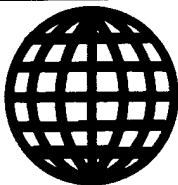


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1 NOVEMBER 1990



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Science & Technology

USSR: Chemistry

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The Catalyst Billions

907M0277A Moscow PRAVDA in Russian No 164,
13 Jun 90, p 5

[Article by Academician V. Koptug, Chairman, Siberian Department, USSR Academy of Sciences, and Academician K. Zamarayev, Director General, Katalizator Interindustrial Scientific-Technical Complex; first paragraph is PRAVDA introduction]

[Text] Do we need new catalysts? The question may seem rhetorical. Could there be any doubt? After all, catalysts are a symbol of progress, acceleration....

Even in the 19th century, chemists were applying the term "catalysts" to an amazing class of substances that, while not changing themselves, are capable of fantastically accelerating (often by millions of times!) processes of the production of new and valuable materials, medicines, foodstuffs, and fuels for transportation and agricultural machinery. This remarkable property of catalysts is extensively used in industry.

Catalysis plays a key role in the creation of many new technologies that are changing the face of modern industry. According to data of the National Research Council and the National Academy of Sciences of the United States, 20 percent of the gross national product of that nation is being produced by using catalysis. Catalysis is of great significance for Soviet industry as well. It is most important for modern chemistry and petroleum refining, where the fraction of catalytic technologies reaches 90 percent. It can be expected that new catalytic technologies will be developed even before the end of this century that will likewise change the face of such sectors of the national economy as power engineering, metallurgy, the medical industry, and the gas industry.

Considering the diversified nature of the problem of developing, organizing the production of, and introducing new catalysts, the Katalizator Interbranch Scientific-Technical Complex [MNTK] was organized at the behest of our nation's leaders in December 1985 to handle this job. The core of the complex was a group of academic and industrial research institutes working on theoretical and technological problems of catalysis. The responsibility for organizing work of the MNTK was entrusted to its head organization: the Institute of Catalysis, Siberian Department, USSR Academy of Sciences. What has Katalizator MNTK succeeded in doing? This can be judged from the following figures.

In late 1985, the USSR was producing 230 grades of industrial catalysts. In 4 years of the current Five-Year Plan, organizations of the MNTK have developed 189 new catalysts, carriers for catalysts, and catalytic processes. Of these, 43 are already being used in industry, 59 are all ready to be introduced, 55 are in the stage of experimental work, and laboratory development has been completed on the rest. Thirty catalysts and processes have been developed for solving ecological problems. Twenty facilities for purification of industrial

emissions have been constructed and are in operation. MNTK projects have evoked considerable interest on the part of foreign companies. They are eager to purchase MNTK products and franchises for its catalysts and technologies. A total of about 9 billion rubles worth of goods have been produced by using catalysts developed in MNTK organizations since the inception of the complex.

The question of whether it has been useful to set up interindustrial scientific-technical complexes and whether they should be maintained in the future is now being hotly debated. Obviously, the answer to this question will be different as it applies to different MNTKs. With regard to the Katalizator MNTK, we feel that it has justified itself and should be maintained. It has made a good showing especially as a form of integrating the scientific potential of academic institutes with the engineering-technological capabilities and the more developed experimental base of industrial organizations. The fruits of such integration can be judged, for example, by the close cooperation that has been established within the scope of the MNTK between the academic Institute of Catalysis and many industrial organizations.

Wide-scale assimilation by our country's national economy of even those catalysts and technologies that have already been developed within the scope of the MNTK could bring enormous profits to our nation and make our economy much more effective, less energy-intensive, and ecologically incomparably cleaner. But under conditions of persistent lack of economic interest of enterprises in radical updating of technologies, mass introduction of new developments goes slowly as before, and unfortunately our industry continues to reject innovations. Experience has shown that the Office of the USSR Council of Ministers on the Chemical-Forestry Complex, the USSR State Planning Commission, and the USSR Ministry of the Chemical and Petroleum Industry understand and acknowledge the key role of catalysis for scientific-technical progress of the nation, devote many meetings to this question, but apparently are unable to change anything in fact. As a result, their decisions usually boil down to the necessity of purchasing modern catalytic technologies abroad with a turnkey contract for delivery of plants.

These decisions put Soviet catalyst production technologies and industry at a severe disadvantage. Inadequate attention is given to updating. In most plants that produce catalysts, facilities are obsolescent and worn out to the extreme. These plants do not have the necessary equipment and raw materials of the required quality or facilities for monitoring and automating technological processes. In plants like this, the best catalyst is hopelessly spoiled in the manufacturing process. This is just another reason why pioneering Soviet developments do not have a good market at home, and it is more often foreign companies that are ready to buy them.

We feel that the way out of this situation is to speed up the change from administrative-command measures of

managing introduction of new catalysts to new economic measures. What are these measures? The development of new catalytic technologies, updating of those already in place, and the production of new catalysts have become profitable. The system of prices and economic standards operating in state enterprises is an obstacle. Unjustifiably low prices for raw materials and energy take away from enterprises the incentives to change to new energy-saving and resource-saving catalytic technologies. Who today would voluntarily want to start producing new catalysts and introducing new technologies at a loss?

Second, we have to start being more decisive in applying penalty sanctions for environmental damage. This will also be a strong incentive for introducing new ecologically clean catalytic technologies.

Third, it is reasonable to charge customs duty to plants for purchases of science-intensive goods (including catalysts) from abroad when analogous Soviet products are available. As things stand now, when catalysts are purchased from abroad by so-called barter deals in exchange for products such as petroleum goods, the system in effect actually gives rewards rather than penalties for import. A special system of taxes and other financial privileges should be worked out that favor organizations and plants taking the risk of developing and introducing new technologies rather than favoring import purchases. Without such support, we cannot count on rapid introduction of new large-scale Soviet technologies.

Finally, it is extremely important that the state should set reasonable priorities for development of base industries of the national economy in allocating our austere budget.

In our opinion, one such priority should be to set up a modern catalyst production industry in our nation, as well as the necessary experimental base for developing technological processes that use new catalysts. After all, catalysts are the most profitable chemical goods everywhere in the world with the exception of the USSR.

When allowance is made for using the wonderful opportunities offered by conversion of defense plants, we feel that this problem can be realistically solved with minimum expenditures in the next 4 or 5 years. According to our preliminary estimates, this will require a total of about 420 million rubles in capital investment. Solution of these problems will lay a firm foundation for further development of the chemical, oil refinery, and medical industries on the qualitatively new basis of energy-saving, resource-saving, and ecologically clean technologies.

By way of comparison, data of U.S. specialists show that the following scenario of increasing volume of catalyst production can be expected in the United States in monetary terms (without allowance for inflation): 1989, 1.785 billion dollars; 1994, 2.545 billion dollars; and the year 2000, 3.7 billion. The most appreciable increase in production volume is expected for catalysts that will be ecologically beneficial.

We understand that it is difficult for the nation to find money. But at the same time we are certain that we must not economize on doing things properly in the production of modern catalysts and other key materials that will decide the scientific and technical progress of our national economy for many years to come.

Tracks Lead to Chemical Plant

907M0244A Moscow *RABOCHAYA TRIBUNA*
in Russian No 103, 4 May 90 p 4

[Article by M. Martynov, staff correspondent, datelined Donetsk Oblast, under the rubric "We Report Details": "Tracks Lead to Chemical Plant"; first paragraph and last two paragraphs were printed boldface in the source text]

[Text] The events at Yenakiyevo and Gorlovka can be considered payment for the lack of concern and disregard for environmental protection measures. The leakage of an unknown poison into the workings at the Uglerodskaya mine was initially seen as a local disaster. But when the Kondrayevka-Novaya and imeni Kalinina mines faced the same phenomenon, it became clear that the scale of the calamity was much larger.

At a press conference in Donetsk, members of the government commission headed by A. Tsygankov, deputy chairman of the USSR Council of Ministers' State Commission on Disasters, reported the following figures. More than 800 people had been in the contaminated zones; of these, 63 were hospitalized. Mines employing more than 10,000 people were shut down.

"Today the main task is to prevent pollution of the water basin," stressed the secretary of the Donetsk Party obkom, V. Sergiyenko. "Otherwise the consequences could be catastrophic."

The concern is justified. The fact is that the large Volyntsevsk Reservoir, which supplies drinking water to the towns of Yenakiyevo, Gorlovka, Ugleorsk, and many villages, is nearby. There is a danger that mine waters contaminated by an unknown poison could enter this reservoir.

But of course, the question on everyone's lips is "What poisoned the miners?" Where did the toxic substance in the working faces come from?

Scientists should provide the answers to these questions. Water and air samples from the mines were sent for study to industry and to academic scientific research institutes in Moscow, Kiev, Kharkov, and Rostov-na-Donu. Institutes and laboratories in Donetsk worked on the analyses. There is still no clear answer, but several substances never before found in the mines have already been found. These include formaldehyde, cyanides, trinitrotoluene, and others. How did they get there?

More and more often, specialists are looking to the Gorlovka Chemical Plant. Not only because it is already guilty of poisoning people underground. The suspicion is enhanced by the fact that the plant was built at the top of a geological fracture where coal seams and rock resembling a multilayered cake emerge. Liquid can flow long distances along these sloped layers.

