology. These are primarily the institutes of the former Department of Technical Sciences of the USSR Academy of Sciences which are now under the various departments.

The institutes which would perform the role of intersectorial scientific centers must be given the rights analogous to the rights of the Institute for Electric Welding imeni Ye. O. Paton under the Ukrainian Academy of Sciences, regardless of the sector where the research results corresponding to their scientific competence will be worked out or introduced.

Among these rights could be the following:

1) The right to work out and submit to the USSR Gosplan, the USSR ministries and departments and the Union republic councils of ministers recommendations in the form of control figures on the production volumes of new types of equipment for incorporating quotas in the annual and long-range plans on their basis (correspondingly the obligation is set for these state bodies to consider the recommendations of the institute in compiling the production plans and to provide for the allocating of the necessary financial and material resources for introducing the new types of equipment);

2) The right to obtain from the sectorial scientific organizations the draft annual plans for scientific research, design and engineering work (for the subjects assigned to the given fundamental institute), to give instructions compulsory for the sectorial organizations to correct these draft plans, and to receive from them annual reports on the planned work carried out;

3) The right to exercise systematic control over the introduction of new types of equipment into the national economy and from the results of the check to prepare proposals on the basis of which the Union republic councils of ministers, the ministries and departments must approve measures to carry out the plans for introducing this equipment.

Obviously many academy institutes could also be given such rights. In addition, the head institutes of the consumer sectors must be granted the right to determine other questions relating to the organization of research and the introduction of scientific and technical achievements into production when these questions need not be brought up to the level of the leading intersectorial and academy institutes. This would guarantee the objectivity of the taken decisions and their conformity to the fundamental national economic interests. And the head institute of the producer sector should maintain the right to determine the fate of new research and development results only in those instances when these results are destined for production use within the sector itself.

The aims of intersectorial coordination in the development of science and technology can be achieved only when coordination will not be of the sort of mere approval made completely dependent upon the conformity of departmental interests, but rather a real legal imperative effect which derives from the higher national economic interest and is not reduced to the achieving of a compromise between the departments.

Understandably, under the conditions of the sectorial structure of production, any scientific and technical policy in actual terms is carried out ultimately as the operational activities of the sectorial scientific organizations, associations and enterprises. But the determining of the basic directions for the technical development of the sector cannot remain the prerogative of the scientific organizations and the departmental managerial bodies of the sector itself. This contradicts the principles of a systems approach, the reason for the existence of a unified state scientific and technical policy, the objective needs of intersectorial integration in economic development, and the interests of the broad-scale introduction of the fundamental achievements of science and technology. Ultimately the determining of the directions of technical development for sectorial production is nothing more than the policy of introducing scientific and technical achievements, and this should commence long before the stage of introduction and be based upon decisions taken on a much higher (supersectorial or statewide) level, under the general influence of fundamental science.

The importance of the raised problems is such that they can only be settled on a legislative basis. A *law on a unified scientific and technical policy in the national economy* could serve as such a basis.

What major organizational and legal decisions must be included, in our opinion, as part of this law?

First of all, it should establish a clear *delimitation of competence* on all levels of carrying out statewide scientific and technical policy.

In his article "On Ascribing Legislative Functions to the Gosplan," V. I. Lenin advanced the notion of the advisability of strengthening the particular competence of this central state institution and imparting to it the full powers of directly carrying out the state's policy in scientific and technical questions precisely because it "as an aggregate of knowledgeable persons, experts, and representatives of science and technology, possesses, in essence, the greatest data for correctly judging things,"[5] and that "a certain independence of the Gosplan is compulsory from the viewpoint of the authority of this scientific institution."[6]

Under present-day conditions in what form should Lenin's idea of linking higher scientific competence with imperative functions be realized?

We feel that in the sphere of scientific and technical policy, the establishing of the joint powers of the Gosplan, the GKNT and the USSR Academy

of Sciences could serve as such a form. A majority of the most important questions related to a unified scientific and technical policy could completely be resolved by joint decrees of the Gosplan, the GKNT (as well as the Gosstroy on major plans for new construction) and the USSR Academy of Sciences, and supervision of their execution must be entrusted to the GKNT. The shifting of the "center of gravity" in the entire system of the unified scientific and technical policy to the joint competence of the Gosplan and the GKNT would conform to the provisions of the Law Governing the USSR Council of Ministers, where the functions of the USSR state committees are clearly stipulated as bodies of the government itself in whose hands rest the distribution of resources which are to be allocated for the development of science and scientific and technical progress. And the giving of an imperative nature (through the form of joint decrees) to the decisions proposed by the USSR Academy of Sciences would be a legal realization of the instructions of the 25th Party Congress on raising the role of the USSR Academy of Sciences as the coordinator of all scientific work in the nation.

The Decree of the CPSU Central Committee and USSR Council of Ministers "On Improving Planning and Strengthening the Effect of the Economic Mechanism on Raising Production Efficiency and Work Quality" focuses on strengthening the imperative and control functions of the USSR Gosplan and the GKNT. This decree states that the Gosplan, the GKNT and the other USSR state committees are obliged first of all to concentrate the forces and resources on carrying out the most important statewide programs, without allowing a narrow sectorial approach to working out the plans. The GKNT is granted the powers to evaluate and monitor the technical level of production and the produced product.

The plan quotas stipulated by the joint decrees should have an indisputably compulsory character for the ministries and departments. From this viewpoint, the sectorial scientific research institutes, design bureaus and enterprises must be reduced to the role of the executors of the imperative decisions worked out on a statewide level, and this is possible only by using a special system of responsibility (for this see below).

This same principle must be realized on the lower levels of carrying out the unified scientific and technical policy. A predominant portion of the specific questions of an intersectorial nature of course cannot be raised to the level of joint decrees of the Gosplan, the GKNT and the USSR Academy of Sciences. Such questions, depending upon their complexity and importance, could be part of the competence of the intersectorial scientific and technical centers of the GKNT system or the academy institutes, following the legal model of the powers granted to the Institute for Electric Welding imeni Ye. O. Paton. The remaining questions of an intersectorial nature in this instance would be part of the competence of the head institutes of the consumer sectors.

Since the use of the most recent scientific and technical achievements in the designing of production methods and equipment for new or

reconstructed enterprises should be the main channel of scientific and technical progress, the proposed method for carrying out a uniform scientific and technical policy could also encompass the design sphere. This means that the proposals of the USSR Academy of Sciences (for the most important plans of state significance) and the other above-indicated scientific centers (for other plans of an intersectorial nature), in accord with the law, should be subject to compulsory use as the scientific and technical basis for these plans. This law must also stipulate that the USSR Academy of Sciences and the designated scientific centers are to be granted the right of "vetoing" the plans which do not meet the level of modern scientific and technical achievements.

The establishing of such a system for distributing competence would make it possible to solve any problems of intersectorial significance on all levels, proceeding from objective, national economic interests, and to link the power of scientific authority with the authority of [official] power. Such a system would be a direct embodiment in law of the provisions of Article 26 of the USSR Constitution dealing with statewide leadership of the development of science and technology and the introduction of their achievements into the national economy.

On a legislative basis it is also essential to introduce a uniform organizational and legal form for planning the processes of introducing scientific and technical achievements. In the place of separate poorly coordinated sections of the national economic and sectorial plans which in one manner or another regulate the rise of the scientific and technical level of production (the capital investment plan for the reconstruction and technical reequipping of the enterprises, the plan for creating and introducing new equipment, the plan for producing the most important product types, and programs for introducing new types of machinery, equipment and materials), we must work out and approve an *unified comprehensive plan for scientific and technical progress.* This plan could provide a close coordination in creating new equipment and production methods and producing new types of products on the basis of them up to the level of the complete satisfaction of the needs of the national economy and the mass use of this equipment, production methods and products in the consuming sectors.

However, for achieving such harmony in planning, it is essential to establish the unchallenged priority of the quotas found in the unified plan of scientific and technical progress, in comparison with the plans for extending the series production of an already developed stable product. In allocating resources the quotas of the unified plan should be given preference. One of the basic aspects in evaluating the draft plans for the series production of already developed products should be their full conformity to the conditions of successfully carrying out the unified plan of scientific and technical progress. Contradictions arising in the course of carrying out these plans are to be settled by the unchallenged preference for the interests of scientific and technical progress, particularly in settling the questions of financial and material-technical supply.

The law must define the procedure for carrying out *work under the comprehensive program* for solving the basic scientific and technical problems, and this would guarantee their complete and prompt fulfillment. The absence of such a procedure impedes the effective use of the methods and forms of specific program management for scientific and technical progress.

For example, the issuing of compulsory nondepartmental orders by the intersectorial scientific and technical centers could obviously serve as an effective legal form for organizing work on the basic scientific and technical programs. This form is similar to the already tested form of internal ministerial orders which are successfully employed, for example, in the electrical engineering industry. But a system of nondepartmental orders should be based upon a fundamental solution to the question of the liability of sectorial organizations for the delayed or poor quality execution of the ordered work stipulated by the program.

The cardinal problem of moving the *fundamentally new scientific and technical achievements* which revolutionize production to the "forefront of introduction" also requires a special resolution in law.

Clearly ineffective are the attempts to solve the "introduction problem" on the basis of establishing uniform legal conditions for all scientific and technical results, regardless of the level of their newness and importance for the national economy. Strictly speaking, precisely such a situation is characteristic for today as the current legal standards do not differentiate between the objects of introduction, no matter now sharply they differ from one another in terms of the importance of the contribution to scientific and technical progress. For example, all inventions entered in the state register are in the same legal status from the viewpoint of the possibilities of taking decisions concerning their practical implementation. However it is well known that the more important an invention is the more difficult its path into production. The diluting of fundamentally new, truly fundamental achievements in the general mass of the results of scientific research, inventions and rationalization proposals contradicts the objective requirements of the scientific and technical revolution.

Obviously the law governing a uniform scientific and technical policy must introduce a priority or privileged status (legal, economic and organizational) for introducing particularly important scientific and technical achievements into the national economy.

Here, in particular, provision must be made for the following: A procedure for the state (nondepartmental) expert evaluation and recognition of the achieved scientific and technical results as particularly important for the national economy (this decision would be taken jointly by the GKNT and the USSR Academy of Sciences); the establishing of a special legal category for particularly important inventions of national economic significance and the coverage of them by the proposed priority status; a procedure for priority incorporation of scientific and technical achievements recognized as particularly important in the comprehensive programs and

plans for scientific and technical progress; the creation of a system of the greatest material encouragement of the enterprises and scientific organizations for creating and introducing pioneer equipment and the complete compensation for the losses of producing and employing it in the initial period; the obligation of developer supervision over the work of creating and introducing pioneer equipment developed on the basis of scientific achievements which are recognized as particularly important for the national economy.

We should point out that the introduction of scientific and technical innovations, particularly major ones requiring a reorganization of production, will never be a painless process for the enterprise, as it objectively involves the overcoming of enormous production, organizational and psychological difficulties. In other words, an enterprise which is developing new equipment, even with the most ideal systems of generous encouragement and advanced organization, cannot have such an easy economic "sense of well being" as an enterprise which for many years has kept the production methods and produced product unchanged. For this reason the task of socialist law is not to "remove" the objective contradiction between science and material production, but rather to use it for the purposes of scientific and technical progress, that is, to turn the given external (in relation to the production system) contradiction into an internal contradiction of production itself which naturally will endeavor to resolve it. In actuality this means the creation of conditions whereby the violating of economic stability due to the factor of technical backwardness would be more profound, more abrupt and felt by an enterprise than a disruption of economic stability due to the factor of introducing scientific and technical achievements.

Up to now in discussing the problems of scientific and technical progress, basic attention has been given to the system of encouraging the enterprises to develop new equipment. At the same time, the introduction of a rigid system of negative consequences for technical backwardness is equally (if not more) important than the creation of guarantees for financial compensation and material incentives for the introduction of scientific and technical innovations.

For example, it would be advisable to approve a *general legislative presumption*: the economic consequences of a lag in the technical level should always be worse for an enterprise than the negative consequences of an introduction period, and on the basis of this an uncompromising system of special taxes should be introduced for technical backwardness. The first attempt at introducing such a tax was the formal establishing of price rebates for products classified in the second quality category with the money going to the state budget. However in actual economic life such price rebates for obsolete products have not been employed as this is prevented by the intertwining of conditions for the basic focus of production on the growth of cost volumes.

In accord with the decree of the CPSU Central Committee and the USSR Council of Ministers on improving planning and the economic mechanism, the price rebates on products of the second quality category should be compulsory; a definite procedure for applying them is provided. Subsequently these rebates could be supplemented by other types of taxes. Thus, gradually an uncompromising system would be developed of special taxes "on technical obsolescence." Obviously such taxes could be levied on obsolete products and old production methods by decisions of both the GKNT and the USSR Gosstandart [State Standards Committee].

Of extreme importance is a fundamental solution to the problem of the *liability* of the organizations, enterprises and their leaders for the nonfulfillment of the obligations established by the various legal prescripts in the sphere of carrying out the unified scientific and technical policy. No policy is possible without real power, and powers which are not reinforced by a system of effective liability of the executors are, in the words of Lenin, merely "an empty rattling of the air with empty sound."[7]

In particular, it would be justified to introduce a special procedure for reviewing in the USSR People's Control Committee and the republic people's control committees cases dealing with the instituting of proceedings against specific officials related to the nonfulfillment of assignments in the sphere of the unified scientific and technical policy, for example, to institute a procedure whereby the people's control committees would draw up rulings on monetary penalties and other administrative punishments from the materials of the cases prepared by the GKNT.

The law must also regulate certain other conditions for carrying out a uniform scientific and technical policy in the national economy. These include:

1) The planning and organizational principles for creating and introducing integrated production systems (systems of machines and equipment, technology for the complete utilization of raw materials with the uniting of different types of production into a single cycle, waste-free technology, and so forth);

2) Specific requirements for the ecological safety of the equipment and production methods being developed;

3) A procedure for standardizing technical articles (elements), for creating standardized modules (blocks), and the compulsory use of standardized elements and blocks in design and production development;

4) Unified standard definitions of "the introduction of new equipment" and "the introduction of new production methods" which should be applied also for evaluating the fulfillments of the scientific and technical progress plans, both for paying bonuses and for the purposes of statistical accounting.

Also awaiting legal definition are the new forms of contractual relationships arising in the process of solving major comprehensive technical problems and the introduction of fundamental scientific and technical achievements. These are the *long-term contracts on cooperation* between the academy institutes and the major enterprises (associations). The main legal distinction of such contracts from the ordinary contracts is the absence of a strict delimitation of the parties into the pure "executor" and the pure "client." The plant operates both as the client or orderer of technical specifications and also the executor of experimental work needed by the institute for the further development of research. In posing fundamentally new technical problems, the starting point is not so much the current production needs of the enterprise as the long-range goals of the development of technology as defined by science itself. But the enterprise selects from the experimental developments of the institute those innovations which it is capable of introducing into production in the immediate planned period. In addition, in contrast to the ordinary economic contracts for the executing of scientific research and experimental design work, the cooperation contracts most often have a multilateral nature. Thus, before our very eyes a new type of contract has arisen which has still not gained either a precise legal name or a definition of its legal nature. In practice it is also termed a contract of socialist cooperation, since it is based upon reciprocal socialist obligations and is drawn up on "social bases" without legal support from current legislation.

Sometimes it is termed a general contract in those instances when it represents a compendium of reciprocal long-term obligations between an academy scientific center (bringing together several institutes) and the enterprises of a sectorial ministry, when it is signed by the directors of all the organizations participating in the cooperation, and is approved by the minister and the leader of the academy center. Thus, the USSR minister of the electronics industry and the president of the Ukrainian Academy of Sciences have approved a contract on organizing specific scientific and technical cooperation to carry out a comprehensive program on the "quality of electron beam instruments." Similar general contracts have been concluded between the Siberian Division of the USSR Academy of Sciences and the Noril'sk Mining and Metallurgical Combine, and between the Urals Scientific Center of the USSR Academy of Sciences and the RSFSR Ministry of Geology. But naturally practice by itself cannot provide a legal description of relationships which are not even mentioned in the legislation.

