APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000100060064-4

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JPRS L/8553

29 June 1979

USSR

TRANSLATIONS ON USSR INDUSTRIAL AFFAIRS

(FOUO 8/79)

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AUTOMOTIVE AND TRACTOR INDUSTRY

WAYS TO MAKE BETTER USE OF AUTOMOTIVE EQUIPMENT IN UZBEK SSR TOLD

Tashkent OBSHCHESTVENNYYE NAUKI V UZBEKISTANE in Russian No 1, 1979 pp 19-24

[Article by L. A. Akhmetov: "Urgent Questions of Raising the Utilization Effectiveness of the Fixed Production Capital of Automotive Transport"]

[Text] At the modern stage of our country's economic development, the problem of raising the utilization effectiveness of fixed production capital (OPF), the value of which has reached almost 980 billion rubles, has acquired the greatest significance. In 1977 alone OPF in the total amount of about 110 billion rubles was introduced into use in the USSR's economy.

Occupying a major share in the aggregate value of OPF in the country's economy is OPF for transport, including common-carrier automotive transport; this necessitates an all-around rise in the effectiveness of its use.

L. I. Brezhnev, in emphasizing the importance of transport, said at the 18th Komsomol Congress: "What are the decisive portions of the struggle for effectiveness and quality in our national economy today? There are several of them, but mainly I would again name capital construction and transport."*

In our republic the value of OPF for common-carrier automotive transport rose from 167.4 million rubles in 1970 to 374.1 million in 1977.

Having such a substantial productive potential at its disposal, the UzSSR [Uzbek SSR] Ministry of Automotive Transport has worked out and introduced a number of highly effective measures for strengthening the production-equipment base and consolidating automotive transport enterprises, making wide use of the achievements of scientific and technical progress, improving the technology of technical servicing and current repair of rolling stock, introducing into operation at automotive transport enterprises progressive forms and methods for the organization and management of haulage, improving the branch's management system, and widely developing socialist competition that were designed for the long term.

*PRAVDA, 25 April 1978.

As a result of the realization of these and other measures, during the first 2½ years of the Tenth Five-Year Plan, the ministry as a whole hauled about 17 million tons of the economy's freight and more than 84.4 million passengers above the plan, realized 2 million rubles' worth of industrial products above the plan, rendered more than 1 million rubles' worth of domestic transport service to the populace, and obtained 28.5 million rubles in above-plan profit from all types of activity.

The results achieved are themselves a natural consequence of a steady improvement in the activity of the subunits of the branch as a whole during the Ninth and Tenth five-year plans to raise all technical, economic and operating indices.

As an analysis indicates, in 1977 the utilization coefficient grew by 11.37 percent for the truck fleet and 7.13 percent for the bus fleet, the kilometerage utilization coefficient rose by 6.49 percent, operating time for trucks per day increased 5.37 percent, output per registered automotive vehicle grew by 56.86 percent in tons and by 72.2 percent in ton-kilometers, output per passenger seat (in passenger kilometers) rose 12.14 percent, and income (in rubles) increased by 32.29 percent per registered vehicle-ton and by 36.06 percent per passenger seat, over 1970.

Thus, during the past 8 years a distinct trend toward a sharp improvement in common-carrier automotive transport operation began to appear in the republic. However, the rise in utilization effectiveness of the OPF did not always correspond to the growth in cost of the capital introduced. Thus the yield on capital per ruble of OPF value was reduced from 1.85 rubles in 1970 to 1.52 rubles in 1976, and profitability fell correspondingly from 43.3 to 35.3 percent.

This is explained primarily by the fact that the extremely necessary process of forming the material and technical base for automotive transport enterprises was being executed during all of these years. Therefore, the pace of introduction into operation of OPF that was extremely substantial in cost surpassed considerably the pace of assimilation of its production capabilities.

Simultaneously, the specifics of the branch's operation that are reflected in the fact that practically no time had to be spent assimilating the capacity of rolling stock should be noted here. But, as with any production work, no little time is spent on assimilating the design capacity of passive capital, which restrains growth in profitability and yield on the capital that is introduced into operation, which is extremely substantial (about 40 percent). This process is inevitable but, at the same time, of a temporary nature, for the indices that characterize OPF utilization effectiveness increase as the design capacity of the passive capital is achieved. Thus, in 1977 total profitability grew by 9.2 percent over 1976, reaching 38.55 percent, and yield on capital grew correspondingly by 5.3 percent, reaching 1.60 rubles. Thus, a reduction in the time spent on introducing and assimilating the design capacity of passive capital plays a decisive role in supporting a steady rise in the OPF utilization effectiveness of automotive transport.

Of no little importance in raising OPF utilization effectiveness is optimization of its structure. Unlike the case in industry, in automotive transport much depends upon the share of passive capital, for an extraordinary growth in the share of active capital is fraught with serious negative consequences. Research that has been conducted and the operating experience of advanced automotive transport organizations of the country's associations, including those of the UzSSR, indicate that optimal ratios in the OPF structure are achieved when the value of the active part is in the 52-58 percent range and the value of the passive part is in the 42-48 percent range, of their aggregate value.

The fluctuation of these indices at automotive transport enterprises depends upon a number of factors. Available statistical data and experience indicate that achievement of the indicated ratios within the OPF structure of automotive transport enterprises and associations provides for a steady and long-term growth of all quantitative and qualitative technical, economic and operating indices.

Thus, during the period examined, a discontinuity in the improvement of OPF utilization for common-carrier automotive transport occurred, thanks to active measures for improving the enterprises' supply and equipment base adopted by the republic's Ministry of Automotive Transport, as a result of which the share of value of the passive capital approximated 40 percent of the aggregate value. The successful work of such enterprises as the Tashkent Automotive Combine No 3, Automotive Enterprise No 56, Automotive Combine No 2 (which provides taxi hauling service) and some bus and taxi fleets of the capital and other oblasts of the republic can be examples of how a satisfactory supply and equipment base enables high technical, economic and financial indices to be achieved over a lengthy time period.

A sharp growth in the cost of newly received rolling stock, which inevitably led to disproportions in the value ratios of the active and passive portions of the OPF, has promoted reductions in yield on capital and profitability. The rate of growth of the cost of newly received rolling stock and equipment predominates considerably over the rate of growth in the productivity thereof; this is being felt especially appreciably in the long term with the arrival of expensive KamAZ [Kama Motor-Vehicle Plant] family trucks. This is graphically evident, for example, in comparing the cost of trucks of the MAZ [Minsk Motor-Vehicle Plant] and KamAZ families that are approximately equivalent in load capability and productivity.

Thus, the cost of the MAZ-503A dump truck is 6,250 rubles, while the KamAZ-5511, which equals it in load capacity (8 tons), costs 19,980 rubles. The MAZ-504V automotive tractor with 14-ton MAZ-5245 semitrailer costs 7,700 rubles, while the KamAZ-5410 automotive tractor with a load capacity of 14-15 tons costs 16,632 rubles. It is completely clear that an increase in the productivity of KamAZ family trucks over that of MAZ family trucks that are similar in load capacity, by a factor of 3 in the first case and by a factor of 2.2 in the second, is extremely problematical.

MAZ family trucks are among the best domestic developments in all their technical, economic and operating parameters, and, obviously, the production of these trucks should increase in the long term. A further rise in OPF utilization effectiveness will require that measures be developed and introduced for raising the productivity of newly arrived rolling stock.

A strengthening of the supply and equipment base of automotive transport enterprises and associations is of paramount importance. Although the energetic measures that were adopted in recent years have enabled the equipping of enterprises and associations to be greatly improved, the estimated provisioning of passive capital per registered motor vehicle is still below the standard.

Of no little importance also is a rise in the utilization effectiveness of the passive portion of the OPF, primarily of machine-tool, garage and other types of equipment, and machinery, tools and mechanized equipment, where the technical servicing and repair of rolling stock is performed. A full-fledged workload must be provided for these types of capital and they must be used productively in two or three shifts, and also on Saturdays and Sundays.

An important factor in raising OPF utilization effectiveness is a concentration of production work and a consolidation of automotive transport enterprises. In 1971-1976, in the branch as a whole, 22 ATP's [automotive transport enterprises] and two automotive trusts were consolidated, and in Urgench a production association for passenger hauling was established. Measures are being developed for converting automotive trusts to the two-tier management system. The NPO [science and production association] Uzavtotranstekhnika has worked out the necessary data for the creation of two regional automotive transport administrations based upon Tashgoravtotrest [Tashkent City Automotive Trust] for Centralized Freight Hauling and the Andizhanskaya Oblast Automotive Trust. It is planned to develop a master scheme for improving the management and development of this branch over the long term.

Decisions of the 25th CPSU Congress pointed to the need to increase the operating time of trucks per day. This is an extremely urgent task. Trucks in the republic's common-carrier transport are used less than 10 hours per day, buses less than 12 hours.

While there has been steady improvement in all technical, economic and operating indices for the ministry during the period examined, the operating time per day of buses, the level of which fell in 1977 to 96.74 percent of 1970's level, remains the sole indicator that tended toward a reduction.

Although this indicator has a certain trend toward an increase for trucks, the impermissibly low truck utilization on Saturdays and Sundays primarily must be noted. An increase in productivity in the use of trucks even to 11-12 hours and of buses to 13-14 hours per day and effective organization of the productive use of trucks, especially in intercity transport, for all days of the week will enable profitability and yield on capital for enterprises and associations and for the branch as a whole to be raised appreciably.

Much depends in this matter on the consignor and consignee and the organization of loading and unloading work in two or three shifts and on Saturdays and Sundays. The creation of bases or mechanization columns will be extremely effective. In this connection, the Freight Hauling Section of the NPO Uzavtotranstekhnika will execute the developments needed to create mechanization columns within the Tashgoravtotrest for Centralized Freight Hauling. In the long term, as the necessary conditions arise, such columns should be created in all oblast centers and large freight-forming and freight-absorbing centers of the republic.

In a speech to the 18th Komsomol Congress, L. I. Brezhnev pointed out: "One of the most important signs of the day for our motherland is the drive for effectiveness and quality. This is not a temporary campaign. This is the party's policy, and it was adopted, as is said, in earnest and for a long time. This is not only the key task of the current five-year plan but also a determining factor in our economic and social development for many years to come."*

In recent years our industry has faced especially sharply the question of raising the effectiveness and quality of the haulage performed and of providing for its regularity and the delivery of freight strictly by the established deadlines without damage or loss.

The comprehensive system of quality control in haulage that NPO Uzavtotranstekhnika introduced in 1978 at Automotive Transport Enterprise No 145 and at a number of other automotive transport enterprises in 1979 is called upon to play a major role in raising the effectiveness and quality of haulage.

A large reserve for improving OPF utilization is a reduction in empty runs by trucks. However, it would be incorrect to achieve just a growth in the absolute value of the truck-run utilization coefficient to the detriment of other technical and economic indices, as is still being practiced at a number of automotive transport enterprises. Raising the truck-run utilization coefficient should be accompanied by the achievement of the highest productivity of rolling stock, otherwise the high value of this indicator will conceal negative features in organization of the haulage process, primarily above-norm nonproductive idle time, a lengthening of time for truck turnaround and for delivering freight, and so on.

A further increase in the amounts and improvement in the organization of intercity haulage will have an important role in reducing empty truck runs. The ministry's automotive transport enterprises will provide during the Tenth Five-Year Plan for the haulage of 9,055,000 tons of freight in centralized (regular) intercity transport, and, in so doing, haulage in

*PRAVDA, 26 April 1978.

1980 will be 63.3 percent over 1975. During the current five-year plan it is planned to send on side routes 787,000 loaded trucks, which should haul 6,346,000 tons of freight and for which 25 additional dispatcher-control posts are to be established. The realization of these and other effective measures has already enabled the volume of centralized intercity haulage during the first 2.5 years of the Tenth Five-Year Plan to increase by 61.8 percent, which is substantially higher than the plan indicators.

An increase in truck kilometerage between repairs, the development of socialist competition to save fuel, spare parts and tires, and an increase in truck kilometerage without overhaul will help greatly to raise the OPF utilization effectivness of the republic's common-carrier automotive transport. The basic rules for this type of socialist competition were developed several years ago by specialists of the science and production association Uzavtotranstekhnika.

The socialist competition that has been engendered at several of the ministry's automotive enterprises to save fuel, spare parts, and parts and to increase truck kilometerage between repairs embraced 123 automotive enterprises and about 20,000 drivers even back in 1977. Collectives of the Yangiyul' ATP of Tashoblavtotrest [Tashkentskaya Oblast Automotive Trust] for Passenger Hauling, Andizhan Automotive Column No 2508 of the Andizhanskaya Oblast Automotive Trust, Shakhrisabz Automotive Enterprise No 35 of the Kashkadar'inskaya Oblast Automotive Trust, Tashkent Automotive Column No 2521 and Automotive Enterprise No 103 of Tashgoravtotrest for Centralized Haulage were recognized as competition winners for 1977 for the industry and they were awarded first-class ratings.

V. I. Lenin, in presenting success in economic work as a function of the personal motivation of each worker to solve specific production tasks, taught: "Not by enthusiasm directly but with the help of enthusiasm born of the great revolution, and by personal interest, personal motivation, and economic analysis you work to build first strong bridges that lead to socialism, otherwise you will not lead tens and tens of millions of people to communism."* And experience in developing large-scale socialist competition convincingly confirms the correctness of these Leninist instructions.

Many starts and initiatives that enable daily work to be organized with effectiveness and quality and the best OPF utilization to be achieved have been engendered and disseminated on a large scale at UzSSR Ministry of Automotive Transport enterprises, associations and organizations.

About 400 drivers in the ministry's system have committed themselves to carrying out two five-year plans during the Tenth Five-Year Plan, 2,662 brigades are vying for the title, "Best Brigade of the Quarter," "Best Brigade of the Quarter," and "Best Brigade of the Five-Year Plan," and 140 enterprises and 1,960 brigades are participating in socialist competition under the slogan, "Work with high productivity and without injuries or

*Lenin, V. I. Poln. sobr. soch. [Complete Collected Works], Vol 44, p 151.

accidents." About 85 percent of the industry's workers are participating in the competition for a communist attitude toward work, and 896 brigades that embrace more than 14,000 people have already been awarded the high title, "Brigade of Communist Labor," and 6,914 persons the title, "Shock Worker of Communist Labor."