The situation is aggravated by the fact that the chemists set up a so-called unorganized (read unauthorized) dump in an old open pit mine where they dumped solid and liquid toxic wastes.

The most shocking thing is that both the oblast sanitary and epidemiologic station and the environmental protection committee knew about the existence of this irresponsible dump but were unable to eliminate it. The permissiveness is also shocking. The workers responsible for the fact that about 40 tons of chlorobenzene leaked at the chemical plant and caused the death of people in the mine were punished by order of the Ministry of the Defense Industry—with reprimands and remarks. It's not a matter of seeking "their blood," but it seems that symbolic punishments can hardly be a lesson.

These days at the mine, where work has stopped, meetings are being held at which the miners are demanding a quick and thorough investigation of the causes of the disaster, punishment of the guilty, social guarantees for the victims and—for the enterprise—compensation for economic loss.

The oblast procurator has begun an investigation.

Poisoning Under Ground

907M0244B Moscow *RABOCHAYA TRIBUNA*
in Russian, No 109, 11 May 90 p 4

[Article by M. Martynov, staff correspondent, datelined Donetsk Oblast: "Poisoning Under Ground: We Track the Event"; first paragraph is printed in boldface in source text]

[Text] It is unusually quiet at the Uglerodskaya Mine of the Ordzhonikidzeugol Association—the cages are frozen, the conveyers have stopped, and railcars are not being dispatched. There is not one miner under ground. Could they be on strike again?

"No, it's all much worse," says A. Degtyar, mine director. "An unknown substance leaked into the workings and poisoned more than 10 miners. All underground work had to be stopped until the causes were completely determined."

This is how it happened. On April 20, miners working at seam 156/580 smelled some sort of strange odor and felt a sweet taste in their mouths. At first they thought that chlorobenzene had gotten into the mine—last year it had been the cause of the death of three miners at the Aleksandr-3 mine in Gorlovka. But an air analysis showed that there was no chlorobenzene, and there was even less of other chemicals than on the surface.

After 5 days, the mysterious danger made itself known in another seam—four miners went to the dispensary complaining of headache, loss of motor coordination, and that same sweetish taste.

The next day a few more people went to the doctor with the same symptoms. It became obvious that an unknown

substance hazardous to human health had appeared in the mine. Underground work was stopped, 94 people were sent for medical examination; 27 of them had symptoms of poisoning.

A state commission headed by N. Surgay, first deputy secretary of UkSSR State Mine Inspection Service [Gosgortekhnadzor], was formed to investigate the situation.

"It's still not clear what poisoned the miners," says Ye. Chernov, chief doctor of Yenakievko. Water and air samples have been sent for analysis to institutions in Moscow and Kharkov, and we hope that they will expose the culprit."

Cry From Eighth Bench

907M0244C Moscow *RABOCHAYA TRIBUNA*
in Russian No 110, 12 May 90 p 2

[Article by V. Chuprin, staff correspondent, datelined Donetsk Oblast: "Cry From Eighth Bench: When Will We Learn Lessons From Industrial Accidents?"; first three paragraphs are boldface *RABOCHAYA TRIBUNA* introduction; final two paragraphs are boldface note from the editorial staff]

[Text] Not far from the Aleksandr-Zapad Mine Administration stands a marble obelisk. "Here," reads the inscription, "the remains of two miners lie at a depth of 400 meters." The portraits of the deceased, O. Demyantsev and I. Dorofeyev, are engraved there.

Of course, anything can happen underground. They couldn't remove the bodies of the miners, but at least they immortalized the heroes' names. Looking at this monument, one immediately thinks that unfortunately it's being replaced by others if you are acquainted with the tragedy that took place here on 2 December last year.

"Standing at the bus stop, I knew that three men hadn't come out of section 165," recalls cutter Yu. Mironov. "My soul felt heavy. The week before at the mine they were talking of nothing but the 165th. Guys refused to go down into the longwall. They claimed that the smell there was enough to knock you off your feet. And when I saw the mine rescue trucks racing to the shaft I understood that there had been an accident...."

"After a couple of hours the pulleys were turning quickly on the headframe.... Then they carefully carried the body of 22-year-old Igor Chebotarev out of the mine cage."

"Then the pulleys on the headframe turned without stopping: 260 miners and rescue workers who had received various doses of the poison came up."

"Chebotarev was buried. O. Demyantsev and I. Dorofeyev remain in the working face for eternity. Cheerful, joking Demyantsev is apparently on his fifth bench, where he cut coal. And the shift engineer is somewhere nearby: he rushed to help his comrade without worrying about himself."

It would seem that this would be the end of it. Dramas are frequently played out in the Earth's depths. They haven't learned to predict accidents at the mines—sometimes rock behaves treacherously. But is the tragedy at Aleksandr-Zapad one of that kind?

Unfortunately, it is just the opposite. The miners knew their poisoner well—the Gorlovka Chemical Plant. The secret odor had pursued them not just for a day or two, but since 1983.

So, one not so bright and sunny day, chlorobenzene began to leak from the local chemical plant.

"But it is such a safe liquid," claimed the chemists, "that our girls wash their hands in it."

The same old story. In other times the cutters ran if the odor in a gallery "made their heads pound." And just what law obliged them to tolerate it?

In 1985 the miners went "to the bottom" and refused to go to the longwall: "We'll be finished; there's nothing to breath."

"You'd like to breathe French perfume at the face? I'll fire you," threatened the current mine director.

How meekly the "rebels" crawled back to their places. But no matter how long you braid a rope, it will always come to an end. Now Aleksandr-Zapad is completely quiet. For 6 months fans have been blowing fresh air into the workings, but the gas concentration is still high.

What misfortune has befallen the mine? Remember the girls who unceremoniously rinsed their white hands in chlorobenzene. And consider this: The overalls from a Swedish company burned up on the backs of the mine rescue workers in a wink—even though they were designed precisely for use under those conditions.

Did chlorobenzene leak into the face? Or was it something a little stronger? Petr Polov, deputy chairman of the Gorlovka stachkom, who was on the government commission to investigate the causes of the accident, leans toward the second possibility. The town is also talking about a "little bouquet," i.e., a mixture of different chemical elements.

I talked with one of the miners who was at the damned face on 2 December. "A month as a group 3 invalid," says former breakage face worker Vasilii Khayminov. "When we were lying in Donetsk under the 'medicine dropper' they promised us the world. Apartments, cars, and money as compensation. And what do I have today except that my liver is ailing and my blood pressure jumps? A 60 percent disability. I am forbidden to work near toxic substances, I can't become overchilled or be in the sunlight, and heavy physical loads are prohibited. Obviously they've brought all the invalids out of the mines. The only road is to the lumberyard."

Vasilii has hit age 36. His comrades in the misfortune, S. Kharchenko, N. Korniyenko, and V. Olada, who are also

sitting before me, are 25-26 years old. They all have wives and two children. And with worried eyes they ask, "What do we do now?"

I didn't mean to give them advice. These guys had already knocked themselves out—and this was after resuscitation!—trying to find a place for themselves in life. They wrote for help to a recent congress of the coal industry trade union. They want to come to the capital to the All-Union Central Council of USSR Trade Unions [VTsSPS]. Surely they wouldn't turn away from the men's misfortune there?

And again I hear the steady voice of the mine labor collective council's chairman Yuriy Shutko.

"In this dramatic situation the boys behaved like heroes. They knew the face at section 165 better than anyone. Before the mine rescue crew arrived to look for the fallen, they took the initiative. We broke down into groups of three for mutual protection. Khayminov and his comrades were among those who rescued themselves, and they dove to the longwall. I was in a drift and watched the safety ropes. Suddenly I hear a terrible shout from the upper, eight bench. One of the cutters had begun to suffocate. We quickly raised the boys, but they were already unconscious...."

I agree with Yuriy. At that moment none of the miners was hiding behind somebody else. But where is this mutual support and miners' comradeship now? The Donetsk oblast trade union council and the Gorlovka territorial trade union committee have thoroughly cleaned out their coffers and scraped up 500 and 250 rubles respectively for each of the 10 invalids.

And don't tell the Aleksandr-Zapad miners that the government has no money. It does! Millions are going to rebuild the Stirol [styrene] Production Association right next to the mine. No one knows yet whether it will suddenly "delight" the miners with some chemical.

It's painful to listen to these men, how they themselves petitioned for a pass to the Donbassenergostroy Hotel in Tuaps. "But, you understand, there is a shortage of passes," they were told at various departments. They arrived, and the health center was practically empty. The mine trade union committee promised to pay the cost of the tickets. But it didn't.

"Our government never loses anywhere," adds comrade S. Kharchenko. "Last year we each earned 700-800 rubles at the longwall. It's an irony of fate, but in October and November, just before the accident we had made 300 each. We couldn't make the plan. They calculated our pensions on the basis of those 2 months. It seems that there is such a law. But what about justice?"

Misfortunes don't come one at a time. Nikolay Korniyenko and Valeriy Olada and their families rented rooms. While they were lying in the hospital their landlords demanded that they move out because they were preparing to sell the houses.

They thought that their own mine would stick up for them. But they got only sympathy.

"Let the chemical plant give you apartments. It was their fault that you suffered."