An analysis and generalization of the particular features of the new system of contractual ties between science and production lead to the conclusion that these ties represent nothing more than cooperation or subcontracting relationships. Subcontracting contracts are widely used in international scientific and technical cooperation, however they have not been described in our domestic legislation. Such contracts differ fundamentally from regular contracts and are considered in the type of "association contracts" which also have not been given a general definition in the current civil legislation.

Unfortunately, as yet the enormous possibilities opened up by the legislative reinforcing, by the development and broad use of the new system of contractual relationships as an organizational, economic and legal form of turning science into a direct productive force have not been realized. On the level of the statewide programs, as yet only planning and coordinating forms are employed. But the contracts concerned with long-range cooperation between science and production literally have been specially developed for the needs of the legal organization of specific program management, since contractual cooperation is a system of relationships arising in the process of the multiple joint activities of different participants aimed at achieving a common goal (the introduction of a comprehensive scientific and technical result into production).

The contractual forms of long-range cooperation, under the condition of their legislative reinforcement, would make it possible to solve many specific problems of the economic responsibility and interests of organizations involved in carrying out the goals of specific scientific and technical programs. The sectorial ministries and scientific centers (including the republic academies of sciences) could act as the guarantors for the carrying out of contractual obligations by the institutes, design bureaus, associations and enterprises within the system of long-term cooperation.

The time spent on introducing the results of scientific discoveries and major inventions into the national economy is becoming a major resource which in addition, in contrast to many other resources, is not replenishable. The delay in the actual implementing of scientific and technical achievements causes as much harm to the national economy as natural disasters, only these losses cannot be calculated. Possibly it would be worth studying the question of introducing a special system of unified statistical accounting for such losses. Society should have a clear notion of how much it is losing due to the unresolved basic problems of introducing scientific and technical achievements.

FOOTNOTES

[1]See: SP SSSR [Collection of USSR Decrees], No 18, 1968, Article 122.

[2]See ibid.

[3]V. I. Lenin, "Complete Collected Works," Vol 33, p 99.

[4]TRUD, 1 February 1975.

[5]V. I. Lenin, op. cit., Vol 45, p 349.

[6]Ibid., p 352.

[7]Ibid., Vol 32, p 340.

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CSO: 8144/0433

COORDINATING ROLE OF URALS SCIENTIFIC CENTER DESCRIBED

Moscow NAUKA--NARODNOMU KHOZYAYSTVU in Russian 1979 signed to press 16 Feb 79 pp 41-55

[Article by Academician S. V. Vonsovskiy: "The Scientific Center and the Productive Forces of a Region" in the book "Nauka--Narodnomu Khozyaystvu" (Science for the National Economy) edited by I. M. Pospelova, Izdatel'stvo Sovetskaya Rossiya]

[Excerpts] To an ever greater degree a rise in production efficiency and quality is determined at present by scientific and technical progress, and by the degree of the actual use of scientific knowledge which causes a transformation of the implements of production. For this reason the party considers research on the laws of nature and society and the determining of fundamentally new ways and possibilities for the development of the productive forces and for creating the equipment and production methods of the future to be a general direction in the development of all Soviet science and its chief staff and center, the USSR Academy of Sciences. And one of the important conditions for solving this problem is the rational placement of scientific centers and institutions. At present the territorial placement of the network of scientific centers and institutions has become one of the important aspects of state policy in the scientific sphere.

In our nation there is an extensive network of scientific organizations including the USSR Academy of Sciences, the Union republic academies of sciences, the sectorial research and design institutions of the ministries and departments, and the laboratories of the instututions of higher learning. Along with them new scientific centers are at work in Siberia, the Urals, the Far East and the Northern Caucasus. There are also other forms for the organization and location of science, among which one might mention the scientific centers of the USSR Academy of Sciences in the Greater Moscow Region, where at present several scientific towns are already functioning such as Noginsk, Pushchino, Obninsk, Dubna, Serpukhov and Krasnaya Pakhra. The regional scientific centers coordinated by the USSR Academy of Sciences possess highly skilled personnel and the appropriate physical plant, and they conduct research in the most diverse areas of knowledge.

For this reason, when we speak of the broad application of scientific results in the national economy, we have in mind the advance of the entire front of Soviet science and all the scientific centers and affiliates of the Academy of Sciences.

Under present-day conditions, in social production a change is occurring from extensive development factors to intensive ones. This process has also encompassed scientific creativity. Scientific development more and more is being determined not only and not so much by the quantitative growth of scientific institutions and an increase in allocations and personnel, but primarily by a rise in the effectiveness of the research itself, by the greater productivity of scientific searches and by the newness and originality of the developments.

At present the questions of scientific development in the various regions of the nation, as never before, are closely linked to the development of their economy. As is known, with the sectorial approach to economic development it is difficult to solve the questions of proportional development and the rational shaping of the economy in one or another region, as well as the problems of regulating the territorial proportions and leveling out the economic development levels of the individual regions of the country, and the efficient and comprehensive use of the local material, labor and natural (water, fuel, energy, land and so forth) resources. Here, in particular, the regional multipurpose resources are far from fully utilized, the mineral and labor resources are incompletely used, and the water, forest and land wealth is irrationally exploited.

On the other hand, with a purely territorial approach, the opportunities are restricted for carrying out a unified technical policy at the enterprises of each sector, as well as for establishing the optimum intrasectorial proportions.

The sectorial and territorial aspects of economic leadership not only do not oppose one another, but form an inseparable relationship. The absolutizing of any approach can lead either to an unjustified scattering of the sectorial management system over numerous territorial management bodies, to the manifestation of local tendencies, or to the breaking up of a management system for an entire regional economic complex among several sectorial bodies, and to departmentalism. For this reason the party proceeds from the necessity of combining the sectorial system of national economic management with a territorial one and the subordinating of all aspects of management to the common socioeconomic tasks.

These fundamental notions and provisions have been considered by the party also in working out and implementing the policy in the area of scientific development. Here certainly the particular features of science are taken into account as forms of social awareness. The existing organization of science by specialty, when it is broken up into the well-known scientific areas, has recently been supplemented by a regional organization (by scientific centers and by large interdisciplinary territorial associations of

scientific institutions). At the present stage there is growing importance for the link of centrally planned research in the most important scientific areas with the solving of regional problems. This helps to develop interdisciplinary scientific research and the rational development of regional labor and natural resources.

As a result of the development of scientific centers, an effect is achieved of conglomeration (unification or association) of the scientific forces in a region, and due to this there is a significant rise in the effective development of science itself, and in addition optimum forms of combining science with production are realized.

If one turns to the problems of the growth of the productive forces in the Urals Economic Region, then among the most important factors determining its development one must put the great and highly skilled scientific potential which is concentrated here.

As is well known, the economy of a region grows up around the basic types of production activity which are its core. And the specialization of a certain region is determined by the available economic and natural resources, by the economic-geographic position, and by the historically shaped conditions.

There are also definite patterns in the economic and scientific development of one or another region of the nation. Thus, in the Urals there have developed those economic and production sectors for which the appropriate natural and labor resources existed. As for science, here as well those scientific directions developed first which were closely linked with the Urals economy. And only later did new areas of research begin to arise which were not directly tied to production. The carrying out of such research is dictated by the inner logic of the development of the fundamental scientific areas.

The Urals are the most interesting portion of the nation in terms of their geology. A study of the geology of the Urals and the search for new mineral deposits are tasks of primary importance. Historically it developed that the growing industrial Urals with their unique natural and skilled labor resources confronted scientists with complicated and responsible tasks in the area of providing a scientific generalization for the data of geological and geophysical prospecting for its natural riches, for the physicochemical study of the complex natural composition of the various ores and minerals, and most importantly, for developing new progressive methods for their industrial exploitation. This is why even in the prewar years, many scientific research and design institutes in the corresponding areas were concentrated in the Urals. And now, when there has been a significant rise in the share of the Urals in the economy of the entire USSR in terms of the output of gross product, and for individual types this reaches 30 percent, its scientific potential is ever more increasing. The extensive network of scientific research, sectorial and design institutes, and of higher and

specialized and secondary institutions of learning creates favorable prerequisites for solving scientific-technical and other tasks posed by the growing national economy, and for accelerating scientific and technical progress in all sectors.

For the purposes of a further active study and development of the productive forces in our region, the Urals Scientific Center of the USSR Academy of Sciences (UNTs) has been formed. It was created on the basis of the scientific institutions which already existed beginning from the 1930's of the Urals Affiliate of the USSR Academy of Sciences, the Institute of Metal Physics of the USSR Academy of Sciences and the Mathematics Institute of the USSR Academy of Sciences which was created somewhat later. The scientific center has been entrusted with the following basic missions:

1) The development of fundamental research in the area of natural and social sciences;

2) The elaboration of scientific problems helping to accelerate the development of the economy and productive forces in the Urals;

3) The training of skilled scientific personnel;

4) The coordinating of research on natural and social sciences and which is being carried out by the scientific institutions of the USSR Academy of Sciences and the VUZes, as well as by the organizations of the other ministries and departments located on the territory of the Urals Economic Region.

It must be pointed out that extensive work is being carried out in this area by the institutes of the UNTs.

Within the system of basic factors related to the intensification of social production (science--technology--management--education), the starting point is science which, in essence, has revolutionized the technical and technological basis of production. For this reason at present all Soviet scientists, including the scientists of the Urals, are confronted with a biune task: a rise in the effectiveness of scientific work and a significant acceleration of the industrial use of scientific achievements.

In the practical utilization of results from fundamental research which is the main source of new technical ideas, it is essential to consider that in a majority of instances this research does not provide ready-made technological solutions, but contains only the idea or indication of the possibility of developing new production methods or a new instrument. Special technical, technological and engineering search is required for turning this possibility into reality. The unification and concentration of the fundamental and applied research, the design developments and experimental work in certain institutions is an important means for further raising the effectiveness of scientific research the reserves of which are still far from fully utilized.

The problems of scientific development are constantly at the center of attention of the local party organizations. Thus, the Sverdlovsksya party obkom at the outset of each five-year plan conducts a practical scientific conference on utilizing scientific and technical achievements in the economy of the Middle Urals. In particular, the third such conference in 1976 outlined a specific program of actions for 1976-1980, and as a result of carrying out this program the scientists and production workers are carrying out many valuable developments in close cooperation.

One of the basic tasks confronting the UNTs, as was pointed out above, is the coordinating of research on natural and social sciences and which is carried out in this region by the various scientific organizations. The pooling of efforts by scientists from the scientific research and design institutes and VUZes helps to accelerate the solving of problems and avoid unnecessary duplication.

For coordinating the research in the area of natural and social sciences being carried out by the institutions of the UNTs, by the VUZes, as well as by the institutions of the various ministries and departments located in the Urals, an Interdepartmental Coordination Council (MSK) for Scientific Research was set up under the Presidium of the UNTs with the rights of a consultative body. The council determines the range of scientific problems, the subjects, and the list of organizations to be involved in the coordination; it isolates particularly important interdisciplinary problems which require the carrying out of joint research by the forces of the scientific institutions of the UNTs, the ministries and departments; it examines the research plans for the problems being coordinated.

Our scientists work closely with 450 scientific institutions and industrial enterprises of the nation. In the activities of the scientific institutions a most important role is played by research on the problem of increasing the efficiency of social production in the Urals Economic Region. Naturally the solution to this problem depends upon the ties of the UNTs institutes with the sectorial scientific research institutes, the VUZes, the leading enterprises and associations located on the territory of the Urals oblasts and the Udmurt ASSR. Thus, general contracts have long been in effect on cooperation with the Uralmash [Urals Machinery] and Uralelektrotyazhmash [Urals Heavy Electrical Machinery] Production Associations, with the Uralkhimmash [Urals Chemical Machinery] Plant, and many others.

The institutes of the UNTs are also obliged to work out and submit to the ministries and departments and to the directive bodies recommendations on utilizing the research results in the national economy for particularly important coordinated problems, and to issue recommendations on the patenting of discoveries. But here at times the "science--equipment--production" chain is broken, and the dates for introducing valuable scientific ideas and developments for the national economy are drawn out for long years. Because of this the national economy suffers great losses, and in addition the effectiveness of scientific expenditures is reduced.

At present, in considering the experience of the Siberian Division of the USSR Academy of Sciences, we have followed the path of creating engineer subdivions in the academy institutes themselves, and these subdivisions should work up and bring the proposals of the scientists to a stage of practical realization.

For introducing scientific-technical developments and recommendations into production, the scientists of the UNTs utilize the following forms of contacts with the industrial enterprises: the concluding of economic contracts and contracts on socialist cooperation, as well as general contracts with major production associations and enterprises; the organizing of laboratories of the UNTs scientific institutions directly at the enterprises; the setting up of coordinating and executive councils to solve major scientific and technical problems; the providing of procedural aid, the holding of consultations, and so forth.

The experience of many years has convinced us that primarily major scientific ideas should be introduced. The use of particular small-scale scientific results, as a rule, has little impact on the production level, and at the same time ties up significant forces of scientists and practical workers. For this reason the introduction into the sector, the mass dissemination of scientific results, and the concentrating of forces on major interdisciplinary scientific developments are the main concern of the institutes of the UNTs and the VUZes.

The solving of these problems has been significantly aided by the cooperation programs of the UNTs with entire national economic sectors, that is, with the industrial ministries. The first of them was drawn up with the USSR Ministry of Nonferrous Metallurgy. The second such general contract was concluded with the RSFSR Ministry of Geology. The concluding of such a general contract on creative scientific and technical cooperation is of exceptionally important significance. This will make it possible to plan scientific research over the long run, and this will create good conditions for reducing the time required to introduce completed developments into production, and will contribute to the comprehensive solution to a number of important scientific, technical and socioeconomic problems of nonferrous metallurgy and the questions of practical geology.

Equally important is the path of developing fundamental science and a comprehensive solution to scientific and technical problems. This path involves long-range general contracts on creative cooperation between the UNTs and the major production associations and plants of the Urals. The direct involvement of plant specialists in the adjusting and introduction of developments significantly reduces the time required to create and introduce new production processes, and it raises the quality and effectiveness of the work.

The presently occurring strengthening of production concentration has been characterized by an increase in the scale of production, by the revamping

of industrial potential and produced products on the basis of introducing the most recent scientific and technical achievements, by consolidating the primary production management unit by organizing large production and scientific-production associations, and by concentrating in large complexes under single leadership not only groups of interrelated enterprises but also strong scientific and design forces. In this regard it can be pointed out that in the UNTs a new and, we feel, very promising form was originated for ties between the Urals academy institutions and industry. This is the creation of unique support bases of the institutes directly at the enterprises themselves. Thus, upon a petition of the Rezhevskiy Nickel Plant in Sverdlovskaya Oblast, on its territory an affiliate of the Laboratory for Nonferrous Metal Pyrometallurgy of the Metallurgy Institute of the UNTs was organized. The production areas and equipment were provided by the plant, and the UNTs makes up the personnel of scientific coworkers. On this basis a long-range program has been worked out and is being implemented to fundamentally improve the method of refining the oxidized nickel ores. Already the first results have been expressed in a reduction of the nickel losses and in lower consumption of scarce blast furnace coke.

The scientists of our Center are earnestly searching for reserves to increase the return from the scientific potential. The obtained results can be considered promising. The economic effect from introducing the developments of an applied nature during the time the UNTs has existed exceeds already 100 million rubles. Many developments of the scientists have provided a significant social effect, for example, they have helped to prevent environmental pollution, to improve and ease working conditions in production, and so forth.

The Accountability Report of the CPSU Central Committee to the 25th Party Congress emphasizes that "...only on the basis of the accelerated development of science and technology is it possible to solve the fundamental missions of the social revolution, that is, to build a communist society." The Urals scientists, as was pointed out above, have also made their contribution to this nationwide concern. However, it must be pointed out that there still are many reserves for improving the efficient use of the material, production and scientific potential. First of all, the absence of a strong and modern base for the experimental industrial testing of new production processes and materials as well as the lack of an experimental plant to produce the instruments and equipment are a significant obstacle on the path to successfully carrying out the planned measures.

As is known, the introduction of scientific developments depends upon many economic organizations. However, due to departmental affiliation at times they have no opportunity to solve these questions independently and efficiently, and this significantly complicates the prompt use of scientific achievements in production practice. It must also be pointed out that a large number of scientific research projects is economically unsound due to the lack of any method to determine the specific economic effectiveness of the individual proposed measures. And this somewhat reduces the interest of the enterprises to use them. In addition, the bringing of the

research to the point of introduction is impeded by a lack of production area for locating the equipment, as well as by the unsatisfactory organization of material and technical supply, particularly in the VUZes.