Strict observance of the amortization periods for operation of OPF, especially of rolling stock, the conduct of a large number of measures for reducing personnel turnover and for creating a permanent, highly qualified contingent of workers, active introduction of the achievements of scientific and technical progress, the effective organization of centralized freight haulage, specialization in haulage, a steady increase in the amount of haulage in containers, packaging and pallets, wide introduction of the brigade contract, the widest possible propagation of the achievements and initiatives of advanced workers and production innovators, and the conduct of other active measures--these are realistic paths for a further rise in OPF utilization effectiveness in automotive transport--one of the most important elements of the economics of a society of developed socialism.

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CSO: 1821

CHEMICAL INDUSTRY AND RELATED EQUIPMENT

UDC 658.382.3:631.812:631.563+632.95

SAFE STORAGE OF TOXIC CHEMICALS

Moscow TEKHNIKA BEZOPASNOSTI PRI KHRANENII YADOKHIMIKATOV I MINERAL'NYKH UDOBRENIY in Russian 1978 pp 5-26

/Chapter from the book "Tekhnika Bezopasnosti pri Khranenii Yadokhimikatov i Mineral'nykh Udobreniy" /Safety Techniques in the Storage of Toxic Chemicals and Mineral Fertilizers/, Rossel'khozizdat, 1978]

/Text/ In connection with the intensification of agricultural production our country's farms receive a large number of toxic chemicals and mineral fertilizers. These chemical agents are stored at the bases and warehouses of Sel'khoztekhnika associations, kolkhozes and sovkhozes.

Managers of trade bases and heads of warehouses are responsible for ensuring safe working conditions during the acceptance, loading and unloading of toxic chemicals and mineral fertilizers. They organize rooms of safety techniques, give the appropriate instructions, provide workers with special work clothing and footwear and with individual protective equipment and see to it that machinery and equipment are in good working order.

The observance of rules of safety techniques by workers and their skillful handling of chemical substances eliminate cases of industrial injuries and occupational diseases.

Safety of Work With Toxic Chemicals at a Warehouse

Sanitary and Hygienic Requirements

Chemical plant protection agents and mineral fertilizers are accepted, stored and allocated only through the warehouses of Sel'khoztekhnika associations or kolkhozes and sovkhozes.

Warehouses consist of one or several structures, open asphalted grounds, reservoirs and motor access and internal farmstead roads. As a rule, these warehouses are built near the railroad stations to which the majority of the kolkhozes and sovkhozes of a given administrative region are adjacent.

Warehouses are located on separate, well-aired and nonfloodable land plots free from any building and fenced.

Greenery is planted on the warehouse territory, which is kept clean. Passages and thoroughfares should be free and roads should have the appropriate pavements and adequate illumination.

During the summer season passages and thoroughfares adjoining production, administrative and sanitary-domestic premises are watered and during the winter season they are cleaned of snow and covered with sand.

Places for the collection and storage of waste containing chemical substances should have special devices eliminating the contamination of soil, underground water and air. Waste and refuse are placed in collectors equipped with tightly closed covers.

The size of sanitary protective zones is established depending on the products list and function of a warehouse. Sanitary gaps from warehouses to production premises should be no less than 20 meters, to domestic premises, 25 meters and to other auxiliary buildings, 50 meters.

Warehouse premises for the storage of mineral fertilizers and toxic chemicals have smooth walls. Slanting floors are installed at the level of warehouse ramps and equipped with chutes for the drainage of effluents. The places where floors join walls are made oval.

The sizes of door openings make it possible to use various mechanization equipment during the performance of loading and unloading work.

The implements and equipment designed for the cleaning of premises are stored and cleaned on premises equipped with washers and drying devices. Devices for cleaning shoes are provided at the outside entrances to buildings.

A double natural and eightfold mechanical air exchange is ensured on the production premises of warehouses of toxic chemicals and a fivefold exchange, at warehouses of solid mineral fertilizers.

The air temperature at a warehouse and on domestic premises should correspond to the data presented in the table.

Air containing dust and toxic gases and vapors must be cleaned before it is discharged into the atmosphere.

The distance from warehouses of toxic chemicals to medical and children's institutions, water supply sources, residential and public buildings and enterprises for the processing and storage of food products is 500 meters and more.

Frequency of Air Exchange at a Warehouse

Premises	Temperature, C°	Frequency of Air Exchange: Acc. to inflow	Acc. to exhaustion
Nonheated premises for the storage of toxic chemicals and mineral fertilizers	It is not normed	Acc. to estimate	Acc. to estimate
Heated premises for the storage of toxic chemicals	8-10	The same	The same
Administrative premises	18-20	1.5	1.5
Domestic premises:			
closet for clean clothes	18	-	-
closet for dirty clothes	18	2.5	2.0
shower room	25	Acc. to estimate	
room for decontamination of special work clothes	18	The same	
rest room	14	"	50 m^3/hour per toilet bowl
wash rooms	16	"	1
premises for rest	20	5	4
premises where workers warm themselves up	20-24	5	5

On premises where the release of toxic vapors, gases and dust is possible the atmosphere is systematically investigated on dates coordinated with local sanitary supervision bodies.

Small fountains connected with the water supply network or tanks are installed for the use of drinking water. Drinking water tanks are made from easily cleaned and disinfected materials, are tightly closed with covers and are placed at a height of 1 meter from the floor. The water in tanks is changed every day. Tanks are regularly washed with hot water and disinfected. The temperature of drinking water should be no higher than 20° and no lower than 8°.

Kiosks for the distribution of carbonated water are equipped with devices for rinsing glasses and with drainage sinks. The use of domestic premises not according to purpose is forbidden.

All sanitary-domestic premises are cleaned and ventilated every day. Ventilation with mechanical boosting is installed. Closets and shower rooms are disinfected periodically. Wash rooms are located next to closets for work clothes. Every wash basin is equipped with a mixer of hot and cold water and a device for washing hands with special liquids. The number of faucets in wash rooms depends on the number of workers. Wash basins should have soap, a towel or air hand dryers.

Gutters, channels and drains in shower rooms and lavatories are cleaned and washed regularly. Floors are kept dry.

Shower rooms are located next to closets. The number of shower networks is determined according to the estimated number of people working in the most numerous shift.

Mechanized laundries are equipped for the washing of work clothes. Departments for the dry cleaning and restoration of clothes with impregnation, as well as a shop for the alteration of work clothes, are provided in them.

The room for drying and dedusting clothes is located next to closets. The area of such a room is determined depending on the equipment placed in them.

Premises for decontaminating work clothes are located separately and their structure and area are determined with due regard for the method of decontamination.

Sewage containing toxic chemicals is decontaminated.

Workers assigned for prolonged work with pesticides, as well as those enlisted in seasonal work at bases and warehouses, undergo a medical examination, which is recorded in the medical book.

Individuals who have not reached the age of 18, pregnant and nursing women, men over the age of 50, as well as individuals who had surgery, infectious diseases and diseases enumerated in the Sanitary Rules for the Storage, Transportation and Application of Pesticides (Toxic Chemicals) in Agriculture, are not permitted to engage in work with pesticides.

The length of the work day is 4 to 6 hours. With a 4-hour work day 2 hours are spent in work not connected with toxic chemicals. One hour out of the total work time is assigned for eating. During work in respirators a 10-minute break is provided every hour.

Acceptance of Toxic Chemicals

Toxic chemicals arrive at a warehouse in closed railroad cars, which after unloading are returned to supplier plants.

The head of a warehouse examines the arriving cargo. When he detects damage to a railroad car or container, which caused losses of toxic chemicals on the road, he draws up a document for making claims against the road administration. In case the supplier does not observe the conditions of transportation, packaging and marking and if the document on the quality of fertilizers is missing, he draws up claim documents for presentation to the supplier.

The technological process of work at a warehouse envisages the specialization of the places of unloading, warehousing and loading of various toxic chemicals. A railroad car with toxic chemicals is placed for unloading at the appropriate section of a warehouse. A brigade consisting of a driver and loaders unloads toxic chemicals from every railroad car.

The driver transports empty trays to the doors of a railroad car on a battery loader. People in charge of loading open the doors, set up a transition bridge and begin to place the cargo on one of the trays at the doors of a railroad car. The driver delivers the loaded tray to a warehouse and, according to the instruction of the warehouse man, stacks it in a certain section. After the interdoor space is cleared, loaders load the trays inside a railroad car and the driver of the loader transports them to the warehouse.

Upon the completion of unloading workers clean the railroad car from the remainders of the cargo, load it with returnable containers and deliver it to the railroad station, first drawing up the appropriate documents.

The pesticides arriving at and released from a warehouse are recorded in the income and expenditure journal, which is kept by the warehouse man.

The kolkhoz chairman or sovkhoz director signs the recording journal.

Storage

Toxic chemicals are stored at special warehouses or in isolated sections of a mineral fertilizer warehouse. It is categorically forbidden to use cellars and fuel and lubricant warehouses as warehouses of toxic chemicals, or to store toxic chemicals under the open sky or an awning.

Sanitary service bodies inspect the warehouse designed for pesticide storage and draw up a certificate for it. The management of a farm reports the delivery of pesticides to the rayon administration of agriculture, the rayon sanitary and epidemiological station, the nearest medical institution and the technical trade union inspectorate. When violations of sanitary rules of warehouse maintenance are detected, the chairman of the State Sanitary Inspectorate has the right to withdraw the certificate and to prohibit further warehouse operation.

Chemical plant protection agents are produced in the form of dusts, wettable powders, concentrated emulsions, solutions and pastes. Depending on the formulas, preparations are packaged in specific containers, that is, dusts and powders, in bituminized paper bags, emulsions and solutions, in metal barrels, canisters, cans and glass bottles with bracings and pastes, in metal drums.

All types of containers with pesticides are supplied with labels written with indelible paint. The color of warning stripes for groups of pesticides is different, that is, for herbicides, red; for defoliants, white; for insecticides (nematocides and acaricides), black; for fungicides, green; for seed disinfectants, blue; for zoocides, yellow. The labels indicate the trade mark or name of the supplier enterprise, name of the product and nominal percent of the active substance in it, pesticide group, gross and net weight, number of the batch, date of manufacture, number of the standard or technical specifications, designations "Fire Danger" or "Explosion Danger" (if the preparation has inflammable and explosive properties) and price (for packages designed for retail sale).

A brief instruction for the application and conditions of storage of the preparation is pasted on every commodity unit.

The quantity of stored preparations should not exceed the tonnage envisaged by the warehouse plan.

The storage of a large number of preparations at warehouses increases the requirements for the observance of rules of safety techniques. Unfavorable conditions for the storage of toxic chemicals lower the stability of working solutions and decrease the content of the active substance and biological activity. The lack of air tightness of containers leads to the accumulation of a large amount of toxic vapors at a warehouse. Therefore, it is necessary to constantly see to it that containers are intact and to observe the storage regime.

When liquid preparations are spilled or sprayed, the contaminated places of warehouses are covered with sand and decontaminated.

Toxic chemicals are repackaged from damaged to undamaged containers in a separate room in a vent hood. Containers should correspond to the All-Union State Standard, or to the technical specifications for the storage of a given preparation.

When loose preparations of sulfur or DNOC are repackaged, metal shovels or scoops should not be used (to avoid spark formation). For these purposes it is necessary to have wooden scoops.

Metal barrels with plugs are opened with special wrenches. When a plug is removed, it must not be hit with a hammer.

Boxes made of planks and other wooden containers are opened with nail pullers, pliers and so forth. It is not permitted to knock down the cover with a hammer.

During the loading and unloading of toxic chemicals mechanical damage to containers (rupture of bags and deformation and puncture of metal containers) is not permitted. The warehousing method is selected depending on the type of container. The useful warehouse area is used optimally.

The storage of preparations on the floor is forbidden categorically.

Journal of Income and Expenditure of Pesticides at a Warehouse in 197

Name of Pesticide ______________

Date of acceptance or release of pesticides	Acc. to what document and from where a pesticide was received or to whom it was transferred (issued)	Income		Expenditure		Remainder on the day of recording		Signature of recipient
		weight, kg	number of container units	weight, kg	number of container units	weight, kg	number of container units	

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000100060064-4

Preparations packaged in metal and wooden barrels and in metal and plywood drums of a capacity of more than 50 liters, as well as in boxes, are stacked on flat standard trays in three tiers. Toxic chemicals in metal cylinders are placed on special shelves in one tier.

Cylinders with fumigants are stored in a vertical position at a temperature no higher than 35°C. When the temperature rises, the cylinder surface is cooled with wet tarpaulin.

When cylinders with fumigants are damaged, a valve is opened and the cylinder is emptied of gas. This operation is performed under the supervision of a specialist in the presence of a physician and after the implementation of personal and public safety measures (distance of no less than 1,000 meters from settlements, quiet windless weather and availability of efficient gas masks). A valve is opened by standing from the leeward side from cylinders.

Bottles and other glass vessels with toxic chemicals are stored on flat trays on the lower shelve tier, or on the floor in one tier. Metal canisters, cans, jars, cardboard boxes, drums of a capacity of up to 50 liters and bags are stored on multitier one- and two-sided shelves, or in stacks on pedestal trays in three tiers and more. The height of stacks and shelves should correspond to the techniques of storing preparations.

Preparations with highly toxic and inflammable properties are stored on multitier shelves, or on pedestal trays, which ensures the safety of containers.

When placing toxic chemicals, one must make sure that containers do not come in contact with warehouse walls. The distance between the stacks of different toxic chemicals (herbicides, fungicides and insecticides) should be no less than 0.7 meters and the distance for the passages of loaders, no less than 3.0 meters.

Every preparation has its period of storage depending on its physical and chemical resistance, volatility, hygroscopicity, stability, capacity for caking and so forth. The quality of a product is guaranteed during this period (if the normal conditions of storage and intactness of containers are observed). If the indicated conditions are violated, the quality of preparations can be lowered even within the period of warranty. In connection with this toxic chemicals are sold before the end of the period of warranty. A strict record of the time of arrival of preparations is kept at warehouses. A small plank with the name of the toxic chemical and the date of its arrival is hung at every stack.

Toxic chemicals containing water are especially subject to the effect of low temperatures. They begin to demix, the stability of working solutions is lowered and the active substance crystallizes. Therefore, water solutions, mineral oil emulsions, paste and some concentrated emulsions are stored at a temperature not below 0°C.

Toxic chemicals possessing inflammable and explosive properties require the observance of special safety measures. Such preparations include the following: dichloroethane, which has a low flash point; DNOC, which explodes from sparks and contact with fire upon drying; calcium cyanamide, which strongly heats up when moistened and releases acetylene; carbophos, phosphamide, methylmercaptophos, metaphos, a 20-percent emulsion concentrate, butiphos and highly inflammable organophosphorus preparations; zineb and ziram decomposing with the release of carbon disulfide.

