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MALAYSIA DRAFTING ANTIPOLLUTION PROGRAM

Kuala Lumpur NEW STRAITS TIMES in English 17 Jul 76 p 6

[Excerpts] Kuala Lumpur, Friday--A five-year environmental programme to control pollution is being drawn up, the Dewan Rakyat was told today.

The programme consists of preventive and restorative measures and would be aimed against all waste discharged into the air, water and the surrounding seas.

Science Technology and Environment Minister, Tan Sri Ong Kee Hui said the fundamental issues relating to environment such as location of industries, conservation and land-use would be looked into "under this programme."

Continuous survey and monitoring will be conducted to assess the true parameters of pollution and its sources within this broad framework. "Studies are being conducted on the agro-based industries and will be extended to industrial sector and other sources of pollution will help to identify the problem area and to formulate standards for control."

Eventually, these standards and other control regulations would be imposed on all polluting discharges through licensing and other administrative measures.

This would require an extensive surveillance and monitoring programme to ensure that the factories comply with the regulations.

Added to this, was the programme on the prevention and control of marine pollution which would continue to be given considerable attention by the Ministry.

A contingency plan for the control and mitigation of oil spills in the Straits of Malacca which was prepared by the Ministry has been passed by the Cabinet recently.

On short-term measures, Tan Sri Ong said the Ministry has directed its attention to the areas immediately affecting the people's health and the quality of the environment.

BULGARIA

BULGARIAN-TURKISH NEGOTIATIONS ON JOINT UTILIZATION OF RIVERS

Sofia ZEMEDEL'SKO ZNAME in Bulgarian 18 Sep 76 p 1

[Text] Istanbul, 17 September (BTA Correspondent) A meeting of the Joint Bulgarian-Turkish Commission for cooperation on the water utilization of rivers crossing the territories of both countries took place on 16-17 September in Istanbul.

The protocol on the work of the Commission signed this evening stresses that, in the execution of the agreement between the People's Republic of Bulgaria and the Republic of Turkey on cooperation in this field and in fulfillment of the respective decisions of the Bulgarian-Turkish committee on economic, industrial and scientific-technical cooperation, a decision has been made to establish a bilateral commission of experts which should study the question of a joint construction of a dam on the Tundzha River and present to the competent institutes of both countries corresponding reports on the matter. The waters of the dam would be used jointly for irrigation and electric-power generation.

The meeting also discussed the Turkish request to have Bulgaria supply them with specific quantities of water for irrigation from the Maritsa River.

The commission also discussed the problem of preserving the purity of the Arda, Maritsa and Tundzha rivers. The Bulgarian delegation provided information on the measures taken by Bulgaria in this regard.

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BULGARIA

WATER LEVEL AND POLLUTION OF SEVERAL RIVERS EXAMINED

Sofia TRUD in Bulgarian 18 Sep 76 p 2

[Interview with Rangel Minchev, associate of the Scientific Research Institute on Hydrology and Meteorology by Bozhko Karabozhkov: "The Rivers"]

[Text] Rangel Minchev, associate of the Scientific Research Institute on Hydrology and Meteorology has followed and analyzed the flow and level of Bulgarian rivers during the past century.

First Observations

"Surveys were made in this field even before Bulgaria's liberation from Ottoman yoke," pointed out the expert hydrologist in our lengthy talk after having finished with his comparisons and evaluations. "These were data based on marks left by the high water levels, on curiosity in connection with preliminary measurements of bridge construction, water-supply equipment (for example the Pasha Ark and Eni Ark irrigation canals) and others. However, systematic studies of the water level of our rivers started on 1 June 1898 with the opening of the hydrometric station on the Danube near Ruse and on 10 April 1909 with the station on the Maritsa River near today's Dimitrovgrad. Later on the number of stations continued to grow and in 1935 the first periodic measurements of the water speed took place by imported equipment (hydrometric propellers).

"These surveys led to the study of the flow (the natural surface and underground waters draining into the rivers) pattern as well as of the regularity of its fluctuations primarily in its average and extreme ranges, reached during given periods of time (annually or over a number of years). These surveys have served as a basis for assessment and construction of all hydro-technical projects so far."

Factors for High Water Levels

[Question] Comrade Minchev, according to you experts, what are the factors that cause the so called flow pattern and, in the last analysis, the high or low water levels of the rivers? And how have these factors functioned specifically in Bulgaria during the last century?

[Answer] The pattern depends on the character of the climatic elements - on the volume, intensity and distribution in time and space of the rainfall, on the air temperature and humidity, on sun radiation, and on the state of the catchment areas - size, above sea-level elevation, slope, and vegetation cover (forests or cultivated land), and on many others. All these factors influence in their own way the minimum, average and maximum flow.

I will satisfy your basic curiosity by informing you that the last 40 years (as I pointed out the older data are quite limited and do not permit comparisons with the present) show a certain fluctuation in the flow pattern of some rivers in whose catchment areas dams have been built. For example, the range of flow fluctuation of the rivers Topolnitsa (near Lesichevo village), of Struma (near Pernik), and of Rositsa (near Vodoley) is declining: the maximum water volumes show a tendency of declining and the minimum - of increasing. Similar change was noticed in some rivers during the same period of time with considerable afforestation of the catchment areas. The data show that the maximum outflow of our rivers occurs most frequently during June and July and less frequently - in March and October. Furthermore, with the broadening of the catchment areas the flow module (the volume per second in 1 sq km) decreases. For example, Maritsa's module near Belovo is 1.4 cubic meter, which decreases 12.7 times near Svilengrad where the catchment area is 28 times larger. On the other hand, the minimum and average flow module is highest in the high-mountain catchment areas and lowest in the lowland regions due to the small quantity of rainfall and higher evaporation. As concerns the natural pattern of the average yearly river flow, no changes have been noticed during the last decades of the 40-year span.

The Water Level of Our Rivers Has Not Been Reduced

Our interlocutor showed us comparative tables for 10-year periods of the average, maximum, and minimum water volumes which have passed through our large rivers. They show clearly that from 1936 to 1975 there are no substantial differences in the numerical data, i.e. the rivers during the past 40 years have run without showing any tendencies of loss in water volume. On the contrary, these data even register a certain increase in the volume of some rivers. For example, the Iskur near Kurilo at the end of 1976 showed 4.76 cubic meters of minimal waterflow per second compared to 0.030 in 1936.

Comrade Rangel Minchev gave us more proof that our rivers today show the same water level as 100 years ago. He told us that a church in Parardzhik has a mark left by the highest water level of the Maritsa in 1857. Exactly 100 years later, on 29 June and 5 September 1957 the Maritsa waters reached the same level. This fact most obviously confirms the same maximum levels at the beginning and end of the past century. The hydrologist showed us historical data of the pre-liberation period of Ottoman yoke which reveals that during the summer seasons the Maritsa had in fact been used to transport lumber from the mountainous regions to the Thracian valley, as well as from

there to its delta in the Aegean Sea. This shows that in the summer seasons as well the river has had high water levels in order to be used as an avenue of transportation. He pointed out that "having in mind that at that time the riverbed had not as yet been corrected, i.e. the width of the riverbed was smaller and the stream velocity slower, it becomes clear why it was able to accomodate lumber rafts during the summer as well. Prof Ivan Shishmanov's notes concerning the transport possibilities of the Maritsa during the Ottoman yoke make us think that by blocking individual sectors the pattern of its low water levels had also been changed."

"We have no data for the outflow in general at the beginning of the past century," declared Comrade R. Minchev. "But for the Maritsa in particular we should agree that at the present time its maximal flow decreases by the quantity of water which its tributary Topolnitsa contributes to the reservoir carrying its name. The minimal and average flow are reduced on their part by the quantity of water used by the arable land for farming needs."