Under present-day conditions, the scientific information received depends largely upon the accuracy and sensitivity of instruments. The new method of research and measurement as well as the use of new high-class instruments provide an opportunity to pose and solve fundamentally different problems. For this reason, a rise in the labor productivity of scientists and the better quality of this labor to a decisive degree depend upon the equipping of scientific institutions with modern highly productive automated laboratory equipment and computers, and upon the elaboration of modern metering systems. Here it is essential to stress that the equipping of scientific laboratories with the most modern methods of measurement and research will also have an impact on improving the quality of work of the sectorial institutes, the plant laboratories, and hence, industry as a whole.

The present-day structure of science is unusually fluid and dynamic. This leads to the necessity of creating scientific subdivisions with flexible organizational ties making it possible when necessary to change the research program and to participate in interdisciplinary scientific developments. Precisely such interdisciplinary scientific programs worked out by the efforts of a number of related and even adjacent scientific research organizations which come together for achieving a common goal are becoming ever more characteristic for modern science.

The collective of the UNTs of the USSR Academy of Sciences, along with all the people of the Urals, feels the daily concern of the party and the government for the development of our region, for the growth and improving of its productive forces, and for raising its scientific potential. Over the Ninth Five-Year Plan, 2.5-fold more money was spent on developing the physical plant of the UNTs than during the Eighth Five-Year Plan. Large amounts of money have also been allocated in the Tenth Five-Year Plan. At the institutes modern scientific instruments and equipment are being put into use, and allocations on housing and cultural-service construction have been increased.

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CSO: 8144/0433

SIBERIAN DIVISION OF USSR ACADEMY OF SCIENCES ORGANIZES DEVELOPMENT RESEARCH

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 9, Sep 79 pp 51-55

[Article by Candidate of Geological-Mineralogical Sciences F. V. Sukhorukov, and Candidate of Economic Sciences A. P. Dubnov: "The 'Siberia' Program, A System for Directing Scientific Research"]

[Text] The Communist Party and the Soviet government have constantly devoted great attention to the development of the productive forces in Siberia.

A vivid manifestation of the party's concern for the development of Siberian science was the Decree of the CPSU Central Committee on the activities of the Siberian Division of the USSR Academy of Sciences in the area of developing fundamental and applied research, raising its effectiveness, introducing scientific achievements into the national economy, and the training of personnel.

The Siberian Division of the USSR Academy of Sciences together with the Siberian scientific research institutions and VUZes, is working out an interdisciplinary program called Siberia [Sibir'], a program for studying the natural resources of the region.

In accord with the basic aims of the program which includes 30 regional programs, the Siberian scientists will work out the problems related to the further development of the regional fuel and energy base, to the development of the territorial production complexes of Western and Eastern Siberia, including the economic development of the BAM [Baykal-Amur Mainline] zone, and to the integrated and rational use of all the natural resources of the region.

The Siberian Division of the USSR Academy of Sciences will be the chief coordinator of the research included in the

Siberia Program and the organizer of introducing the scientific achievements into practice. In carrying out this grandiose program an active part will also be taken by many ministries and departments, the Siberian Division of the All-Union Academy of Agricultural Sciences imeni Lenin, the Siberian Affiliate of the USSR Academy of Medical Sciences, as well as the major enterprises and sectorial institutes.

The successful solution to the crucial tasks posed by the Siberia Program will depend largely upon the precise organization of the management of the vast and lengthy work of implementing it.

The article by V. F. Sukhorukov, chief of the section of regional programs under the Administration for the Organization of Scientific Research (UONI) of the Presidium of the Siberian Division of the USSR Academy of Sciences, and A. P. Dubnov, scientific secretary for economic and humanitarian sciences of the UONI, is devoted to the questions of the organization of the management system for scientific research under the Siberia Program.

The program for the interdisciplinary study of the natural resources of Siberia (the Siberia Program) was drawn up by the Siberian Division of the USSR Academy of Sciences, and approved in February 1978 at the Division General Meeting. The leaders of the Division, Academicians G. I. Marchuk and A. A. Trofimuk, have described this program in their articles which have been published in the mass press.

The General Meeting of the Siberian Division of the USSR Academy of Sciences approved the basic principles for leading the academy and sectorial scientific institutions and the VUZes of Siberia which will be involved in studying the problems comprising the interdisciplinary Siberia Program.

The main task which must be carried out in creating the new leadership system is to pool the efforts of all the involved departments and institutions in scientifically establishing the strategy for the socioeconomic development of Siberia over the long run.

In following the specific program approach, for solving the very complex problems under the Siberia Program, there are plans to set up (on the basis of the system existing in the Siberian Division of the USSR Academy of Sciences for organizing scientific research and development and the introduction of them into practice) a new system for directing the elaboration and implementation of the specific programs which comprise the unified interdisciplinary program.

The effectiveness of the leadership over the scientific research and developments carried out within the specific long-range programs depends upon

numerous factors, and above all upon the competence of the leading specialists and program leaders, upon the ability of the management personnel to ensure a high quality of comprehensive planning, as well as upon the coordinated actions of the executors.

The creation of a system for managing the activities related to implementing such a large-scale and long-term program is a multistage process of adapting the already existing management system to the new and responsible tasks.

During the first stage of setting up the system for directing the Siberia Program, three management levels are to be organized (on the basis of the long existing system for managing scientific research in the Siberian Division of the USSR Academy of Sciences).

The first (higher) management level--the Scientific Council for the Siberia Program and the executive body of the council.

The Scientific Council is headed by one of the leaders of the Siberian Division of the USSR Academy of Sciences and the main program coordinators. It includes the coordinators of all the specific programs, the leaders of the scientific research institutions involved in the elaboration and implementation of the Siberia Program but not part of the system of the Siberian Division of the USSR Academy of Sciences, as well as representatives from the staff of the Department Presidium.

The Scientific Council brings together the activities of four sections which are headed by the main program coordinators. These are the resource-raw material sections (mineral and biological resources), the regional economic section and the section for particularly complicated programs.

The executive body is formed by the Presidium of the Siberian Division of the USSR Academy of Sciences. Its basis is the Administration for the Organization of Scientific Research (UONI) of the Siberian Division of the USSR Academy of Sciences (the section for regional programs and the development of peripheral centers). Leadership of the executive body is entrusted to the main scientific secretary of the Siberian Division of the USSR Academy of Sciences.

The second management level is the Coordinating Council for the Specific Program and the executive body for this program.

The Coordinating Council is headed by the coordinator of the specific program. The council includes the leaders of the subprograms who represent all the organizations participating in the elaboration and implementation of the specific program.

The personnel of the executive body is formed by the coordinator of the specific program. The scientific secretary who heads this body is under

the program coordinator as well as the chief of the UONI of the Siberian Division and one of his deputies.

The third level is the scientific collectives formed for the period needed to carry out the specific research and development comprising a certain specific program.

The personnel of the scientific collectives includes scientists and specialists from institutions of differing departmental affiliation. These collectives are led by executives who are under the leadership of their institution and the coordinator of the specific program.

The three management levels which were described above are vertical levels for contacts within the system for directing the Siberia Program. The structure of the horizontal ties of each program management level with the state bodies, the various organizations and institutions still requires further serious working up.

The forming of the Siberia Program is still in the initial stage. Many involved question must still be solved. For example, we should determine the state status of the program, its legal and financial resource powers, and the basic principles and conditions should be worked out for transferring the results of the scientific research and developments to the planning and economic bodies. Even now it is essential to determine precisely what expenditures are needed for the research on each of the natural resources of Siberia (both in the Siberian Division of the USSR Academy of Sciences as well as in the departments participating in carrying out the program). It is also essential to determine the necessary expenditures of the Siberian Division for carrying out the Siberia Program over the longer run.

In the initial stage it is also essential to organize the system for directing the Siberia Program. This is a period of transition from the existing system of planning, organizing and managing the academy, sectorial and VUZ research to a system of directing the elaboration and implementation of the specific programs.

In this regard particular attention must be given to defining the functions of the various program management levels, and the content of the leadership of each of these management elements must be clearly elucidated. It is also essential to disclose what impedes the transition from the presently existing management system to the specific system, and what measures must be taken for facilitating this transition.

The main principles which underlie the allocation of functions between the different management levels for the specific program system consist in the following. Each of the previously mentioned management levels of the Siberia Program is given definite powers in planning the program and its component parts, in carrying out structural organizational policy which considers the coordination of research and development, in recruiting and placing personnel, in using and allocating financial and material resources,

in specific management which includes control and analysis of scientific activities by the subdivisions subordinate to the given body, as well as the use of various sanctions and incentive measures for these activities, in establishing contact with all levels of leadership, in evaluating the effectiveness of the entire program leadership system, and so forth.

In accord with these basic principles, on the first management level the basic leadership functions are integrated, and decisions are taken on the questions which ensure the implementing of the Siberia Program as a whole, for transforming the previous planning procedures, for seeking out personnel, financial and material resources, and allocating them to the specific programs.

The first level leadership bodies rank the specific programs in terms of the degree of their importance, they determine the aims and tasks of these programs, they help them in organizational interaction, and they establish the dates for implementing the specific programs as well as the degree of liability and obligation of their leaders. In this way a basis is created for taking decisions by the leadership of the inferior management levels. The personnel of the specific program coordinators is also examined and approved on the first management level.

The leadership of the second management level, in relying on the basic decisions of the first level leadership, details the specific plans, and provides proper use of the personnel, the financial and material resources, as well as the rational organization and coordination of the work done by the researcher and developer collectives. On this management level, the quality of the research and development carried out is analyzed, control over the fulfillment of the program is exercised, and decisions are taken related to the forming, elaboration and implementation of the specific program. Precisely here is concentrated the specific information on the results of the work done by the subprogram coordinators, the responsible executors and the scientific research collectives directly involved in solving the problems of a certain specific program. Such information is essential for evaluating the progress made in the planned works toward the ultimate and intermediate goals.

The third level provides direct leadership over the scientific research carried out in the subdivisions of the scientific organizations involved in working out the program. In the first stages of introducing the specific program system, the leadership functions on this level virtually do not differ from the previous ones.

The specific management functions on the various leadership levels of the Siberia Program can be briefly described in the following manner. The first management level works out the strategy of the program. This involves the selecting of goals, the defining of resources, the questions of organization and management, as well as assessing the results of all the work. On this level key decisions are taken which consider national interests, and the overall strategy of the program is coordinated with the

superior state and party bodies as well as the departments having jurisdiction over the organizations coordinated by the Scientific Council.

The second management level reviews the basic questions related to the organization and management of the process of working out and implementing the specific concrete programs.

The third level provides direct leadership over the process of transforming the fundamental research results into the end and intermediate results of the specific program, and the preparation of them for use on the various national economic levels and for incorporation in the state economic and social development plans.

The functions of the different-level leadership bodies managing the Siberia Program can be finally defined only in the process of the forming, elaboration and implementation of the specific programs.

The Siberian Division of the USSR Academy of Sciences has created a permanent scientific practical seminar for the scientific secretaries. This is the initial element in the system of measures related to the scientific organizational support for the leadership of the Siberia Program.

The first meeting of the seminar was held on 14-15 June 1978. The basic aims of this session were: to evaluate the state of the scientific organizational work related to the Siberia Program in the first half of 1978, to discuss the content of the work, the functions and status of the scientific secretary of the program's coordinating council, to define the main areas of joint work for the scientific secretaries of the programs and the Regional Program Section of the UONI in the area of long-range and operational planning and management, as well as the informational support for the leadership of the specific program.

The seminar examined the statutes of the Scientific Council of the Siberia Program, the Coordinating Council of the Specific Program, the rights and duties of the coordinator and scientific secretary of the Coordinating Council of the Specific Program.

The assignment was formulated for the scientific secretaries of the coordinating councils for their independent elaboration of each individual specific program. In accord with this assignment, the scientific secretaries should draw up their own proposals on the quantity of interrelated stages during which there will be carried out the selection, evaluation, elaboration, testing, production and technical use of the results of the fundamental research carried out in the sectorial, intersectorial or territorial-production complexes, as well as proposals which ensure the realization of the aims of each individual program.

Also discussed were the proposals of the scientific secretaries dealing with the use of the methods of network planning and management, as well as the creation of a data bank for the Siberia Program.

The second session of the seminar was held on 24-25 December 1978, and at this preliminary results were given for carrying out the Siberia Program in 1978, for its organizational support, and measures were also outlined for 1979.

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CSO: 8144/0433

SIBERIAN DIVISION OF ACADEMY OF SCIENCES IMPROVES TIES WITH INDUSTRY

Moscow NAUKA--NARODNOMU KHOZYAYSTVU in Russian 1979 signed to press 16 Feb 79 pp 18-40

[Article by Academician G. I. Marchuk: "Scientists of Siberia for the Nation" in the book "Nauka--Narodnomu Khozyaystvu" (Science for the National Economy) edited by I. M. Pospelova, Izdatel'stvo Sovetskaya Rossiya]

[Excerpts] The high development rates of the productive forces and the new complicated tasks of tapping the regions of Siberia urgently require a strengthening of scientific and technical potential in the East of the nation and a closer link between scientists and production workers.

At the beginning of 1977, the CPSU Central Committee reviewed the activities of the Siberian Division in the area of developing fundamental and applied scientific research, raising its effectiveness, introducing scientific achievements into the national economy, and the training of personnel. A decree of the Central Committee sums up the results of the work done by the division, and outlines a long-range program for its activities.

The Siberian Division is carrying out extensive work to improve the forms of scientific management and this is aimed at concentrating the scientific forces and equipment. This work is based upon specific program planning and financing.

The State Committee of the USSR Council of Ministers on Science and Technology [GKNT], the RSFSR Council of Ministers and the USSR Academy of Sciences are helping to organize interdisciplinary programs on the major problems. They are giving particular significance to the financial and material-technical support for this work. Precisely such major programs are of enormous significance for the development of science itself, and they create a firm foundation for applied research and the introduction of fundamentally new ideas into the national economy. The Siberian Division is involved in 105 comprehensive programs being coordinated by the GKNT on the most important problems of scientific and technical progress in the national economy. Another 15 coordination programs on major fundamental scientific problems have been drawn up by the Siberian Division. These

involve 30 institutes of the Division in various specialties. Such programs have been created and are being implemented in the area of turbulence, microelectronics, laser physics and laser engineering, catalysis, molecular biology, the use of mathematical methods in chemistry, the development of the units and software for optical computers, the automating of scientific research and other areas. An essential feature of the coordinating program is the fact that they encompass the entire cycle of work from profound scientific research to the introduction of the obtained results into production.

In efficiently maneuvering resources, the presidium of the Siberian Division of the USSR Academy of Sciences has provided specific financing for carrying out major problems without an additional increase in allocations from the budget. This is an effective form of financing.

The creation of regional programs of the Division is also a new form for organizing major interdisciplinary researc , and these programs are aimed at contributing to the tapping of the natural resources and developing the productive forces of Siberia. Their implementation requires not only extensive cooperation by the Division institutes, but also the attracting of a large number of institutions from other departments, as well as close interaction with the party and soviet bodies. The major regional programs of the Division are related to the problem of Lake Baykal and to the economic development of the zone of the BAM [Baykal-Amur Mainline].

The advances in the area of fundamental research have also been the basis for the development of applied work and for solving the second main task of the Division, namely the introduction of scientific results into national economic practice.

The experience of the Siberian Division in the area of contacts with the national economy was commented on by Comrade L. I. Brezhnev in his speech at a meeting with the leaders of the academies of sciences of the socialist countries.

The Siberian Division carries out scientific and technical cooperation with 300 enterprises in the nation. During the Ninth Five-Year Plan alone, Division scientists turned over more than 700 major developments for use in the national economy in machine building, nonferrous and ferrous metallurgy, the chemical, aviation, radioengineering and other industrial sectors as well as agriculture.

The exploratory work, the applied research, the laboratory developments and introduction into practice are carried out by the institutes of the Siberian Division of the USSR Academy of Sciences on the basis of the extensive industry of Novosibirsk, Krasnoyarsk, Irkutsk, Tomsk and other Siberian cities.

We are endeavoring that the results of the scientific research gain application not only at individual enterprises but also in entire national economic sectors. We feel that "use in the sector" should become the chief mechanism of the link between science and production, and involve each sector and each enterprise.