Furthermore, there are preparations with oxidizing properties (magnesium chlorate, calcium chloride-chlorate and chlorinated lime), whose contact with highly inflammable substances can lead to the self-ignition of the latter.

Incompatible Toxic Chemicals

Calcium and sodium cyanide mixture	Acids, alkalis, dichloroethane and preparation 242
Zinc phosphide	Acids and hexachloran on superphosphate
Magnesium chlorate, calcium	Sulfur preparations (ground and colloidal sulfur and wettable powders), organophosphorus preparations (metaphos, methylmercaptophos, carbophos, butiphos, trichlorometaphos, chlorophos, methylnitrophos, octamethyl, phthalophos, anthio and so forth); 20-percent celtan, DNOC, polychloropinene, polychlorocamphene, nitraphene, G-17 sticks, carbyne, esters 2,4-D, preparation No 30, TMTD, sevin, zineb, hexachlorobutadiene, dichloroethane and other fuel preparations

Inflammable preparations and oxidants are stored only on isolated premises with the observance of the storage regime.

Highly active toxic substances (calcium arsenate, granosan, calcium and sodium cyanide mixture and methyl bromide) are stored in an isolated section equipped with ventilation and shelves. If it is impossible to assign especially equipped sections for them, preparations are placed in one section, but in its different corners. At the same time, one must see to it that containers are safe.

Formalin, carbathion, amine salt, esters 2,4-D, nitraphene, hexachlorane emulsion, phosphamide and concentrated emulsions thickening at a low temperature (preparation 30, polychloropinene and so forth) are placed in the heated section of a warehouse. Fire safety rules are observed in the section.

Inflammable preparations (concentrated emulsions of organophosphorus preparations, sulfur derivatives, DNOC, calcium cyanamide, zineb, ziram, 20-percent celtan, esters 2,4-D, sticks and so forth) are stored in special sections with the observance of all fire safety measures and rules. In zones where a large number of sulfur preparations (colloidal, ground and so forth) are applied inflammable preparations are placed in a separate section. TMTD, simazine, atrazine and propazine are stored together with them. Large quantities of DNOC are stored in a separate section.

Magnesium chlorate and calcium chloride-chlorate are stored separately. In zones where a large number of these preparations are used an insulated section is assigned for them. If this is impossible, oxidants in small volumes are stored in a general section next to noninflammable toxic chemicals (dichloralurea, 2,4-D sodium salt, copper sulfate and so forth).

Warning tablets "Guard Against Fire" and "Contact With Organophosphorus Preparations and Sulfur Is Not Permitted" are hung at the warehouse.

Toxic chemicals inside the warehouse must be placed with due regard for their physicochemical, toxic and inflammable properties. When preparations are stored, the degree of toxicity, effect of the environment, possibility of joint storage and function group are taken into consideration.

Depending on the properties of toxic chemicals warehouses are equipped with a minimum of five sections, that is, for highly toxic preparations, preparations requiring a positive storage temperature, inflammable preparations, preparations with oxidizing properties and preparations stored on dry unheated premises.

Toxic chemicals not requiring special storage conditions are placed in a separate section depending on their form. It is advisable to store powdery preparations separately from liquid preparations. In all cases toxic chemicals are placed in sections according to function groups (insecticides, fungicides and herbicides).

I. Section of Highly Active Toxic Substances

Insecticides

Calcium arsenate--a bright gray 38- to 42-percent powder. In the presence of moisture and carbon dioxide it releases toxic acid. It is noncombustible. It is stored on flat trays placed in three tiers, as well as in steel drums of a capacity of 25 to 50 liters. The warranty storage period is 2 years.

Methyl bromide containing 99.5 percent of methyl bromide is a transparent, colorless liquid. It is highly volatile. At a temperature above 4°C it is transformed into gas capable of igniting. A mixture of vapors of bromine methyl with the air explodes within 13.5 to 14.5 percent. It is stored in steel cylinders of a capacity of 50 liters and is placed on flat trays on shelves in one tier. The warranty storage period is 3 years.

Technical dichloroethane containing 94 to 96 percent of dichloroethane is a transparent, colorless liquid. A mixture of vapors of dichloroethane with the air can explode. It is stored in steel barrels of a capacity of 100 liters and in glass bottles (in bracings) of a capacity of 20 liters. Barrels are stacked on flat trays in three tiers and bottles, on flat trays on shelves or on the floor in one tier. The warranty storage period is 2 years.

Octamethyl is a dark brown 50-percent emulsion concentrate. It is inflammable. It is stored in glass bottles of a capacity of 10 liters packaged in iron drums, or in steel canisters of a capacity of 20 liters. It is placed on flat trays on shelves in three tiers. The warranty storage period is 1.5 years.

A calcium and sodium cyanide mixture is a 45-percent powder or dark gray granules. It is highly volatile. Under the effect of moisture it releases hydrogen cyanide. Contact with dichloroethane is not permitted. It is stored in steel containers of a capacity of 5 to 10 kg. It is placed on flat trays on shelves in three tiers.

Granosan containing 1.8 to 2.3 percent of ethylmercurchloride is a highly volatile light gray to orange powder. It is noncombustible. It is stored in steel containers of a capacity of 1, 5, 10 and 25 liters. It is placed on flat trays on shelves. The warranty storage period is 2 years.

II. Heated Section

Insecticides

2,4-D amine salt is a cherry colored to dark brown 40 percent water soluble concentrate. It is difficultly inflammable and has an average toxicity. It is stored in steel barrels. It is stacked on flat trays in three tiers. The warranty storage period is 2 years.

Gamma-isomer hexachlorocyclohexane is a gray to yellow-gray 16 percent mineral oil emulsion with an average toxicity. It is difficultly inflammable. It is stored in steel barrels of a capacity of 100 liters. It is stacked on flat trays in three tiers. The warranty storage period is 2 years.

40-percent carbathion is a highly volatile reddish-yellow liquid with a sharp odor. It is stored in steel barrels of a capacity of 100 liters. It is stacked on flat trays in three tiers.

Nitraphene is a pastelike or dense dark-brown mass containing sodium salts. It has an average toxicity. When highly dried, it acquires inflammable properties. It is stored in steel drums of a capacity of up to 50 liters. It is stacked on flat trays or on pedestal trays. The warranty storage period is 2 years.

Polychloropinene is a bright yellow 65-percent emulsion concentrate. It has an average toxicity and is difficultly combustible. It is stored in metal barrels of a capacity of 100 liters and in drums of a capacity of 15 to 25 liters. It is placed on flat trays on shelves or on pedestal trays in stacks. The warranty storage period is 2 years.

40-percent phosphamide is a yellow-brown labile syrup-like liquid. It has an average toxicity, is highly inflammable and, when coming in contact with oxidants (mixture temperature of 35 to 40°C), ignites spontaneously. It is stored in glass bottles of a capacity of 20 liters, iron drums and metal cans. It is placed on flat trays on lower shelf racks, or on the floor in one tier. The warranty storage period is 1.5 years.

Formalin is a 40-percent water soluble concentrate. It is highly volatile, colorless transparent liquid. It is difficultly inflammable. It is stored in glass bottles placed in baskets or in aluminum containers of a capacity of 20 liters. It is placed on flat trays on shelves or in stacks on pedestal trays; bottles, in one tier and cans, in three tiers and more. The warranty storage period is 3 years.

III. Section for the Storage of Inflammable Preparations

Fungicides

Colloidal sulfur is a grayish-yellow powder containing 98 percent of sulfur It has a low toxicity. It melts and burns well and, when coming in contact with oxidants, ignites spontaneously. It is stored in five-layer kraft bags with a bituminized padding of a capacity of 20 kg. It is stacked on pedestal trays. The warranty storage period is 2 years.

Ground sulfur is a yellow powdery substance containing 97.5 to 99.5 percent of sulfur. It has a low toxicity and, when coming in contact with oxidants, ignites spontaneously. It is stored in five-layer bituminized bags of a capacity of 20 kg. It is stacked on pedestal trays. The warranty storage period is up to 5 years.

Zineb is a bright yellow 80-percent wettable powder. It has a low toxicity. It is inflammable and in the presence of moisture and light decomposes with the release of explosive carbon disulfide. It is stored in jute and polyethylene bags of a capacity of 20 kg. It is stacked on pedestal trays. The warranty storage period is 2 years.

Ziram is a bright yellow 86-percent wettable powder. It has a low toxicity, is inflammable and decomposes similarly to zineb. It is stored in jute and polyethylene bags of a capacity of 25 kg. It is stacked on pedestal trays. The warranty storage period is 3 years.

TMTD is a bright gray 70-percent powder with gamma isomer hexachlorocyclohexane. It has an average toxicity and is inflammable. It is stored in double paper bags with a lining of a capacity of 20 kg.

Herbicides

Atrazine is a white or gray 58-percent wettable powder. It has a low toxicity and is inflammable. It is stored in five-layer bituminized bags of a capacity of 20 kg. It is placed on pedestal trays in three tiers and more. The warranty storage period is 2 years.

Butiphos is a yellow to light brown 70-percent emulsion concentrate. It has an average toxicity, is highly inflammable and, when coming in contact with oxidants, can ignite spontaneously. It is stored in capacities of up to 100 liters and in polyethylene canisters of a capacity of 20 liters. Canisters are stacked on flat trays on shelves or on pedestal trays and barrels, on flat trays in three tiers. The warranty storage period is 2 years.

Technical 2,4-D butyl ether is a yellow to brown oily liquid. It has an average toxicity and is highly inflammable. It is stored in barrels of a capacity of up to 100 liters. Barrels are stacked on flat trays in three tiers.

2,4-D octyl ether is a dark brown 42- to 52-percent liquid. It has an average toxicity and is highly inflammable. It is stored in steel barrels of a capacity of up to 100 liters. It is stacked on flat trays in three tiers. The warranty storage period is 2 years.

2,4-D butyl ether is a yellow to brown 60-percent emulsion concentrate. It has an average toxicity and is highly inflammable. It is stored in steel barrels of a capacity of 100 liters. It is stacked on flat trays in three tiers. The warranty storage period is 2 years.

Carbyne is a dark amber 12-percent emulsion concentrate. It has an average toxicity and is highly inflammable. It is stored in steel drums of a capacity of 10 to 15 liters and in steel barrels of a capacity of 100 liters. It is stacked on flat trays on shelves or on pedestal trays in three tiers and more. The warranty storage period is 2 years.

Propanide is a 34- to 46-percent emulsion concentrate. It has a low toxicity and is highly inflammable. It is stored in steel barrels of a capacity of 100 liters. It is stacked on flat trays in three tiers. The warranty storage period is 2 years.

Simazine is a white or yellowish 50-percent wettable powder with a smell. It has a low toxicity and is inflammable. It is stored in five-layer bituminized or polyethylene paper bags of a capacity of 20 kg and in metal or cardboard (with a polyethylene lining) drums of a capacity of 20 kg. It is stacked on pedestal trays in three tiers and more. The warranty storage period is 2 years.

Propazine is a white or light gray 50-percent wettable powder. It has a low toxicity and is inflammable. It is stored in polyethylene bags placed in plywood drums of a capacity of 50 kg and in steel or plywood drums of a capacity of 20 liters. It is placed on pedestal trays in three tiers. The warranty storage period is 2 years.

Calcium cyanamide containing 18.5 to 20 percent of nitrogen cyanamide is a dark gray powder. It has an average toxicity and is noncombustible. When moistened, it releases gas and can ignite. It is stored in steel drums of a capacity of 50 to 100 liters and in bituminized bags of a capacity of up to 35 kg. Bags are placed on pedestal trays and barrels, on flat trays in stacks in three tiers and more. The warranty storage period is 1 year.

Insecticides

DNOC is a 40-percent water soluble powder or a yellow paste. It is highly toxic and explosive when dried up. It is stored in plywood or metal drums with paper or polyethylene lining of a capacity of 20 to 100 kg. It is placed on flat trays on shelves. The warranty storage period is 2 years.

Carbophos is a 30-percent emulsifying concentrate and a light to dark brown highly labile liquid. It is highly inflammable. Contact with fire and oxidants is not permitted. It has an average toxicity. It is stored in aluminum flasks of a capacity of 20 liters. It is placed on flat trays on shelves. The warranty storage period is 2 years.

Carbophos is a 50-percent emulsion concentrate and a dark brown highly labile liquid. It is highly inflammable and has an average toxicity. It is stored in aluminum flasks of a capacity of 20 liters. It is placed on flat trays on shelves. The warranty storage period is 1 year.

Celtan is a 20-percent emulsion concentrate and a brown oily labile liquid. It has an average toxicity and is highly inflammable. It is stored in steel drums of a capacity of 15 liters, canisters of a capacity of 20 liters and steel barrels of a capacity of 100 liters. It is stacked on flat trays on shelves or on pedestal trays in three tiers and more. The warranty storage period is 3 years.

20-percent metaphos is an emulsion concentrate and a dark brown liquid. It is highly toxic and highly inflammable. Contact with oxidants is not permitted. It is stored in aluminum containers of a capacity of 20 liters. It is stacked on flat trays on shelves or on pedestal trays. The warranty storage period is 2 years.

Methylmercaptophos is a 30-percent emulsion concentrate and a dark brown oily highly labile liquid with a strong smell. It is highly toxic. When coming in contact with oxidants, it ignites spontaneously. It is stored in steel canisters with a protective cover of a capacity of 20 liters. It is stacked on flat trays on shelves or on pedestal trays. The warranty storage period is 2 years.

Polychlorocamphene is a light to dark brown 50-percent emulsion concentrate. It has an average toxicity and is difficultly inflammable. It is stored in steel barrels of a capacity of 100 liters. It is stacked on flat trays. The warranty storage period is 2 years.

IV. Section of Insulated Storage of Oxidants

Insecticides

Calcium chloride-chlorate containing 355 to 370 g/l of calcium chloride-chlorate is a cloudy odorless liquid. It has an average toxicity. It is stored in steel barrels of a capacity of 100 liters. It is stacked on flat trays in three tiers. The warranty storage period is 2 years.

Magnesium chlorate (58 percent of magnesium chlorate) are light brown granules with an irritating effect. They have a low toxicity and are fire hazardous. Contact with highly inflammable preparations is not permitted. They are stored in double paper bags with a lining of a capacity of 20 to 25 kg and in steel drums with a removable bottom of a capacity of 20 liters. They are stacked on pedestal trays. The warranty storage period is 2 years.