Conclusion

It looks as if the conclusions of the expert hydrologist contradict with reality, in that the outflow of our rivers had not decreased, i.e. that they receive today the same quantity of nature's water (mainly from rainfall) as 100 years ago. On the one hand they are as "full" as during the time of the April uprising, while on the other hand - they are presently, especially during the summer months, fully dried out. Comrade Minchev explained this "contradiction" not by any changes in the climate of the country, but by a number of factors in the present-day Bulgaria as an agriculturally and industrially developed country. "First of all," pointed out Comrade Minchev, "right after the liberation our private-ownership farming started to expand. It began to make greater use of artificial irrigation for agricultural crops at the expense, of course, of our river streams. On the other hand, the growing industry started also to consume part of their waters. Dams appeared later on and during their filling period it was very natural to see downstream dried up riverbeds. If, of course, a magic wand could eliminate these factors all of a sudden, the Maritsa as well as the Iskur and Arda would flow in their ancient riverbeds during the four seasons just as they were observed by Konstantin Fotinov, Ivan Popov and others. The balance of our rivers would probably also remain unchanged during the years to come. Thus, we could draw the conclusion that a 100-year period, quite long for a human life, is extremely short nature in order to enable it to make any changes in the volume pattern of the river flow."

The Trouble Lies Somewhere Else

"The studies show that the trouble facing our rivers is not the decrease in their water level," said Comrade R. Minchev in conclusion, "but in the chemical pollution which increases constantly. The data concerning the chemical pattern of the river flow show that the concentration of pollution (expressed in ammonium, sulfate, chlorine, sodium and potassium ion content)

increases proportionately with the decrease of the flow and reaches its maximum under a minimum flow immediately after the discharge from the chemical plants and populated centers. This concentration continues to grow with construction of new plants and with the increase of our population."

"I could cite among the most polluted rivers the Khadzyska river near Ruzhitsa village with 84 milligrams per liter of ion concentration by high water and reaching 1706 by low water, the Beli Lom river near Razgrad with 151 and 725, and the Kriva river near Novi Pazar with 363 and 569 respectively and others. However, the chemical pollution of our largest river, the Maritsa, at Polvdiv is relatively small - from 12 to 85 mg/l by high and low water respectively."

"The data show that the concentration of the pollution of the river flow (especially during low water) has reached in a great number of rivers threatening extremes, which makes the rivers unsuitable for crop irrigation or for fish-breeding. Furthermore, the evaporation pollutes the air as well."

"Furthermore, the data concerning river cloudiness show that it increases by high water due to the erosion of the sloped arable land of the catchment areas. It is true that the anti-erosion measures are gradually reducing the cloudiness, but it is still a very important factor, especially by the lowest flow in which case it increases considerably after the discharge of the water which washes the ore wastes."

"The analysis of the hydrological data shows that the natural outflow pattern during the past century has not changed, but that the human activity has caused considerable damage by construction and consumption."

We can conclude from the analysis and scientific findings of both experts that we, in our country today, enjoy a climate similar to that of our countrymen who lived during the time of the April uprising and the liberation of Bulgaria from the Ottoman yoke. Neither the meteorological nor the hydrometric data show significant lasting changes in the atmosphere and rivers in the country since the very beginning of the past century. And yet, the published studies of the climatologist, for example, did show the periods of the climatic "fluctuations" characterized by him, which, the non-expert could call in a certain sense "changes" as well, because they refer to extended periods (the warmer trend from the beginning of the century to the end of the 40 years, the subsequent cooling up to our time and the expected new warm trend). These studies and findings are also in this respect interesting and valuable for science as well as for numerous readers, many of whom had written to us asking what climatic changes have occurred in our country during the past century, while not including in the term "changes" any understanding of the wide-ranging variations which could bring our continental climate closer to the subtropical or polar one.

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BULGARIA

SERIOUS POLLUTION IN STARA ZAGORA OKRUG REPORTED

Sofia OTECHESTVEN FRONT in Bulgarian 23 Sep 76 p 2

[Article by G. Manov, OTECHESTVEN FRONT okrug correspondent: "Measures, Measures, But Where Are the Results?"]

[Text] The Chemical Combine is one of the biggest air polluters in the Stara Zagora area. A number of technological improvements were made with expected positive results, but.... It was reported in the course of a meeting with environmental protection specialists that the chemical combine is "spraying" 50 tons of dust and 10 tons of nitrogen oxide, 40 tons of sulfur dioxide, and 2 tons of hydrogen sulfide per day. Consequently it continues to be dangerous to the atmosphere over Stara Zagora.

Also among the heaviest air polluters in the okrug is the Purva Komsomolska TETS. Every 24 hours, its stacks release 1300 tons of dust and over 400 tons of sulfur dioxide. Some days the firm particles of these toxins feel like grains of sand dropping from the sky.

Soil Protection

This is another vital problem in Stara Zagora Okrug. Following is a statement by soil inspector E. Enchev: "Every year, 2400 tons of chemical toxins fall on the okrug's farm crops. The machines used for vegetal protection are washed in canals, revines and rivers, ignoring the fact that they pollute the waters and the soil. In this manner, 38,000 decares of land have been polluted by agricultural aviation aircraft, and 58,000 decares have been polluted by industrial waters.

The problem of preservation of the environment in the area of the open pit mines within the Maritsa-Iztok complex involves the restoration

of the land and required improvements. The opening of the mines and quarries disturbs the upper soil stratum and changes the soil which becomes unsuitable for agricultural or forest activities. Yet, is it only a question of mines and quarries? Recently Engineer A. Oreshkov, deputy director of the Stara Zagory Forestry-Industrial Combine, stated with concern that yet another 150,000 decares of land within the Maritsa-Iztok complex area will be destroyed by the new thermoelectric power plants and mines. I asked how many decares had been recultivated in the past 3 years and it turned out that there were slightly over 4500. Endless arguments are taking place on how to accomplish this. Biological and technological recultivation is taking place. For the time being, the Ministry of Power Industry is not implementing land recultivation regulations. The areas are submitted without being leveled off and organized, and their deformation is continuing. The idea was presented of planting grapevines on such areas with a high sugar content and developing a grape and wine combine and building caves in the huge dugouts. This is an interesting idea which should be considered and discussed by competent individuals. Several years ago, I visited the area of the Kursk Magnetic Anomaly in the USSR. I saw there open pits of impressive scale. However, I also saw something else: the Soviet people, owners of huge and endless land, take amazing care of the protection of the structure of the soil layers. In our country, we are careless, despite the great shortage of land.

What Is the Condition of the Water in the Okrug?

The okrug consumes 100 million cubic meters of water for industrial means and about 92 cubic meters for residential purposes. In the Seventh Five-Year Plan, water availability per capita per 24 hours for household use must average 220 liters. There are over 120 industrial enterprises representing an unsated consumer of water and a fierce polluter of rivers and dams. Yet Stara Zagora rivers are shallow. The Tundzha and Sazliyka, in particular, have reached maximal pollution. Nearly one-half of the polluting enterprises have no filtering equipment. Those with funds have not designs and those with designs have no one to do the installations.... This is a vicious circle which has not been broken over a number of years. How long will it last?

How to satisfy future needs particularly for drinking water? According to the water resource plans, the following dams will be built: Muglitzh, Lazoya, Chatalka, Grudevo, and Enina.

Every year about 1 million cubic meters of quarry materials are removed from the okrug's rivers for construction requirements. The deep dredging of gravel and sand disturbs the subsoil water system. The output of water supply wells is dropping in some terraces along the rivers. Elsewhere, such wells have dried out entirely. This is yet another alarming phenomenon with which few people are concerned. A new approach

must be adopted to the operation of river quarries. Where should quarry materials be extracted from, construction workers ask. In many countries, rocks are used for sandmaking. After grinding, rock turns into sand. Yet another method exists: by building dykes on suitable areas in order to raise the level of the rivers. Thus, sand extraction areas may be created artificially.