The path from the idea on the tip of a pen or from a test tube to a large installation or chemical combine is long, complicated and often thorny.

How can one see to it that a scientific development is quickly taken up by an entire sector? It is possible to point to several real, already proven ways for the extensive realization of scientific research. I will take up three examples from the experience of the Siberian Division which in different ways illustrate the same idea.

The first example is related to the mining industry. The start to this work was made at the Tashtagol Mine in Mountain Shoria, where iron ore is mined for the Novokuznetsk Metallurgical Combine. This mine employs many real enthusiasts for their job, starting from the mine chief and the chief engineer and ending with the young Komsomol collective.

They turned to the Mining Institute of the Siberian Division of the USSR Academy of Sciences for advice on what could be done to substantially alter and ease the heavy work of the miners. The scientists arrived at the mine. Cooperation started up. The joint work lasted about 7 years. As a result at this mine fundamental problems were solved and these would have been beyond the boldest production engineer and the most venerable scientist if they had not pooled their knowledge and efforts.

Without exaggeration it can be said that there was a true revolution in ore mining techniques. When this system began operating on one face, the remaining 20 faces had to be closed down. It alone produced as much ore as could be brought to the surface from all the other faces. Labor productivity in underground work rose by 4-fold, and for the entire mine by 2-3-fold. In terms of productivity it reached first place in the world. Working conditions changed abruptly and work was more mechanized and safer.

The USSR Ministry of Ferrous Metallurgy actively supported the developed method. At the mine a 2-week seminar was held for the chief specialists of the associations and mines of the ministry. It was recommended that all the mines of the sector with similar mining and geological conditions convert to the new method.

Here we for the first time felt the might and promise of our system of introduction. And it is merely a question of carrying the question out fully to put in the hands of the production workers irrefutable arguments in favor of technical innovation. Any skeptic can be convinced by facts.

The second example concerns the development of automated control systems.

The development of 1,600 automated control systems during the Ninth Five-Year Plan marked the beginning to a new search, the forming of scientific bases, and the finding of ways for rational management at the enterprises, starting with accounting and ending with operational management. During the Tenth Five-Year Plan, the representatives of science and industry have continued to solve these difficult but exceptionally important problems.

About 10 years ago, even before the mass use of ASU [automated control system] began in the nation, the then director of the Barnaul Radio Plant arrived at our Computer Center. He came and said: "Develop a system so that I can know what is being done at my plant. The planning department provides one answer, the marketing department another, the bookkeeping office a third, and each handles the figures in its own manner. As a result I have no accurate information which would allow me to manage things."

We concluded a cooperation contract with the Barnaul Radio Plant. Involved in the work, in addition to the Computer Center, were the Institute for the Economics and Organization of Industrial Production and the Systems Scientific Research Institute of the Ministry of Instrument Building. Over the 7 years these institutes, together with the plant, developed the Barnaul system. This system monitors, records and keeps the accounting records, it provides the necessary information, it controls the output of new products, and much else. A possibility has arisen of analyzing the course of production on all levels and to take decisions efficiently. As a result there has been a sharp reduction in losses, the material consumption rates have been reduced, labor productivity has risen, and the coefficient for steady product output has risen from 0.54 to 0.75-0.80.

In 1971, the system was reviewed by the ministry board and was accepted as a standard one for the enterprises of the ministry.

At present the Barnaul ASU is in use and without the participation of scientists is being introduced at 103 enterprises of the nation. On the basis of this system, for third-generation computers the universal and adapting Sigma ASU has been developed, and this is a new step ahead on the path of widely using the ASU in the Siberian economy. Here is the second example showing how the promising development of scientists finds its way into the entire sector.

The third example is related to the development of our natural riches, and specifically, the Tyumen' oil.

At the Presidium of the Siberian Division of the Academy of Sciences, the scientists were given 11 problems the solution to which would make it possible to substantially increase oil production, and these included pumping water into the wells for increasing the oil output, laying pipeline in swampy ground under permafrost conditions, and the production of additives which would facilitate the movement of oil through the pipes.

We incorporated these and other problems in the work program of the Siberian Division. Of course, many other organizations and scientific research institutes of the ministry were also at work on them.

In the process of working on the "oil" subject which was coordinated by Academician A. A. Trofimuk, Siberian scientists developed methods and models which helped the employees of the ministry and the workers of Tyumenskaya Oblast to solve these problems.

These three examples describe three different forms of introduction in the sector. But they all affirm that the existing organizational structure contains many opportunities for successfully materializing scientific results. It is merely a question of an active desire for this and a mutual understanding among the scientists and the production workers, and particularly their leaders.

The Siberian Division of the USSR Academy of Sciences has found and tested out various effective forms of cooperation between academy science and production. Up to the present on the basis of them a system has been developed which provides a single process of fundamental and applied research, development and their practical implementation.

One such form is compiling together with the sectorial ministries comprehensive long-range programs for scientific research and the introduction of its results into production. These programs are approved on a bilateral basis by the Presidium of the Siberian Division of the USSR Academy of Sciences and by the appropriate ministry. These programs are aimed at solving important scientific and technical problems of a sector. At present the Siberian Division is working under bilateral programs with eight ministries of the nation.

Another form that has been developed which helps to accelerate the introduction of scientific achievements into practice is the creation near the Division institutes of sectorial scientific research institutes and special design bureaus with experienced production workers, and these act as the connecting link between academy science and industrial sectors. The decision to organize them was taken in 1966 upon a proposal of the Siberian Division and the Novosibirskaya CPSU Obkom. The plans of these departmental institutes and design bureaus include the continuation and development of completed scientific developments of the academy institutes the realization of which means the appearance of new materials, equipment and production methods.

At present, such organizations have been set up by ten Union ministries and departments. Located in the surroundings of Akademogorodok, these scientific research institutes and design bureaus comprise the so-called "introduction belt" of the Novosibirsk scientific center. These are given not only scientific developments of the Siberian Division, but also trained personnel, and this makes it possible in an earlier stage to move on to production and design work and reduces by approximately one-half the

time required for introducing a new scientific idea into industry. This experience will be extended to other scientific centers as well.

One other fruitful form of cooperation is comprehensive cooperation by a group of scientific institutes with a leading major enterprise in its sector. We have in mind the Novosibirsk Sibsel'mach [Siberian Agricultural Machinery] Plant which is an offspring of our five-year plans. It played a leading role during the period of industrialization and during the Great Patriotic War. At present the time has come to reconstruct the plant, and this is significantly more difficult than developing a new one, as any reconstruction is complicated by the fact that production should not suffer in carrying it out. Scientists along with the plant decided to work out a comprehensive program for solving the reconstruction problems. It was agreed with the ministry and the plant leadership that the major developments would subsequently be introduced in the entire sector. At present an ASU has been created at the plant and exceptionally important work is being carried on automating the production processes.

Cooperation has born fruit. In January 1975, the General Secretary of the CPSU Central Committee L. I. Brezhnev congratulated the collective of Sibsel'mash on its early fulfillment of the quotas of the Ninth Five-Year Plan for the growth of the production volume and labor productivity. It was pointed out that the successes of the plant were the result of widely introducing scientific and technical achievements with close cooperation with the institutes and scientists of the Siberian Division.

One other way for disseminating scientific ideas in the sector is through the sectorial scientific research institutes.

We have experience where academy institutes carrying out a major development aimed at a certain sector bring in the scientific research institute of this sector and along with it carry the scientific research and experimental design developments to a completion. And then this sectorial scientific research institute which belongs to a ministry and, as a rule, maintains contacts with approximately 10-15 plants in the nation, distributes the new production plans and the new decisions which have been developed together with the scientists of the Academy into the sector. This is a very interesting and serious action which provides an opportunity to correctly use state resources, in pooling the forces and equipment of the academy and sectorial institutions in certain areas.

At the same time the successful experience of cooperating with the head enterprises and scientific research institutes of the sectors has shown that there is a number of unsolved problems in this strategy. One of the most difficult is the following. If an idea of the scientists has traveled through the head enterprise, the main administration and ministry into a certain sector, then it is spread only here, in this sector, while a related sector, as a rule, has no opportunity to quickly apply this same idea at its enterprises.

It turns out that if enterprises which are similar in terms of certain processes are located nearby but belong to different departments, and the scientific development provides good results in one sector, there is no universal mechanism which would make it possible for this development to pass through the interdepartmental "barrier" to the enterprises of the other sector. The scientists themselves are unable to collaborate simultaneously with a large number of enterprises and scientific research organizations.

In order in some way to alter this situation, the Presidium of the Siberian Division proposed the idea of holding "Technical Progress Days" in Novosibirsk and at these major developments by scientists of the Siberian Division carried out on the basis of experimental units in scientific institutes and at the enterprises of Novosibirsk and the Novosibirsk Economic Region would become available to the entire scientific and technical community of the city, the oblast and other cities of Siberia. The institutes and developers would invite a broad range of specialists from different economic sectors, they would demonstrate to them their new units, production methods, substances, and operating models of new equipment, and would provide the necessary consultation, documents and information on introducing these innovations at the enterprises of the city and the oblast. The organizations interested in the given development could subsequently get in touch not only with the scientists but also with enterprises which had already introduced the development.

It is worthy of note that during the holding of these "Days" as a rule not only scientists but also production workers who first introduced or tested out these innovations described the scientific developments.

During the year 17 "Technical Progress Days" were held in 10 institutes of the Siberian Division. These involved 1,400 specialists from 300 industrial enterprises and organizations in the cities of Novosibirsk, Krasnoyarsk, Tomsk, Kemerovo, Barnaul, Tashkent and elsewhere. All the "Days" were attended by a large number of prominent industrial specialists. This shows the significant interest of the production workers in the proposals of the scientists, as well as how many points of contact there are in the work of the scientific institutions of the Siberian Division and the needs of practice.

A major task of the Siberian Division is a close tie of the research carried out at the Division with the interests of the RSFSR economy in the east of our country. This is reflected in the charter of the Siberian Division, according to which it, in contrast to the other specialized divisions of the Academy, is accountable not only to the Presidium of the USSR Academy of Sciences, but also to the RSFSR Council of Ministers.

Up to now it has been a question predominantly of developing the results of scientific research at the industrial enterprises. Let me give several other examples of work related to the needs of the RSFSR economy.

Thus, the Institute for the Economics and Organization of Industrial Production of the Siberian Division together with scientists and specialists from the RSFSR gosplan has carried out analytical calculations for the development rates and proportions of the RSFSR economy over the long run.

An important component in the research on the RSFSR economy was the analysis of the economic ties of the RSFSR with the other Union republics and the determining of the place of the RSFSR in the unified national economic complex of the USSR.

Mathematical economics analysis has been carried out on the location and development of the productive forces broken down for the major economic zones of the RSFSR over the long run. Great attention has been given to the search for rational proportions in the development of the western and eastern regions of the RSFSR. Also being studied are the optimum rates and proportions for the development and location of the various production sectors on the territory of the RSFSR.

People are required to solve those enormous tasks which confront our country. The organization of the Siberian Division started with this problem. The recruitment and training of youth for work in the scientific area and in production were carried out under a definite system through school Olympics, the physical and mathematics school, the young technician clubs, the polytechnical schools, the Novosibirsk and other state universities and graduate studies.

Novosibirsk State University holds a special place in the training of personnel. The territorial proximity with the Siberian Division and the maximum utilization of its material and personnel resources make it possible to organically combine training with the process of scientific research. Each year around 700 university graduates become coworkers in the academy and sectorial scientific research institutes as well as instructors in the VUZes of Siberia and the Far East. For strengthening the existing scientific areas, and particularly in setting up new ones, special groups are organized consisting of graduates from Novosibirsk University headed by candidates of sciences. With their help entire chairs and laboratories are staffed in the young VUZes and universities of Siberia.

In recent years, the moving of existing scientific collectives out of the Novosibirsk Scientific Center to other scientific centers of the Division has been encouraged. In precisely this manner within a short period of time the Computer Center in Krasnoyarsk, the Geological Institute in Ulan-Ude and new departments and laboratories in Kemerovo, Krasnoyarsk and other Siberian cities were organized and began to work effectively.

The university, along with the Division institutes, represents a strong basis for improving the skills of higher and secondary school instructors and national economic specialists. Although, in our view, these facilities are far from fully utilized.

The system which has developed in the Novosibirsk Scientific Center for the interaction of science and education is gradually being extended into other centers of the Division.

The scientists of the Siberian Division have shown a great responsibility in accepting the party's instructions on the necessity to raise the role of the scientific collectives of the Division in solving problems related to the development of Siberia's productive forces. The general meeting of the Division and the party and economic activists of the scientific centers in Novosibirsk, Krasnoyarsk, Irkutsk, Yakutsk, Ulan-Ude, Tomsk, as well as in Kemerovo have formulated 24 comprehensive scientific programs aimed at the accelerated economic development of the Siberian regions.

These programs include the key problems of the integrated use of the mineral raw material, land, forest and water resources in the eastern region of the nation, the long-range aspects of the socioeconomic development of the Siberian territorial-production complexes, and the economic problems of the intersectorial national economic and regional complexes. In them serious attention has been given to the questions of protecting the environment, and to solving ecological problems in the industrially developed and new industrial regions. Involved in implementing these are around 40 institutes of the Siberian Division of the USSR Academy of Sciences, the institutes of the Siberian Division of the All-Union Academy of Agricultural Sciences imeni Lenin and the Siberian Affiliate of the Academy of Medical Sciences, as well as scores of organizations from other ministries and departments.

The attention shown by science to Siberia is now becoming a new incentive for the development of fundamental research. This will bring the solving of scientific problems closer to the practical tasks of regional development. The feedback which inevitably occurs here will encourage the posing of new fundamental developments.

The trip of the General Secretary of the CPSU Central Committee, the Chairman of the Presidium of the USSR Supreme Soviet Comrade L. I. Brezhnev to the regions of Siberia and the Far East was of important significance for carrying out the decisions of the 25th Congress on the integrated tapping of the natural riches and the development of the productive forces.

From the results of this trip, the Politburo of the CPSU Central Committee, the Presidium of the USSR Supreme Soviet and the USSR Council of Ministers instructed the party, state and economic bodies to review the specific questions related to the further socioeconomic development of the regions of Siberia and the Far East and which had been raised by L. I. Brezhnev in the course of the trip and from its results.

During his stay in Novosibirsk, L. I. Brezhnev noted the contribution of scientists from the Siberian Division of the USSR Academy of Sciences to

the industrial and economic development of the entire region. It was particularly stressed that the country is expecting even more from the practical application of science, and in particular, in solving the fuel and energy problems, in geological prospecting, petrochemistry, machine building and other areas.

L. I. Brezhnev again drew the attention of scientists at the Siberian Division to the necessity of organizing things so that the active role of the scientists would help solve the problems of linking science with practice, thereby contributing to the growth of the nation's productive forces.

As a result of the trip of the General Secretary of the CPSU Central Committee L. I. Brezhnev through Siberia and the Far East, the work under the integrated development programs for the productive forces of Siberia has gained a new impetus and acquired a new content.

The USSR Academy of Sciences, its Siberian Division and the Far Eastern Scientific Center are drawing up their own proposals on a broad range of questions related to the socioeconomic development of Siberia and the Far East.

All the outlined measures will provide an opportunity to concentrate the efforts of the scientists on the problems that are vitally important for the Siberian regions, and will contribute to the fullest utilization and proper development of the existing scientific potential. The implementation of the planned programs require a complete coordination of the research being carried out by the sectorial academies, by the scientific research institutes and VUZes of Siberia. The work on the major interdisciplinary problems should be carried out by the joint efforts of all the research collectives, regardless of their departmental affiliation. It is also essential to strengthen the ties between the scientists of the Division and the Far Eastern and Urals scientific centers.

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CSO: 8144/0433

LENINGRAD R&D COORDINATING COUNCIL TO DEVELOP FUEL AND POWER TECHNOLOGY PROGRAM

Leningrad LENINGRADSKAYA PRAVDA in Russian 29 Sep 79 p 1

[Article under the byline of LenTASS: "Accelerated Development for the Fuel and Energy Complex"]

[Text] The decisions of the 25th Party Congress, the plenums of the CPSU Central Committee and the works of the General Secretary of the CPSU Central Committee and Chairman of the Presidium of the USSR Supreme Soviet, Comrade L. I. Brezhnev, give an important place to a consistent rise and growth in the efficiency of the nation's fuel and energy complex on the basis of a significant broadening of the construction of atomic, hydraulic and thermal power plants, the development of more productive and advanced power and energy-consuming equipment, and an all-round campaign for the saving of fuel and electric power.