V. Section for Preparations Not Requiring Special Storage Conditions

Insecticides and Zoocides

Celtan is a light yellow 18-percent wettable powder. It has an average toxicity and is difficultly inflammable. It is stored in three-layer bituminized bags of a capacity of 20 to 25 kg, in plywood drums of a capacity of 25 liters and in wooden barrels of a capacity of 25 liters. It is stacked on pedestal trays. The warranty storage period is 3 years.

Sodium fluosilicate (93 to 95 percent of sodium fluosilicate) is a white to gray small crystal powder. It has an average toxicity and is inflammable. It is stored in wooden barrels of a capacity of 40 to 50 liters and in plywood drums of a capacity of 20 to 50 liters. It is stacked on pedestal trays. The warranty storage period is 2 years.

Metaphos is a white, yellow or gray 2.5-percent dust. It is highly toxic and noncombustible. It is stored in double paper bags with a lining of a capacity of 20 kg. It is stacked on pedestal trays. The warranty storage period is 2 years.

70-percent sayphos is a white crystalline substance. It has a low toxicity and is difficultly inflammable. It is stored in five-layer bituminized bags of a capacity of 20 to 25 kg. It is stacked on pedestal trays. The warranty storage period is 2 years.

Sevin is a 50- to 80-percent wettable powder. It has an average toxicity and is inflammable. It is stored in polyethylene bags placed in cardboard boxes of a capacity of 20 to 25 kg. Boxes are placed on pedestal trays. The warranty storage period is 2 years.

Thedion is a white or yellowish 50-percent wettable powder. It has a low toxicity and is difficultly inflammable. It is stored in five-layer paper bags of a capacity of 20 kg. It is placed on pedestal trays. The warranty storage period is 2 years.

Granulated chlorophos is a grayish 7-percent powder with a weak smell. It has an average toxicity and is difficultly inflammable. It is stored in four-layer paper bags of a capacity of 20 kg. It is placed on pedestal trays. The warranty storage period is 1.5 years.

Technical chlorophos is an 80-percent viscous mass. It has an average toxicity and is difficultly inflammable. It is stored in iron drums with a polyethylene lining of a capacity of up to 100 liters. It is stacked on flat trays in three tiers. The warranty storage period is 1 year.

Chlorophenylchlorobenzenesulfonate is a white or light brown 30-percent wettable powder. It has a low toxicity and is inflammable. It is stored in five-layer paper bags of a capacity of 20 to 25 kg. It is placed on pedestal trays. The warranty storage period is 3 years.

Herbicides and Defoliants

Dalapon is a white 85-percent water soluble powder. It has a low toxicity and is noncombustible. It is stored in paper bags with a lining of a capacity of 20 kg. It is placed on pedestal trays. The storage period is 2 years.

Dichloralurea is a white or gray 50-percent wettable powder. It has a low toxicity and is noncombustible. It is stored in double paper bags with a lining of a capacity of 20 kg. It is placed on pedestal trays. The warranty storage period is 3 years.

Diuron is a white or light gray powder. It has a low toxicity and is difficultly combustible. It is stored in paper bags of a capacity of 20 to 25 kg. It is placed on pedestal trays. The warranty storage period is 2 years.

Monuron is a yellow or light gray 80-percent wettable powder. It has an average toxicity and is difficultly combustible. It is stored in polyethylene bags of a capacity of 20 to 25 kg placed in drums. It is stacked on pedestal trays. The warranty storage period is 2 years.

Phenuron is a white crystalline substance. It has a low toxicity and is difficultly combustible. It is stored in paper bags of a capacity of 20 to 25 kg. It is stacked on pedestal trays. The warranty storage period is 2 years.

Pyramine is an 80-percent wettable powder. It has a low toxicity and is difficultly inflammable. It is stored in jute bags with a polyethylene lining of a capacity of 25 kg. It is stacked on pedestal trays. The warranty storage period is 2 years.

Sodium trichloroacetate is a white to brown 87-percent crystalline lumpy powder. It has a low toxicity and is difficultly combustible. It is stored in cardboard drums of a capacity of 20 liters. It is stacked on pedestal trays. The warranty storage period is 1 year.

Fungicides

Green vitriol are greenish-blue crystals of various sizes. They have a low toxicity and are noncombustible. They are stored in wooden barrels of a capacity of up to 120 liters and in boxes of a capacity of up to 80 kg. They are stacked on flat trays in three tiers. The warranty storage period is 5 years.

Blue vitriol is a blue crystalline substance. It has an average toxicity and is noncombustible. It is stored in barrels, plywood boxes, drums of a capacity of 50 kg and bituminized bags of a capacity of 25 to 30 kg. Bags are placed on pedestal trays and barrels and drums, on flat trays in three tiers. The warranty storage period is 5 years.

Copper oxychloride is a light green 90-percent wettable powder with a blueish shade. It has an average toxicity and is noncombustible. It is stored in double bags or in fibrous cast barrels of a capacity of 20 kg and in cardboard drums of a capacity of 20 kg. It is stacked on pedestal trays. The warranty storage period is 3 years.

Phthalan is a white crystalline 50-percent substance. It has a low toxicity. It is stored in paper bags (with a lining) of a capacity of 20 kg. It is stacked on pedestal trays. The warranty storage period is 2 years.

The warehouse man, who is well-familiar with the function and rules of preparation handling, is responsible for the storage and distribution of pesticides. The warehouse man and his assistants are permitted to stay at the warehouse only during the acceptance and distribution of preparations, as well as for the performance of other operations.

The warehouse man's duties include the acceptance and distribution of pesticides, issue of documents for them, observance of the intactness of containers, selection and dispatch of pesticide samples for analysis and organization of work on decontaminating the equipment, empty containers, warehouse territory and loading and unloading mechanisms.

During work at the warehouse it is prohibited to eat, smoke, or work without special work clothes, respirators or gas masks.

Release of Toxic Chemicals

Toxic chemicals from Sel'khoztekhnika warehouses are released to farms after the confirmation by the rayon agricultural administration of the r .diness of kolkhozes, sovkhozes and other agricultural enterprises and organizations to accept toxic chemicals and to work with them. This certificate is issued only to farms having warehouses for the storage of toxic chemicals, special work clothes and individual protective equipment, special machines for the transportation and application of toxic chemicals and instructions and directives for precautionary measures during work with toxic chemicals.

Pesticides from the warehouses of kolkhozes, sovkhozes and other farms are issued at the written order of the kolkhoz chairman, sovkhoz director or other managers to the person responsible for the execution of plant protection work.

Pesticides are released by weight or by the number of container units with an indication of the net weight. An accidentally scattered preparation is placed in a container and the rest is decontaminated.

Pesticides are released for 1 day of work and in some cases (for remotely located brigades, if reliable storage places are available), for a few days.

Upon the completion of work unutilized pesticides are delivered to the warehouse, which is recorded in the book of acceptance and distribution of pesticides with an indication of their amount.

The head of a warehouse or the warehouse man release toxic chemicals in serviceable containers with good marking. When preparations are loaded on motor transport facilities, the incompatibility of some groups of pesticides is taken into account.

The driver of a loader takes from a stack a tray with toxic chemicals and brings it to the motor vehicle. The brigade of loaders places the tray on motor transport facilities or in a container. If the warehouse (base) has a sufficient number of trays, toxic chemicals are loaded in packages on motor transport facilities.

Decontamination of Containers and Special Work Clothes

Measures for the decontamination of containers and special work clothes are implemented on especially equipped grounds, in the open air or in a room with exhaust devices. People with individual protective equipment and well-familiar with safety rules are permitted to engage in this work.

Metal barrels, canisters and drums contaminated with organochlorine, organophosphoric, dinitrophenol and other preparations are treated with a 5-percent solution of caustic or washing soda (300 to 500 grams per pail of water).

Containers are filled with a solution and left for 6 to 12 hours, after which they are washed with water many times. If there is no soda, it is possible to use wood ashes, which are placed in a container and drenched with water until a liquid mash is formed. Then it is shaken well for a complete removal of the preparation from container walls and left for 12 to 24 hours. After that the content is poured into pits and the container is washed with water many times.

The following are used for the decontamination of containers emptied of organomercuric preparations: 20-percent solution of ferrous chloride, 0.2 percent solution of potassium manganate acidified with hydrochloric acid (5 ml per liter), Pereguda paste, or a mash of chlorinated lime (1 kg per 4 liters of water).

Containers are filled with solutions and left for 5 or 6 hours. Then they are treated with a 1-percent solution of potassium manganate. At the expiration of a 24-hour period containers are washed with warm soapy water (4 percent soap solution in a 5-percent soda solution).

Containers emptied of arsenic containing pesticides are treated with a 1-percent solution of blue vitriol and then with a 2-percent solution of soda and ammonium sulfate.

Containers emptied of dichloroethane and methyl bromide are carefully ventilated and treated with vapor (120 to 130°C) until the pesticide smell disappears.

Glass and metal containers emptied of a chlorine mixture are washed with a 10-percent solution of chlorinated lime, treated with steam and left in an overturned position.

Containers emptied of carbamine pesticides (TMTD and sevin) are decontaminated with a 1-percent solution of potassium manganate acidified with hydrochloric acid (5 ml per liter), or with a mash of chlorinated lime.

Special work clothes contaminated with toxic chemicals and mineral fertilizers lose their protective properties and can become a source of poisoning. Dirty special work clothes should not be used, brought home or stored on residential premises. Every day after the completion of work special work clothes should be shaken out, beaten out or vacuum cleaned.

Special work clothes from which dust has been removed are hung for 8 to 12 hours under an awning for airing and drying. Any special work clothes are washed as they are contaminated, but no less frequently than once in 6 work shifts.

Heavily contaminated special work clothes made of fabrics without impregnation are soaked (for 6 to 8 hours) in a soap and soda solution, boiled (30 minutes), rinsed in hot (50 to 80°), warm and cold water, wrung out and dried.

After special work clothes made of fabrics with impregnation are soaked in a soap and soda solution, they are washed for 10 minutes at a temperature of 40°C, rinsed and dried flat.

A total of 5 liters of water, 125 grams of soap and 25 grams of soda are needed for soaking and washing 1 kg of dry special work clothes. A total of 9 liters of water are needed for each rinse. Special work clothes can be decontaminated by soaking and washing them in solutions OP-7, OP-10, and DIAS, or in the Progress powder. A total of 100 grams of the substance are used per 10 liters of water.

Special work clothes (footwear, gloves and aprons) made of rubber and clothes made of fabrics with a film cover are treated with a 3- to 5-percent solution of calcined soda or a mash of chlorinated lime and washed with water.

Special work clothes contaminated with organophosphorus, dinitrophenol and other pesticides are shaken out and soaked in a soap and soda solution for 6 to 8 hours. After that they are washed twice or three times in a hot soap and soda solution.

During manual washing special work clothes contaminated with organochlorine pesticides are soaked in a hot 0.5-percent soda solution for 6 hours. At the same time, they are stirred well and the solution is changed three times. During machine washing soaking in the drum is shortened to 2 hours.

Special work clothes contaminated with organomercuric preparations are soaked in a hot 1-percent soda solution for 12 hours and then washed (three times, 30 minutes each time) in a soap and soda solution with an addition of alkyl sulfonate.

Special work clothes contaminated with several pesticides are decontaminated by methods recommended for the decontamination of the most toxic and stable preparations.

Rooms are cleaned with a solution of calcined soda (200 to 300 grams per pail of water) and a 10-percent solution of chlorinated lime.

Land plots contaminated with pesticides are treated with chlorinated lime and dug again.

Dust collected by a vacuum cleaner during the cleaning of rooms and special work clothes, as well as the sewage obtained after the decontamination of rooms, containers and special work clothes, is treated with chlorinated lime (500 grams per 10 liters of water during a 24-hour period).

Toxic chemicals and containers emptied of them considered unsuitable for use are destroyed on kolkhozes, sovkhozes and other agricultural organizations by the workers of the Sel'khoztekhnika Association in accordance with the order of the USSR Ministry of Agriculture and the All-Union Soyuzsel'khoztekhnika Association.

The manager of the oblast (kray) Sel'khoztekhnika Association gives the order to destroy toxic chemicals and containers for bases and warehouses of oblast (kray), interrayon and rayon subordination and the manager of the republic Sel'khoztekhnika Association, for bases and warehouses of republic subordination. The order indicates the name and amount of the toxic chemical, the reason for destroying it and the individual responsible for the performance of work on the destruction of toxic chemicals and for the procedure of the preparation and execution of work.

On the basis of this order measures for the destruction of toxic chemicals are mapped out with due regard for the specific number of preparations, local conditions, availability of mechanization equipment and fuel resources and so forth. After coordination with local bodies of the soviets of people's deputies, sanitary supervision and fire protection bodies and nature conservation bodies these measures are approved by the manager of the appropriate Sel'khoztekhnika subdivision.

All toxic chemicals dispatched from warehouses for destruction are recorded in a special book, which indicates the following: name of the toxic chemical and its document data; date of arrival at the warehouse and date of dispatch for destruction; gross and net weight; number and date of the document on the basis of which the toxic chemical is sent to be destroyed, as well as the individual accompanying the toxic chemical to the destruction site and responsible for its safety on the road. It is permitted to destroy a small amount of toxic chemicals (up to 10 kg) on kolkhozes, sovkhozes and other farms.

Sites for the destruction of toxic chemicals are located on land plots unsuitable or inconvenient for other uses with poorly filtrating grounds and with a stand of ground water of no less than 2 meters from the lower level of burial with a slant of no more than 1.5 percent in the direction of open reservoirs.

With a slant of more than 1.5 percent provision is made for raised ditches eliminating the flow of atmospheric water along the territory. In this case the site should have an independent storm runoff.

The distance from the place of location of a site to settlements and open reservoirs is no less than 5,000 meters. The site territory is fenced along the perimeter.

Anabasine-sulfate, nicotine-sulfate, chlorine mixtures and carbon disulfide are destroyed by adding a double amount of the mash of chlorinated lime or a 5-percent solution of potassium manganate.

Calcium and sodium cyanide mixtures are destroyed with a freshly prepared 10-percent solution of green vitriol and slacked lime (6 liters of green vitriol and 3 liters of slaked lime per 100 grams of the toxic chemical).

The toxic chemical is put into the decontaminating solution carefully, mixed for the first 30 minutes and poured into a pit after 3 or 4 hours.