Note that they weren't petty bureaucrats at the trade union committee and the administration of Aleksandr-Zapad. They were glad to help. But how? You can't take a step on your own—you're engulfed in instructions, standards, orders. And these bookkeepers spit on a person from their high tower. The boys stayed at the face and fed the country coal—and the government gave them benefits. Service, long meritorious service, an early pension. If you lose your health, go to the lumberyard.

Yes, that's our socially protected citizen. For decades we talked about the human factor, the fact that the ordinary laborer is our foundation. However, we didn't create any laws that would defend his vital rights. If he died, the enterprise would put up a marble monument. If he lost his health on the job, good riddance.

I can't help remembering a TV program about a young Italian lady. They did her sutures incorrectly in the hospital. The surgeons undid them, corrected the mistake, and gave her a huge monetary compensation for their negligence: after the operation the patient was able to take off on a round-the-world trip.

One might imagine what kind of money a businessman sets aside if a worker dies or is mutilated at the plant.

"We have exactly the same system as in the West," they assured me at the coal miners' trade union central committee. "From the minute a person is hired at the mine the government pays for his insurance. If a misfortune befalls him, the enterprise compensates the loss."

But how much—that's the question. After the loss of a breadwinner, they pay a family two or three times his monthly wage.

Can we tolerate this injustice any longer? We need to pass a law or some other regulatory act on the responsibility of the government and enterprise for a person's death or disability on the job. And the mining category should be highlighted in this document. Today this is where the fatal injury and accident rates are almost 2.5 times higher than in other branches. An average of 600-800 miners die underground every year. Almost every million tons of extracted fuel takes a human life.

Of course we can spend a long time discussing the fact that this is a loss that cannot be made up. But can't we take a thousandth (think of it!) part of the cost of the coal obtained at such a price and send it to the orphaned family?

The tragedy cost Aleksandr-Zapad 7.5 million rubles. According to a decision by the State Arbitration Commission the chemical plant will compensate it. But when will they pronounce this verdict in court? In a year or in

5 years? In my opinion, the state is obligated to compensate this loss immediately from its treasury. Then the trade union committee would not brush away the victims, it would be able to give them immediate and effective assistance. Then let the enterprise responsible for the accident pay back the state budget after the trial.

Editor's Note. While this material was being prepared for the press, troubling reports began to come from Donetsk: miners in Yenakievo, next to Gorlovka, suffered from an unknown chemical. Our newspaper reported this on 4 and 11 May. Overall, four mines in the oblast have stopped working, and more than 10,000 men are unemployed today. At meetings the residents of the two towns are demanding exhaustive information about the cause of the damage to the health of hundreds of people.

Won't the tragedy at Aleksandr-Zapad be repeated at other coal enterprises in the Central Donbass? Won't it take new human lives?

Danger Remains

907M0254A Moscow *RABOCHAYA TRIBUNA*
in Russian No 112, 15 May 90 p 4

[Article by M. Mefodiyev under the rubric "From Our Correspondents' Reports": "The Danger Remains: Follow-up on Letter"; text of introductory letter originally printed in boldface italic]

[Text] Dear "Rabochaya tribuna" editor:

I'm turning to you for help. I've been sick for 3 months already—I have a high temperature, and my arms and legs go numb. I don't have the strength to carry a bucket of water or coal. At the oblast clinical hospital they diagnosed "chronic mercury poisoning." And I'm not the only one—the residents of other houses on Tevosyan and Ostrovskiy Streets have been afflicted with the same misfortune. This includes children, which is a real pity. In December of last year, the gorispolkom decided to resettle us in 1990, but I can't wait that long....

N. Sushkova KOMMUNARSK Lugansk Oblast

I don't know what the reasons was—slow mail or the gorispolkom's efficiency, but N. Sushkova no longer needed help. I arrived just as the residents of building No. 20 on Ostrovskiy Street, including Natalya Petrovna, were moving to new apartments. This can be considered the final event in the "mercury epic" that was played out in KommunarSK.

It all began in September of last year. S. Bredikhin, a resident of building 29 on Tevosyan Street, set out to repair a dilapidated barn. When he began to tear off the old roof, little silver balls poured out from under the rotten rubberoid sheets. Mercury! The specialist he called from the city's sanitary and epidemiologic station confirmed that not just the barn but even the ground around it was saturated with this liquid metal.

News of the dangerous discovery immediately spread through the city. As usual, rumors and conjectures embellished with improbable details began to trickle out.

It must be admitted that the rumors weren't groundless. As it was quickly discovered, the source of the contamination was not limited to the old barn. Studies performed on the territory and then on the apartments at the demand of the residents of neighboring buildings, revealed the presence of mercury. It was even detected in the plaster. The gorispolkom decided to relocate the residents of four buildings. But that wasn't the end of it; mercury was found in a neighboring hospital.

They began to find it in other parts of the city. In one place they found half a flask; in another a champagne bottle full; and then somebody threw a bottle with the metal right into the health station. The city was in the grip of a kind of mercuryphobia. People called the city health station demanding that it check whether the insidious metal was in their building or apartment. And these suspicions were sometimes confirmed. Traces of mercury were detected along Metallurgists' Avenue [Prospekt Metallurgov], on Gmyr Street, and even in an electrical socket in one apartment.

"We were simply overwhelmed," lamented P. Koryachko, the city's chief public health doctor. "We did hundreds of analyses."

Eliminating the source of the contamination, everyone naturally wondered where such misfortune had come from. How did mercury get into a particular place? The militia, the KGB, and procurator's office tried to answer these questions, but the investigation produced nothing definite. It was said that some craftsman made a mirror for which he used mercury in the barn where it had all started.

The other discoveries were attributed to the fact that mercury is used to produce homemade high-sensitivity TV antennas.

It is possible. But another question arises: where did all these skilled craftsmen get the mercury? It is not sold in stores. Therefore, they bring it from the plant where it is used. Therefore the decision was made to see how mercury is stored, inventoried, and used at the city's enterprises.

The inspection showed that a total lack of concern and patriarchal procedures ruled over the use of mercury at the metallurgical works, the coke by-product plant, the laboratory at the mining and metallurgical institute, the civil structures plant, and enterprises under the auspices of the Ukrpromvodchermet Association. Inventory was taken by eye, and it was stored any old way—it was the simplest thing to pour a bottleful and take it away. In general, an old truth was confirmed: except for the rare exception, every accident is the result of negligence.

Today the enterprises' mercury management is already in order. Strict orders have been issued, instructions and regulations prepared, and inventory and storage of the liquid metal improved. Does that mean that everything is in order?

"No, I wouldn't say so," answers N. Antonov, assistant chief engineer for ecology at the metal works. "We still don't know what to do with old fluorescent and mercury vapor lamps, 8,500 of which accumulate every year."

It turns out that old lamps along with other trash from the metal works and other enterprises in the city are simply thrown onto the dump. Specialists warn that this is fraught with dangerous consequences. Mercury and its compounds are building up in the soil and spreading long distances through ground and rain waters. Preventing this requires a special storage facility, which, so far, no one is planning to build. Are they really going to wait for another accident?

Good Steam

907M0254B Moscow *RABOCHAYA TRIBUNA*
in Russian, No 112 15 May 90 p 2

[Article by I. Mordvinets staff correspondent, datelined Volgograd Oblast, under the rubric "Fact and Commentary": "Good Steam"¹]

[Text] [Statement by A. Parkhmenko, director of the nitrogen-oxygen plant] "We haven't been fully operational for almost 6 days."

[Statement by A. Shkarupa, tire plant director] "The same here. And today we'll produce a little more than half the target output. In May alone we lost 215 million rubles."

[Statement by K. Rakityanskiy, director of Rezinotekhnika Production Association] "The assembly line at the Volgograd Tractor Plant has already stopped several times because of us. To remedy the situation we even convinced people to work on 9 May. But but because steam with the necessary parameters wasn't supplied, there was nothing for them to do. Who will believe us now?"

[Statement by V. Moskaltsov, director, synthetic rubber plant] "The same here and everywhere throughout the city's entire chemical complex, and it employs 30,000 people. We wait and wait, with no end in sight...."

The fact is that TETs-1, the main supplier of process steam, without which "major chemistry" can't operate, is in a distressed state. Reconstruction is needed immediately. On 6 April, Yu. Semenov, USSR minister of Power and Electrification, and A. Ustkachintsev, first deputy minister of the chemical and petroleum refining industries, signed a joint order on this. But neither the funds nor the materials for the planned measures were allocated. As a result we are only patching up holes with the money that all these chemical complex enterprises are coughing up. But this method doesn't help much. In

1989, they shut down 43 times—29 times in the last 4 months. What does it mean to "crank up" chemistry after a forced shutdown? Defective production and problems with the environment go on for a week or more.

And the catastrophe is not a local one. For example, a shutdown at the tire plant and Rezinotekhnika essentially means a shutdown of the country's automotive complex, which employs 2.5 million people and produces many billion rubles' worth of goods annually.

In addition, the TETs-1 is almost without management today. The senior director retired, and the worker elected to replace him couldn't handle it. But they won't select a new one....With this kind of management, station personnel let pass a sharp increase in suspended particles at the water intake that occurred during a hurricane on the night of 2-3 May. As a result, there were loud bangs in several boilers, and now only 4 of 10 are in operation. No one here can predict equipment operation, even in the next few days.