The scientific and production collectives of Leningrad and the oblast will make a weighty contribution to solving this most important national economic problem. At present over one-half of all the basic power equipment being created in our nation is being developed and produced in our city. In the years of the current five-year plan alone, the Leningrad power machine builders have developed and produced power units with a unit capacity of 800,000 kilowatts for thermal plants, the equipment of a head power unit of 1.2 million kilowatts, an atomic reactor with a power of 1 million kilowatts, and hydropower units of 640,000 kilowatts. This has made it possible to provide a significant savings of fuel resources in the national economy.

The Leningrad, Beloyarsk and Kola atomic power plants [AES], the Sayano-Shushenskaya, Miatlinskaya and Chirkeyskaya hydropower plants [GES] and a number of other projects are being built under the designs of Leningrad institutes. A significant savings in electric power has been provided by the work carried out by Leningrad organizations to design long distance super high voltage power transmission lines, to develop economic and advanced control methods for the Unified Power System of the Nation, and to increase the efficiency of the low-calorie types of fuel.

Substantial work has been done to increase the economy of the diesels, fuel equipment, electric motors, compressors and other fuel and power-consuming equipment being developed and produced in Leningrad, as well as to introduce progressive production methods.

The scientists, designers and specialists are focusing efforts on creating new power sources on the basis of thermonuclear reactions, introducing other scientific achievements, and the fuller utilization and processing of fuel raw materials. In designing and building the power projects, and in manufacturing equipment for them, ever wider use is being made of the experience of a comprehensive solution to the most important national economic problems as acquired by the Leningrad enterprises and organizations involved in creating the Sayano-Shushenskaya GES.

The tasks of further increasing the contribution of the Leningraders to raising the efficiency of the nation's fuel and power complex were discussed yesterday at a session held in Smol'nyy of the Economic and Social Development Council under the Leningrad CPSU Obkom.

Giving a speech at the session was Academician I. A. Glebov, representative of the presidium of the USSR Academy of Sciences. Statements were also read by N. M. Markov, general director of the Scientific and Production Association for Research and Designing of Power Equipment imeni I. I. Polzunov, L. V. Tupitsyn, general director of the Izhorskiy Zavod Association, N. N. Kovalev, Hero of Socialist Labor, corresponding member of the USSR Academy of Sciences, and chairman of the Central Board of the Scientific and Technical Society for Power and the Electrical Engineering Industry, B. I. Fomin, general director of the Elektrosila Association, S. A. Kazarov, manager of Lenenergo [Leningrad Regional Administration of Power System Management] and M. V. Kostenko, chair head at the Leningrad Polytechnical Institute imeni M. I. Kalinin.

Speaking at the session was G. V. Romanov, member of the Politburo of the CPSU Central Committee and first secretary of the Leningrad Obkom.

It was pointed out that the level of work carried out by a number of the scientific research and design organizations, associations and industrial enterprises in the area of creating and producing power equipment still does not fully meet the requirements of the party Central Committee. Certain plans and developments contain obsolete technical solutions, and the material intensiveness of the equipment and projects is being reduced slowly. Individual types of machines are inferior to the best world models in terms of the economy and reliability indicators. There have been instances of the delayed execution of contractual obligations.

At certain enterprises and organizations, proper attention is not paid to the development of the socialist competition to raise the technical level, to reduce the time for developing and introducing new equipment, for increasing the output of power equipment and its early delivery to the projects under construction, and for the thrifty consumption of fuel, electric power and heat.

The Economic and Social Development Council under the CPSU Obkom approved the basic areas for the work of the enterprises and organizations in creating and producing highly productive and economic power units, raising the technical and operating specifications of the power consuming machinery and equipment, and developing the capacity of the Leningrad enterprises for the purpose of ensuring the comprehensive delivery of equipment to the power projects.

Complete recommendations were approved on the discussed question. It was proposed that the Leningrad Interdepartmental Coordinating Council of Scientific Institutions of the USSR Academy of Sciences, the scientific research, the scientific research and design organizations, the associations and enterprises jointly with Lenplan [Planning Commission of the Leningrad City Executive Committee], work out a specific program for further increasing the contribution of the Leningraders to raising the efficient development of the nation's fuel and power complex. The CPSU gorkoms and raykoms, their economic and social development councils, and the local soviets must provide close control over the implementing of this work which should be carried out considering the demands found in the Decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Strengthening the Effect of the Economic Mechanism on Raising Production Efficiency and Work Quality."

10272
CSO: 8144/0357

LENINGRAD OBKOM COUNCIL CALLS FOR CREATION OF CENTER TO COORDINATE POWDER METALLURGY R&D

Leningrad LENINGRADSKAYA PRAVDA in Russian 21 Oct 79 p 2

[Article by Prof A. Grigor'yev, chairman of the Subsection for Powder Metallurgy under the Economic and Social Development Council of Leningrad and Leningrad Oblast: "What Powder Metallurgy Promises"]

> [Excerpts] The 25th CPSU Congress oriented our national economy at increasing production efficiency, and at the technical reequipping of the enterprises on a modern technological basis making it possible to save expenditures of labor, materials and power as much as possible. We have also been directed to this by the Decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Strengthening the Effect of the Economic Mechanism on Raising Production Efficiency and Work Quality."
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> At present we are taking up the capabilities of powder metallurgy, what is already being done, and what must be done for its development in Leningrad.

The natural question may arise: if the merits of powder metallurgy are so great, then what impedes its broad use, and in particular at the Leningrad enterprises? Why has this production method which is rightly termed the "technology of the 21st century" undergone such an extended "incubation period" in its development?

In actuality, until recently the raw material base of powder metallurgy was developing extremely slowly, and the production of the specialized equipment such as presses, tools, sintering furnaces, and so forth, was organized in a completely unsatisfactory manner. Skilled personnel is still lacking everywhere. The Leningrad party organization evaluated how powder metallurgy and other progressive preparatory processes were being introduced in our city.

At present what impedes the broad introduction of this progressive direction? In our opinion, it is first of all the clearly expressed interdepartmental nature of this production and technical problem which should be solved fundamentally and comprehensively, by the efforts of at least several ministries, including: ferrous and nonferrous metallurgy (the production of the powders), heavy machine building and the machine tool industry (the creation of presses and fittings), and the electrical engineering industry (electrical equipment). The products themselves can be successfully manufactured at the enterprises of the involved sectors, as is already being done by the motor vehicle builders, as well as at the specialized intersectorial associations which serve certain economic regions.

The Economic and Social Development Council for Leningrad and the Oblast under the CPSU Obkom has worked out specific proposals to expand the existing sections and shops as well as organize new modern ones at a number of associations and enterprises in the city (the Istochnik, Krasnaya Zarya and Avtoremont production associations, the Petrodvorets Timepiece Plant, the carburetor parts plant, and others). There are also favorable conditions for setting up a powder metallurgy shop at the Kirovskiy Zavod Association which has metallurgical and tractor production.

A most important measure for the city is the present thorough reconstruction of the Instrument Association as a specialized powder metallurgy enterprise.

There is also provision to create at 27 Leningrad enterprises sections involved in spraying and coating metal powders on pieces.

Our city has a number of sectorial institutes which are playing a leading role in the development of the Soviet raw material base for powder metallurgy. These include: Mekhanobr [All-Union Scientific Research and Planning Institute for the Mechanical Processing of Minerals], Gipronikel' [State Institute for the Planning of Nickel Industry Enterprises], the All-Union Institute for the Aluminum, Magnesium and Electrode Industry, and others. However, in this area there still are subjects for which the scope of scientific and technical developments, in our view, must be increased. For example, for the production of high quality general-purpose iron and copper powders, as well as the special nickel-containing powders for spraying and plating.

At present, the powders are basically produced by two methods: the spraying of molten metal and the chemical-metallurgical processing of the crude ore. The first method is more accessible and does not require great capital investments, but does not always provide the proper powder quality. And for this reason the fate of large-scale powder metallurgy depends upon how rapidly precisely the metallurgical production of a large quantity of high-grade cheap iron powder of varying grades is developed in the country.

Even now there is a number of original technical solutions to this problem. Here is one of them. The plasma chemistry method for the economic

production of hydrogen provides a powerful competitor to the traditional reducing agent for extracting iron from the ores, namely oxygen and its oxides. This creates the prerequisites for organizing in the future coke-free metallurgical production, the end product of which will be an iron powder which has been reduced by hydrogen from the ore concentrates, and not the traditional billet. Such a structure of metallurgy meets the needs of not only the economy but also nature, and makes it possible by many times to lessen the harmful effect of the coke-based metallurgical enterprises on the environment.

Many Leningrad institutes have broad opportunities for active involvement in solving this scientific and technical problem. But we see the most efficient and successful solution which would make it possible to substantially accelerate the introduction of progressive production methods at the city's enterprises in organizing as part of the Mekhanobr Institute a modern experimental-industrial base which would include a unit for the experimental production of low-tonnage batches of iron powders.

An analysis of the subjects of the scientific research and design work being carried out by the Leningrad sectorial institutes indicates that while strong forces are concerned with the questions of producing metal powders and granules, clearly insufficient attention is being paid to the technology of general-purpose powder materials and products. The setting up of such an interdepartmental scientific and technical center is an urgent necessity.

It is also advisable that the planning commission of the Leningrad City Executive Committee which is working out the problems of forming the territorial specialized production of general machine building products directed one of these enterprises into the industrial and experimental production of products made from metal powders. In our opinion, we should again analyze and assess the specialization and development prospects of the enterprises and organizations of the Ministry of Ferrous Metallurgy which exist in our city and which as yet are completely on the sidelines in solving the designated questions.

As for the personnel problem of powder metallurgy, a number of institutes (the Polytechnical Institute imeni M. I. Kalinin, the Technological Institute imeni Lensovet, the Mining Institute and others) are already turning out these specialists, but in quantities which now clearly are insufficient. Obviously it is time for these VUZes to take additional measures for satisfying the rapidly growing need of the national economy for such personnel.

The CPSU raykoms, the party organizations of the scientific research institutes, the VUZes and the enterprises are confronted by major, serious questions in order to ensure the proper development of this progressive production method in our city.

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CSO: 8144/0357

NEW R&D COORDINATING COUNCIL FOUNDED IN ARMENIAN ACADEMY OF SCIENCES

Yerevan KOMMUNIST in Russian 30 Oct 79 p 4

[Article under the byline of Armenpress: "The Questions of Coordinating Science are Discussed"]

[Text] The first session has been held of the Council of the Armenian Academy of Sciences on Coordinating Scientific Activities of Scientific Institutions in the Republic VUZ's in the Area of the Natural and Social Sciences.

In opening the session, the chairman of the Coordinating Council, the president of the Armenian Academy of Sciences, Academician V. Ambartsumyan took up the tasks of the scientific collectives in the area of coordinating research and creative cooperation, and he emphasized the importance of this work for accelerating scientific and technical progress.

E. Mirzabekyan, vice president of the Armenian Academy of Sciences, gave a report on the further improvement in coordinating scientific research and accelerating the introduction of its results into production.

In his report "Questions of Coordinating Scientific Research on the Problems of Environmental Production in Armenia," the deputy chairman of the Armenian Gosplan, Yu. Khodzhami, spoke of the measures carried out in recent years to protect the water and air basins, as well as the soils and mineral wealth of the republic.

Participating in the debates on the reports were: S. Tumanyan, Armenian first deputy minister for higher and specialized secondary education, A. Nalbandyan, academician secretary of the Division of Chemical Sciences of the Armenian Academy of Sciences, G. Adonts, temporary academician secretary for the department of physical-techhical sciences and mechanics, the corresponding members of the Armenian Academy of Sciences, the minister of public health E. Gabriyelyan, M. Simonov, professors L. Ovsepyan and Kh. Barsegyan, and S. Karakhanyan, director of the Institute of General and Inorganic Chemistry of the Armenian Academy of Sciences.

Also participating in the session of the coordinating council were: R. Svetlova, deputy chairman of the Armenian Council of Ministers, and M. Edilyan, deputy head of the department for science and institutions of learning under the Central Committee of the Armenian Communist Party.

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CSO: 8144/0357

ACADEMY VP PROPOSES 'EXTRADEPARTMENTAL' DEMONSTRATION EXPERIMENTS FOR NEW TECHNOLOGY

Moscow KOMSOMOL'SKAYA PRAVDA in Russian 24 Nov 79 pp 1-3

[Interview by B. Mokrousov with Academician Yevgeniy Pavlovich Velikhov entitled: "Science: Present and Future"]

[Excerpts] The vice-president of the USSR Academy of Sciences, Academician Ye. P. Velikhov is a prominent specialist in the field of theoretical physics and plasma and magnetic hydrodynamics physics.

He was born in Moscow in 1935 into the family of a railway engineer. In 1958 he graduated from the physics department of Moscow State University imeni M. V. Lomonosov [MGU] and then from the graduate school of the Institute of Atomic Energy imeni I. V. Kurchatov. Since that time he has been working at that institute, presently as assistant director.

In 1968 Yevgeniy Pavlovich was elected an associate member of the USSR Academy of Sciences and in 1974, academician.

He is the director of the controlled thermonuclear fusion program in the USSR.

Academician Ye. P. Velikhov is engaged in considerable pedagogical work; he is a department chairman at MGU and the dean of the faculty at Moscow Physical Engineering Institute.

At the 16th and 17th Komsomol congresses he was elected a member of the Komsomol Central Committee, and for several years he was chairman of the Komsomol Central Committee council of young scientists and specialists. This year he became the chairman of the Leningrad Komsomol Committee on Prizes in the field of science and technology.

Ye. P. Velikhov has been awarded the Order of Lenin and the Order of the Red Banner of Labor. He is a USSR State Prize laureate.

Our Correspondent Talks With Academician Yevgeniy Pavlovich Velikhov About the Significance of Science for Social Progress

[Question] The development of science is increasingly closely connected with the development of education. In your opinion, what problems are arising here?

[Answer] The main thing is that the schools--both the secondary schools and the universities--must react flexibly to the changes occurring in all fields of human activity under the influence of the scientific and technical revolution and above all in science and technology themselves.

I particularly want to talk about the organization of higher education. It should be as close as possible to the leading edge of the entire front of scientific and technical work. All those who are selflessly and disinterestedly toiling on practicable programs, advancing scientific thought or proposing technical solutions useful to society should be enlisted in teaching activity as fast as possible. This will help shorten the protracted process of retransmitting the knowledge obtained to the university teachers and from them to the students. As is well known, good experience has been gained in organizing the new system of education--the experience of the Moscow Physico-Technical and Physical Engineering Institutes, Novosibirsk State University, Leningrad Polytechnical Institute and other VUZ's where education has been combined with scientific research and the solution of technical problems. The other VUZ's should also switch over decisively to this system, which has proved its value.

[Question] And what should be done in cities where there are few highly qualified scientists, especially in the field of natural sciences, and where experienced engineering personnel are only beginning to appear?

[Answer] Equipment should be more widely used in teaching. Modern technology makes it possible to record the lecture of a good professor--even an entire course of lectures--on a video-tape recorder and distribute them to the VUZ's. Unfortunately, educational television is poorly developed in our country. The best scientific and pedagogical talents must be enlisted in it.

Nevertheless, wherever possible it is important to develop the teachers' and students' personal contacts with leading scientists and engineers as much as possible. Here an important role could be played by the schools in the most important trends of science and technology and by effective propaganda of advanced scientific and technical experience.

Frankly, today it is difficult to write textbooks--there is not even any time for it.

[Question] But won't this result in the fundamental nature of education being lost?

After all, many textbooks now resemble collections of different scientific theses. They present the classical legacy of distinguished scientists and practical workers in the passionless language of recorders of developments. Here it is not out of place to mention Hegel's words, "Nothing great was ever accomplished without passion." The classics of science were very passionate, if anyone was, and their passion must be conveyed to those who are beginning to toil in the cornfield of science, engineering and technology.