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CSO: 8344/1350

CHEMICAL INDUSTRY AND RELATED EQUIPMENT

UDC 66:338.32.002.1"71"

CHEMICAL INDUSTRY ENTERPRISE CONSTRUCTION IMPROVEMENTS DISCUSSED

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, 1979 pp 49-54

[Article by N. I. Patrikeyeva and G. L. Koren'kov: "Ways of Increasing the Economic Efficiency of Putting New Large-Capacity Chemical Production Facilities Into Operation"]

[Text] Under the conditions of the accelerated growth of the chemical industry, an increase in the efficiency of putting new industrial enterprises and facilities into operation is becoming particularly urgent.

One of the main directions of scientific-technical progress in the chemical industry involves enlargement of the capacities of the units, industrial lines and individual assemblies of the equipment. Beginning in the Ninth Five-Year Plan, this direction of technical progress has been characteristic of all the subsectors of the chemical industry. While in the Eighth Five-Year Plan the capacity of the individual units of the ammonia production facilities was not over 100-120,000 tons a year, in the Ninth and 10th five-year plans it rose to 450,000 tons a year. The capacities of some units producing ammonium nitrate, nitric and sulfuric acid and other products have also increased [11].

The principal indicators of the efficiency of enlarging the units in the chemical industry, in their planning are: the specific capital expenditures, the production cost and labor productivity.

The indicators of the efficiency of enlarging the ammonia synthesis units in domestic production are shown in Table 1 [2].

According to the estimates of the GIAP [State Scientific Research and Planning Institute of the Nitrogen Industry and Products of Organic Synthesis], putting into operation an ammonia unit with a capacity of 800,000 tons a year will make it possible to reduce capital investments by 11 percent as compared with a unit with a capacity of 410,000 tons a year, and to reduce the production cost of ammonia by 7 percent and double labor productivity [3].

Table 1. Technical-Economic Indicators for Obtaining Ammonia With Various Industrial Systems

Indicators	Catalytic steam-oxygen conversion of natural gas at pressure of 20 kgs/cm^2	Conversion of natural gas with steam in tubular furnaces at a pressure of 30 kgs/cm^2	Conversion of natural gas with steam in tubular furnaces at a pressure of 40 kgs/cm^2
Capacity, 1000 t/yr	218	400	410-450
Number of service personnel, %	100	55	31
Labor productivity, %	100	331	612
Specific capital investments, %	100	62	61
Production cost of 1 ton ammonia, %	100	70	58

With an increase in the production capacity of the ammonium nitrate shop from 200,000 to 450,000 tons a year, the specific capital investments are reduced by 20 percent, labor productivity increases by 75 percent, and the production cost of ammonium nitrate is reduced by 3 percent.

According to the estimates of GIAP, installing large-scale units with a capacity of 1.5 million tons a year of ammonium nitrate will make it possible to reduce the specific capital investments by 15-20 percent as compared with a unit with a capacity of 450,000 tons a year, to reduce the production cost by 5-8 percent and considerably increase labor productivity.

Enlarging the sulfuric acid production capacity also considerably improves the technical-economic indicators of the production facility (Table 2) [4].

A substantial improvement in the technical-economic indicators, with the enlargement of the capacities of individual methanol production units from 50,000 to 400,000 tons a year, can also be graphically seen from Table 3 [5].

With an increase in the capacity of the nitric acid production units from 120,000 to 450,000 tons a year, the labor input per ton of acid is reduced by 40 percent, its production cost is reduced by 30 percent, and the specific capital investments are almost halved [6].

An analysis of the planning data shows that the work indicators of the enterprises are improved in proportion to the enlargement of the chemical units, with advanced technology ensuring almost half of the entire growth in labor productivity. The second half of the increase is achieved through organizational and technical factors, including an improvement in production organization, introducing scientific organization of labor and improving the administration [7].

Table 2. Economic Efficiency of Enlarging Sulfuric Acid Production Facilities

Number of industrial units	Capacity of industrial unit, 1000 t/yr	Capacity of shop, 1000 t/yr	Specific capital investments, rubles/yr	Production cost, rubles/ton	Labor productivity per worker, tons/yr
2	120	240	40.3	17.81	2220
1	180	180	36.1	17.25	1745
2	180	360	30.4	15.81	2548
1	360	360	26.4	15.03	2548
2	360	720	24.6	14.42	4260

Table 3. Basic Technical-Economic Indicators of Methanol Production Units of Varying Capacity

Indicators	Yearly capacity, 1000 tons			
	50	100	200	400
Production cost, rubles/ton	50.0	45.5	41.5	37.5
Same, %	100	91	83	75
Specific capital investments, rubles/ton	100	85.0	72.5	61.5
Hauling distance, km	200	300	450	650
Transport costs, rubles/ton	0.5	0.75	1.1	1.6
Specific capital investments in transport, rubles/ton	1.5	2.25	3.4	5.0

In consideration of the technical-economic substantiations of the efficiency of enlarging the chemical units, in the years of the Ninth Five-Year Plan the development of the chemical industry was carried out in two directions: on the one hand, numerous contracts were concluded with the capitalist countries to supply the USSR with complete industrial large-capacity units and, on the other hand, similar large-capacity units produced domestically were intensively planned and designed [8]. By the end of the Ninth Five-Year Plan in the mineral fertilizer industry alone there were 20 large-scale units in operation, including: for ammonia, with a capacity of 410,000 tons a year--5, for ammonium nitrate, with a capacity of 450,000 tons a year--6, for sulfuric acid made from pyrites, with a capacity of 360,000 tons a year--8, and for sulfuric acid made from sulfur, with a capacity of 450,000 tons a year--1 [9].

During the years of the Ninth Five-Year Plan capacities for the output of 38 million tons (in conventional units) of mineral fertilizers were constructed and put into operation, as the result of which their production reached 90 million tons by the end of 1975, including 39 million tons for nitrogen fertilizers [1, 10]. Ammonia production in the USSR rose from 7.6 million tons in 1970 to 12 million tons in 1975 [9].

The increase in ammonia production in the Ninth Five-Year Plan was achieved as the result of launching for operation units with a capacity of 600 and 1,360 tons a day with both domestic and imported equipment. During these years several ammonia synthesis units with a capacity of 600 tons a day were put into operation at shops of the Cherkassy and Rovno Azot production associations, as well as several units with a capacity of 1,360 tons a day at shops of the Nevinnomyyssk, Severodonetsk and Novomoskovsk Azot production associations and the Novgorod Chemical Plant [9].

By the end of 1977 in the USSR there were already in operation eight complete industrial lines, imported and designed on the basis of domestic developments, with a capacity of 410,000-450,000 tons of ammonia a year. In ammonium nitrate production, by the end of the first year of the 10th Five-Year Plan, nine units with a capacity of 450,000 tons a year had been put into operation [3]. Large-scale units for the production of ammonium nitrate with a capacity of 1,400 tons a day are in operation at the Bereznik Chemical Plant, at the Novomoskovsk, Cherkassy and Rovno Azot production associations and at the Ionava Nitrogen Fertilizer Plant [1].

In accordance with the resolution of the 25th CPSU Congress, in 1976-1980 an increase of up to 143 million tons in the output of mineral fertilizers is specified [9]. During the years of the 10th Five-Year Plan the production of nitrogen fertilizers should increase through newly introduced capacities by 26.9 million tons, and reach 65.9 million tons. Ammonia units with a total capacity of 13.4 million tons must be put into operation for this [1].

The specificity of the characteristic features of the current five-year plan lies in the fact that the increase in capacities is planned mainly solely through putting into operation modern, highly productive equipment, using sets of machines with a large unit capacity that operate according to industrial power systems (production of ammonia with machines with a unit capacity of 1,360 tons a day, of nitric acid--1,150 tons a day, of ammonium nitrate--1,400 tons a day, of carbamide--1,000 and 1,400 tons a day). Before 1980 in the nitrogen industry alone the introduction of over 100 sets of machines with a large unit capacity is planned, including 13 for the production of ammonium nitrate with a capacity of 1,400 tons a day and 26 for the output of synthetic ammonia with a capacity of 1,360 tons a day each [10, 12]. Capital investments amounting to a total of 6 billion rubles are to be utilized for this in the current five-year plan, and of them over 3 billion rubles will go for the construction-installation work, which is approximately twice as high as the corresponding level in the Ninth Five-Year Plan [1].

Fulfilling the tasks set by the end of 1980 will make it possible to produce approximately 67 percent of the total production volume of ammonia on the basis of new equipment, instead of 25 percent in 1975, and 45.1 percent of ammonium nitrate and 71.2 percent of nitric acid as against 21.3 and 43.2 percent respectively in 1976 [2, 3].

In the 10th Five-Year Plan construction of enterprises and facilities will continue on the basis of compensatory agreements with the firms of capitalist countries, in accordance with which loans are extended by them and equipment is supplied, with compensation for its cost through part of the output that will be produced at the facilities constructed. Large-scale enterprises are being constructed on this basis: a nitrogen plant in Tol'yatti, the Prikumskiy Plastics Plant and a number of other facilities [13, 14].

A guarantee of putting large-capacity chemical units into operation on schedule, as well as putting into operation the planned capacities and developing the technical-economic indicators in the normative periods is of great national economic importance in fulfilling the tasks set in the 10th Five-Year Plan and for a longer period in the future.

Analysis of the Effect of the Length of the Investment Cycle on the Efficiency of the New Enterprise and Facilities

In practical work, to evaluate the economic efficiency of a new enterprise and facilities, a system of indicators is used: specific capital investments, production cost, labor productivity, the reimbursement period or coefficient of efficiency of capital expenditures, capital-output ratio and profitability.

The problem of increasing the efficiency of using the fixed production capital occupies one of the central places among the many problems of social production efficiency.

The chemical industry's equipping with fixed production capital in the years of the Ninth Five-Year Plan alone increased 1.66-fold. Intensive updating of the fixed capital took place. The coefficient for updating the fixed capital during this period was 0.47 [15].

In the Ninth Five-Year Plan the capacities of the most important types of chemical production increased as follows: by 72 percent for the output of sulfuric acid, by 38 percent for mineral fertilizers and synthetic ammonia and for each, through putting large-capacity production facilities into operation [16].

In connection with this, in the 10th Five-Year Plan and for a longer period in the future, an improvement in the use of the production capital of new enterprises becomes decisively important. The solution to this national economic problem is connected mainly with increased efficiency in the use of the capital investments.

The output-capital ratio is one of the important indicators of the economic efficiency of capital investments--this is, in the final analysis, an improvement in the quality of all construction. Estimates show that an increase in the output-capital ratio from the fixed production capital now existing in the country's national economy of just 1 kopeck means obtaining 8 billion rubles worth of additional output [17].

It should be noted that raising the technical-economic level of production in the chemical industry during the last 10 years did not exert a substantial influence on the dynamics of the output-capital ratio. The output of the gross product in prices on 1 July 1967 per ruble of average annual value of the fixed production capital was 86.0 kopecks in 1965, 87.9 kopecks in 1970 and 86.7 kopecks in 1975 [15]. One of the reasons for this situation is the considerable increase in fixed capital through putting new enterprises into operation.

The efficiency of the newly established enterprises is determined by the level of organization of the investment process. At present a certain idea has formed of the typical structure of the investment cycle according to the stages of its development in time. In this case, three stages are usually singled out: planning, construction and putting the production capacities into operation.

According to the norms approved at present, for an estimate of the norms for the length of time for the planning, construction and putting into operation the capacities, the number of facilities in the chemical industry includes: planning of 80 facilities, construction of 125 facilities and putting into operation the capacities of 132 facilities.

In accordance with the existing norms, the length of time for the investment cycle for a plant producing 400,000 tons of ammonia a year on the basis of converting natural gas is 71 months, including 17 for planning, 36 for construction and 18 months for putting it into operation. According to these norms, six years is required from the beginning of the drafting of the engineering plan to putting the enterprise into operation and arriving at the planned capacity, with the planning taking 24 percent of the total time, performance of the construction-installation work--50 percent and developing the planned capacities--26 percent. The period of obsolescence of equipment, however, under today's conditions of the scientific-technical revolution, is seven-eight years [18, 19].

Therefore, an essential factor in increasing the efficiency of capital investments under today's conditions is acceleration of their turnover, based on reducing the length of the individual stages of the investment cycle and shortening the period in which the funds are frozen through optimum distribution of the capital investments in accordance with the phases of the cycle.

The Soviet economic system has at its disposal great potentials for a sharp reduction in the construction periods. The high level of construction equipment, accumulated experience in planning and organizing production and highly skilled personnel make it possible to erect facilities in the established periods and ahead of schedule, which is indicated by practical experience in many construction organizations. For example, in the last five-year period, in 33 months (with the norm 36 months), a complex for the production of synthetic ammonia was erected at the Novgorod Azot Production Association, and in 20 months instead of the 34 according to the norm the third section of the sulfuric acid production complex was constructed at the Uvarovo Chemical Plant. In 21 months (instead of the 31 according to the norm) construction was completed of the second section of an ammophos production complex at the Sumy Chemical Combine [13, 18, 20].

In the Ninth Five-Year Plan definite progress was also achieved with respect to reducing the length of time of the last stage of the investment cycle. For example, in 1974 the periods for putting production capacities into operation for 98 facilities of the Ministry of the Chemical Industry were reduced, including putting into operation in the last five-year plan ammonia synthesis units,with a capacity of 1,360 tons a day, earlier than the normative period at the Nevinnomyssk, Severodonetsk and Cherkassy Azot production associations [1, 13, 16].

The accelerated development of these production facilities was furthered by: training operations personnel for the appropriate production facilities during the construction period, eliminating the omissions in the plan in the process of construction and not after its completion, checking the reliability and working capacity of the industrial and pumping-compressor equipment during its adjustment by representatives of the machine building plants and a good quality of work execution (turning the complexes over for operation without omissions).

It is interesting in this connection to make an analysis of the organization of the investment process of leading firms of the capitalist countries that imply, by construction period, all the stages--from the planning to putting the capacities into operation. The construction periods of the large modern ammonia units of the Kellogg Company consr'‵‵te on the average about two years, with the following work schedule:

Stage	Period, in months	Proportionate distribution of time in total period, in %
Planning	3	15
Supplying equipment	5	25
Construction-installation work	10	50
Putting into operation	2	10

At the given stage of development of science and technology this period may be taken as optimum. The essential difference in the structure of the investment cycle stems from the fact that the work is done by the method of combining several stages of the investment process. This denotes a transition from consecutive fulfillment of individual stages to parallel (planning is carried out parallel with construction, development of operations is begun while the construction work is still being done), which ensures a considerable reduction in the investment cycle.