These facts clearly show that the question of adoption of effective measures for protection of the environment in Stara Zagora Okrug is becoming ever more urgent.

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BULGARIA

REJECTION OF EFFICIENT, CHEAP WATER-PURIFYING SYSTEM CRITICIZED

Sofia STURSHEL in Bulgarian 17 Sep 76 p 1

[Article by Chavdar Stoev: "Before the Pitcher Gets Broken. Attention: Comrade Grigor Stoichkov, Minister of Construction and Architecture"]

[Text] I am not referring actually to any pitcher. I am talking about an invention of a kind that you can pack in a bag -- a small one, but actually quite beneficial to society if, it goes without saying, it is adopted and put to use.

As you surmise, however, it has neither been adopted nor approved by the agencies concerned. To be more precise, some have approved it (the Committee on Science, Technical Progress and Higher Education), others have not (the Ministry of Construction and Architecture, the Water Supply and Sewerage SD Economic Directorate). Controversies rage, councils of experts are appointed, resolutions are adopted, reams are written, retorts are traded....

But let us begin at the beginning.

The invention is called a chlorinator and serves to treat water for drinking and household needs. This chlorinator is 10 times cheaper than those imported at the moment and than another kind of chlorinator produced in our country. It saves electric power (I refer to millions of kilowatt-hours annually -- Author's Note) since it requires no heated premises. It can be installed at water sources where the water has no pressure, and most of the water sources in the country are of this kind. Tending it is simple and easy.

What is most interesting is that despite controversies, councils, correspondence and various commissions this chlorinator has been used for year after year and at the moment is operating at more than a hundred water sources. It does its job, so to speak, quietly, modestly and without any trouble.

Let us mention besides that the competent bodies in the Ministry of Health and Social Welfare have checked its operation and have certified that water treated by it is within the relevant public health standards and limits. Let us add that the Institute of Labor Hygiene has approved it as far as labor protection is concerned.

Let us say in addition that already two newspapers, RABOTNICHESKO DELO [Labor's Cause] and TRUD [Labor], have written critically and in a reasoned manner about this whole story and mainly about the need for this invention to start operating and saving money for society!

But the chlorinator is still not operating, as you have perhaps suspected! Why, will ask the reader who as co-owner of the state insists that his money in the common exchequer be spent thriftily and reasonably.

This is the story.

Water-Supply and Sewerage Planning NIPPI [Scientific Research, Planning and Design Institute] has also developed a chlorinator which is not an invention. As has already been said, it is 10 times more expensive than the one referred to above, requires electric power, is usable only at water sources where there is pressure, is difficult and complicated to operate and, most importantly, is still nonoperative, is still being overhauled and supplemented...despite the fact that it has a "K" rating and a gold medal.

It deserves thinking about -- more expensive, more complicated and defect-ridden, but the Water-Supply and Sewerage SP [Economic Enterprise] and the Ministry of Construction and Architecture jumped at it, unwilling to hear a word about an economical, simple and cheap invention that does the same job and saves millions . . .

The controversy, to be sure, is scientific and we should like to recall that, apart from the endless discussions, sessions and councils, in which quite personal preferences and calculations, in addition to the people's interests, are involved, science uses a procedure which is called experiment. I refer to the two apparatuses after all, and not to how the galaxies were created. The inventions must be installed at several water-treatment stations and an impartial commission must decide and check how they operate. Here too is the place for us to say that the Committee on Science, Technical Progress and Higher Education quite a long time ago allotted funds to produce models of the cheap chlorinator and to conduct this experiment, but the Water Supply and Sewerage SD has thus far done nothing. This, among other things, is very significant!

Perhaps you recall that we began with a pitcher and surely you are now wondering what connection all this story has with a pitcher! The connection is this: We have written and described sufficiently how one plant, due to

mismanagement, has wasted I don't know how many thousand leva worth of machinery and output and how at another construction project, due to laggardness, society has lost millions . . . We have written that those concerned are responsible to us and sometimes the guilty ones are even punished, but millions have been thrown away! There is no recovering them! Let us now try to act in such a way that the money is not wasted that has been provided for improving and remedying the defects of that apparatus which was expensive to begin with, without even taking notice of the other one -- the other apparatus which at the moment is operating not at 10, but at 50 water-treatment stations . . .

To conclude, let us say that we have done what the newspapers RABOTNICHESKO DELO and TRUD did months ago. Now let the Ministry of Construction and Architecture and the Committee on Science, Technical Progress and Higher Education do the necessary. The pitcher, so to speak, is worth millions! It's no pleasure to anyone if it is broken!

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EAST GERMANY

PROBLEMS OF LAND RESTORATION INVOLVING OPEN PIT MINES OUTLINED

Leipzig NEUE BERGBAUTECHNIK in German Vol 6, Jul 76 pp 536-541

[Text of article by Dr Konrad Werner and Dr Werner Einhorn, GDR Academy of Agricultural Sciences, Halle Institute for Land Restoration and Conservation, Doelzig branch]

[Text] When open pit mines are developed and operated--especially brown coal open pit mines, entire land areas are subjected to planned change both in their structure and in their character.

To convey about 250 million tons raw brown coal in the GDR, about 3,000 ha (hectares) of land surface must be withdrawn yearly from its previous use, which is predominantly agriculture and forestry.

Because site conditions are worsening, it is necessary constantly to increase mass transport in order to maintain production capacity. At this time, about 0.9 to 1.0 billion m³ excavated material must be moved yearly. Thus the excavation:coal ratio has shifted since 1960 from about 2.8:1 to almost 4:1. In the year 1980, it will be 5.4:1, and by 1990 it will be still less favorable. These numbers fluctuate because open pit mines are terminated and started. Thus, in the period from 1960 to 1971, a capacity of 100 million tons raw coal yield had to be replaced. In the terminating open pit mines, the average ratio of excavation: coal here was 2.76:1; the open pit mines which replaced them, however, had a ratio of 4 to 6:1. In the years until 1980, a conveyance capacity of 150 million tons must be replaced. By 1990, 29 open pit mines will terminate, and 20 open pit mines will be newly developed (1).

As a rule, the sites are formed by penetrating strata of brown coal which have a considerable extent. The site-bound open pit mine fields reach a size from 30 to 50 km². About half of the presently operated open pit mines are located in the Cottbus area, where 60% of the prospected brown coal supplies of the GDR are also situated. The other open pit mines are distributed among the Halle region and the Leipzeig region. Because of the surface extent of the strata, several open pit mines generally provide conveyance at one site, so that the open pit mine fields are frequently separated from one another only by small safety zones. These zones must

accommodate not only streets, railroad lines, and the remaining residue of dwellings, but generally also river beds. The boundaries of the open pit mine fields are particularly determined by geological circumstances, by the infrastructure, and by larger settlements. However, technical progress entails constant growth and increasing output capacity of the heavy machinery in the open pit mines (excavators, spreaders, conveying bridges, etc.). A use time of 20-30 years is necessary to make such equipment profitable. The result is that the open pit mine fields are extended. The trend in moving excavated material here is clearly in the direction of operating powerful conveying bridges. Up until 1973, nine 34-m conveying bridges were available in the GDR for moving excavated material. They had a possible annual capacity of 100 million tons of excavated material.

Since the excavation technology used has considerable consequences for the type and quality of land reclamation, the development of excavation technology in brown coal mining in the GDR shall be characterized through the following figures (2, 3):

	1960	1973	1980
Rail operation (in %)	69.0	40.5	17.0
Conveying bridge operation (in %)	28.4	52.5	62.0
Conveyor belt operation (in %)	2.6	7.0	21.0

For mining brown coal, it is necessary to eliminate from the open pit mine field every and all construction, including towns, streets, railroad lines, stream and river beds, as well as lines of all types.

The anticipated devastation of nearly 100 settlements makes clear the resulting effect, by the year 2000, on the infrastructure in the mining regions.