For this reason, a commission from the Ministry of Energy has come to Volzhsk. The results? Still unknown.

Footnote 1. The title is a play on words: It's what you say when someone is going to the steambath, i.e., the equivalent of "Bon appetit" before a meal.

Miners Returned to Working Faces

907M0254C Moscow *RABOCHAYA TRIBUNA*
in Russian No 112, 15 May 90 p 3

[Article by M. Martynov, staff correspondent, datelined Donetsk Oblast, under the rubric "We Report Details": "Miners Returned to Working Faces"; first and fifth paragraphs were printed in boldface in the source text]

[Text] Miners of Yenakiyev and Gorlovka lived in tension for 3 weeks, impatiently awaiting news from Moscow, Kiev, Kharkov, and other cities to which they had sent for study the samples of mine water and air in which an unknown toxic substance had been found. *RABOCHAYA TRIBUNA* reported on this event and its consequences. Remember, three mines were shut down. Dozens of miners were hospitalized for observation and treatment.

It is alarming that no one knew what had poisoned these people. Scientists were unable to explain what substance had penetrated the mines. Rumors and conjectures increased. The miners and residents of the towns suspected that the real reason for the disaster was being hidden from them. If the presumed culprit, the Gorlovka Chemical Plant, belongs to the Ministry of the Defense Industry, that means that some kind of secret substance that poisoned the miners is being made there. Plant and ministry management couldn't even dispel these suspicions by solemnly stating that the plant wasn't producing any secret products. The atmosphere became heated.

Everyone sighed with relief when the analysis results arrived from the scientific laboratories: the reason for

the poisoning wasn't any mysterious substance, but common formaldehyde. This report relieved the tension. The miners at the Kondratyevskaya and imeni Kalinina Mines of the Artemugol Association returned to the faces.

Even the managers of segments of the most damaged mine, the Ordzhonikidzeugol Association's Uglerskaya, went underground. Taking precautionary measures, they observed the workings and stated that the atmosphere in the mine was normal, that the miners could work without anxiety.

But the incident cannot be considered closed. Precisely how formaldehyde got into the mines still remains to be determined. Without an answer to this question there is no guarantee that there won't be a repetition. Therefore a government commission headed by the chairman of the USSR Council of Ministers' State Commission for Disasters, V. Doguzhiyev, is focusing on preventive measures.

Today this is the most important thing. After the tragedy at the Aleksandr-Zapad mine in December of last year, comprehensive procedures were developed to sharply reduce harmful discharges by chemical and metallurgical enterprises. But the reports of individuals responsible for their implementation do not arouse optimism—a good half of them have not been carried out. The attempt to put off the work, to curtail it, to complete the assignment any old way by hiding behind objective factors—which is always difficult to fight—is manifesting itself.

'Chemical' Rumors Are Flying

907M0293A Moscow *RABOCHAYA TRIBUNA*
in Russian No 160, 15 Jul 90 p 3

[Unsigned article, Press Center of the USSR Ministry of Defense]

[Text] Recently within the scope of the general process of security consolidation and arms limitation, some progress has been made on the path to reduction and eventual prohibition of chemical weapons.

However, even today materials appear from time to time in certain Western mass media that have the aim of slowing down positive processes by using lies and slander about an imaginary "Soviet chemical threat."

A routine "chemical" rumor was launched the other day by some Western publications citing "circles of the secret services" of West Germany. It is alleged among other things that there are "30,000 metric tons of poison gas" stored at nine Soviet depots in East Germany. Added to these "frightening" figures is another, no less fantastic. It is alleged that the USSR has 32 stockpiles of toxic agents beyond its borders in Warsaw Pact nations.

We have to remind you once more that the USSR has no chemical weapons beyond its borders.

Unprotected: We All Were, Not Just Those Cleaning up Chernobyl Aftermath

907M0293C Moscow *RABOCHAYA TRIBUNA*
in Russian No 168, 25 Jul 90, p 2

[Article by V. Pyrkh, Krasnoyarsk under the "What Will Happen to Us?" rubric: "Unprotected: We All Were, Not Just Those Cleaning up Chernobyl Aftermath"]

[Text] It is as if nothing could surprise us anymore: not strikes, or protest meetings...but we were shocked by this news: the heroes of Chernobyl had declared a hunger strike in a regional hospital....

"What can you make of it?" A friend who had been there gave it up as a lost cause. "They're nuts, the whole bunch of them."

His indifference was most disturbing. So I went off to the hospital myself.

Viktor Vink got his notice in the morning. He put down his cobbler's hammer, said good-bye to his friends. Then he hurried off to the municipal military registration and enlistment office, where he met a crowd of "draftees," former soldiers, officers....

"Are they sending us off to Afghanistan?" He felt a pain in his chest.

"Can't be," someone reassured him. "That's all over...."

Yeniseysk is a small town, they quickly got to know each other. Serezha Andriyanov, Volodya Samylin, and Kolya Kushnarev were drivers; Viktor Vink himself, a shoemaker for the KBO, had once served in the marines; and here was Pavel Ulitin, a machine fitter at the Yeniseysk Machine Works, who had been a cook in the military. It was these five who were selected at the military registration office. They were "run past" the doctors, certified to be in good health, and delivered to the regional center. Only then were they told: "You are volunteers. You will be cleaning up the aftermath at Chernobyl."

When I reconstruct that summer of 1987 from stories, I involuntarily catch myself thinking: and how would I, a captain in the reserves, have acted in a situation like that? Would I have snapped to attention and clicked my heels? Or perhaps I would have stood dejected to one side, stunned by the oppressive warning: from 3 to 5 years in prison for not showing up at the assembly point.

But no, say what you will, when it comes to interests of the State, there is only one word: "duty." Duty to the people, duty to the nation.... And if I had got the call, I would be marching in the same line with the rest. As had my own brother and my nephew. And all the same, something keeps me from attuning myself to the unreservedly patriotic wave.

"It took us 2 days to get there by air," said Victor Vink, barely controlling the tremor in his fingers, "and we went straight to Unit 3, where the 'Siberian regiment' was working. You run out onto the roof, and your only

protection is a face mask and cotton coveralls. That's why we would work for only 10 seconds at a time.

"I just can't understand it for the life of me: in the fever of the very first hours, or at most days, following the accident, one could put up with such equipment. But after a month, or a year? Why, a year later, they were bringing in people from all over the Soviet Union and making them work without any shielding."

...Having picked up radiation, Vink left in September for Yeniseysk. And so he would be working as before, at his KBO, if he had not started feeling sick within a few months. First his head would suddenly start reeling, then his temperature would rise.... They examined him at the local hospital and shook their heads: he would have to go to Krasnoyarsk, his thyroid was extremely enlarged.

He went there at his own expense and was examined as an outpatient. The doctors found nothing particularly wrong with him. After all, in Siberia, everyone has some kind of thyroid disorder....

"Then, spending the night in the railway station," says Vink, "The thought first came to me: who needs us, the cleanup workers? It cost them nothing to haul us off to Chernobyl." The same thought came up a second time when he met with his friends: one had broken off with his family, a second was in and out of hospitals although he had not been sick before Chernobyl, and a third was on the verge of a nervous breakdown. And all had the same dizziness and headaches.

I would be the last to suspect doctors of indifference. They are excellent specialists and are doing everything within their power.

"The problem is," says O. Kulik, chief of the Department of Occupational Pathology of Regional Hospital No 1, "that there are no shifts in the blood or vital organs of these guys. How can we talk about radiation illness if there is nothing wrong with the blood?"

"They all have disorders of the nervous system," Yu. Tereshchenko, docent of the department of internal illnesses of Krasnoyarsk medical institute, supported his colleague. "But how do we tie this in with Chernobyl? We have no such procedures!"

Now let's try to get this straight: Are apparently completely healthy lads faking their illness? To get out of work? M. Saladina, medical inspector of the regional public health department, said as much to me: "Just like during a war: some goldbrickers stay at the factory. Whether its Afghanistan or Chernobyl.... We give healthy peasants special duty...."

And all the rest of the cleanup men, and there are more than 90 of them, have the same problems: nobody got any benefit from the stay at Chernobyl. So what are we to think: are they healthy or not?

And so I have come to the point I started from: the hunger strike of the cleanup workers. In the spring of this

year, 30 citizens of Yeniseysk who had been at Chernobyl Nuclear Electric Power Plant at different times joined into a union and set up the first primary organization in the region to make common cause in defending their rights and assisting each other. When an account was opened at the bank, 24 cleanup workers used money donated by the Yeniseysk Uspenskaya Church, which had donated 1,000 rubles for Chernobyl veterans, to travel to the regional hospital in the hope of getting a thorough examination there. Moreover, they had been promised that they would be shown to specialists from Moscow Scientific Research X-Ray and Radiological Institute.

But time passed, and they were left in the hands of the same hematologists and neuropathologists....

"The neuropathologist says 'healthy' and is backed up by the hematologist, and I can't climb the stairs to the second floor," complained one of the cleanup workers.

Disillusioned, they settled on an extreme measure: they refused to eat. After that, Yu. Smirnov, a leading specialist from the Moscow Institute, arrived in Krasnoyarsk. He picked out four patients for further examinations. And what about the rest of them?