An important feature in setting up the norms for the Kellogg Company is the fact that for each stage of the investment cycle the advance time is determined with respect to other construction jobs, which essentially amounts to compiling a consolidated grid schedule. The consolidated grid schedule is plotted so that all the jobs do not exceed the assigned final period for completing the construction project as a whole and are correctly interconnected.

With this type of organization of combining the work, a high degree of condensing of the schedule is achieved. Above all, coinciding in time is ensured for the planning and construction stages. Of the total length of the first stage of the cycle, including, in addition to the planning, the research work, material provision for the construction project and services for administration and the commercial operations, as a rule two-thirds of the time is spanned by the construction period and only one-third is carried out before the start of the construction work (placing orders for equipment and building structures, etc.). An even greater degree of coinciding is achieved in the construction process itself. The period for implementing operation takes place almost wholly at the stage of construction and is limited to a brief start-up and adjustment period. The combining of the individual stages became possible due to introducing automated systems used when designing the enterprise. The use of computers to solve economic problems now makes it possible to perform a breakdown by stages and establish a sequence for fulfilling the work that ensures acceleration of the launching of the production capacities [21, 22].

On the basis of the experience of the leading construction projects of the USSR and other countries, the length of the cycle for designing and putting into operation new capacities may be reduced 2-3-fold.

As a result of drawing out the periods for construction and putting the capacities constructed into operation, the national economy incurs great losses: the planning proportions are distorted, the equipment and industrial processes become obsolete and production efficiency is reduced. The existence of overstated norms, in addition, does not stimulate the planners, construction workers and buyers themselves to accelerate the course of the construction work and to fulfill all the work entrusted them according to the plan ahead of schedule or on schedule.

A substantial potential for reducing the investment period is combining the planning with the construction process. The possibility and efficiency of this combination have been proven by domestic and world practical work in capital construction, one of the most recent examples of which is the construction of the Volga Motor Vehicle Plant. So far, however, the experience in combining has not been properly disseminated in the chemical industry. In the opinion of a number of specialists, the successful solution to this problem is possible only on condition that unified management of these processes is established [23].

A set of complex problems is characteristic of each phase of the construction process. If one takes into consideration, however, the fact that they are all solved by different, loosely interrelated organizations, the difficulties in achieving maximum reduction and combining of phases and in eliminating the disruptions both within and between the individual stages of the work become clear. All this indicates that the problem of improving the investment process as a whole, as well as the phases that make it up, has long been an urgent one.

Under the conditions of the scientific-technical revolution it is very important to use the target program method of administration, including using it to improve the management of the investment process.

During the last few years an ammonia shop for the Severodonetsk Chemical Combine and a number of other industrial facilities in the country were constructed with the use of the target administration method [23].

Practical experience in using the target management method attests to its high efficiency: the construction periods are considerably reduced as compared with the normative ones, work specialization is intensified, maximum concentration of labor and material resources at the facilities is ensured, continuity in performance and a high technical level of work are attained and the possibility of rapidly introducing the newest advanced experience is afforded.

The final phase of the investment process is putting the production capacities constructed into operation. Therefore, to increase the efficiency of the chemical industry, the periods for putting the planned capacities into operation are very important. The capital expenditures for construction of the enterprises are counted from the moment they are turned over for operation as the value of the existing fixed capital. Practical experience shows that one of the main reasons for deterioration of the output-capital ratio indicator is putting the new capacities into operation slowly.

In the Ninth Five-Year Plan 20-25 percent of the newly introduced chemical enterprises and facilities put the planned capacities into operation with a lag behind the normative periods. At the same time, many enterprises, after achievement of the planned capacities in relatively short periods, for various reasons under-utilize them again. The number of newly introduced facilities that regularly under-utilized the planned capacities in the past five-year plan was 50-60 percent for the Ministry of the Chemical Industry [24].

Due to the disruption of the established periods for putting the planned capacities into operation in 1971-1975 for the four subsectors of the chemical industry alone, the output obtained was short by 27.2 million tons of mineral fertilizers, 908,000 tons (in terms of monohydrate) of sulfuric acid, 580,000 tons of synthetic resins and plastics and 154,000 tons of chemical fibers and threads [24].

As an analysis shows, the main reasons for the lag in the rates for putting the planned capacities into operation are planning errors, defects in the equipment supplied, shortages in provision with raw materials and materials and skilled labor forces and omissions in the construction and installation work. For example, as the result of errors made in planning an ammonia shop with a capacity of 400,000 tons a year at the Novomoskovsk Azot Production Association, after achieving the monthly planned capacity in September 1975 (after 11 months instead of the 18 according to the norm), the plan for the output of a considerable number of products was not fulfilled in 1976 [24].

In the Ninth Five-Year Plan approximately one-fourth of the facilities in the chemical industry that were put into operation on schedule did not achieve the planned capacity due to defects and poor quality manufacture of the production equipment [24].

Lack of connection between the construction and putting related production facilities into operation is particularly detrimental to the national economy.

Protracted periods for putting capacities into operation postpone the projected and planned periods for reimbursement of the expenditures, which means a diversion of resources, just as with above-norm uncompleted construction. Unfortunately, often the enterprises provided with complete sets of imported equipment are also a long time being put into operation, which reduces the efficiency of the foreign currency operations.

Reducing the periods for constructing and putting the capacities into operation is a major potential for increasing the output of goods and increasing the efficiency of social production.

Norm-Setting for Putting Planned Capacities Into Operation and Technical-Economic Indicators

Noted among the most important tasks of the 10th Five-Year Plan is the need for considerable acceleration in putting newly introduced capacities into operation and achieving the planned technical-economic indicators.

Completion of the construction of the facilities and turning them over for operation, although it is an important stage, is not the final goal of the cycle of establishing a new industrial enterprise. Putting the planned capacities into operation and achieving the planned technical-economic indicators for the enterprises put into operation; labor productivity, production cost and profitability--that is what is the final goal and should be the concluding phase of the entire cycle of designing and forming the new industrial enterprise. This premise should be the criterion for evaluating all the production-economic operations of new industrial facilities and determining the actual periods for reimbursement of the capital investments.

One of the main reasons for the inadequate level of development of the economic indicators of new industrial enterprises, even on condition of efficient use of their planned capacities, is underestimation of the qualitative aspect of the problem of putting them into operation. In practice it has been customary to regard a new enterprise as put into operation if its planned capacity is achieved. The economic indicators of the plan, however --labor productivity, production cost, profitability of the work--are often put into the background. This aspect is of national economic significance, however, since it is by no means a matter of indifference to society what material and labor input are employed in achieving the developed operation of the planned capacity. The products of the new industrial enterprises should be produced not with just any, but with the minimum material and labor input, at all events not exceeding the planned values.

As experience shows, the planned level of labor productivity at new enterprises in many cases is achieved later than the planned capacity, and the planned production cost and profitability--later than the planned level of labor productivity.

Profitability is a generalizing indicator, since it reflects the final results of the enterprise's work. It depends on the mass of the profits and on the magnitude of the production capital and reflects the capital-output ratio of the production and the level of use of the fixed and working capital.

It should be noted that one of the principal reasons for slower attainment of the planned labor productivity, as compared with development of the planned capacity, is the fact that when the actual volumes of fixed capital lag behind the planned amounts for the size of the industrial-production personnel, at a number of new enterprises the planned contingent of workers is reached or even exceeded.

As a result of long utilization, unproductively, the funds for maintaining the operations personnel are expended, and the state does not obtain the planned profits.

The new enterprise produces amortization deductions from the total amount of fixed capital put into operation, and these deductions are often related to a lower output volume than specified by the plan.

On the basis of the data from an investigation made by the USSR Central Statistical Administration on 1 July 1973 it was established that in the chemical industry 55 percent of all the industrial lines were operating with full use of the hourly planned productivity, and 14 percent were used at less than 75 percent of it. According to the data from an analogous investigation on 1 July 1975, the level of use of equipment had risen, but insufficiently [25].

According to the data of the USSR Central Statistical Administration, in 1975, due to under-utilization of the planned capacities, the supply obtained was short 5 million tons of mineral fertilizers, 47,000 tons of chemical fibers and threads and 136,000 tons of synthetic resins and plastics [26].

In the last few years a widescale discussion has unfolded in economic literature, devoted to the problem of increasing the efficiency of work of a new enterprise, and various proposals are expressed on this topic.

For acceleration of putting into operation the planned capacities, L. Gatovskiy, corresponding member of the USSR Academy of Sciences, completely justifiably and opportunely poses the question of the need to develop advanced norms for expenditures and results from putting new equipment into operation that are complex in nature and encompass the following indicators: production cost, profit, profitability, materials input and output-capital ratio; labor intensiveness, labor productivity and expenditures for wages; production volume [27].

For consistently carrying out a policy directed toward compulsory fulfillment of the planned indicators, P. Bunich, corresponding member of the USSR Academy of Sciences, points out the expediency of introducing the rule of all-round efficiency into the standard methodology for determining the economic efficiency of capital investments, and its dissemination to all the fixed capital of the enterprises, thus bringing close together the projected and planned indicators of the enterprise's work.

At the present time the evaluation of the work of enterprises with respect to fulfilling the planned assignments, if these assignments are below the planned levels, but fulfilled and overfulfilled, is considered successful, even though society has not fully obtained the yield from the capital investments. It is precisely through this that planning of a low level of yield on capital investments may be explained to a considerable extent.

To increase the interest of the collectives in working out stepped-up plans, it is proposed to make the transition to stimulation for the production efficiency level, and not just for fulfillment of the planned indicators [28].

A number of economists, in our opinion, correctly formulate the question of the need and expediency of establishing a compulsory final analysis of the efficiency of individual executed plans and programs of capital investments. For this purpose they propose introducing the accountability of the master planners to the higher organizations and the USSR Central Statistical Administration with respect to all the enterprises and structures accepted for operation. The accountability report should reflect the economic indicators (including the length of time for construction) of the original and reapproved plan, the actual indicators and their accordance with the planned ones, and also an analysis of the reasons for deviations of the indicators achieved from the planned ones. The planning institute should also give corresponding proposals for extremely rapid achievement of the planned capacity, an increase in labor productivity, reduction in production cost and other planned indicators, if they are not achieved.

Monitoring a change in the basic technical-economic indicators that determine the efficiency of capital investments is proposed for implementation not only by the planning organizations and organs of expert examiners, but also by the buyers of the capital construction. Problems of ensuring the planned technical-economic indicators at the enterprises put into operation should be constantly under the eye of the planning and financing-credit organs [29-32].

The five-year plans actually take into account only putting the planned capacities into operation in consideration of the established norm for putting them into operation. No one of the economic indicators (production cost, size of personnel, profitability of the production) for new production facilities is taken into account officially and systematically. The report on putting new capacities into operation is compiled selectively for a limited group of new capacities. For organization of the effective accounting of the actual efficiency of new production facilities, Z. Korovina proposes that there also be included in the statistical report and the section for technical development and organization of production of the five-year and yearly plans for new enterprises and facilities the following indicators (according to the plan and actually): the value of the fixed production capital put into operation, the production volume in physical and value terms, the production cost, total profits and number of industrial-production personnel, counting the production facilities put into operation as new for five years [33].

To reduce the length of time for construction of large-capacity ammonia units, V. Solomin proposes "eliminating independent norms for the length of time for putting planned capacities into operation or combining them with norms for the length of time for construction, as well as working out with subsequent approval according to centralized procedure the norms for achieving the planned technical-economic indicators: labor productivity, production cost, production profitability, etc., applicable after the planned capacity of a new enterprise is put into operation" [18]. Such a conclusion does not take into consideration the specificity of chemical industrial production facilities, and therefore it cannot be recognized as substantiated. The point is, that the period for putting the planned capacity into operation cannot fully be combined with the stage of construction due to the intercoordinatability of the industrial operations. It is, however, possible to combine some stages of launching the individual assemblies, which will contribute to reducing the start-up and adjustment period as a whole. Therefore, it should be acknowledged that the norms for putting the planned capacities into operation are still far from optimum, and do not take into consideration the acceleration of scientific-technical progress.

R. Merkin also poses the question of the transition to norm-setting for development of production not only of the planned capacities, but also of the planned economic indicators (production cost, profitability, labor productivity), the achievement of which will make it possible for the enterprise to emerge at the planned level of efficiency [34]. It is also impossible to agree with this kind of proposal, for in the course of putting the planned capacities of new facilities into operation, the planned level of technical-economic indicators should also be achieved. Independent norm-setting for their achievement may lead to stretching the periods for the new enterprise to emerge at the normal operating conditions. It is, however, important for the development of the economic system that during the development of operations fulfillment of all the quantitative and qualitative indicators of the work specified in the plan for the new enterprise be ensured.

Solving the problems of reducing the length of time for putting the planned capacities of new enterprises into operation requires the devising and implementation of a set of organizational-technical measures that ensure the preparation for developing operations of the planned capacities and achievement of the technical-economic indicators in the normative periods.

This set of measures should include measures to improve and accelerate the planning, construction and development of the industrial enterprises and facilities put into operation (monitoring the quality of the planning designs and the quality of the construction and installation work, training personnel, etc.).

Priority measures among those mentioned are elimination of cases of turning facilities over for operation with major construction omissions, undeveloped and untested equipment; reduction of the periods for developing the enterprises, facilities and production facilities put into operation through carrying out the necessary preparatory work, including training personnel and on-schedule coordination of material-technical provision and sale of the output.

Under the conditions of accelerated development of the chemical industry, one of the central places is occupied by the problem of increasing the efficiency of the new enterprise, and not only the level of economic efficiency of these enterprises, but also the rates of realizing scientific-technical progress in the national economy and adherence to the outlined rates and proportionality in its development depends on its successful solution.

The analysis made of the effect of the length of the investment process on the efficiency of a new enterprise indicates that the problem of improving the investment cycle as a whole, as well as its component phases, has long been a pressing one. Under today's conditions of the development of the economic system and the longer perspective, problems of reducing the investment process and accelerating the turnover of capital investments are particularly acute. A central role in solving these problems is played by a reduction in the periods for construction and putting into operation the capacities at large-capacity chemical units newly introduced.

It has been established on the basis of the analysis made that the norms for putting planned capacities into operation are still far from optimum and do not take into consideration the acceleration of scientific-technical progress.