For natural as well as economic reasons, therefore, the installations of the infrastructure, especially in the form of traffic roads, water courses, and settlements, must be concentrated in the boundary areas of the open pit mines.

Drainage is one of the most important measures in developing or in operating an open pit mine. Through subterranean drainage, filtering well interlocks, or also through surface well drainage, the open pit mine is kept free of ground water and is secured against water flowing in from elsewhere. The effect, which such large-scale drainage exerts on the water economy as an ecological factor, can easily be derived from the quantity of raised water. With about 4 to 6 times the raw coal conveyance, the total water raised in draining the open pit mines during the year 1972 amounted to about 1.19 billion m³. Thus it almost attained the quantity of water raised by all the operations of the VVB (Association of State Enterprises) water supply

and waste water removal (4). By 1980, it is expected that the elevation of water through brown coal mining will rise to 1.42 billion m^3/a . Taking an average of all open pit mines, $5.55 \text{ m}^3/\text{t}$ raw brown coal will here be raised. In the open pit mines of the Niederlausitz, even $7.0 \text{ m}^3/\text{t}$ will be raised. The quantities of water which have been discovered by digging are generally added through pipeline systems to the natural discharge and thus to the flow velocity. On the one hand, this leads to an increase of the discharge output, and on the other hand it leads to a ground water drain tunnel which can reach a diameter from 2 to 10 kilometers, depending on geological circumstances and on the flow direction of the ground water. Especially at soft sites near groundwater as well as at areas of the Niederlausitz with organic soils, areas used for agriculture and forestry are therefore considerably impaired in their yield capacity.

To obtain brown coal, new open pit mining developments first require that the incident quantities of excavated material be dispersed either to dumps or to a neighboring open pit mine. The resulting hollow form is designated as the exploratory configuration. Only when the mining of brown coal reaches a certain degree of facility, can further accumulations of excavated material be accommodated as internal dump in the respective open pit mine. Not only does the opened ditch generally already assume enormous proportions, but the hollow form of the open pit mine is constantly growing, as a consequence of the mass deficit from conveying the brown coal.

During the development period, the installation of a conveyance line for excavated material (a siding for rail operation or a conveyor belt system) to the dumping area or to a neighboring open pit mine is a necessity. At the same time, appropriate systems, usually by rail, must be constructed to transport the yield of brown coal from the open pit mine to the coal-refining industry (briquette factory, power plant, and the like). This necessitates bifurcation of ground areas that are used for agriculture and forestry. It is necessary to pass over existing traffic systems as much as possible without crossings. If it is impossible to accommodate the masses of excavated material in a neighboring open pit mine, extensive surface areas, predominantly used for agriculture and forestry, must be made available for dumping. The border region of the open pit mine is therefore further impaired through direct consequential measures of brown coal mining.

Among these factors also belongs the erection of "green" reservoirs and of other surface-water protective measures, based on the demands which mining makes on natural retention areas in river and meadow regions.

These explanations clarify the enormous extent to which entire land areas will deliberately and in principle be altered in future years through mining activity. The annihilation of all vegetation and the destruction of the natural geological structure is necessarily associated therewith. This not only signifies that production capacities of the most manifold type will

be deleted, but often also that regions will be lost which are quite significant for human recreational purposes in industrially congested areas. Other negative effects result from the point of view of pollution from noise, dust, and dirt.

Mining activity with the most modern technical means inflicts enormous destruction on cultivations which have been built by nature and by man for hundreds and thousands of years. In view of this destruction, one fact provides an optimistic mood: Under our social circumstances, the best presuppositions exist to allow the socially necessary destructive phase of human activity to be followed by a constructive phase.

Already today, a series of examples shows that, as the result of mining activity and of the subsequent purposeful measures of reclamation, the land of mining areas has been restored so that its ecological value must be estimated higher than before the beginning of mining activity.

This circumstance, however, is opposed by numerous cases in which massive efforts are necessary to do justice to the significant requirement of creating an environment worthy of socialist society, through the restoration of mining lands.

Our cultivated land is directed towards maximum production. The realization that it must also fulfill important ecological functions creates the necessity of paying increased attention to questions of the deliberate development of complex land restoration involving mines. It is no longer sufficient to consider recultivation as a specific problem of land cultivation for plants or for forests, but rather as a complex of measures to create restored lands in the train of mining. Besides high agricultural and forestry production, these lands will as much as possible do justice to the requirements posed from an ecological point of view in the predominantly densely settled mining areas of the GDR. It must here be taken into account that increasing significance must accordingly be ascribed to the principal social task of further increasing the material and cultural living standard of our people as well as to the satisfaction of the recreational needs of the workers. This task seems to be opposed by the requirement for the most effective possible utilization of each square meter of ground - which likewise holds for dumping areas - as well as by the constant intensification of agricultural and forest production. The objective of this intensification is to maximize the creation of foodstuffs to supply the populace and of raw materials for industry. What is involved here, however, is not a real contradiction, since high plant production in agriculture and forestry is a consequence of effective soil use and likewise represents a significant ecological concern.

In this sense, even an intensively used agricultural ground area permits multiple utilization.

Problems of Planning Land Restoration Involving Mines

Brown coal mining operations in the GDR are bound by legal determinations to high-quality immediate reclamation of all areas which have been used by it for mining but which are no longer necessary for this purpose. This concerns directly devastated ground areas as well as terrain that has not actually been scarred but which has been impaired by the transport of excavators, borings, trestles, and the like. Furthermore, the mining operator must reach agreement with the respective authorized regional council - which bears the full responsibility for his territory - concerning the purpose of reclamation (agriculture, forestry, restoration of the water economy, restoration as a recreational area, or otherwise). He must reach such agreement for all ground areas for which mining use is anticipated and he must already do so before mining utilization begins.

This agreement must be specific over the respective anticipated time of the plan, with respect to the type, extent, and period of reclamation. It must be set down as a plan addition to the annual plans. The type of future utilization of areas reclaimed from mining is already regulated in principle in paragraph 13 section 1 of the mining law of the GDR. It says here: "Land areas used in the implementation of the exploration-, winning-, or storage-right are again to be reclaimed in their proper quality and preferably for agricultural uses, immediately after their mining use has terminated. If agricultural utilization cannot be achieved or if such utilization does not correspond to economic and territorial requirements, the land areas are to be reclaimed for forestry or for other purposes."

The value of land restored from mining operations depends to a large extent on its utilization. Consequently, decisive significance must be ascribed to the determination of the use type. The requirements put to a complex land restoration involving mining are no longer satisfied here by offers from the mining industry to implement viewpoints appropriate to open pit mining technology, that is to designate cohesive soil for agricultural use, slopes for green areas and for forestry, and residual holes for water economy. Undoubtedly, the type of piled-up earth material is normative in its significance for the type of future use. Perspectives of mining technology, such as the extraction procedures used, the type of dumping (interior or exterior dumping, elevated or submerged dumping) also direct the design of the terrain for different directions of utilization. However, social requirements and their reflection in the respective territory are decisive in the shaping of land restoration involving mining. Accord with these requirements must be reached, while taking into account scientific, economic, and ecological conditions.

In planning land restoration involving mining, it likewise is not sufficient to start only with the narrowly delimited area immediately devastated by mining. Rather, it is necessary also to include in the considerations all the boundary areas, together with their economic functions. In principle, the interests of particular economic areas are here to be subordinated

to the overall social and territorial interests.

In determining the proportion of agriculturally used area in the reclaimed land area, first consideration must be given to the requirements of the socialist agricultural operations operating at the boundary zones of the open pit mines, i.e. to their production tasks as well as to their complements of working forces and other capacities.