There are only two institutes in the nation (the second is in Kiev) that are empowered to diagnose and hence to effectively treat the cleanup workers who are scattered from the Baltic to the Far East, but tens of thousands are in need of constant care. So many tortured human destinies! How slow we are to realize the scale of the disaster that has befallen us!

"Essentially, we were without medical protection," Vink told me. In point of fact, is the term "protection" applicable to the endless medicine droppers being used for hospital treatment of locksmith Anatoly Lombrozo, a first-draft veteran of Chernobyl? Or the interminable penicillin shots that are being used in an unsuccessful attempt to bring down the months-long high temperature of Aleksandr Patrin? Can we blame Vink himself for his completely shattered nerves when the diagnosis of Yeniseysk doctors is "first-degree chronic radiation sickness," and no such sickness is found in the regional center?

Some say: psychosis, they all have mass psychosis, they are mad with radiophobia. Well, suppose that it's true; but are they or the state to blame? Until recently, the cleanup workers were disregarded in all governmental resolutions. It was not until this spring that they were remembered. But will health be restored by the remote prospect of getting a place to live or acquiring medication, albeit at a considerable discount?

I read the local newspapers and I wonder: somewhere a capsule emitting radioactive cesium has been found near a children's sandbox, somewhere a section of road has suddenly started to "glow".... In Krasnoyarsk-26, formerly hidden from foreign eyes and affectionately

known as "Atomograd," radiation monitors went off-scale, and guess where—on a playground! Local specialists ran their legs off looking for the cause. In bewilderment and alarm, they threw up their hands and called in the radiometric specialists from Krasnoyarsk and Moscow.

"And only when we looked at the construction documentation did it become clear what had happened," I was told by V. Savelyev, deputy director of the Chemical Mining Combine.

It was found that the reinforcement brought into the city for making concrete pilings was radioactive. Pilings were broken up, and reinforcement was "fished out" around the nation. And was it just chance that got people out of trouble? But then, situations like this are coming up in other cities as well. They could have been avoided if we only had a special radiation monitoring service. After all, fire protection and power supervision have been organized.... Why then is there no such supervision over radiation to this day? Haven't we learned anything from Chernobyl?

Not so long ago, an electronic display was set up in the middle of Krasnoyarsk. Now it's quite popular. Exact time, temperature, atmospheric pressure, radioactive background.... It is the latter data that passers-by first look at. We can look at the temperature later. Although personally, I don't trust the display.

Poison on Tap, or Why Polluted Effluents are Getting Into the Capital's Water Supply

907M0293D Moscow *RABOCHAYA TRIBUNA*
in Russian No 169, 27 Jul 90 p 3

[Article by L. Korneshova]

[Text] Workers at Oostankino State Farm near Moscow are quite ordinary people at first glance. But they are said to have only one strange quirk: they really have a great fear of rain. Just terrified. What could be the case?

Well, it's like this: the farm raises pigs. There are about 30,000 of them here. And it seems that settling basins for the manure were constructed at the farm about 20 years back. But, either from stupidity or carelessness, they built them literally five paces from the Ucha River. So if there is a cloudburst, the tiny dam can be washed out in the wink of an eye. And that means that 130,000 metric tons of foul smelling liquid manure liberally seasoned with nitrates gush into one of the largest reservoirs of drinking water for the capital...

Moscow quenches its thirst from two "wells." The first is the Volzhskiy water intake, where Oostankino and their ilk have made ready for "aggression." The other is in Rublevo. We visited the place with G. Selezneva, deputy chief of the department of sources of water supply.

Soviet sewage treatment plants have one puzzling aspect: they are all located in the immediate vicinity of sources of drinking water. If this is not wide-scale sabotage, how

else can we explain such stupid bungling? Just whose bright idea was it to build the enormous Glebovo Poultry Farm Association in Istrinskiy Rayon? Its treatment facilities are ready to pull any stunt. And once again, it is the water storehouse of the capital that is being threatened...

"Our agriculture near Moscow is a delayed-action bomb," says G. Selezneva. "We are sitting on a powder keg, all waiting for it to go off. But that's just the beginning: with every freshet, the rain washes thousands of metric tons of manure into the river. And that means nitrates, bacteria, a persistent nasty smell."

Specialists figure that the total number of cows and horses in tsarist Russia and today is roughly the same. Then why is it that the prerevolutionary Rublevo station, which at that time was equipped only with slow-action filters, had no problem in providing the city with clean drinking water? The answer is simple: they were not keeping all that livestock in the sanitary zone; they knew that they would not be able to deal with the waste. But there is something wrong with our business acumen. Where does the collective or state farm usually dump its manure? Into the river. And right next door they build a plant for producing ... mineral fertilizers.

And so, the dilemma today comes down roughly to this: either development of the national economy or clean rivers. The reason is the ever notorious lack of communication between agencies. On the one hand, the capital needs food, and nearby farms are growing like mushrooms. On the other hand, the advent of every new plant or state farm complicates an ecological situation that is already bad enough without it. For example, how is the chairman not going to plow the riverside field? After all, no one has removed it from the balance sheet, and the plan is already in place. That is why cabbage heads are all but rolling into the water on the banks of Klyzma reservoir. And we could even let it go at that if they would only grow their cabbages without herbicides and pesticides.

Well then, who is in charge of the sewage plants, who is looking out for them? Either ancient old men or those who might take one drink too many. This is the rule. Of course, they have little understanding of the operation of the facilities entrusted to them. Specialists have tried many times to correct this situation: Mosvodokanal holds special vocational schools and classes. The only thing is, no one attends them. Such is the way of things: a man is prone to be concerned about his immediate environment. But the immediate environment, Moskovskaya Oblast, is sipping sweet water from underground wells while giving the capital sewage to drink.

And it isn't just the good old farmers who are harming the water supply. Military units are throwing heavy metals like mercury and lead into the rivers. If we really wanted to, we might be able to extract only one fifth from the water. And check it out: what other kind of

infection has been tossed in with them? After all, the heroic army is not accountable to Mosvodokanal.

Cities that are already too big are spreading out over the waterways. According to the rules of sanitation, no more than 10,000 *Escherichia coli* may simultaneously inhabit an average body of water. But, by way of example, the city of Istra every day dumps water into the river of the same name with as many as a million of this form of "low-life" swarming in every liter. Alas, this is now considered normal...

The only organization that could have stood the cost of sewers and workable sewage treatment plants was the former Fourth Main Administration of the USSR Ministry of Public Health. So the situation is still under some control. But explanations can be found here as well: there are government vacation homes and spas in Rublevo...

"We have to look truth in the face," says Volkov, chief of the Administration of Water Supply of Moscow. "After all, if we continue to spoil our water in this way, monstrosities will soon start being born. For now, we are coping with the situation somehow, but treatment should be producing drinking water from natural water. No technology, even the most advanced, is intended for manure, nitrates, mercury, and lead. Every day, they are throwing 170,000 cubic meters of such water at us. We use chemical reagents for any additional treatment. But science still cannot tell us about all side effects. And what if there were some kind of great accident? Do we just shut off the valves? The least that would happen is the breakout of an epidemic in the city.

"And another thing I would like to say. Any enterprise or hospital that is being built must get an "okay" from the water supply administration. But this has somehow been quietly forgotten for quite some time. If anything should happen, the water administration cannot even properly intimidate the violator. Judge for yourself: for dozens of metric tons of poison dumped into the water, the sanitary inspection imposes a fine of... 20 rubles! And incidentally, we may as well include Goskompriroda themselves in the matter: they are not to be trifled with and charge a whole hundred rubles."

What is interesting is that there is absolutely no administrative responsibility for contamination of sources of drinking water. Even if an alert policeman were to take it into his head to write out a citation, the procurator's office would make him judicially answerable for exceeding his authority.

"We can take a case to court," says Selezneva. "However, then we have to show who actually did the dirt. The more so as dozens of the violator's neighbors are behaving no better. Even so, we have recently been able to win a few cases. For example, in January a year and a half ago, there was a bad accident in a subsidiary facility of the Second Clock Plant: there was an oil spill on the ice. When the ice melted, all this wealth ended up in the river. And even though the cost of cleanup came to 700,000 rubles, the citizens of Moscow were drinking

water that smelled like oil for many weeks afterward. The court made the company responsible for reimbursement of expenditures only... for added reagents. The spill cost the clockmakers only an ordinary reprimand.

But what about the State? Aren't they concerned at all about the water conservation department? It would seem that there is no question, and there are even the appropriate decrees. But they all boil down to a set of empty phrases like "make certain," "not permit," "adhere to." Such "stringencies" are no way to deal with violators.

Today there is an unhealthy dependence of matters on the character of the official. For example, it is categorically forbidden to start any new construction or expand or rebuild any existing farms and enterprises without the agreement of agencies of the sanitation division. However, these agencies are under the direct jurisdiction of local councils. And subdivisions of Goskompriroda are run by the Council of Ministers. Do underlings have the courage to go against their bosses? This is hardly subordination.