[Answer] But of course if we reduce all teaching to current problems of science and technology, even their promising and rapidly developing fields, then we will lose in education. It is impossible to base teaching solely on improvisation, even if it is intelligent improvisation.

I think that we must arouse the scientists' interest in writing good, thorough textbooks. And in general, teaching must be given the greatest attention. A good business-like working contact between the Academy of Sciences and the system of popular, professional and technical education and the university is needed at all levels. Scientists are spending a lot of time on organizational and administrative work; it would be good to use part of it for pedagogical activity.

[Question] The problem of introducing the achievements of science into practice, upon which you just touched, is of course not simple. In your opinion, what must be done for the rapid advancement of scientific and technical ideas?

[Answer] The true communist approach is very important for the wide and rapid introduction of scientific and technical achievements into public practice. As was stressed at the 25th CPSU Congress, "Revolution in science and technology requires cardinal changes in the style and methods of economic activity, a decisive struggle with stagnation and routinism, genuine respect for science and the ability and desire to consult with it, to take it into consideration." And from the scientists we need carefully thought-out proposals for improving the mechanism of scientific and technical progress.

In this regard, I would consider it necessary to share a consideration which I find exciting and which could possibly be realized in our country in the long run.

First of all, I should point out that there are at least four stages in getting, advancing and using new scientific accomplishments. The first stage is laboratory research, sometimes chaotic, sometimes directed, but quite extensive research. This is part of what is customarily called basic science. As a rule, such work, if it is of high scientific value, widens our view of the world, of the nature of specific mechanisms.

Then comes the search for how the results obtained can be used in order to develop science itself or practice. The institutions of the Academy of Sciences are performing well at these two stages.

Next comes the point when it is necessary to demonstrate reliable data on opportunities for practical application of a given process, method, device, instrument, etc. A demonstration experiment, which would confirm the practical feasibility of a scientific idea and during which the basic parameters for production would be worked out, is necessary.

And finally, the last stage: the creation of the experimental model and the organization of the industrial process. As a rule, this stage is carried out in different branches of the national economy; it is directed by the ministries and departments.

[Question] And who works on the demonstration experiment?

[Answer] That's the whole point-anyone who wants to works on it. Or to put it more precisely--no one works on it. And this concept is still completely unsettled.

The demonstration experiment is being inadequately incorporated into the structure of academic and branch (departmental) science. Scientific and technical discoveries often do not correspond to the interests of specific ministries. They are often of interest to many of them at once. On the other hand--a paradox--the bigger the discovery the more it "threatens" the existing technologies, the established, stabile production processes. And, of course, the workers of the ministries and departments have little enthusiasm for given discoveries. Everyone understands that if you agree to accept some scientific or technical idea, this will cause a lot of trouble. For this reason, the feasibility of the novelty must be reliably demonstrated before concrete talks are held with any department about its introduction. The scientist often does not have sufficient basis for judging industrial models at once on the basis of laboratory models. And in evaluating his discovery's prospects, the scientific worker may greatly underestimate them or, to the contrary, overestimate them if he has too rich an imagination.

Of course, one can take the path of a high-risk strategy, as is often done in our country, and immediately build experimental models. In that case, it would now be possible to begin the construction of thermonuclear power plants. But such an approach will result in great losses. And a low-risk strategy in which we mark time at the second stage--the development of opportunities for practical application--will result in enormous integral expenses. This means that the optimal strategy must be sought. And that is precisely the demonstration experiment.

In our planned economy, resources must be found for extradepartmental experimental verification, sometimes on a large scale, of specific scientific ideas. Planners, designers, manufacturing engineers and fitters are required for this. Not many of them are needed, but they must be specialists of the highest qualifications.

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CSO: 8144/355

MECHANICAL ENGINEERING INSTITUTE ORGANIZES TIES WITH PRODUCTION

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 9, Sep 79 pp 44-50

[Article by Corresponding Member of the USSR Academy of Sciences K. V. Frolov: "Problems of Improving the Organization of Science"]

[Text] The 25th CPSU Congress outlined a magnificent program for the planned reequipping of all the national economic sectors on the basis of modern equipment, raising the level of mechanization and automation of the production processes, and the greatest possible acceleration in the rate of scientific and technical progress.

The implementing of this program requires the more efficient use of the potential possibilities of science, the more rapid development of fundamental research, and clear coordination in carrying out the enormous amount of applied scientific research.

The tendency characteristic for the present stage of the scientific and technical revolution for a shortening of the times for realizing new ideas and the corresponding acceleration in the obsolescence of known technical solutions has substantially reduced the time required for the formation of new ideas and the search for fundamentally new solutions which provide the creation of ever more modern machines and their rapid introduction by industry.

Under these conditions, the effectiveness of science is determined not only by the level of research and the obtained results, but also by the time required to carry out the entire cycle of work (from the idea to introduction). In turn, this time depends directly upon the level of organization and support for the entire complex of fundamental, exploratory and applied research and experimental designing on the broad front from science to production.

The historical process of the development of science as a direct productive force in society under the conditions of a socialist national economy more and more leads to the strengthening of the ties between science and production. Here the natural strengthening of their impact on one another can be explained by the fact that such concepts accepted in the

organization of industrial production such as management, planning, support, efficiency, specialization, cooperation, and, finally, the international division of labor, have also become customary in solving the questions of the organization and development of science.

This process has given rise to a multiplicity of diverse forms for cooperation between science and production. Broad recognition has been gained by contracts of socialist cooperation, multispecialty creative brigades, and direct economic contracts between scientific research organizations and enterprises. Positive results have also been provided by the organizing of scientific-production associations. We should note the direct ties between production and the institutes of the Siberian Division of the USSR Academy of Sciences and the Ukrainian Academy of Sciences. Also interesting are the proposals of the Ukrainian Academy of Sciences to set up on the basis of its institutions scientific and technical associations and sectorial laboratories for the problems being worked out by the academy institutes.

Very promising is the economic experiment being carried out in the nation to convert the scientific research, design and planning organizations, the production and scientific-production associations and enterprises in a number of the leading machine building ministries to a new system of planning, financing and economic incentives for work in the area of developing new equipment.

At the same time, many questions of a further improvement in the organization of science and a rise in its efficiency still require a radical solution. For example, ineffective scientific developments are still encountered. The experimental facilities of a number of the scientific research institutes require expansion and modernization. Many difficulties arise in working out intersectorial problems. Special attention is required by the organizing of work in the strategic areas of scientific development, including the creation of the scientific bases for the technology of tomorrow, the machines of the future.

The experience of many years in organizing and carrying out interdisciplinary scientific research on such problems as the strength and durability of machines, the increasing of their reliability under extremal operating conditions, the protection of the human operator against vibration and so forth and the naturally arising extensive ties which the State Scientific Research Institute for Mechanical Engineering imeni Academician Blagonravov possesses with the scientific centers and industry make it possible to outline certain ways for a further improvement in the organization of science in solving general technical problems.

The Institute of Mechanical Engineering works under the scientific and procedural leadership of the USSR Academy of Sciences.

A number of the scientific councils and commission of the USSR Academy of Sciences was created by the leading scientists of the Institute of Mechanical Engineering or with their direct involvement.

These were the councils on the theory of machines and systems of machines (Academicians I. I. Artobolevskiy and V. I. Dikushin), on the theory and principles of the design of robots and manipulators (Academician I. I. Artobolevskiy), on the problems of strength and plasticity (Academician Yu. N. Rabotnov), the commissions of the USSR Academy of Sciences on Space Research (Academician A. A. Blagonaravov), and on machine building technology (Academician V. I. Dikushin). Academician N. G. Bruyevich played a major role in the organization and development of fundamental research on reliability problems. Major theoretical and applied problems have been and are being solved by the Scientific Council on Friction and Lubricants of the USSR Academy of Sciences and this was set up on the initiative of Academician S. P. Korolev and is now headed by Academician A. Yu. Ishlinskiy and Prof I. V. Kragel'skiy. This council, in essence, coordinates all scientific research on friction engineering in our nation.

The Institute of Mechanical Engineering is also involved in carrying out the interdisciplinary programs of the USSR Academy of Sciences. Within these programs it carries out fundamental research in the area of the mechanics of machines and control in machines, machine vibroacoustics, the biomechanics of man-machine systems, as well as in the area of friction, wear and lubrication in machines, and the mechanics of deformation and failure. Such a broad field of activities is explained by the necessity of a comprehensive approach to studying machines and to shaping the ideology for the creation of future machines.

The elaboration of the global problems of protecting the environment against the harmful effect of machine technology and protecting man against the harmful effect of the environment created by machine technology can serve as a vivid example of the necessity of the interaction between the technical, natural and social sciences which are brought together by the USSR Academy of Sciences.

We should particularly distinguish the questions related to the protection of man against vibration and noise. In recent years the Institute of Mechanical Engineering has been working on these questions. While, for example, the problems of protecting the environment against the harmful products of machines in the process of their operation in a number of instances have been solved by improving the employed fuel or working medium virtually without any substantial change in the design of the machines, the essence of the questions of protecting man against vibration consists in the machines themselves, and these problems cannot be solved in principle without a radical improvement. At the same time, a rise in the productivity of the machines and a corresponding rise in the speed of the parts of the machines are always accompanied by various dynamic phenomena which give rise to vibration, and as yet it is impossible to fully

exclude these, and for machines operating on vibration principles, this is fundamentally impossible.

As a consequence of this, the search for an optimum solution to the questions of protecting man against vibration has inevitably led to the necessity of a fundamental study of the nature of the influence on various sorts of biological processes caused by vibrations which bring about the appearance of stable anomalies of these processes and irreversible consequences. Thus, on the borderline of the technical and natural sciences, a new scientific direction has arisen, vibration biomechanics.

An example of the beneficial interaction of technical and natural sciences could be the method worked out by the Institute of Mechanical Engineering for the optimum selection of machine and design parameters in the stage of designing them under the conditions of a constant man-computer dialogue (at present the institute is continuing to improve this method). The method makes it possible to consider as many criteria quality as are needed for creating a sufficiently complete simulation model of the functioning of the machine or the design considering the various contradictory criteria characterizing stability, active vibration, strength, metal intensiveness, the degree of protecting man against vibration and noise, and so forth. The method of the optimum selection of machine and design parameters is successfully being introduced at numerous enterprises in more than 12 different ministries, and has provided a major economic effect for the national economy.

In organizational terms, the development of new areas has encountered a number of difficulties which involve, in particular, the support of scientific work and the developing of new specialists who should work in an area which brings together problems from different areas of science. The questions of supporting the work should be settled on the basis of improving the organization of scientific research. An optimum combination of specialization and cooperation in the scientific research with its dependable coordination provides an opportunity to free the necessary material resources as a result of excluding the duplication of work and concentrating efforts in the crucial areas.

An important form of conducting research is the participation in solving interdisciplinary problems. The Institute of Mechanical Engineering is working out a number of interdisciplinary problems concerned with the dynamics of machines, the protecting of man against vibration, the reliability and durability of machines, robot engineering, control theory, as well as the methods of organizing scientific research in creative collaboration with the institutions of the USSR Academy of Sciences and the Union republic academies of sciences, with the scientific research organizations of the ministries and with the scientific centers of the CEMA countries. The generalizing of the results of scientific research on such a broad front is an essential condition for working out the theoretical bases for the development of future machines.

The Institute of Mechanical Engineering maintains steady ties with industry. It is successfully working under several score contracts of socialist cooperation with industrial enterprises and production associations and with the sectorial scientific research institutions and scientific-production associations. A significant amount of work is being done under economic contracts with the enterprises, organizations and associations of the various ministries and departments, including with 25 enterprises and organizations of Moscow.

Such work carried out by the Institute of Mechanical Engineering provides the national economy with an opportunity each year to receive millions of rubles in profit, without mentioning the social and ecological effect of this work.

Due to cooperation with industry, the Institute of Mechanical Engineering has obtained a range of unique data on the stressed state of complex designs and elements under various conditions of their operation in working under extremal conditions. This has made it possible to ensure the strength, reliability and durability of the structural elements (special-made hydroturbines for the Volga, Bratsk and other GES, powerful hydraulic presses for the Novokramatorsk Machine Building Plant, reactors for the Novovoronezhskaya AES, the AES in the GDR, CSSR, Bulgaria and Finland, powerful steam turbines operating under peak loads, and nuclear power units).

The fundamentally new antifriction materials developed by the Institute of Mechanical Engineering have been introduced into production, and these have made it possible to increase the durability of friction parts of modern machines and mechanisms by several fold.

The examples of the cooperation of the Institute of Mechanical Engineering with production and with the sectorial scientific research and design organizations show the great effectiveness of direct ties with industry, when science, in helping industry, receives from it the necessary experimental information and extensive opportunities for conducting research on full-scale models of the new machines under real operating conditions.

However, it must be pointed out that the concept of the cooperation of science with production is not a uniform one. In the broad sense science ultimately should work for production and be oriented to its needs even in the process of the most profound fundamental research. In the narrow sense, this cooperation means a direct tie with production, that is, direct participation in solving particular, narrow sectorial questions.

It is essential to work for an optimum combination of the various types of contact between the scientific institutions and the industrial enterprises. Otherwise it cannot be excluded that the academy and sectorial scientific research institutes which are capable of solving intersectorial problems will gain only a temporary effect achieved at the price of losing future

prospects, of reducing the rate and narrowing the front of fundamental research which they must carry out.

The optimum position seems to be the one whereby hierarchical levels of subsystems have been clearly defined in the complicated, widespread and unified state system of organizing the scientific potential of the nation, and the relationships and goals of their development are uniformly defined. The hierarchical levels of subsystems must be established in differentiating the entire diversity of scientific research in terms of its goals and not in terms of its nature (fundamental, theoretical, applied, and so forth), as has been widely accepted.

The experience of the Institute of Mechanical Engineering indicates that the organization of scientific work aimed at solving intersectorial problems should provide a close relationship with the research being carried out in the academy institutes, and be based upon principles characteristic for the organization of scientific work in such institutes. In other words, the scientific areas assigned to an institute should be stable and be depicted in long-term and current thematic research plans. It is essential to develop highly skilled personnel specialized in the specific scientific areas, and create an experimental base for the given scientific areas. The area of applying the results of the scientific research in the various areas of the national economy should be relatively broad.

In the sectorial scientific research institutes, the range of new products assigned to them is stable. The scientific research institute bears full responsibility to its sector for the creation and improving of these products. The scientific research institute must utilize scientific results from different areas of science.

It is advisable to clearly define the status of the scientific research which is aimed at developing the scientific bases for the elaboration of specific scientific and technical decisions, and correspondingly clarify the status of the scientific research institutes involved in these purposes. Here it is not of fundamental importance whether the scientific research institutes carrying out intersectorial scientific research are under the Academy of Sciences or the machine building ministries. It is important that the organization of such research, its financing, encouraging, research and personnel support conform in an optimum manner to the specific focus of the scientific areas of the intersectorial scientific research assigned to the scientific research institute. It is important that the scientific prodedural leadership be carried out by the Academy of Sciences with the coordinating of the activities of the scientific research institutes jointly by the Academy of Sciences and the State Committee for Science and Technology [GKNT].

For concentrating forces on the elaboration of the most important intersectorial problems and for the effective coordination of the activities of the corresponding scientific research institutes, it is advisable to strengthen the coordination of scientific research and set up a special

coordinating council under the GKNT and the USSR Council of Ministers involving in its work both the institutes of a broad scientific and technical specialization as well as the head scientific research institutes of the machine building ministries. The compiling of the long-range scientific and technical forecasts for the development of the basic intersectorial scientific directions in the plan for creating future machines, the organization of the interaction with the academy institutes and the sectorial scientific research institutions, as well as the elaboration of the urgent problems of further improving the organization of intersectorial scientific research--all this work in the area of machine building could be assumed by the special council.

The creating of a scientific coordinating council for machine building would ensure a further strengthening of the work aimed at solving the fundamental problems of machine building which are of an intersectorial nature. The activities of this council will make it possible to exclude the scattering of material and human resources, eliminate parallelism in work on the same problems of an intersectorial nature, and will provide an opportunity to reduce the times for working out fundamental problems and introducing the results in industry, and to disseminate the experience of the advanced machine building enterprises and sectors in different industrial sectors.