With the transition to industrial forms of production, particularly animal production, in the process of further concentration and specialization, however, changes must be noted in the relationships between production in the boundary areas and the utilization of dumping areas. These changes result particularly from the fact that the necessary replacement investments for devastated production plants in the open pit mining field are in principle set up with a view to industrial production. In the boundary areas of open pit mines, the corresponding presuppositions for this are frequently not given, with respect to the required improvement areas, grazing areas, water requirements, and the like.

It is always possible, in the economic interest, to extend the proportion of dumping areas to be used agriculturally beyond the extent necessary for business operation. The necessary presuppositions for the LPG (Agricultural Producer Cooperative), VEG (State Farm) and their KAP (Cooperative Crop Production Departments) whose economy involves the dumping areas, can be created, if necessary, through the furnishing of government means. It therefore also appears suitable to assign locations to preliminary agricultural use, even if these locations will at a later time be used otherwise (for example as a parking area or as a picnic area for anticipated recreational regions).

Ground areas that are as large as possible, flat, but slightly sloped are to be provided for agricultural use. Such areas afford surface drainage without erosion damage. With respect to surface design, the utilization of modern agricultural machinery and equipment in complex use is to be taken into account here. The fields should here have parallel boundaries, and field sizes from 40 to 60 ha are desirable for the plant-producing ground, from a technological view and under the conditions of industrial plant production.

Tilling the soil in accord with the requirements of recultivation provides two results: On the one hand, a rapid increase of soil fertility, that is the transformation of the mining dump substrate to a productive planting site, and on the other hand the immediate inclusion of these areas into the reproduction process of the economy. It must be noted here that certain minimum requirements must be placed on the quality of the dumped material in order to guarantee effective agricultural utilization and in order to avoid subsequent intense economic effort to develop soil fertility. In connection with the transition to industrial forms of animal production and with the associated manure operation, it appears necessary, however,

to subject the so-called boundary sites to more detailed examination with respect to their suitability for agricultural production. (The extent to which groundwater may rise to the surface and consequently be endangered from the manure still remains to be investigated.) This would entail the consequence that industrial installations for animal production should preferably be established in the neighborhood of larger dumping complexes of the Niederlausitz. Because these complexes are little suited for agricultural production, they have primarily been directed towards forestry utilization. Intensive feed production should be implemented in these areas, in connection with the utilization of the resulting manure.

The fraction of areas to be established for agricultural utilization is in the first place determined according to economic viewpoints of public enterprise. On the other hand, the fraction of areas to be used for forestry is determined more strongly by ecological requirements, in addition to the actualities of soil science.

The fraction of area necessary for forestry utilization can consequently be estimated with much more difficulty. For this it is necessary, to take into account, besides the geological conditions of the soil, the relief of the dumping areas and the forest component of the larger region, in connection with the population density of the boundary area of the open pit mines. Beyond this, protective plantings are of great significance in shielding town sites and highways against wind, dust, and noise. The width of such plantings depends on the degree of protection and on the chosen type of tree. Other wooded plantings are required on the slopes of above-ground dumps, dumping areas, residual holes, and other terrain features. Forest utilization should here as a rule extend beyond the shoulder of the slope and the foot of the slope. If these minimum requirements are met, further forestry areas can, under some circumstances, be put into use with the sole objective of wood production.

The requirements concerning soil quality, surface formation, and relief are less severe for forestry utilization than for agricultural utilization. For efficient forestry utilization, however, it is also necessary to provide large area complexes which are connected as much as possible. Cultivable soil material should here be available more massively than with agricultural utilization. Utilization and tilling of the soil is determined with a long view when forest areas are established. With agricultural utilization, the process of soil formation can be continuously controlled through tilling the soil, fertilizing it and choosing the type of plant. With forestry utilization, however, this is possible only to a limited extent. Areas used in forestry do not as a rule provide a yield before they are old enough for the wood to be used as poles. The utilization of agricultural areas should in the first place be effected with the perspective of obtaining high and stable yields. By comparison, the utilization of areas for forestry should take into account, besides wood production, even more their ecological function. This must be taken into account in choosing the type of tree for establishing timber. This means that a

departure must be made from the planting of large poplar resources, although such planting is indicated from the perspective of quick production. Ecologically more valuable timber should be established, even if such timber provides a yield only at a later point in time.

Special problems exist with respect to making the residual holes of open pit mines accessible and useful for recreational purposes. The number of residual holes from open pit mines which have hitherto been created and which are still to be created from mining activity is considerable. According to Preissel (5), there are 330 residual holes (1970) in the region of the Niederlausitz brown coal district alone. Of these, 234 come from brown coal mining. By 1985, another 25 residual holes will be added here. In the Leipzig-Altenburg brown coal region, 24 larger residual holes exist at this time. By the year 2000, these will increase by 10 intermediate residual holes and by 9 very large terminal residual holes.

Residual holes filled with water nearly always genuinely enhance the scenery. Besides multiple tasks within the framework of their utilization for the water economy (surface water retention basins, ready availability of water for consumption in industry and agriculture, and more of the like), their utilization for recreation is of great significance. But the possibilities for using residual holes depend strongly on the quality of the water. Especially when the water predominantly fills up from rising ground water, it frequently appears that the pH-values are quite low, because of the leaching of pyrite and hydromyrite, which are present in the tertiary layers. Improving the water quality is therefore a basic problem which requires urgent solution. The impairment of water quality through the emission of ash and dust from neighboring industrial plants also plays a role here. Only when the water quality is satisfactory can the residual holes be comprehensively used for purposes of water economy as well as for recreation. In general, a pH-value from 6 to 8 and a maximum iron content of 5 mg/l is desired for a residual hole to be useful in the water economy. There is a good chance of achieving these limit values if qualitatively good river water, possibly from the source of the surface water, can be fed in (5).

When a residual hole is filled, the point is to prevent the ground water from escaping from the residual hole escarpments, and thereby to prevent leaching of the dumping areas. This is achieved by feeding in more river water than the inflow of ground water would otherwise be. The water in residual holes from open pit mines can furthermore be neutralized by rinsing in or dumping coal slurry and lime-containing ash (5).

The extent of utilization for the water economy depends strongly on the economic function and on the water-economic requirements of the border area of the open pit mine. On the other hand, the recreational use of residual holes from open pit mines is determined by other factors. Utilization of residual holes for recreational purposes poses requirements beyond those of water quality, especially on the shape and security of the

slopes. Flat slopes (in the area of 1:10 to 1:20 shore sections) should extend at least several meters below the water level. Not only are they necessary for technical safety reasons, but they are also presupposed, in addition to large areas of still water, for a biologically sound lake.

Only farsighted planning and designing of the land restoration involving mining, taking into account the importance of subsequent use, will make it possible already to design the final slope to a significant extent during the running operation of the open pit mine. Subsequent shaping of the slope requires a large economic effort. For this reason, more attention should be paid to this problem.

Recreational sites in forest and water areas are claiming ever increasing significance. Both the demand for bathing opportunities and the demand for water sports are constantly rising. It is therefore necessary to check how much participation the residual lakes from open pit mines will have in recreational use. The spectrum extends from a simple bathing beach with a sales stand and a bathhouse for neighboring communities up to a central resort area, whose significance possibly extends far beyond regional boundaries, and to extensive year-around building constructions such as hotels, cottage settlements, marinas and anchorages, parking lots, hiking trails, and the like. Such installations again influence the infrastructure and the economic function of the border areas of the open pit mines. This is especially true since building construction of larger size should first of all not be erected on the dumps, if at all possible, because their building ground is unsafe, but should be erected on ground with plant growth. By contrast, smaller buildings, picnic areas, parking lots, and the like, can without difficulty be erected on the reclaimed areas. Such installations should be erected and operated by the recreational associations of neighboring communities or by special-purpose associations. But this again requires that demands be analyzed from the point of view of need and of the availability of financial means, working forces, building capacities, as well as from the point of view of the infrastructure.