When the Food Program was passed, the natural conservation organizations were told: do not touch agriculture. We are now reaping the harvest of a "farsighted" policy. People are not being fed, and nature is dying. As a result, the capital of the command-administrative system has become a victim of the system itself. So what do we do to correct the situation? There is only one way: the reservoir must have a caretaker. Let him be answerable to us, and let him deal severely with violators. Let us say that any ordinary inspector in the water conservation department could personally set fines for slipshod operations and stupidity. A terrible thing? He would take bribes? But there is no other way—otherwise we will not save ourselves from self-genocide.

'Chemical Dragon' Safely Locked Up

907M0294a Moscow PRAVDA in Russian No 214,
2 Aug 90 p 5

[Interview with Colonel General S. Petrov, chief of chemical forces, USSR Ministry of Defense, on the occasion of the June U.S.-Soviet summit meeting in Washington by Lieutenant Colonel V. Nikanorov; press center, USSR Ministry of Defense, 9 August 1990]

[Text] Two months ago at the U.S.-Soviet summit meeting in Washington, in addition to agreements on reduction of nuclear and conventional weapons, a very important agreement was signed on an 80 percent reduction in chemical weapons and an eventual agreement on complete destruction of such weapons. A realistic outlook has arisen for ridding the earth of the terrible arsenals of "silent death." The USSR and the United States bear their share of the responsibility for producing such arsenals. It is significant that they are the very two powers that have accepted the responsibility for reducing and eventually eliminating these arsenals. But this is a task that is not at all as simple as it might seem. Safe

destruction of chemical munitions is a far more complicated problem than producing them. This is the subject of today's interview with Colonel General S. Petrov, chief of chemical forces of the USSR Ministry of Defense.

Question: First of all, Stanislav Veniaminovich, we would like to get a better idea of the extent of the stockpiles of chemical weapons at the disposal of our nation. Couldn't you let us in on this secret?

Answer: There is no secret about it. At one time we had revealed that our stockpiles were no more than 50,000 metric tons by weight of toxic agents. I can now give you a more specific figure: 40,000 metric tons.

Question: And what kinds of toxic agents are being stored in our chemical arsenals?

Answer: I will simply list them in accordance with international nomenclature: VX, Sarin, Soman, yperite, lewisite, and a mixture of yperite with lewisite. Such is the list of agents that constitute our stockpile of chemical weapons. I would like to take this occasion to stress once more that these weapons are stored exclusively on Soviet territory. The rumors being spread by some Western mass media that the Soviet Union allegedly has stockpiles of chemical weapons on the territory of East Germany and other Warsaw Pact nations are absolutely groundless. And incidentally, the falsity of these fabrications was confirmed just the other day by an authoritative group of representatives of the Bundeswehr who had conducted an inspection of military supply depots and other facilities of the East German National People's Army using the most advanced West German equipment. No traces of chemical weapons were found, nor could they have been found, on the territory of East Germany.

Question: And didn't these rumors start with the just begun operation "Lindwurm" ("Dragon") on removal of U.S. chemical weapons from the territory of West Germany?

Answer: I could not rule out the possibility of such a connection. Popular fear of the "chemical dragon" is great. According to available data, there are on West German territory about 102,000 rounds of U.S. artillery ammunition charged with chemical warheads. It is quite probable that statements about the presence of Soviet chemical weapons on German territory were meant to act as a kind of propaganda cover for this operation to distract the attention of the alarmed West German citizenry from the U.S. chemical arsenals then actually present on the banks of the Rhine.

Question: But let us return to our own stockpiles of chemical weapons. How is it proposed that they are to be eliminated?

Answer: We already have some experience in this field. Since 1970 up to the present time, about 438 metric tons of various types of chemical weapons have already been

destroyed. We have a certain number of mobile installations for destroying chemical warheads (they were demonstrated at our military facility in Shikhany in 1987 for participants of the Geneva talks on banning chemical weapons). Of course, such facilities can be used only for small-scale destruction of chemical weapons. But complete solution of the task now before us will certainly necessitate construction of stationary facilities in accordance with all rules of environmental protection.

A large-scale facility for destruction of chemical weapons was ready to start operations late last year near Chapayevsk. Modern technology was provided for this enterprise that had been confirmed to be ecologically safe by conclusions of an interagency committee and a governmental committee. However, the explanatory work fell far short of adequacy, and failed to convince the people of the complete safety of the facility. Considering public protests, the Soviet government decided to reprofile this facility into an instructional production complex on teaching and training personnel for chemical weaponry destruction facilities. Thus, the Soviet Union at this time does not have any stationary facilities of this type.

Question: What is the way out of the situation?

Answer: One agency, or even two or three agencies afford a scope that is too narrow for handling this truly state-wide job. A plan has now been drafted for a State Program for Destruction of Chemical Weapons in the USSR. This is a sizable multiple-volume document. Eighteen agencies, including, of course, the Ministry of Defense, played a part in working out this plan. With regard to Soviet and world experience in producing facilities of this kind, the plan considers questions of ecologically safe technologies for destroying the toxic chemical weapons in our possession, and substantiates various options for siting facilities and for operating procedures. Of course, the Supreme Soviet has the last word here. But in my view, the most preferable option is to build one or two highly automated, safe, and ecologically clean facilities at sites in parts of our nation with low population density. According to preliminary estimates, about 3 billion rubles will be required. The cost for the United States will be comparable. Thus, contrary to a few naive calculations of some, we can hardly expect a great financial return from disarmament in the near future. But in the long term, there is no argument that this is an advantageous cause, and is worth the capital investment.

An extremely short time remains to the deadline for beginning destruction of chemical weapons agreed to by the Soviet Union and the United States (no later than 31 December 1992). I would therefore like to appeal to the higher legislative body of the Soviet State to make haste in ratifying the State Program for Destruction of Chemical Weapons in the USSR, and especially to designate the places for construction of the facilities where these weapons will be destroyed.

Question: We are always talking about destruction. But can't we make use of the stockpiled chemical weapons by converting them, let us say, to fertilizer?

Answer: In principle, of course, it is possible to use some forms of phosphorous-containing toxic weapons for producing fertilizer. But this would be a truly "golden" product if we judge by its cost. And indeed, the amount of possible product will be small on the national scale, if we consider the relative insignificance of the stores of initial raw material. Nor should one lose sight of the purely physiological issue. Under the present conditions of the widespread very negative attitude even toward relatively inoffensive agricultural chemistry, one could scarcely find anyone eager to use fertilizers made from "chemical bombs." On the other hand, we should probably not ignore the possibility of producing arsenic from lewisite. We are intently considering this problem in cooperation with the Ministry of the Chemical and Petroleum Industry.

Question: And finally, a last question, which is on the minds of many people. How dangerous is the implementation of these plans?

Answer: This is one of the main issues that we have never once lost sight of. The concern for safety actually permeates the entire plan of the State Program which provides for the most serious ecological expertise, and multiple checks on the operating reliability of enterprises. Incidentally, an impressive safety factor has been built into the designs of these facilities from the beginning. In calculations with the use of appropriate models, various situations have been worked out, even the most improbable, such as an aircraft or a meteorite striking the facility. The calculations confirm that catastrophic consequences can be completely avoided even under such extreme circumstances. I will add that an appropriately equipped and trained subdivision of the chemical forces will be deployed in the near vicinity of each such enterprise: a kind of "fire brigade" to monitor operation of the facility and prevent any extraordinary accidents.

And in conclusion, I would like to say that we intend to carry out all steps on elimination of chemical weapons publicly and openly. By the end of this year, specific procedures shall have been worked out for conducting mutual inspections of the performance of each party taking on these obligations. And not only the process of destruction of chemical weapons, but also the stockpiles waiting for processing will be subject to monitoring. Of course, the Soviet public will also be kept widely advised of our activity in the destruction of chemical weapons. The people themselves will see that the "chemical dragon" is safely locked up, and we will not set it free.

Ghost of Chernobyl?

907M0318A Moscow *RABOCHAYA TRIBUNA*
in Russian No 186, 16 Sep 90 p 4

[Article by Yu. Kirinitsyanov, Kazakh SSR]

[Text] Two explosions thundering almost simultaneously in different enterprises of Kazakhstan have

finally torn open the shroud of pseudosecrecy and agency arrogance.

The blast was so strong that glass blocks fell off the wall of the plant shop. Five workers were injured by the fragments. The damage from the blast was categorized as light. And the fire was put out rather quickly, within an hour and a half. Then why did such a panic arise in the city? Like a movie about a nuclear disaster, Ust-Kamenogorsk bristled with gas masks and respirators, as if ghosts had appeared in the city. What had happened was that the explosion occurred in a nuclear fuel plant. A highly toxic material, beryllium, had escaped into the atmosphere....

On Saturday I finally managed to get in touch with V. Mette, director general of the Ulbinskiy Metallurgical Plant Association (this innocuous name was a "front" for an enterprise of the Ministry of the Nuclear Power Industry, although it had long been no secret to local citizens). Vitaliy Leonidovich was at the plant, although it was a day off. And no wonder, there are no days off right now. Especially since a "high" commission headed by First Deputy Minister B. Nikitelov has arrived in Ust-Kamenogorsk.

So, just what happened? The director general admitted that they had been unable to ascertain the cause of the accident to the last detail. A so-called "over-design" situation had occurred that was difficult to foresee. A hazardous suspension goes through an underground tunnel from the process room to the decontamination building. The system is reliable, and according to the director general, harmful emissions into the atmosphere were practically excluded. But this time, the system had turned against them. Beryllium began to oxidize at 3,000°. The automatic equipment cut off the ventilation in the shop, and meanwhile hydrogen had crept back to the place where people were working....