One of the effective methods for introducing the results of scientific research into industry is the use of a system of product quality standards by various criteria. At present within the system of the USSR Gosstandart [State Standardization Committee], with the active involvement of the Institute of Mechanical Engineering, work has been undertaken on interdisciplinary problems for drawing up the standard technical specifications in the area of the calculations and testing for strength, durability, wearability and vibration safety. The work is being done by the leading scientific research and design organizations. On the basis of the systems of intersectorial standard materials worked out in accord with the interdisciplinary programs, sectorial standards should be improved which consider the specific features of the approaches existing in the sectors.

The elaboration and introduction into industry of the designated standard technical specifications will be a major contribution to developing a scientific methodological basis for ensuring the quality of machines in terms of the criteria of strength, durability, wearability and vibration safety, and will make it possible to bring the results of scientific research of an intersectorial and sectorial nature to the point of practical utilization.

Particular attention must be paid to the questions of training highly skilled engineer, technical and scientific personnel and their specialization. The existing list of specialties and programs under which the specialists are trained do not always meet the requirements of scientific and technical progress.

The extensive network of scientific research and design organizations in the nation requires the immediate solution to the personnel question, since the level of the research carried out is directly dependent upon the specialization of a scientist. Thorough attention must be given to the process of training specialists in accord with the system of VUZ--scientific research institute--production. In each sector there are leading scientific research and design organizations and enterprises. Within the system of the Ministry of Higher and Specialized Secondary Education, as a rule, there are training institutes engaged in preparing the corresponding specialists. However, unfortunately, there is a lack of an organic tie between them. One of the tasks of the council, the creation of which was mentioned above, should be to work out a uniform and compulsory statute on the cooperation of training, scientific research (design) organizations and industrial enterprises.

In conclusion, I would like to take up one other problem related to improving the organization of science.

The work planning system employed in the sectorial scientific research institutes and providing for the incorporation of the creation of a product in the thematic plan conforms to the interests of through planning for all links in the chain of scientific research institute--design bureau--production which are directly involved in the development and production of a given specific new product. This progressive system as a whole has proven effective, but it does not exclude the possibility of duplicating the same scientific research in developing different machines.

The improving of the organization of scientific research on the sectorial level, in ensuring the prompt isolating of the scientific content of the work which is being done in the various sectors in creating new equipment, the combining of particular scientific problems and their consolidation, coordination, and turning over for development to institutes engaged in solving such problems on a high scientific level, as well as the returning of the obtained scientific results back to the sectorial scientific research institutes--all of this would help to disclose concealed reserves essential for the efficient functioning of a unified system for the organization of science in our nation.

The opportunity inherent to the socialist system of taking sound decisions on a centralized basis and on a state level, and to create the necessary conditions for realizing them is the guarantee for the successful improving of the Soviet scientific organization.

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CSO: 8144/0433

INTERDEPARTMENTAL COORDINATING COUNCIL FORMED IN LENINGRAD

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 8, 1979 p 137

[Text] To improve coordination of fundamental and basic research carried out by the scientific establishments of the USSR Academy of Sciences, the institutions of higher learning, and the scientific-research organizations of the ministries and departments that are located in Leningrad and Leningrad Oblast, the Karelian ASSR, and Murmanskaya, Arkhangel'skaya, Vologodskaya, Novgorodskaya and Pskovskaya oblasts, an Interdepartmental Coordinating Council of the USSR Academy of Sciences has been organized in Leningrad.

Academician I. A. Glebov, representative of the Presidium of the USSR Academy for Leningrad, has been named chairman of the council.

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CSO: 8144/0433

ORGANIZATIONAL REFORM GIVES BRANCH R&D CENTER BROAD ADMINISTRATIVE POWERS

Leningrad LENINGRADSKAYA PRAVDA in Russian 11 Nov 79 p 2

[Interview with Valentin Nikolayevich Bogdanov, director of the All-Union Scientific Research Institute for Electric Welding Equipment by Zh. Manilova: "The Experiment is Over, the Work is Continuing"]

[Text] [Question] Valentin Nikolayevich [Bogdanov], what difficulties is your institute experiencing and what benefits has it gained in working under the conditions of the new experiment?

[Answer] An experiment is carried out in order to obtain results which then make it possible to draw a correct conclusion. I assume that our conversation will be useful when we obtain such results. Not before.

[Question] This was a note from my pad. The transcript of a talk begun but not completed several years ago with V. N. Bogdanov, director of the All-Union Scientific Research Institute for Electric Welding Equipment [VNIIESO]. Subsequent to the Decree of the CPSU Central Committee "On Measures to Increase the Efficient Work of Scientific Organizations and to Accelerate the Use of Scientific and Technical Achievements in the National Economy," the VNIIESO among a series of other scientific research, design and engineering organizations in the sector of the electric engineering industry, as an experiment, converted to the new system of planning and economic incentive. Over the past years, repeatedly announcements on the developments of the institute have appeared on the pages of LENINGRADSKAYA PRAVDA, but the director has continued to refuse to continue the commenced conversation. "It is too early!" he argued categorically. And probably he was right because he not only feared premature conclusions, but was perfectly aware of the long-range goals of the experiment and its broad prospects. And only after the decree approved by the party and the government and aimed at improving planning and strengthening the impact of the economic mechanism on raising production efficiency and work quality did the director of the VNIIESO consider such a conversation to be useful. And he began it thus:

[Answer] At present it is an indisputable fact that it is becoming evermore advantageous to invest funds into scientific development. But certainly under the condition that here each ruble should be spent with the greatest effectiveness. But there is the question of how to force this ruble to "work" fully. The problem is not an easy one, as it involves a mass of problems not only of an economic nature but also an organizational, planning, social and moral-ethical one. And it even goes beyond this. In the last decade, in this area there has been an intensive and thorough search for new forms and methods for the work of scientific organizations. And the experiment in our sector was started for the same purpose.

[Question] Is the experiment based upon a comprehensive approach to solving the problems enumerated by you or was it necessary to isolate several of them to be solved first?

[Answer] Ultimately, of course, it was a comprehensive approach, but the start was made by an organizational reform. In the electric engineering industry, about 20 scientific and technical centers were organized, and these were to be responsible for progress in one or another subsector. Our institute became one such center. This is a completely new form for organizing sectorial science, and what is particularly important, a new form of linking science with production. Let me try to show this from the example of the VNIIESO which now bears responsibility for all technical policy in the area of the development and production of electric welding equipment in the nation.

Let me begin by saying that the scientific and technical center has been given enormous rights. For example, all the work of developing new equipment is carried out under our aegis. Not a single research subject can be carried out or even planned without us. All the subject plans are sent to us, and after careful analysis we defend these plans at the ministry. A duplication of work on the national scale is excluded, a real possibility of standardizing the products is created, and most importantly, a firm barrier is erected against the development of equipment which does not conform to the modern technical level.

We will not stand aside from the checking of these plans in the future. The NTTs [Scientific and Technical Center] has assumed rigid control over the dates of carrying out any development. Incidentally, the so-called card for the technical level of any new product must be signed by the director of the center without fail.

[Question] But certainly the development of new equipment is only a part of the path which new equipment must follow from the time the experimental model is born until it is used. And it is no secret that precisely beyond the threshold of scientific research, in the production sphere, difficulties most often start, as a result of which a new design for years [is not] introduced into mass production and as a consequence becomes obsolete.

[Answer] This is a major problem the solution to which in the process of the experiment required from us in the literal sense of the word a reorientation in the institute's specialty. Note that even in its name additions have appeared. At present it is not merely a scientific research and experimental design but also an engineering institute. Previously it was the case that a new product was developed at the institute, but production could not begin producing it due to the absence of the required production methods and equipment. Now all the research and design subjects are carried out at the institute in parallel with the development of production methods. A plant is delivered a new design with all the production specifications, and this sharply reduces the time for developing the articles and their high quality is guaranteed.

[Question] The engineering and production work of the institute is an additional specialty. How were you able to get out of the situation if previously the VNIIESO employed predominantly researchers and designers?

[Answer] We worked hard and life impelled us. We reshaped our personnel policy, and gave preference to graduates from VUZes in the production engineering specialty. The institute how has as part of it large production departments. I how have a deputy who directs all production questions.

[Question] Understandably the function of a scientific and technical center entails per se the functions of an institute. But can a center influence the economic mechanism of the enterprises or more widely the economy of a sector?

[Answer] The economic activities of the sector are our concern. We are responsible to the ministry for their state. And I now keep in front of me a summary table of the basic technical and economic indicators for the operations of the electric welding equipment plants in our sector. And I can see what is the volume of commodity product at one or another enterprise, and what product profitability there is. Here are the figures showing the return on investment, output per employee, the output of product per meter of production area, the number of employees, and so forth. This is essential to know in order, in developing the new equipment, to plan ahead of time for what plants that will produce it. Previously we also knew the capabilities of the plants, but we could not require them to take up our innovation. Now the situation has changed. The draft annual plans of the enterprises in the sector, and I particularly want to emphasize this, are worked out with our immediate involvement (naturally, the plans are subsequently approved by the ministry). Once a year the leaders of all the plants meet at the enterprise. We coordinate these plans with them as well as with the representatives of the USSR Gosplan, the USSR Gossnab and the Committee for Science and Technology.

[Question] Valentin Nikolayevich, yet when it is a question of the enterprise plan, the plant director will fight to the end for the benefit of the plant and not for the institute.

[Answer] But, in the first place, we have the right to intervene in the planning, and secondly, in possessing the technical and economic analysis for each enterprise, we have a sound argument. Now it is not so easy to repel us. Let us assume that the plant director has vowed that his enterprise will not develop a new electric welding device this year, that production is overloaded, and so forth, in that "classic" spirit which was characteristic in the relations between the institute and the plant prior to the experiment. "Dear Ivan Stepanovich," I tell him in this instance, "you must be involved in developing the equipment, because your production capacity is not fully utilized, there is a surplus workforce, and as for funds, here there is no problem."

The influencing of production while still on the planning level is an extremely important circumstance, but at present we are also concerned with evaluating the technical level of the finished products of the sector. Product certification, it must be said, works dependably. Incidentally, like a price does. There is the so-called 15-06 price list which contains the prices for all the products of our specialty and which we draw up. The State Price Committee conducts talks about this at present with no one except us. And this is correct as who better can judge the price, but the one who knows better than others the design of the equipment and its production methods. An enterprise always endeavors to somewhat increase the prices artificially for its articles, and we restrain them. For this, of course, we are armed with data on the profitability of the enterprises and we have a good knowledge of the trend for its increase over decline.

[Question] The party and the government have confronted the national economy with tasks aimed at saving material resources. Have you succeeded in carrying out this policy in the sector?

[Answer] The NTTs has been given the right to elaborate the consumption standards for materials to be used on products of electric welding equipment and for labor norming, because these standards again are determined precisely by the design and the production method of the article. We carry out this work jointly with the enterprises.

[Question] For a minute try to imagine yourself simply as an institute director, and not the leader of a NTTs. What advantages does the new system provide for planning per se for the research activities of the VNIIESO?

[Answer] These advantages arise out of all that I have already mentioned regarding the new role of the institute in the sector. In being concerned with the development of new equipment and in influencing the entire subsequent chain of "science-production," we now have an opportunity to draw up comprehensive research plans. The so-called schedule orders reflect all the stages of developing the new equipment, and for this reason we now have a precise notion of where and how we can reduce the time for its development and introduction. In being involved with the production methods, we can, for example, oblige an enterprise ahead of time to start technical

preparations for producing the new article. Comprehensiveness in planning is an enormous boon.

[Question] In terms of the conditions of the experiment do you now have a different economic incentive system than before?

[Answer] Our institute, like the entire sector, operates under the principle of economic accountability. The end and materialized product of the work of the researchers, designers, production engineers and workers--this is now what is important. And only it, its actual value can like feedback remunerate the work of the people. As for the incentive funds, they are analogous to the funds of the industrial enterprises. At present we have available more solid funding for various types of bonuses, trips to vacation homes, and finally, somewhat greater freedom in capital construction and the purchasing of equipment for the needs of the institute.

[Question] The results of the experiment are beyond dispute. This can be seen from the fact that in accord with the Decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Strengthening the Effect of the Economic Mechanism on Raising Production Efficiency and Work Quality," all the sectorial institutes in the next few years will convert in one or another form to the system carried out by you for planning and economic incentive. Your experience is very valuable for them, and for this reason it would be beneficial to mention those negative aspects which, we might say, were not anticipated in preparing the experiment.

[Answer] We were greatly impeded by the fact that only the scientific research institutes and design bureaus and not the enterprises were converted to the new operating conditions in the sector. Just look what happened. The deductions for the development of new equipment at the plants are only 5-7 percent of the total profit, and the remainder is chiefly for fulfilling the gross plan. And what incentive here is there for new equipment! This is why, with all our rights, we had at times to operate from a position of strength and pressure. And this is always difficult and not always effective. However, as is seen from the decree, such a discrepancy will soon be eliminated, and the enterprises themselves will be interested in developing new equipment.

Of course, in the process of the experiment we were not always on top of things as we lacked experience, we were short of forces and at times lacked confidence in these forces. As a rule, the completion dates suffered. Sometimes because of our fault, and sometimes due to the fault of the plants. And this is the case, we cannot conceal it, even now.

But the important thing is that over the last decade, we have not had a single unrealized development. Not one of them has been shelved or lost in oblivion. This is the main result of the experiment which is also of social significance. As for the economic and qualitative indicators of

our work under the new conditions, we can let the figures speak. At present we are developing 35-40 new types of equipment a year, and over the last 5 years all of them have been classified in a superior quality category. As a total the sector produces almost one-half of the products with the Quality Sign, and this figure is growing year after year.

Recently I was given the following data: The economic effectiveness of our developments over the 9 months of the current year was 15 rubles per ruble of expenditures, and in 1971 (we first introduced this indicator then), the figure was respectively 9.5 to 1. Of the total number of developments completed on 1 July of this year, 86 percent was on the level of an invention.

Recently we estimated the period required to replace our products. A figure of 7-8 years was obtained. American specialists consider 5-10 years as a good indicator for the operation of the sector. So, I would assume, here we have achieved good results. Incidentally, this indicator up to now, from my viewpoint, has unjustifiably been ignored. Combined with the indicators for the technical level of the product and the economic efficiency of production, it most objectively characterizes the work of the leading sectorial scientific research institute. We constantly speak about reducing the development time or of the rapid introduction of these developments into production, but the period for replacing the sectorial product is a more profound and complete one because it reflects the intensity of the institute's work as well as its direct impact on production.

[Question] Your argument, Valentin Nikolayevich, also seems convincing because the product development period should be known in the long range development planning of the sector.

[Answer] Without this it is difficult to establish the very development trends. Long-range planning should also consider them and not just the statistics. Several years ago, as a result of a thorough analysis of the needs of the national economy for electric welding equipment, it was ascertained that the demand for it had outstripped the production capabilities. We turned to the governmental bodies with a proposal to build new enterprises. Our view was supported, and construction was started in Pskov on a plant for heavy electric welding equipment. The first stage of the enterprise went into operation 2 years ago, and the second will soon be completed. We consider this plant to be our offspring since we contributed to its birth, we determined the range of equipment, we developed the production processes for it, and so forth. Even up to the point that at the outset I myself carried out the duties of the plant director.

At present a great deal is being said about the prospects of the plasma method of working metal. This is correct, and at the institute we have developed such work widely. However, under present conditions, when we are responsible for the progress of the sector, it is also essential to consider the real prospects, that is, where and how soon such equipment will be produced. Under our initiative, a new enterprise specialized

exclusively in the production of plasma equipment will be built in Leningrad Oblast. Together with other organizations, we have already drawn up the technical and economic background studies.

I sometimes wonder: but what if we were proposed to go back to the old way. Wouldn't it be easier? No it would not. Undoubtedly not because a psychological change has already occurred in us ourselves. Having overcome the difficulties of reorganization, we have tasted the sweetness of its fruits. This may be overstating it, but this is the case. The work of the hands of man are all the dearer to him the more energy and heart he has invested in it.