A special problem arises particularly in the Leipzig region, which is poor in recreational opportunities. This problem is caused, on the one hand, by the devastation of still existing recreational areas through the operation of open pit mines, and, on the other hand, by the very late point in time at which it is foreseen that the residual holes from the open pit mines will be capable of use. The most rapid possible improvement of the recreational situation therefore requires that the mining operation manage its dumping in such a way that the residual holes generated in the running operation of the open pit mine are rather small and as flat as possible. Such holes can more quickly be filled with water. However, it is presupposed for this that flooding with flowing water can be effected.

Mining activity entails numerous negative direct and indirect consequential phenomena. But what has been said indicates that, besides these phenomena, there exist favorable presuppositions for designing the land restoration

subsequent upon mining in the responsible collaboration of all social forces. The restored land can even have significant advantages compared to the initial land. If recreational use is anticipated, for example, the landscape can be brought alive through considered relief design in the predominantly flat regions of the Lausitz and of the brown coal region of Leipzig-Halle. The erection of above-ground dumps can likewise make a contribution in this connection, if their adaptation to the land situation is taken into account.

Ecological perspectives likewise require to attribute significantly greater significance not only to the establishment of extensive areas useful for forestry but also to the planting of quick growing wood. This should include the planting of smaller and otherwise poorly useable areas, the raising of hedgerows against wind erosion, as well as the planting of rows of trees on public roads and streets, and the planting of individual trees at conspicuous points (6).

The financing of the layout of such plantings is generally clarified through appropriate legal determinations. Nevertheless, a lack of clarity still exists with respect to the responsibility for planting and care. This lack of clarity must certainly be removed. In no way can the present state be considered satisfactory, according to which such planting measures are left to the parties with legal rights to the areas. Such measures should be a component of area development plans, with their long-term conception, just like the allocation of large interconnected use areas for agriculture and forestry. By applying industrial production methods, such areas can be efficiently utilized in agriculture and forestry.

In view of the necessity of multiple utilization of land restored from mining, it furthermore does not appear correct to regard recreational use purely from the viewpoint of extended recreation. The dumping complexes which are being used solely and intensively for agriculture and forestry should be evaluated ecologically to provide additional recreational facilities for weekends and holidays, especially in the densely settled Leipzig area, which for decades has been deprived of recreational facilities. Besides the already mentioned measures of planting quick wood, a path layout which is not specified exclusively by efficiency is also relevant here. Besides paths which afford access to shrub wood areas or forest areas, special foot paths could possibly be laid out, which again are bounded by hedges or by rows of trees against areas in agricultural use. Poplar plantings are established, in view of their rapid growth, with the objective of utilizing their timber. In every case, such poplar plantings should be surrounded with planted borders which afford better adaptation to the scenery. Persons engaged in short-term recreational activity primarily move on forest trails and on streets and rarely spend time in the interior of a copse. Consequently, increased attention should also be paid to questions of trail design and trail routes in areas used for forestry. The limit on installing main highways in the extent of the legally prescribed guide values of 10 running meters per are of forested

dumping areas¹ would not be appropriate for these requirements. Given the conditions of multiple land use, and in the interest of improved recreational value of the land, main highways should, under some circumstances, also be laid out beyond these guide values. A more dense network of roads emanating from these highways should afford better access to the area.

Starting from previous reclamation practice, it can be ascertained that, despite successful individual examples, further scientific penetration of the problem of designing land restoration subsequent to mining is absolutely necessary. Scientific bases are at this time especially lacking for decisions of the territorial organs, especially in areas where there exist conflicts of interest. Up to now, such decisions concerning the future design of land restoration involving mining have been rendered more or less spontaneously in accord with offers by the mine operators and with territorial requirements. No time may be lost with proper research on the treatment of the numerous problems still to be solved. Besides creating a necessary scientific background for the complex design of land restoration involving mining, the switch must be set in the direction of immediate conversion of the resulting information into practice. The task involved here requires for its solution the collaboration of institutions dealing with mining, with agriculture and forestry, with water economy, with territorial planning, with ecology, as well as of economic and territorial state establishments (7).

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YUGOSLAVIA

BRIEFS

MEDITERRANEAN ENVIRONMENTAL PROTECTION CONVENTION--Tome Kuzmanovski, assistant to the president of the Federal Committee for Agriculture and president of the Yugoslav Commission for Protection of the Sea Against Pollution, signed the Convention on the Protection of the Mediterranean from Pollution in Madrid on 15 September. [Belgrade BORBA in Serbo-Croatian 17 Sep 76 p 4 AU]

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MOSCOW ENVIRONMENTAL COUNCIL'S ACTIVITIES DESCRIBED

Moscow MOSKOVSKAYA PRAVDA in Russian 9 Sep 76 p 2

/Article by T. Beskova: "Air Under Protection"/

/Text/ In accordance with the Eighth Session of the Moscow City Soviet of Workers' Deputies of the 13th convocation an interdepartmental scientific and technical council for problems of intensifying environmental protection and for an efficient utilization of natural resources in the capital and in the forest-park protective zone was established in October 1973. Important tasks were set for it in the joint decree of the Moscow City Committee and the Local Committee of the CPSU and of the executive committees of the Moscow City Soviet of Workers' Deputies and the Moscow Oblast Soviet of Workers' Deputies on measures to increase environmental protection in Moscow and in the forest-park protective zone in 1976.

At the request of T. Beskova, correspondent of MOSKOVSKAYA PRAVDA, B. Kozyritskiy, the council's scientific secretary, and V. Kostrikov, deputy chairman of the section mentioned below, head of a division of the State Scientific Research Institute for Gas Purification in Industry and Sanitation, discuss the work of one of the sections, that is, for the protection of the capital's air basin.

In 3 years more than 300 installations for the purification of industrial and storm water and 1,800 dust collecting and gas purifying facilities were built in the capital, more than 260 small boilers were closed and most of those still remaining were transferred to less toxic gas fuel.

What is the role of our council in this? We do not have legislative rights, but all our proposals and plans are examined by the Moscow City Executive Committee and often are the basis for its decrees. We get much support from the Moscow City Committee of the CPSU. The city committee of people's

control helps us a great deal. Furthermore, representatives of the central high-altitude hydrometeorological observatory, the sanitary epidemiological station and the State Inspectorate for the Control of the Operation of Dust Collecting and Gas Purifying Facilities are members of our council. Using their legal rights, they impose fines on violators and close some of the most harmful production sections.

One of the council's basic tasks is to coordinate the efforts of all the capital's organizations and enterprises aimed at environmental protection. Six sections work in our council, that is, for noise and vibration control, for the protection of rivers, reservoirs, the air basin and green plantings, for sanitary cleaning and purification of areas and for the control of pollution by motor transport gas. Each has its own coordinating center. For example, in the section for the protection of the air basin this is NIIOGaz /State Scientific Research Institute for Purification in Industry and Sanitation/.

In the last few years the solution of the problem of protecting the capital's air basin has advanced considerably. A number of Moscow's scientific research institutes have taken up the initiative of NIIOGaz, which undertook the obligation to maximally meet our city's needs for gas purifying facilities. Not only did the institute itself increase the volume of work for Moscow five times, but it also regularly holds coordinating conferences and seminars and gives methodological help to enterprises in training gas purification specialists.

Section meetings regularly hear reports of the State Inspectorate for the Control of the Operation of Dust Collecting and Gas Purifying Facilities on how enterprises solve the task of reducing harmful discharges into the atmosphere. The object of such reports is to disclose shortcomings and ways of eliminating them and of generalizing positive experience.

It should be said that there is such experience. The All-Union Soyuzenergolegpromavtomatika Association and the Giprogasoochistka Institute give extensive help to the capital. A special division for nature preservation was created in the Ministry of Chemical Industry, where overall plans for the protection of the air basin for all the sector enterprises located in Moscow were worked out. Rayon party committees and rayon executive committees took part in the solution of this problem. For example, managers of scientific research institutes, design offices and enterprises regularly report on the measures taken by them to clear industrial discharges into the atmosphere at the meetings of the office of the Krasnogvardeyskiy Rayon Party Committee.