I asked the director general to explain a discrepancy in data: the central press had carried a report by Chairman of the Regional Council of People's Deputies I. Tutevov to the effect that the beryllium concentration in the vicinity of the accident was only twice the acceptable level. At the same time, a concentration of 50 times the limit allowable level of the hazardous material had been recorded at the other end of the city in the vicinity of the silk textile combine.

He explained that there are two different scales: one for enterprises and the other for residential districts. The requirements are more severe in the latter case, which is why the excess was so great. However, this excess is not a threat to citizens.

Frankly, this agency chicanery was not very convincing. And this is why V. Mette told me that parallel observations of the soil and air are now being made by three monitoring organizations: the Committee on Conservation of Nature, the Sanitation and Epidemiology Station,

and the Weather Service. All data collected by these organizations show that we "got through" this time.

I later telephoned the East Kazakhstan Weather Station and learned from the attending meteorologist K. Omarova that their department was not making beryllium measurements. Even today there are no data. At the Regional Sanitation and Epidemiology Station, S Bochkarev, assistant to the chief physician, refused to be interviewed, giving the excuse that their city takes harmful emissions for granted. Besides the Ulbinskiy Metallurgical Plant, smoke pours out of the lead-zinc combine and the titanium-manganese plants....

To be sure, he added that this is his own purely personal viewpoint. And I got a startling bit of news from the regional committee of the party: until last year, specialists of the Regional Committee on Conservation of Nature have not been allowed to pass through the gates of the plant.

"Yes," admitted the director general, "It was just last year that I signed an order allowing them to monitor us."

One is altogether moved by the very way that the issue is stated: the ones who are going to be checked give their permission. Incidentally, the unprecedented liberalism of the secret agency was of no use. The "over-design" situation had not been prevented. Can it be that even extra-agency monitoring has been ineffective? The fact is that there are few specialists on beryllium in the nation. For example, it is a subject at the Institute of Marine Transport Hygiene from which workers have only now been "presumed" to have been called.

And yet another alarming fact: the plant has been sited within city limits. To put it mildly, this is certainly not the best approach, especially since similar enterprises in other nations are sited far from centers of population.

And specially trained monitors are employed there. Therefore there is no need for local specialists on nuclear power to invent a double standard of permissible concentrations.

It seems that this avails us nothing. Vitaliy Leonidovich promised to put together one more committee of deputies and other representatives of the community. He says that he will let them convince themselves that the plant is safe. As to people showing up on the streets in gas masks, this is no more nor less than "ideological subterfuge." No more nor less!

Fortunately, another agency, the USSR Ministry of Power is not playing such dangerous games. However, how shall we put it? The explosion that occurred on the fifth unit of Ekibastuz GRES-1 [State Regional Electric Power Plant] in Pavlodarsk Oblast took two lives. And once more a committee headed by the deputy minister of the USSR Ministry of Power arrived.... The causes of the accident, as reported to me by R. Zhumatayev, secretary of the Municipal Party Committee, are still being studied. But it is already clear that there was an equipment failure. In contrast to Ulbinskiy Metallurgical Plant, GRES-1 is a young enterprise. I recall the pomp with which it was started. And it was not done without some rush work. A few years back, there was a raging fire there. But, as we see, the officials of the Ministry of Power did not profit from the lesson.

The explosion in the two Kazakhstan enterprises has caused an explosion of indignation among citizens of the republic. As has become known, a group of people's deputies of the Kazakh SSR is preparing an inquiry for the president of the republic: how long are central agencies here going to be run like this? And why is it that so-called specialists can practically never foresee the "over-design" situation that puts totally innocent people in harm's way?

Agrokhim: Formation Period

907M0277B Moscow PRAVITELSTVENNYY
VESTNIK in Russian No 24, Jun 90 p 3

[Interview with N. M. Olshanskiy, chairman of Agrokhim State Agrochemical Association by unnamed PRAVITELSTVENNYY VESTNIK correspondent; date and place not specified; first paragraph is PRAVITELSTVENNYY VESTNIK introduction]

[Text] In August 1989, the former Ministry of Mineral Fertilizer Production was replaced by the Agrokhim State Agrochemical Association. How are things going there? Here is what our correspondent was told by N. M. Olshanskiy, chairman of the board of Agrokhim.

Answer: The association has existed as a new form of management for less than a year; however, certain shifts have been observed toward democratization of mutual relations between the management agency and the enterprise, which is the main component of the economic system. A typical example is the state purchase order. In 1988, it was set for enterprises at 82 percent of the volume of goods produced. For 1990, this index is less than 10 percent. State purchase orders are now established only for consumer goods, medicines, and certain kinds of plastics.

Question: The association has taken on the total responsibility for satisfying the needs of our country for mineral fertilizers, chemical agents for protection of growing plants, and some other kinds of chemical and mining-chemical goods. By what means will this be done?

Answer: Even before enterprises had worked out the quota for 1990, we held consultations with consumers, primarily agroindustrial committees of Soviet republics, to determine the true need for goods of the sector. After generalizing these results, we communicated to each enterprise the requirement for its output for agriculture, various sectors of industry, and also the realistic possibilities for providing the enterprise with raw materials and supplies. Then Agrokhim signed an agreement with each enterprise defining the scales of production, volumes of deliveries to rural areas and industry, and also resources for export.

One of the fundamental principles in setting up Agrokhim was conversion to a cash self-paying and self-funding basis. Therefore, we have to make all import purchases at our own expense. The agreement with each enterprise of which I spoke specifies the requirements in cash terms for raw materials, supplies, equipment, and spare parts. It is significant that in doing so we have made provisions for the purchase of medical equipment and consumer goods for each collective. We have agreed to allocate considerable money to solve ecological problems and expand the present base of the construction industry.

After generalizing enterprise requirements, the association makes purchases of all necessary goods from abroad

for each specific client, but now at wholesale, which promises a considerable savings.

Agreements on the aforementioned matters are an example of real partner relations between the board and enterprises of the association.

Question: Nikolay Mikhaylovich, it is well known that the USSR was producing more mineral fertilizer than any other nation even before the association was set up. However, due to a shortage of special equipment, violations of handling regulations, and an acute scarcity of storage facilities, more than 3 million metric tons of fertilizer are lost on the way to the field. Will Agrokhim change this situation?

Answer: I would divide this question into two parts. First, are we producing a lot or a little? In absolute terms, indeed the most in the world. At the same time, we are putting only 120 kilograms of mineral fertilizers on each hectare of plowed field. By way of comparison, Bulgaria is using 180 kilograms; Hungary, 250; Czechoslovakia, 300; Belgium, 600; and Holland, 800 kilograms.

All these nations are producing stable high yields of agricultural crops. Naturally, it is not just a matter of mineral fertilizers, but the relationship is obvious. Therefore, considering the area of tillage of the USSR, I would say that we are not producing a lot of fertilizer. Statistics show that we need a lot more.

Another thing is that there is a considerable problem of balanced application of chemicals with each other and with such components that raise soil fertility as organics, spropel, and peat.

Question: It has recently been noticed that over the last 15 years from 8 to 40 percent of the humus has been lost in soils of various regions of the nations. And this has mainly been because the level of application of organic fertilizers is low. In the USSR they make up only 27 percent of the total volume of nutrients added to the soil, while in East Germany it is 45 percent, in Britain, 49 percent, and in the United States, 61 percent....

Answer: I would add that the disparity is especially great between application of mineral fertilizers and chemical agents for protection of growing plants. In nations with developed agriculture, 30-50 kilograms of such agents are used per metric ton of mineral fertilizers. The figure for the USSR is only 13 kilograms. And even these comparisons do not give a true picture. For example, Japan spends more than 100 times as much as we do per hectare on chemical agents for the protection of growing plants. To compare the scales of utilizing pesticides, I can tell you that the United States uses them to treat 90 percent of the areas under cultivation, Japan uses them to treat 100 percent, and in the USSR no more than 35 percent is treated.

Besides that, the shortage of other pesticides results in losses of 25-30 percent of the possible harvest due to diseases and pests.

Our rural areas are woefully inadequate in deacidifying soil, and to make matters worse, about 70 million hectares (or nearly 30 percent of the arable land) in the USSR has elevated acidity. And after all, a simple agrotechnical method like liming raises the effectiveness of chemical fertilizers by 30-40 percent. There has been a shortfall of deliveries of lime to our rural areas for years on end. And the sad thing is that in contrast to pesticides, where there are no facilities, at times no technologies or raw materials and costly imports are needed, everything is available for liming: stockpiles of raw materials, equipment, but no railroad cars to haul the finished goods to the rural areas.

And now we come to the second part of your question about losses in transportation, storage, and application. This is a serious problem, and unfortunately has not been solved to date.

Take just the question of warehouses. There are no warehouses at all for almost 18 million metric tons of mineral fertilizers. As a result, mineral fertilizers and chemical ameliorates are unloaded and stored directly in freight yards in 340 rayons of Russia and 45 in the Ukraine. Some republics are giving inadequate attention to this problem, especially on the rayon level. In our opinion, it is Agrokhim's job to deal primarily with setting up inter-republic and inter-regional warehouses, while republic and oblast agroindustrial agencies must deal with developing local bases for the introduction of chemistry.