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CSO: 8144/0357

INSTRUCTIONS GOVERNING RESEARCH CONTRACTS OF VUZ'S PUBLISHED

Moscow BYULLETEN' NORMATIVNYKH AKTOV MINISTERSTV I VEDOMSTV SSSR in Russian No 10, Oct 79 pp 40-45

[Instructions on the Procedure for Carrying Out Scientific Research by Institutions of Higher Learning under Economic Contracts with Clients; approved by the Order of the USSR Ministry of Higher and Specialized Secondary Education of 26 January 1979, No 100]

[Text] General Provisions

1. The current instructions are to be extended to work carried out by VUZes under contracts with clients in accord with the Standard Statute on the Procedure for Concluding Economic Contracts and Issuing Internal Ministerial Orders for the Carrying Out of Scientific Research, Experimental Designing and Technological Work as approved by the Decree of the State Committee of the USSR Council of Ministers for Science and Technology [GKNT] of 5 August 1969, No 360, including research work.*

The VUZes carry out economic contract work in accord with the Statute Governing Scientific Research in Institutions of Higher Learning on the subjects corresponding to the training specialty of the specialists and the approved scientific areas.

Work related to introducing the results of completed research relating to an economic contract subject is carried out in accord with the conditions stipulated by the Standard Contract for the Transferral by Enterprises and Organizations of Their Scientific and Technical Achievements to Other Enterprises and Organizations and for Helping Them in Using Borrowed Advanced Experience as approved by the Decrees of the GKNT of 31 December 1971, No 350, and 12 January 1978, No 9.

2. The economic contracts are concluded first of all for carrying out work provided by the decrees of the governments of the USSR and the Union

*The listed work below in the Instructions is termed "Economic Contract Work."

republics, the GKNT, by the plans of the USSR Academy of Sciences and the Union republic academies of sciences, by the sectorial and republic plans for scientific research and the use of scientific and technical achievements in production.

3. The VUZes conclude economic contracts with associations, enterprises, institutions and organizations for each scientific research, experimental design, technological or exploratory project (subject). The concluding of economic contracts with several clients for one subject is not allowed.

The drawing up of the economic contracts should be carried out in accord with Appendices 1-5.*

4. For interdisciplinary work, a single economic contract is concluded with the head VUZ. In the carrying out of an interdisciplinary subject by a group of VUZes, the economic contracts between the VUZes can be concluded only under the condition that the head executing VUZ turns over the corresponding limits and financing to the coexecutor VUZ. The amount of work carried out by the coexecutor VUZ is determined here for all the costing items, and is not considered in the amount of work for the head VUZ.

The affiliate of a VUZ and its institutions operating on an independent balance sheet carry out work on the basis of economic contracts concluded by the VUZ under which this affiliate has been organized.

Economic contracts are not to be concluded between the structural subdivisions of a VUZ (including those operating on an independent balance sheet).

5. The carrying out of economic contract work by the special problem scientific research laboratories of VUZes is not to be allowed.

The Organization of Economic Contract Work

6. A scientific research sector (scientific research unit) organizes the economic contract work to be carried out by the chairs and by the sectorial scientific research laboratories of a VUZ.

7. The scientific research sector is organized by the ministry (department) having jurisdiction over the VUZ.

A scientific research sector is classified in a wage category for scientific workers by the USSR State Committee for Labor and Social Questions together with the USSR GKNT, the USSR Ministry of Finances with the participation of the USSR Ministry of Higher and Specialized Secondary Education and the USSR Academy of Sciences.

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*The appendices to the current Instructions are not given in the BYULLETEN'. Editor's comment.

8. In the absence of a scientific research sector in a VUZ, the economic contract scientific research is organized by the chairs of the VUZ.

In this instance the wages of scientific workers are paid according to the third category.

9. The organization of economic contract work in a scientific research unit as well as in the scientific institutions of a VUZ operating on an independent balance sheet (scientific research institute, design bureau and so forth) is carried out by these institutions in accord with the statutes (charters) approved for them and the current instructions.

10. The ministry (department) having jurisdiction over the VUZ approves the basic scientific directions, the annual amount of expenditures and the wage fund for carrying out the economic contract work using special (nonbudget) funds, and the limit allocations for the support of administrative and managerial personnel of the scientific research sector.

11. The structure and the staff schedule of a scientific research sector are approved by the rector of the VUZ.

12. A scientific research sector is headed by a leader the position of whom is filled by competition.

13. The leader of a scientific research sector provides for the following:

The elaboration of the draft plans of economic contract work of the VUZ;

The drawing up of proposals on the allocation of the limits and staffs approved for the sector;

The organization of carrying out economic contract work on a high scientific and technical level and within the established dates;

The state registering of the work to be carried out, the drawing up of reports on completed work, and the compiling of a summary annual report on the scientific and research work of the VUZ;

The organization of the use of the scientific and technical developments of the VUZ in the national economy;

The drawing up of draft contracts with the client;

Control over the work of the executors of the economic contract work (jointly with the leadership of the VUZ chairs and faculties) and the accepting of the work performed by them;

The carrying out of other measures related to the organization of economic contract work at the VUZ and reporting on it.

14. For the purposes of the broader involvement of the VUZ faculty in working out the scientific research plans in the most promising areas, in supervising their execution and in evaluating the effectiveness of the activities carried out by the VUZ scientific subdivisions, scientific-technical commissions (councils) can be organized under the scientific research sector.

15. The organization of work related to the contract (subject) is entrusted to the leader of the subject, as a rule, selected from the professors and docents of the chairs. Considering the scientific qualification and experience of the leader in scientific organizational work, in individual instances he may be permitted to direct several economic contract works simultaneously, but not more than three. With the permission of the ministry (department) having jurisdiction over the VUZ, the subjects may be directed by staff scientific coworkers from the scientific research sector who have an academic degree or title. The designated persons can be the leaders, as a rule, of one economic contract work.

For an interdisciplinary subject, leaders of individual independent sections (stages) of the work can be appointed.

16. The leader of a subject bears personal responsibility for the carrying out of the work on a high scientific and technical level and on the established time.

Executors of Economic Contract Work

17. At a VUZ economic contract work is carried out by the following:

By the faculty, by auxiliary-training and production personnel on the staff of the given VUZ and its affiliates, as well as by workers, technicians and engineers of training-production enterprises of the given VUZ, under conditions of holding several positions with payment of up to 0.5 of the rate for the combined position (depending upon the importance of the work being carried out);

By graduate students and students who are studying off the job;

By the staff of the scientific research sector.

18. The rector of a VUZ can carry out economic contract work as an extra job in the capacity of a leader of a subject with the permission of the superior organization having jurisdiction over the VUZ.*

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*The simultaneous or sequential execution of paid economic contract scientific research and a teaching load with an hourly pay during the academic year is not permitted.

19. The deans for scientific and academic work, evening and correspondence instruction are permitted to carry out economic contract work as a second job in the position of subject leaders with the permission of the rector of the VUZ.*

20. The following are not permitted to be involved in economic contract work in a VUZ under the conditions of a second job:

Persons of the regular staff of the VUZ who have been permitted in the established procedure to carry out other additionally paid work;

Persons of the regular staff of the scientific research subdivisions of the VUZ;

Persons of the faculty during a period of advanced training or probationary training, as well as in the instance of the nonsubmission of a scientific report on state budget projects included in the individual plan;

Consulting professors;

Regular employees of the client enterprises, institutions and organizations as well as other persons not on the staff of the given VUZ;

Probationer researchers and probationer instructors.

21. The staff coworkers (except the administrative and managerial personnel) of a scientific research sector are appointed to vacant positions provided in the staff schedule by an order of the rector for the period the contract (subject or stage) is in effect.

22. The involving of persons carrying out second jobs in the economic contract work is done on the basis of individual contracts with the rector (the dean for scientific work) of the VUZ.

23. Individual contracts are concluded for carrying out the work as a whole or for its individual stages provided in the economic contract, as well as for carrying out specific assignments of a research or production nature on just one subject. The designated work is carried out during nonworking time in the basic position.

The individual contract should stipulate the amount of the work to be assigned with a description of the assignments in terms of individual stages, the dates of completing this, the types of reporting on the work to be performed (in what form the work is to be turned in), and the procedure and amount of wages.

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*The simultaneous or sequential execution of paid economic contract scientific research and a teaching load with an hourly pay during the academic year is not permitted.

24. The leadership and faculty of a VUZ can be appointed to the following positions:

Basic Position	Extra Position
Rector, dean	Senior scientific coworker (performing duties of subject leader)
Professor, docent having academic degree	Senior scientific coworker (with the right to perform duties of the leader of a subject of a section of an interdisciplinary subject)
Senior instructor, instructor and assistant having academic degree; docent, senior instructor not having academic degree	Senior scientific coworker, junior scientific coworker
Instructor, assistant not having academic degree	Junior scientific coworker

25. Graduate students may be assigned by an order of the rector to positions of junior scientific coworkers with a wage up to 0.5 of the rate with the agreement of their scientific leaders, the heads of chairs and graduate studies after the chair's approval of the subject of the dissertation work under the condition that this coincides with the subject of the contractual work and the successful fulfillment of the individual plan. The assignment is made for the period the contract (stage) is in effect.

26. Students may be assigned by an order of the rector to positions of senior technicians, senior laboratory workers, technicians, laboratory workers, preparatory workers and workers with a wage up to 0.5 of the rate.

27. Graduate students and students in a calendar period can be assigned to carry out economic contract work for full working time with the corresponding wages.

28. The wages of persons assuming extra positions from the faculty are paid in stages in accord with the calendar plan of the work according to the contract on the basis of the scientific and technical report or the technical statement on the completed stage, the bilateral act for the acceptance and delivery of the work and the time sheet.

29. The wages for persons assuming an extra job from among the auxiliary training and production personnel and executors from among graduate students and students are paid in the established procedure on the basis of a document showing the completion of the work and the time sheet once a month.

30. In figuring the wages of persons assuming an extra job, the days of sickness, official trips and leaves relating to the basic position are excluded.

31. For persons assuming an extra job from the faculty of the VUZ, in being sent on a mission to carry out work related to the economic contract, wages are maintained fully both for the basic and extra position.

32. Executors from among graduate students are sent on official missions to carry out work relating to the economic contract in accord with the current legislation.

33. Executors from among the students can be sent on official missions to carry out work related to the economic contract only during the holiday period. During an academic semester, students studying under individual plans can be sent on an official mission for a period of not more than one workweek, including travel time in both directions.

34. Per diems are paid to executors from among the students for the days they are on an official mission considering the full salary of the position held.

35. Executors from among graduate students and students, in carrying out work under a contract which exceeds 2 months in the established procedure are to be granted leave according to the position held or are to be paid compensation upon completion of the work for the unused leave in an amount proportional to the time worked.

36. Labor booklets are filled out in the established procedure for the executors of economic contract work from among the graduate students and students who have never worked before.

37. The executors of economic contract work are paid bonuses in the established procedure.

Procedure for Concluding and Drawing Up Economic Contracts

38. An economic contract is concluded on behalf of a VUZ by the rector or dean for scientific work considering the response of the faculty (VUZ) council on the advisability of carrying out the given work.

Appended to the economic contract are the following: A technical and economic background study, the technical specifications, the work program and calendar plan for carrying out the work, and estimate calculations (costings).

39. The economic contract drawn up by both parties with the appendices is recorded in a special log and kept in the bookkeeping office, while a second copy is kept in the subdivision in charge of economic contract work of the VUZ.

40. The work commences on the date stipulated by the contract, but not earlier than the date of receipt of the advance payment stipulated by the economic contract.

The commenced work should undergo state registration within the established procedure.

With the failure to receive the advance from the client on the date stipulated by the economic contract, the executor has the right to seek arbitration for compulsory collection of the advance.

41. An economic contract can be amended or abrogated upon the mutual agreement of the parties. With the failure to reach agreement, the dispute is resolved by arbitration in the established procedure.

The Cost of the Work and the Payment Procedure

42. The cost of the work under an economic contract is determined by estimate calculations (costings) which provide for the direct expenditures and overhead.

43. The direct expenditures include the outlays directly related to carryout the work under the specific economic contract.

The direct outlays are determined for each job as the total of the following expenditure elements for: Wages, wage deductions; equipment, materials and chemical agents; services of outside organizations and enterprises; production business trips; other direct expenditures. Appended to the estimate is a calculation of each expenditure element.

The wage fund is determined by direct calculation, proceeding from the necessary staff of executors, the current wage rates and the date for carrying out the work. The ratio between the wage fund and the other expenditures in the economic contract can vary depending upon the nature of the work to be performed.

The wage deductions (deductions for state insurance) are planned in a percentage of the calculated total wage fund according to the established rates.

The total direct expenditures on economic contract work include the expenditures related to the purchasing of equipment and devices needed to carry out the work and to the manufacturing of experimental models, examples of machines and laboratory stands.

The samples of machines, equipment and devices, experimental models and laboratory stands manufactured for carrying out economic contract work at the expense of the clients upon the completion of the work are entered on the balance sheet of the VUZ.

The purchase of special equipment for performing scientific research should be provided for in the estimate and the contract. In moving the equipment from the warehouse to the laboratory, its cost is written off against the expenditures relating to the contract (subject), and is accounted for as part of the expenditures of incomplete production.

Upon completion of the work relating to the contract (subject), the special equipment is returned to the client or is left to the VUZ under the conditions of a gratis transfer, if this is stipulated by the contract or written agreemen has come from the client.

The item "Basic Materials (Minus Wastes)" gives the value of the materials (chemical agents) to be consumed in carrying out the economic contract work. The value of the expended materials (chemical agents) is reduced by the value of the usable wastes. Materials are supplied through the warehouse.

In the expenditure item for services of outside organizations and enterprises, the cost is planned for the individual theoretical and experimental projects, the designing and manufacturing of stands, mockups and models of the articles to be made both by the outside organizations and enterprises as well as by the internal design bureaus (public design bureaus, special design bureaus, special designing and engineering bureaus, and so forth), by the computer centers, by the experimental shops, experimental plants and so forth operating on an independent balance sheet, in addition to the cost of the services of the patent information organizations, the industrial design shops, printshops, and so forth.

Official trips made solely for the purpose of carrying out economic contract work or for participation in the research and testing for workers engaged directly in the execution of this work are considered in the item "Production Official Trips." Expenditures on all other official trips by production or administrative-managerial personnel are considered as overhead.

The item of other direct expenditures shows all remaining expenditures on carrying out the work relating to a specific subject (economic contract), where these expenditures can be included directly in its cost but in terms of their nature do not fit in all the other expenditure items, for example:

The renting of buildings and offices;

The consumption of metered electric power, gas and water supply;

The purchasing of patent and other special scientific and technical literature.

44. The overhead includes expenditures on the support of the management personnel, the centralized auxiliary services (patent information, metrological, economic, economic analysis and the organization of introduction,

the bureau of metering and measuring instruments, the laboratory of special metering instruments, the repair and installation bureau, the bureau for drawing up scientific projects, the movie and photographic laboratory, and so forth), the reconstruction, maintenance and major overhaul of offices, the purchase and repair of supplies and equipment for the centralized auxiliary services, and the general economic, VUZ and other expenses.

Overhead in drawing up an estimate of economic contract work is determined in a percentage of the direct expenditures for the VUZes.

Overhead is distributed over the subjects proportionately to the direct expenditures.

45. In the process of carrying out the work under an economic contract, the rector of a VUZ has the right within the limits of the approved total expenditures to make changes in the expenditure estimate, including to increase expenditures on the purchase of equipment and materials for scientific research at the expense of saving funds under the other estimate items, including the savings of money in the wage fund, and to pool funds under individual contracts for the purchase of expensive scientific equipment.

46. Payment for completed work is made by the clients in stages and as a whole for the economic contract according to the estimated cost.

47. The estimate calculations should fully consider all the expenditures needed for carrying out the work under the economic contract.

48. Not less than 70 percent of the total excess of income over expenditures remaining at the disposal of the VUZ rector should be spent on modernization and the replacement of scientific laboratory equipment.

49. Up to 1.5 percent of the total excess income over expenditures can be used to cover expenditures related to the publishing by the VUZes of journals, monographs, collections of scientific works and lecture series, and for organizing patent-licensing and scientific-technical information, above the allocations provided for in the VUZ estimates.

Reporting on Economic Contract Work

50. In accord with the calendar plan of the work relating to the economic contract, for each stage a scientific-technical report or a technical statement is drawn up. The form of reporting for the stage is determined by the conditions of the economic contract.

51. A scientific-technical report is drawn up for the completed scientific research, and this is made out in accord with the requirements of the state standard and is recorded in the established procedure.

52. The turning over of the results of the scientific research to the client is formalized by a statement of completed work.

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CSO: 8144/0433