Unfortunately, however, there are also other examples. According to our data, in the city there are about 50 organizations which can greatly help the capital to improve its air basin. We sent letters to most of them asking to advise the council of the work being done in this direction and of plans for the near future. Strange as it may seem, the largest organizations did not answer us. The directors of the State Scientific Research

Institute of Nonferrous Metals, under whose jurisdiction the entire start-up and adjustment Energotsvetmetochistka Administration is, twice ignored our request.

The directors of the All-Union Scientific Research Institute of Cement, from which we have the right to expect considerable help, refer to the fact that the head institute is located in Novorossiysk, apparently, believing that this fact relieves them of the solution of the capital's urgent problems.

We have prepared overall plans for the protection of the air basin for 12 ministries. However, some of them did not even examine our proposals. Meanwhile, in ministries and departments it is advisable to organize special subdivisions which would deal with environmental protection problems. This work should be done constantly and systematically. All the existing gas purifying and dust collecting facilities need an annual check on their working order. It is also necessary to increase the reliability and efficiency of the existing equipment and to work on the development of new techniques which would make it possible not only to reduce, but in individual cases also to completely eliminate harmful discharges into the atmosphere.

The construction of purifying facilities at all the existing enterprises in Moscow is to be completed during the current five-year plan. The solution plan for the introduction of an automated system for controlling the state of the air basin, which will make it possible to obtain express information on the slightest changes in the air composition and to take immediate measures, is being prepared.

We are rightly proud of the fact that the capital's air basin is much cleaner than in other large industrial cities throughout the world. However, a great deal still has to be done. A successful implementation of the outlined plans is the most important condition for solving the task of transforming Moscow into a model communist city.

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CAPITAL INVESTMENTS IN ENVIRONMENTAL PROTECTION DISCUSSED

Moscow PRAVDA in Russian 24 Sep 76 p 2

/Article by P. Poletayev, chief of the division for nature preservation of the USSR State Planning Committee: "In Order To Beautify the Earth"

/Excerpts/ A set of measures aimed at further improving nature preservation and the utilization of natural resources are to be implemented in a planned manner in the Soviet Union. First of all, it is necessary to increase the output and to greatly improve the provision of enterprises with equipment for purifying gases and sewage and processing solid household waste. The production of basic gas purifying and dust collecting equipment in a volume of 52,000 tons is planned in 1976. However, the need for it is much greater. So far the situation with regard to the production of equipment for sewage purification is not better. As yet not enough machines for refuse processing plants and refuse transshipping stations are manufactured. The situation with regard to the production of chemical materials for water supply and sewer installations and gas purifying and dust collecting units is not satisfactory. Machine building ministries and the Ministry of Chemical Industry should pay more attention to meeting the needs of the national economy for this important output.

Lowering the level of pollution of the natural environment largely depends on the organization of control over the sources of discharge of harmful substances into the atmosphere, water basin and soil. The organization of such control presupposes the development of scientifically substantiated standards and norms of the maximum permissible discharge in the country's specific geographic points. In this connection it would be advisable for all ministries and departments under the methodological guidance of the USSR State Committee of Standards to develop the drafts of such norms and approve them in accordance with the established procedure in the next 1.5 to 2 years. It appears that control over the observance of the maximum permissible discharge by industrial enterprises should be entrusted to the Main Hydrometeorological Service under the USSR Council of Ministers, the Ministry of Reclamation and Water Resources and the USSR Ministry of Agriculture.

In our opinion, there is an urgent need for the development of a single method of determining the economic damage resulting from environmental pollution, as well as the efficiency of capital investments allocated for nature protection measures. As long as this is not done, many enterprise managers will consider the expenditures on nature preservation unprofitable.

Our state is carrying out gigantic capital construction. Large agrarian and industrial complexes are being formed on large expanses and the transfer of the runoff of northern and Siberian rivers to southern regions and many other things are being planned. This strengthens the country's economic might and contributes to an increase in the material well-being and cultural level of the Soviet people. At the same time, during the implementation of such projects measures to prevent possible negative ecological consequences are not always ensured. Practice convinces us that an all-around expert check of these types of projects should be raised to a qualitatively new level.

As industrial and agricultural production develops, urbanization grows and the size of the population increases, serious problems of protecting animals and poultry, biological resources of rivers, lakes and seas, wild vegetation and forest resources arise. Their solution must not be postponed to tomorrow. The USSR Academy of Sciences and the academies of sciences of the Union republics together with scientific research institutes of national economic sectors should intensify their investigations in the field of the economics of nature utilization.

Planned economic management, an active participation of the population in the protection of the country's natural resources and a thrifty and careful attitude toward all natural resources guarantee that we will preserve and beautify our land for the present and future generations of the Soviet people.

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'POST' AIR POLLUTION CONTROL LABORATORY IN MOSCOW DESCRIBED

Moscow MOSKOVSKAYA PRAVDA in Russian 1 Aug 76 p 2

[Article by T. Starostina: "Air Under Control"]

[Text] These unusual silvery installations, which have recently appeared on Kolkhoz and Komsomol squares, attract attention right away. A high mast with a wind vane, which has a horizontal rod strictly directed to the north, is installed on their roof. Here the doors are opened three times a day, that is, at 0700, 1300 and 1900 hours.

This is a novelty--the "POST" overall stationary laboratory for air pollution control. It was designed in Leningrad 2 years ago. This year it was exhibited at the hydrometeorological service pavilion at the USSR National Economic Achievements Exhibition and in the summer it appeared on the capital's noisy thoroughfares.

The content of discharges of industrial enterprises and municipal transport into the air is measured by the "POST" laboratory. The points on Komsomol and Kolkhoz squares have not been selected by accident. It is well known that they are some of the capital's overloaded transport centers.

The finest filter is inserted in the flange of a hose connected with a pipe. An automatic device connects the pump at a preset time. In the laboratory the filter will be subjected to a careful analysis, which will help to accurately determine the percentage of dust in the capital's air basin at a specific time.

The concentration of harmful admixtures in the atmosphere depends not only on the time of the day. The study of the effect of weather conditions on the state of the air medium is very important for scientists. This will help not only to control, but also to forecast it the way meteorologists now forecast weather. Therefore, a meteorological station is a necessary part of the "POST" laboratory. Atmospheric pressure, air humidity and temperature and wind direction--all these are recorded at the station simultaneously with the state of the air medium.

The following is another characteristic of this laboratory. Many indicators are recorded here automatically. The "POST" station also made it possible to increase the number of measurements and their reliability, because air samples are taken at specific points at the same time.

"The 'POST' control and measuring complexes will help to improve the existing system of observation of the state of the capital's air basin," says Valentina Konstantinovna Petrenko, chief of the division for the study and control of environmental pollution of the Central High-Altitude Hydrometeorological Observatory. "The information received from the station comes to us and is processed and analyzed. The observation data are transmitted to party and Soviet organizations, scientific research institutes, enterprises and sanitary epidemiological stations, where specific measures to sanitize the atmosphere and to improve the state and intensify the protection of the environment are developed."

Another station will be put into operation this summer and 11 laboratories will operate in Moscow before the end of the year. The number of "POST" complexes will increase in the capital. An automated network for controlling the pollution of the city's air basin is to be established on their base.

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STATUS OF LAKE BAYKAL ENVIRONMENTAL EFFORTS DISCUSSED

Moscow TRUD in Russian 7 Sep 76 p 2

[Article by K. Proday-Voda, secretary, Buryatskaya Oblast CPSU Committee, Ulan-Ude: "The Pure Baykal Waters"]

[Text] The tempestuous development of production forces in Eastern Siberia, the construction of new enterprises, and the expansion of the communal economy made many people fear that the Baykal may suffer and the unique natural complex of a lake-sea may be destroyed as a result of the side effects of technical progress.