As the result of the analysis made it was revealed that achievement of the planned technical-economic indicators for the work of new enterprises and facilities as a rule lags behind the development of the planned capacity and extends beyond the normative periods for the last stage of the investment cycle, as the result of which the output-capital ratio and profitability of the enterprise's work are reduced, which makes them inefficient. Such a situation must not be regarded as tolerable, for achieving the planned levels of production cost, labor productivity and profitability is of national economic importance and requires an extremely rapid solution.

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METALLURGY

EFFICIENT USE OF ENERGY IN METAL PRODUCTION DISCUSSED

Moscow TSVETNYYE METALLY in Russian No 4,1979 pp 1-9

[Article by P. F. Lomako: "A Rational Use of Energy Resources--An Important Factor in Increasing the Efficiency of the Production of Non-Ferrous Metals"]

[Text] At all of the stages of socialist construction the communist party of the Soviet Union has attributed paramount importance to the development of power engineering and of power supplies for the country's economy. This is testified to by such an historic document as the GOELRO plan which was worked out on the initiative and under the leadership of Vladimir Il'ich Lenin, the historic decisions of the 25th Congress of our party, the socio-economic program for the development of the country during the Tenth Five-Year Plan, and also the decisions of the November (1978) Plenum of the Central Committee of the CPSU.

In his speech at this Plenum, the General Secretary of the CC CPSU and chairman of the USSR Supreme Soviet Comrade L. I. Brezhnev gave a profound analysis of the development of the country's economy and clearly defined the decisive sectors of work which require the most serious attention from party, government, trade union, Komsomol , and economic agencies.

The Plenum of the CC CPSU bound ministries and departments and local party, government, and economic agencies to concentrate their efforts on solving the key national economic problems and, especially, on a further development of metallurgy, power engineering, and the fuel industry.

The CC CPSU Plenum emphasized that the chief condition for the successful fulfillment of the projected assignments in increasing production is a steady realization at all levels of economic management of the course defined by the party aimed at an intensification of the use of resources and a rational use of everything which is created by the labor of the people.

The country's energy base includes three basic components: the extraction of fuel and the production and consumption of energy. The first two elements of this complex are performed by the fuel branches and the USSR Ministry of Energy and Electrification, and the third by all of the branches of the economy. Successful work to introduce new energy capacities, electric transmission lines, and heating systems is indisputable. Without this the further development of the economy would simply be impossible. However, despite all this, it would, of course, be possible to make certain complaints against the USSR Ministry of Energy and the organizations which are responsible for continuous supplies of fuel connected with the systematic restrictions in energy supplies and the failures to deliver fuel, especially during the fall and winter, and with an insufficient level of reliability (which became clear, in particular, during the period of the December 1978 cold). However, this does not remove the responsibility from consumers for a zealous attitude toward energy resources. In the sphere of consumption the issues of the most efficient use of energy have to be decided on a state and branch level.

In view of the fuel and energy crisis which has struck the capitalist countries, our country which is practically the only major power which is capable of solving the problems of economic development on its own fuel and energy base has to be especially thrifty with natural energy resources.

This is determining the enormous public importance of mobilizing all of our reserves for economizing fuel, steam, electric, and other types of energy in every branch of industry, and, especially, in such energy consuming branches as non-ferrous metallurgy.

The workers of non-ferrous metallurgy are making their contribution to the development of the economy. During three years of the Tenth Five-Year Plan substantially more output was produced than during the corresponding period of the previous five-year plan. Compared with 1975, there has been a substantial increase in the production of aluminum, nickel, titanium, and rolled non-ferrous metals. The production of other non-ferrous metals has also increased. During this time more than 300 large new facilities have been put into operation in the branch.

Energy plays a large role in the development and improvement of the technical level of non-ferrous metallurgy, since non-ferrous metallurgy is one of the most energy intensive branches of the economy: it consumes more than 100 billion kilowatt hours of electric energy a year, more than 23 million tons of conventional fuel, and 74 million gigacalories of thermal energy. At the present time the highly developed energy base of the enterprises of non-ferrous metallurgy is to a large extent the basis of the branch's production potential. The functions of the branch's energy service include: providing uninterrupted energy supplies for enterprises, increasing the efficiency of the use of fuel and energy resources, protecting the environment, and the overall automation of production.

The reliability of energy supplies is ensured mainly by the centralization of the energy supplies from the energy systems of the USSR Ministry of Energy; by the development and improvement of enterprises' own electric stations, boiler rooms, and other sources of energy; by the construction of warehouses for reserve types of fuel; and by the modernization of intra-plant energy supply systems, including their automation and dispatcherization.

The ministry constantly devotes a large amount of attention to increasing the efficiency of the use of fuel and energy resources, to decreasing energy expenditures, and to developing the branch's energy enterprise.

The ministry's Board constantly examines the problem of energy use and makes decisions which increase the level of the economy of electric energy and fuel at all technological stages.

Every year branch and sub-branch conferences of energy engineers are held, organizational and technical measures are worked out and implemented, and checks and mutual checks on energy use are performed at the branch's enterprises.

Progressive norming is one of the ways of helping to reduce energy expenditures. In accordance with the five-year plan for the development of the economy, the ministry has been given the assignment of an average reduction in the expenditure norms for energy resources: for electric energy--5 percent, for fuel--5 percent, and for thermal energy--7.3 percent. This reduction of norms is set in the planning indicators.

As a result of measures which were carried out to improve the energy enterprise, to master secondary energy resources, to automate technological processes, and to modernize energy consuming machinery, the assignments to economize boiler and furnace fuel and thermal energy which were set for the ministry as a whole for 1978 were fulfilled. An economy of 100,000 tons of conventional fuel, 950,000 gigacalories of heat, and 280 million kilowatt hours of electric energy was obtained.

The enterprises of Soyuzredmet, Soyuztsvetmetobrabotka, and Soyuznikel' have the best indicators in energy use for all types of fuel and energy resources.

Many enterprises of the branch are performing constant work to increase the efficiency of the use of fuel and energy resources, are achieving reductions from year to year in the specific energy expenditures for output, and are obtaining a substantial economy on the basis of organizational and technical measures. Among these enterprises are the Zaporozh'ye and Berezniki Titanium and Magnesium and the Kirgiz Mining and Metallurgical combines, the Bratsk and Volkhov Aluminum Plants, the Rezhskiy Nickel Plant, the Kirov and Artemov Non-Ferrous Metal Processing Plants, and many others. Planned work to economize fuel and energy resources is conducted at most of the enterprises.

If we examine the work to economize energy resources in the branch for, let us say, the last ten years, four basic directions can be traced:

--a decrease in losses for the transformation of electric energy;

--a decrease in direct expenditures of energy resources at all stages, and a maximum use and enlistment in the active energy balance of secondary energy resources;

--the shifting of productions to new technological processes which ensure an overall use of raw materials on the basis of closed waste-free material and energy balances;

--an improvement of the structure of the fuel balance.

These directions are being realized in an overall manner and are parallel to one another, and in the future also they must be in the field of vision of the leading workers of enterprises and institutes.

In 1978, the proportion of semiconductor silicone rectifiers at electrolysis transformation substations came to 96 percent, compared to 21 percent in 1965.

The extensive introduction of installations for the use of secondary energy resources is a very important top-priority task. Supplying production machinery with thermal-utilization installations produces a large technological effect and ensures production intensification, the overall use of raw materials, and the protection of the environment.

A great deal of attention is being given in the branch to the use of secondary energy resources. From 1966 through 1978, 50 waste-heat boilers and 150 coolers were introduced.

Waste-heat boilers in our branch are in most cases an inseparable part of the basic unit, an energy-technological complex which solves the problems of capturing valuable components from waste gases, purifying them of harmful elements, and using secondary heat for the production of steam and hot water and for heating blasting air. It has to be noted that at those enterprises where there is a correct attitude toward the use of secondary energy resources significant positive results have already been achieved.

A number of examples could be cited in which the energetic actions of energy engineers, in collaboration with production engineers, are producing real results. For example, approval should be given to the work of the energy engineers of the Ust'-Kamenogorsk Lead and Zinc Combine which was begun under the direction of the chief energy engineer N. A. Stolyarevskiy (who has now retired on pension) and is being actively continued by the new chief energy engineer of that combine G. A. Zorkov.

It has to be noted that the director of the combine I. S. Voronin and its chief engineer A. S. Kulenov exercise immediate direction over and take active part in the development and introduction of energy-technological systems. Close collaboration between the combine's workers and the collective of specialists of the "Uralenergotsvetmet" Production Association has developed at this combine, thanks to which the transformation and compressor enterprises have been reconstructed, all of the furnaces have been shifted to evaporation cooling, and the boiler of the slag sublimer is operating with high efficiency. The furnace of this unit also operates on evaporation cooling and yields 45 tons of steam per hour without expenditures of primary fuel, which makes it possible to economize 15,000 tons of conventional fuel a year.

For the first time in world practice a waste-heat boiler has been put into operation and is operating successfully behind the rotary kiln No. 7, which has made it possible to increase the productivity of the kiln by 20 percent, to improve working conditions, and to achieve an economy of 6,500 tons of conventional fuel a year. The use of water in the circulating water supply systems has doubled, which is producing not only a real economy of fresh water (and this means an economy of electric energy to pump it), but also a decrease in the number of harmful discharges.

Reconstruction work has been performed on the waste-heat boilers of the Krasnoural'sk Copper Smelting Combine and the Sredneural'sk Copper Smelting Combine. Evaporation coolers have been introduced behind the annode furnace of the "Uralelektromed'" Combine and the shaft furnaces of the Karabash Copper Smelting Combine and the "Yuzhuralnikel'" Combine.

Many such examples could be cited. The following collectives which are doing active work in this direction deserve to be noted: Raztsvetmet (director A. N. Polyakov, chief engineer A. K. Ushakov, chief energy engineer V. A. Sidorov), the Bratsk Aluminum Plant (director N. P. Avdeyev, chief engineer N. S. Matveyev, chief energy engineer A. G. Rodionov), the Almalyk GMK (director M. R. Ramazanov, chief engineer A. V. Ivanov, chief energy engineer Ye. K. Shegay), and the specialized associations and enterprises of the system of the Administration of the Chief Energy Engineer.

In the future, work on improving the branch's fuel and energy balance has to be conducted in the following basic directions.

1. Supplying metallurgical units with waste-heat boilers for the effective use of the heat of waste gases, the full extraction from them of SO_2 and of valuable components, and also a complete halt to discharges (polluting wastes) in the environment, including:

   --the creation of energy-technological complexes based on existing metallurgical units (converters, KS furnaces, reverberatory and hardening furnaces, and so forth);

   --the creation of energy-technological complexes based on newly built units on the basis of oxygen spray, cyclone, and Kivtset processes.

2. The introduction of evaporation coolers for the purpose of using the heat of waste gases and increasing the service life of the structural elements of furnaces.

3. The introduction of installations for the high-temperature heating of air which is supplied for combustion and into the technological process.

4. The introduction of installations for the use of the heat of refuse slag.

5. A solution of the problem of the use of low potential heat (cooling water, air, and so forth).

6. The introduction of highly effective fire-resistant and insulation materials.

The use of automation and control systems plays a decisive role in the stabilization and optimization of technological modes of operation, which leads to a maximum decrease in the expenditure of energy resources and an increase in the efficiency of processes.

Suffice it to say, that the introduction of the "Aluminiy," "Elektroliz," "Draga-1," "Nefelin," and "Karat" systems and the "Automated Analytic Control System" are already at the present time producing a real economy of many millions of kilowatt hours, thousands of gigacalories of heat, and thousands of tons of fuel.

Attention should be called to the substantial reserves for economizing electric energy which exists in electrothermics. Thousands of electric furnaces with a total capacity of more than 3,000 megawatts have been installed in the branch. With our strained electricity balance there is a great field of activity here for economizing electric energy on the basis of replacing a large number of worn out and obsolete furnaces, optimizing their operational modes, and improving their insulation and automation. Thus, the introduction by the Tsentroenergotsvetmet of an automatic regulation of the operational modes of the furnaces of the Pobuzhskiy Nickel Plant is already yielding an actual economy of more than 5 million kilowatt hours a year. And there are dozens of them in the branch, and the annual economy of electric energy from shifting them to an automatic operational mode will come to more than 120 million kilowatt hours.

As a large consumer of electric energy, electric ore smelting has substantial reserves for economizing electric energy and increasing labor productivity, and intensifying the process. The use of modern automation systems for managing and controlling the technological process in thermal ore furnaces will ensure an exact compliance with the established technology and a stable economy of material and energy resources.

Participation in the all-union competitions for the best proposal on economizing electric and thermal energy which are held by the State Inspectorate for Industrial Power Engineering and for Power Engineering Supervision is one of the factors which characterizes the level of work on economizing fuel and energy resources.

Non-ferrous metallurgy is one of the most active participants in the competition and has solidly held a leading place among the other branches. However, the level of energy consumption and the existing possibilities to improve our energy economy and energy technology allow us to draw the conclusion that the branch's results could be better.

First of all, one is struck by the fact that far from all of the enterprises and organizations take part in the competition. On the average, around 20 percent of the enterprises of non-ferrous metallurgy participate in each competition. The branch institutes rarely participate in competitions. Greater activity by head institutes will intensify the work on the rationalization of energy use.

The most active participants from non-ferrous metallurgy in the competitions are: the "Yuzhuralnikel'" Combine (chief energy engineer D. Z. Sayfutdinov), the Kol'chugina Non-Ferrous Metals Processing Plant (A. I. Klenov), the Ust'-Kamenogorsk Lead and Zinc Combine (V. A. Zorkov), the Volkhov Aluminum Plant (G. S. Konev), the Novokuznetsk Aluminum Plant (P. A. Snitko), the Dneprovsk Aluminum Plant (A. Ya. Shevchenko), the Uzbek Refractory and Heat-Resistant Metals Combine (B. P. Lopukhin) and certain others.

These enterprises have taken part in all of the latest competitions, and the "Yuzhuralnikel'" Combine has sent an average of five proposals to each competition.

The activeness of certain enterprises of Soyuzmed', Soyuztsvetmetobrabotka, and Kazmintsvetmet leaves much to be desired.

There is little participation in the competitions by the enterprises of Soyuzredmet, Soyuzpolimetall, Soyuzzoloto, and Soyuzvtortsvetmet, and also by certain enterprises and organizations of the Administration of the Chief Energy Engineer. All of this is a reason for the fact that there are serious shortcomings at a number of enterprises of the branch in the rationalization of the use of fuel and energy resources.