As of now, farms are getting barely more than 40 percent of the machinery that they need to spread mineral fertilizers and less than 50 percent of the required machinery for the application of toxic chemicals. The lack of storage facilities and equipment for delivery means that fertilizers and pesticides are being dusted and sprayed rather than applied.

However, even if we solve these and other problems of developing the material base for increased use of chemicals, one crucial problem remains: technical personnel. There is a drastic shortage of specialists, soil scientists, and agrochemists in our rural areas; there are none at all on half the state and collective farms, and there is nowhere to get them because agricultural vocational schools do not teach agrochemistry at all and 107 institutions of higher education of the nation are graduating just a little more than 1,000 soil scientists and agrochemists all told.

If we can solve these problems in concert, we will get a high return from our facilities for introducing chemicals. We are now working on a draft of a program for these operations.

Question: And what is already being done in practice?

Answer: We are taking part in construction of modern storage facilities and establishing relations with agriculture on the rayon level. For example, in Sumskiy Rayon of Sumskaya Oblast and Voskresenskiy Rayon of Moskovskaya Oblast, we are setting up agrochemical centers for improving the yield of agricultural crops by introducing modern cultivation technology. We are enlisting major foreign companies in this effort. We have already purchased analytical and other equipment for these rayons and will be teaching Soviet specialists modern ecologically safe methods of chemical application. We are setting ourselves a realistic ultimate goal: improvement of crop yield.

Question: We know that the management of the former ministry worked on a budget and that payment to employees did not directly depend on the results of business activity of enterprises. What about Agrokhim?

Answer: The board and its working machinery are now maintained at the expense of the association's own means. The council of Agrokhim (and this is the highest management agency of the association) has decided that managerial workers will be paid on the basis of business agreements like those I have mentioned. Of course, the form of agreements will be improved, but we feel that the fundamental condition has been rightly chosen: violators will pay. If the conditions of an agreement are broken by managerial personnel, it will mean a loss of real wages.

On the whole, enterprises will pay the board members of the association for specific services rendered. For this purpose, the association has set up a foreign trade union, commercial bank, and wholesale arbitration company, and we are actively thinking about leasing.

In spite of the brief experience of operation of the sector under new conditions, there has been a marked movement toward democratization of mutual relations with enterprises and accountability and subordination of the work of board members to the presidium and council of the association. The same thing has been noted by the collectives of enterprises with whom we try to meet as often as possible. In a word, early work experience confirms that workers of the sector have chosen a promising form of management.

Determination of Copper, Barium, and Yttrium in High-Temperature Superconductor

907M0248A Kishinev IZVESTIYA AKADEMII NAUK MOLDAVSKOY SSR: SERIYA BIOLOGICHESKIKH I KHIMICHESKIKH NAUK in Russian No 2, March-April 1990 pp 73-74

[Article by I. D. Grama, K. I. Turte, and M. P. Banaga, Institute of Chemistry, Moldavian SSR Academy of Sciences: "Determination of Copper, Barium, and Yttrium in High-Temperature Superconductor"]

[Text] The development of the technology of superconducting materials based on metal oxides is closely related to analytical testing of the final products, i.e., to the determination of the amount of ingredients and oxygen in them. One must take into account that the lack of this information prevents comparative analysis of the properties of high-temperature superconductive materials (HTSM).¹ Various methods are used to quantify metals in HTSM.² The atomic absorption analysis (AAA) method is most often used.^{3,4,7,8} Purely chemical analysis methods are used more rarely. The goal of this study was to develop a method for the chemical analysis of cations in the HTSM $YBa_2Cu_3O_{7-8}$ as well as $YBa_2Cu_{3-x}Fe_xO_{7-8}$.

The volumetric (titrimetry) method yields the most reliable results when determining large amounts of elements (0.1% and higher) in specimens to 1 g.⁵ Iodometric and complexometric methods are best for determining copper; the complexometric method is best for yttrium and barium. We used the complexometric method as the simpler of the two.

We know^{6,9} that analytical determination of these elements by this method is nonselective and that masking agents must be used: a fluoride ion for Y(III) and Fe(III) when determining Cu(II) and thiocarbamide for Cu(II) in determining Y(III). Barium does not interfere with the determination of copper or yttrium. According to one source,⁶ it is recommended that barium be determined by reverse titration or titration by the substitution method. Both copper and yttrium interfere with barium determination. Therefore copper is separated from yttrium and barium by extraction with diethyl dithiocarbamate in chloroform.⁹ Then the sum of the yttrium and barium is titrated, and barium is determined from the difference.

Experimental Section

Reagents: 2.5 M hydrochloric acid; sodium fluoride (chemically pure); thiocarbamide (pure for analysis), a 1-M solution; hydrous ammonia, a 25% solution; triethanolamine (pure for analysis); acetic acid, a 0.2-M solution; sodium acetate (chemically pure), a 0.2-M solution; EDTA, a 0.01-M solution; sodium sulfate (chemically pure), a 0.01-M solution; and diethyl dithiocarbamate (DDTC), pure, recrystallized, a 17% solution.

A buffer solution (pH 10), 70 g NH_4Cl , is dissolved in 520 ml of a 25% solution of NH_3 and diluted with water

to 1,000 ml. The buffer solution (pH 6) is prepared from a 0.2-M solution of acetic acid and sodium acetate. Thymol blue is used in a 0.1% solution. One part of the tracer xylene orange is dissolved in 99 parts H_2O . One gram of the tracer murexide is pulverized with 99 g NaCl (chemically pure), and 1 g of the tracer eriochrome black T is pulverized with 99 g NaCl (chemically pure).

Determination process. A 0.32-g specimen is placed in a beaker, to which 10 ml of hydrochloric acid (2.5 M) is added. It is heated slightly. After the specimen is dissolved, the solution is cooled to room temperature and placed in a 50-ml graduated flask, and distilled water is added to raise it to the mark.

a) Determination of copper. An aliquotic portion (5 ml) is transferred to a 100-ml flask for titration and diluted to 50 ml with water. Sodium fluoride (0.2 g) and an ammonia solution are added up to a pH of about 6 is reached. Then, 10 ml of a solution of ammonium chloride and a 50 ml solution of murexide are added, and the result is titered with a solution of EDTA until the solution's color changes from yellow to violet.⁶

b) Determination of yttrium. An aliquotic portion (5 ml) is transferred to a flask for titration and diluted to 50 ml with water. One droplet of a solution of thymol blue and an ammonia solution is added until a yellow color develops, and then 0.5 g thiocarbamide is added. Then 10 ml of the buffer solution (pH 6) and 50 mg of xylene orange are added, and the substance is titered with a solution of EDTA until the solution's color changes from red to yellow.⁹

c) Determination of barium. An aliquotic portion (5 ml) is transferred to a 100-ml separating funnel and diluted with water to make 30 ml. It is neutralized with an ammonia solution until the pale blue color of ammonia complexes of copper develops. Then, 10 ml of buffer solution (pH 6), 2 ml of a solution of DDTTC, and 30 ml of chloroform are added, and it is shaken for 2 minutes. After the solution separates, the chloroform is drained off. This operation is repeated once again. The transparent solution is transferred to a flask for titration, and 10 ml of buffer solution (pH 10), 30-50 mg of eriochrome black T, and 25 ml of a solution of EDTA are added and titered with a solution of magnesium sulfate until the color changes from blue to bright red.⁶

Table 1 presents the results of the determination of copper, yttrium, and barium in specimens of $YBa_2Cu_3O_{7-8}$ (TU-48-05-31-37786) and $YBa_2Cu_{2.95}^{57}Fe_{0.05}O_{7-8}$. The latter is synthesized by the ceramic method. The data in Table 1 show that the error in determining cations in HTSM specimens does not exceed 2.0%. The relative standard deviation for copper S_r was 0.018 (0.008 by the AAA method); for barium $S_r=0.01$ (0.01); for yttrium, $S_r=0.008$ (0.014). Our data are on the level of those of Shaburova and Yudelevich⁷ and somewhat inferior in terms of S_r for copper in the atomic absorption analysis method, while the S_r for Y is lower.

Table 1. Results of Determining Y, Ba, Cu (n=3; P=0.95).

Specimen	Oxide, Element	Quantity, %	Found, C ₊ , %	S _r	S _d , pub., based on AAA ¹
According to documentation					
YBa ₂ Cu ₃ O _{7-δ} (TU-48-05-31-37786)	Y ₂ O ₃	17.6	17.4±0.3	0.008	0.014
	BaO	45.0	44.6±0.5	0.01	0.01
	CuO	36.5	36.2±0.3	0.01	0.008
Introduced					
YBa ₂ Cu _{2.95} ⁵⁷ Fe _{0.05} O _{7-δ}	Y	13.37	13.34±0.08	0.008	
	Ba	41.32	40.7±0.8	0.01	
	Cu	28.20	28.2±0.2	0.018	

Conclusion.

A complexometric procedure for determining Y, Ba, and Cu in HTSM specimens is proposed. The relative standard deviation of the determinations does not exceed 0.01.

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