Compared to last year, in 1978 the production of heat on the basis of secondary energy resources was reduced by the Irtysh Polymetallic and Balkhash Mining and Metallurgical Combines, the Chelyabinsk Electrolyte Zinc Plant and the Dneprovsk Electrode Plant, and the enterprises of Soyuzredmet. Not all enterprises are carrying out measures to introduce waste-heat boilers and air heaters. Frequently the failure to meet the schedules for introducing these installations is explained by all kinds of "objective" reasons, with the exception of a lack of planned work and of the necessary attention by enterprise administrations to these important issues.

Every year from 30 to 40 enterprises permit overexpenditures of fuel and thermal and electric energy. The greatest overexpenditure of fuel and energy resources was committed in 1978 by the Krasnoyarsk, Bogoslovo, and Ural Aluminum Plants, the Sredneural'sk Copper Smelting Plant, and the Almalyk Mining and Metallurgical Combine.

As a rule, the overexpenditures take place as a result of weak technological and production discipline, insufficient organizational work in this direction, and the lack of planned work to increase the efficiency of the use of fuel and energy.

A number of enterprises are lax in carrying out the instructions and assignments of superior agencies on measures to increase the efficiency of the use of fuel and energy resources in the economy with respect to the use of progressive expenditure norms. For 1978 overstated expenditure norms for fuel and energy resources compared to the norms which were actually reached for individual types of output and operations were established without sufficient technical and economic substantiation at the Verkk-Neyvinskiy and Sukholozhskiy "Vtortsvetmet" Plants, the Leningrad "Lenvtortsvetmet" Association, the Balkhash and Alaverdi Mining and Metallurgical Combines, and the Dneprovsk Aluminum, Dneprovsk Electrode, and Kamensk-Ural'sk Non-Ferrous Metals Processing Plants.

This kind of unsatisfactory setting of norms makes it possible to obtain an "economy" of fuel and energy resources without carrying out organizational and technical measures.

Around 40 percent of the steam and water heating boilers still operating in the branch are obsolete and uneconomical, 15 percent of the compressors are worn out or obsolete, and there is other uneconomical energy equipment still operating in the branch. Their replacement and modernization will make it possible to economize hundreds of thousands of tons of conventional fuel and hundreds of millions of kilowatt hours of electric energy a year.

The problem of secondary energy resources occupies one of the chief places in the branch. The total output of secondary energy resources in the branch comes to 29 million gigacalories, with a possible use of 15.4 million. However, the actual production of thermal energy on the basis of secondary energy resources in 1978 was equal to 4 million gigacalories, or slightly more than 25 percent of the possible level.

During the last ten years the average annual increase in the production of thermal energy based on secondary energy resources has been 12 percent, which, of course, is insufficient. When the production of thermal energy based on the use of secondary energy resources is brought to 10 million gigacalories the annual consumption of conventional fuel will decrease by ? million tons.

Thus, the branch has a large scientific and technical and production stock and there is complete clarity with respect to the ways of accomplishing many of the tasks of economizing energy resources.

The ministry is demanding from leading workers of all ranks and from concrete executors an absolute, active, and creative fulfillment of all of the previously adopted and approved plans, assignments, programs, and studies and their introduction into production.

Under the conditions of the scientific and technological revolution, in order to raise the technical level and standard of production, to improve its economics, and to make maximum use of production reserves it is essential to thoroughly improve the energy enterprise of enterprises. As is demanded by the November (1978) Plenum of the CC CPSU, a new approach is necessary to the accomplishment of our tasks.

Calculations show that a systematic and overall realization of the planned work in the above-mentioned basic directions of improving and further developing energy use and the energy enterprise at the enterprises of non-ferrous metallurgy will make it possible to decrease production expenditures in the branch in the near future by almost 1 billion rubles a year.

It has to be remembered that with the dimensions of our consumption a decrease in the consumption of energy resources by one percent is equal to an economy of hundreds of thousands of tons of fuel and more than one billion kilowatt hours of electric energy. It is not possible to accomplish the task of a substantial increase in the efficiency of use all at once, by means of carrying out individual, even major measures. A system is needed here which would involve in active work all of the elements of the ministry and the collectives of institutes, enterprises, and the specialized organizations of the Administration of the Chief Energy Engineer.

In order to increase the efficiency of the use of fuel and energy resources at the branch's enterprises overall plans have to be worked out for improving technology and the energy enterprise both for the current year and for the future.

Power engineers, production engineers, and branch institutes have to take part in the development of these plans. The plans for measures have to be supported by financing and material and technical resources.

From the very beginning of its work, the ministry has and continues to devote a great deal of attention to the organizational strengthening of the energy service. At the present time the Administration of the Chief Energy Engineer is a large functional and production element which has as its components plants, production associations and production-technical enterprises, and scientific research and planning and designing institutes.

Their location in the areas of the mining, production, and processing of non-ferrous metals--in Central Asia, in the Urals, in Siberia, and in the European part of the country--accords best with the demand for an overall constant and efficient solution of the problems of improving the energy enterprise of enterprises.

These organizations are employing their own efforts to improve branch, electric power stations, boiler, oxygen, and compressor stations, and other facilities of the energy enterprise. Semiconductor equipment is being introduced on a wide scale, metallurgical units are being shifted to evaporation cooling, and waste-heat boilers are being introduced. This work is being performed in close contact with all-union associations in subbranches each of which has now created and consolidated divisions of the chief energy engineer.

The development of the basic directions of the technical development of the branch's energy engineering, their practical realization, and an improvement of the efficiency and development of the leading specialized organizations is being successfully directed by the workers of the Administration of the Chief Energy Engineer O. N. Bagrov, A. D. Nikulin, V. N. Klimov, and N. G. Shamrayev.

A substantial contribution to the development of the specialized organizations of the Administration of the Chief Energy Engineer has been made by Yu. A. Kuznetsov, Yu. Ya. Ol'skiy, A. N. Kasatkin, A. V. Panchenko, I. S. Zverev, B. N. Kisilev, N. Ye. Tsaregorodtsev, and many others.

A large amount of fruitful work is being performed by the leaders of the energy services of all-union industrial associations Yu. D. Zhuravin, G. N. Boch'karev, O. I. Kharlamov, V. N. Kholmogorov, D. A. Tanyayev, A. S. Vasil'chenko, and A.S. Dubrovin.

A highly important organizing moment for every subbranch is the composition of plans and technical and economic reports on the modernization of technology and basic technological and energy equipment in order to bring energy expenditures for production to the progressive and optimal levels which have been attained both at advanced domestic plants and abroad.

As for the technical aspects of the problem of reducing energy expenditures, they have now been sufficiently well worked out in science and engineering and many have been tested in production. At the same time, of course, scientific and engineering searches have to actively continue both in breadth and in depth. There is also the question of the mass introduction into production of new designs which have already been given practical tests.

Having solid scientific backing and substantial engineering preparations, the "VAMI" Institute has developed systematic plans until 1985 for a substantial reduction in the specific expenditure of electric energy in the electrolysis of aluminum and of the expenditure of heat in the production of alumina.

The cost of modernizing an electrolysis production which achieves the above result is 120 million rubles, and the cost for an alumina production is 37 million rubles. In addition, 600 million rubles worth of electric and thermal energy is freed.

At the present time the "Gipronikel'" and "Kazgiprotsvetmet" Institutes have begun to develop this kind of plan. This kind of work should be organized by all head institutes in their subbranches. At the same time, consideration has to be given to the questions of modernizing the shop and general plant energy enterprise.

We have built up quite a large amount of positive experience in working with other ministries on rationalizing the use of fuel and energy resources.

In order to shorten the time periods involved in the institution of the measures and the use of secondary energy resources, in 1975 the USSR Ministry of Non-Ferrous Metallurgy together with the Ministry of Power Machine Building developed a coordination plan for the introduction during the years 1975-1980 of waste-heat boilers in non-ferrous metallurgy.

Time has shown that such plans make it possible to greatly speed up the rates of the introduction of waste-heat boilers.

The ministry has now worked out a program for equipping the branch's thermal ore furnaces with automatic systems for regulating electrical operational modes. We have enlisted in the work on this problem the enterprises of the Ministry of Electrical Engineering Industry and of VNIETO [expansion unknown] and the Cheboksary Electrical Apparatus Plant; the help of these organizations will make it possible to substantially shorten the time for introducing the above systems. The realization of the program will make it possible by 1985 to economize around 80 million kilowatt hours of electric energy.

The development of the electrolysis of non-ferrous metals and the shift of certain processes to the use of direct current require the creation of new types of transformer equipment.

The necessity for increasing the reliability and the economical nature of electric installations at enterprises requires the creation of new types of electric equipment: engines, transformers, furnaces, and others.

We hope to obtain all of these types of electrical engineering equipment from the Ministry of Electrical Engineering Industry in the nearest future.

A high level of efficiency has been obtained as a result of our cooperation with the USSR Ministry of Power Engineering and Electrification which has created mobile "Severnoye Siyaniye" gas-turbine electric power stations in order to supply power to non-ferrous metallurgy enterprises which are remote from electric transmission lines. In the future these stations are supposed to be transferred to atomic sources of power.

The solution of the very important problems which determine technical progress in our branch, an intensification of production, a rise in labor productivity, and an economy of material resources obliges our scientific and engineering cadres and our specialized organizations and institutes to reorganize the system of their work and to adopt a course aimed at the large-scale introduction of scientific and technical achievements.

Above, we have considered the most important directions of improving the energy enterprise of non-ferrous metallurgy and, on this basis, of economizing all types of energy resources. It can be said that while several years ago these directions were strategic ones for the branch, now it is time to consider them as tactical; that is, as being fundamentally solved, practically realizable, and no longer requiring special profound theoretical studies.

It is necessary, however, to constantly look forward, not to lose the perspective, and to define the next strategic directions for the branch which in the foreseeable future have to create not only the basis for a qualitatively new energy base for production, but also insure a more rational and economical use of energy resources in the branch. Of these directions, the following should now be noted.

1. Atomic energy. Given the limited nature of stocks of natural organic fuel, this direction is one of the most important ones. Studies have to be conducted in the field of creating economical atomic energy installations of small capacity for supplying energy to facilities which are remote from the energy systems of the Ministry of Energy. We should also not lose sight of the use of large atomic electric power stations for supplying energy to such energy intensive subbranches as the aluminum branch and others.

2. Cryogenic equipment. Super-conductivity at temperatures of 0-80 Kelvin can be used to produce direct current electric energy and to transmit energy first over small distances (for example, from a hydroelectric power station to electrolysis installations), and then, as experience is gained, on the wider scale of the energy supply systems of enterprises. There is a sharp decrease in losses here for the transformation and transmission of energy.

3. Plasma equipment. In recent years, definite positive changes have taken place in this direction. Research has been supplemented by laboratory experiments which are already yielding practical results.

For example, in the "Tsentroenergotsvetmet" Production Association (Director A. N. Kasatkin, chief engineer A. V. Dubrovin, division chief A. V. Zverev) work has been performed on the restoration process for obtaining cobalt from oxide. A restoration plasma furnace is being created at the "Yuzhuralnikel'" Combine. It is necessary not only to carry out a concrete plan for further scientific research and designing developments, but also to accelerate the practical introduction of the results which are obtained.

4. Automated management systems. The experience in creating and introducing the "Alyuminiy," "Elektroliz," "Draga-1," "Nefelin," and "Karat" systems and the "Automated Analytical Control Systems" testifies to the progressive nature of this direction. Further joint work by production and power engineers and specialists in the field of automation and computer equipment will make it possible to make the fullest use of automated systems to improve technological indicators at all stages, improve the quality of output, reduce the expenditure norms for energy resources, decrease the number of people working at a given stage, and improve the other indicators of the economic and technological efficiency of production.

In recent years environmental protection has turned into a global problem which affects the interests of all humanity and which is closely connected with an efficient use of natural resources, including energy resources. For the purpose of solving this problem the ministry, the branch institutes, and enterprises and organizations are working on specially developed plans to carry out a large complex of scientific research, planning and designing, installation, and start-up and adjustment operations.

We have definite achievements. In recent years there has been a substantial and continuing decrease in the amount of harmful discharges into waters and into the atmosphere. The branch's branch institutes and enterprises have developed and introduced systems for purifying and conditioning wastewaters which make it possible to introduce on a wide scale water circulation the secondary use of water and to reduce the expenditure of fresh water. Dust and gas purification is becoming increasingly deep and the number of dust and gas purification installations is constantly growing. However, it has to be acknowledged that many problems of environmental protection have not yet received their necessary solution and that decisions which are made are not always carried out on schedule.

Our attention and the attention of the leaders of our enterprises and associations is now directed toward the successful conclusion of the work stipulated by the five-year plans for environmental protection on the protection of waters and of the environment in the areas of operating enterprises.

A combination of the accomplishment of tactical and strategic tasks is a necessary condition for progress in any field of activity, including the rationalization of energy use.

In order to accomplish all of the above-enumerated directions it is necessary to mobilize internal reserves and to direct toward this end the efforts of the scientific and engineering cadres of our organizations and enterprises. Closer scientific contact with the corresponding institutes of the USSR Academy of Sciences and with related branches of industry have to be developed and strengthened.

The responsibility of every subdivision, division, and of every executive and specialist for his work has to be increased. This is demanded by the dimensions of the tasks of the Tenth Five-Year Plan and by the decisions of the Twenty-Fifth Congress of our party.

The ministry has made up a plan for the execution of the decisions of the November (1978) Plenum of the CC CPSU and of the positions set forth in the speech at it by the General Secretary of the CC and Chairman of the Presidium of the USSR Supreme Soviet Comrade Leonid Il'ich Brezhnev. In developing this plan it is essential to organize the development of measures on energy for every enterprise, shop, and sector in conformance with the conditions and tasks of these collectives and to provide every worker with a concrete assignment which follows from the overall measures and to ensure their absolute accomplishment. Along with party, trade union, and komsomol organizations it is necessary to carry out constant effective control over the accomplishment of each assignment and of a measure as a whole. As is stated in the decisions of the November (1978) Plenum of the CC CPSU our main attention now has to be directed toward the fulfillment of the plans established for 1979.

The realistic nature of these plans has to be supported by great organizational and educational work in the collectives of enterprises and by increased state planning, production, and labor discipline.

The fourth year of the Tenth Five-Year Plan will be for non-ferrous metallurgy a major step toward the fulfillment of the decisions of the 25th CPSU Congress and a base for further movement forward.

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END