In 1966 the Baykal Cellulose Plant was built on the lake's shore. At that time the construction of a second big enterprise for the expensive processing of timber -- the cellulose-cardboard combine -- was launched. Special measures had to be taken to insure the high quality purification of their sewage waters.

In January 1969 the USSR Council of Ministers passed a decree encompassing the practically entire set of problems related to the preservation and sensible exploitation of the natural resources of the lake's basin. Two years later, the CPSU Central Committee and USSR Council of Ministers passed a decree on additional measures dictated by concern for the preservation of the resources of the Lake Baykal basin.

The deadlines have expired. The time has come to sum up the work done. Let us immediately say that the results cannot fail to satisfy everyone who cares for Lake Baykal. Now, at the beginning of the year, a state commission signed the final documents on the cleaning of the lake shores and the banks of rivers flowing into it from timber floating waste. These words conceal great efforts. It is a question of changes in the transportation system for the development of the forests in the lake's basin. Some 1200 kilometers of timber hauling motor vehicle roads were built along the old timber floating lines. The termination

of the floating provided the national economy with 40 percent higher output per hectare of cutting area.

The course charted toward rational utilization of natural resources around Lake Baykal raised the question of the comprehensive processing of the timber. In turn, this called for the concentration of its dressing areas. Instead of 90 small lower reach warehouses scattered along the banks of taiga rivers, only 8 big and comprehensively mechanized warehouses remained within the Zabaykalles association. The concentration of the grading of felled logs at such warehouses created such a stock of timber waste that it became economically profitable to build big shops for their processing. Today the overall capacity of these shops enables us to produce 200,000 cubic meters of industrial chips. This amount will be increased by yet another 50 percent in the forthcoming years.

Currently the Onokhoy timber combine is producing 70,000 square meters of pressed wood tiles made of timber sawing waste and fuel wood. Shops for the manufacturing of arbolite panels were built at the Khandagatayskiy and Chelutayskiy industrial timber farms. On the basis of this output, Zabaykalles set up its own housebuilding plant which will install in each timber felling settlement 20,000 square meters of comfortable housing per year .

The Zabaykalles association formulated a detailed comprehensive program implemented with the help of the USSR Ministry of Timber and Wood Processing Industry, for the conversion of all enterprises to waste-free technology. The Ulan-Ude Furniture - Timber Processing Combine has already become one such model enterprise. The timber supplied here in logs provides, above all, lumber; cutting waste provides industrial chips; the sawdust is hydrolized and the bark is converted into valuable tanning raw material.

But let us go back to the banks of the taiga rivers. Immediately following the promulgation of the decree, special brigades were set up in all Zabaykalles industrial timber farms which retrieved sunken logs from the river bottom, cleared the banks of waste, plowed the areas of the former paper storage warehouses, and planted grass. By the end of 1972 a legal document was signed on the cleaning of the first of the former main floating lines -- the Ona River, 133 kilometers long. The Barguzin, Itantsa, Angyr, and other rivers followed. The overall length of the rivers rescued from pollution totaled almost 2000 kilometers. Baykal fish, including the famous omul, reappeared in the upper reaches for spawning. These effective measures, as well as the temporary ban on omul fishing, made possible the rebuilding of industrial fish stocks as confirmed by control fishing now conducted in Lake Baykal under the guidance of ichthyologists.

The struggle for the purity of the lake was waged not only in timber logging areas. The decree called for completing the construction of purification systems in Ulan-Ude and adjacent areas, as well as at the Baykal Cellulose Plant and Selenginsk Cellulose-Cardboard Combine. This is a major and complex project. In the past five-year plan, over 58 water protection projects were completed in the republic, including the Ulan-Ude urban filtering systems which are processing 105,000 cubic meters of sewage per day. Filtering systems were built at the TETs, the Aviation Plant, the Talovskiy Reinforced Concrete Structures Plant, and others.

However, a number of enterprises do not have the possibility to organize the comprehensive purification of sewage waters. In this connection, the construction of two other main collectors and a big pumping station was undertaken in the republic's capital. Unfortunately, a lag has been allowed to occur in the building of these projects. Enterprises such as the Il'ka Automotive Vehicle Repair Plant, the Novo-Bryansk Machine Repair Plant, and the dairy industry association have delayed the construction of purification systems. A total of 45 million out of 58 million rubles allocated to the republic in the Ninth Five-Year Plan for the creation of filtering systems were utilized.

As generally recognized, the Selenginsk Cellulose-Cardboard Combine and the Baykal Cellulose Plant have today some of the best filtering systems on earth. They insure the mechanical, biological, and chemical neutralization of the sewage waters and their saturation with oxygen. The creation of a filtering complex is considered a major step in the solution of the international problem of the purification of industrial sewage. Naturally there is active scientific participation in this matter. The creation of a department of ecological toxicology is an important landmark in the implementation of the decree on the protection of Lake Baykal. The task of the department is to analyze, on a daily basis, the water which, covering all the stages in the production of cellulose and the filtering, goes back to nature.

The excellently equipped ecological laboratories became centers of research problems. The main task now is to reach a condition for sewage waters so as not to dump them anywhere but to reuse them on the basis of a closed cycle.

The implementation of this task will be achieved soon at the Selenginsk Combine. Cost estimate work on a water circulation system is nearing completion. Installation outlays will total 15 million rubles.

All these and other measures reliably secure not only the total protection but the multiplication of natural resources in the Baykal basin and of Lake Baykal itself. However, the further development of the republic's

economy raises a number of problems related to the development of this natural complex. It is above all a question of timber resources. Even though the annual natural timber growth in the republic is in excess of 17 million cubic meters, in accordance with the new felling rules in the Baykal basin we have the possibility to procure no more than 4 million. This is two-thirds of Buryat requirements. The new rules call for a more rigid "age census" for the standing timber. Today the only trees which may be cut may not be less than 160 years old. This is an unjustified measure. Incidentally, this is not exclusively my view. This is believed by many local workers. It is supported by Academician N.P. Anuchin, a noted scientist and our biggest forestry expert. This is no accident, for even when the limit was 120 years, procurement workers rarely came across an absolutely healthy tree: the standing tree was rotten beginning with slightly more than 1 meter from the butt. We would like to direct the attention of the USSR Council of Ministers State Committee for Forestry to the respective directival documents stipulating the need to insure the "prompt utilization of ripe and overripe growth" and request that the question of the age of trees to be felled be reconsidered.

This is one aspect of the matter. The other one is that natural growth covers the entire territory of the republic while cutting is taking place only in inhabited and developed areas mainly within the boundaries of the water protection area. This means that the areas of the northern Yeravninskiye forests, where felling would have absolutely no influence on the ecological balance of the lake's basin, remain untouched. For many years we have raised with the USSR Ministry of Timber and Wood Processing Industry the question of the establishment of new industrial timber farms in the Yeravna forests. Strange though it may seem, such profitable suggestions have been ignored.

This situation could face us with the need to import raw materials for the timber processing and cellulose enterprises in the republic from other parts of the country. The development of the timber areas in the zone of the Baykal-Amur Main Line is also being delayed unjustifiably. The procurement and processing of timber locally would enable us to meet the growing requirements of transportation construction workers in the building of homes and industrial projects, and to avoid the importation of prefabricated housing from a 1000 kilometer distance.

Anyone who has visited Lake Baykal will never forget the stern beauty of its banks -- bare rocky coniform hills alternating with the dark coniferous taiga breaks and bare snow spots above the hot sand of the dunes. The eye can see through dozens of meters of the crystal clear water and the air is so transparent that the opposite bank, 80 kilometers away, is always visible. However, Lake Baykal is famous not only for its landscape. It is an area offering all necessary conditions for

the development of a network of balneological, mud, and climate resorts and for the development of mass tourism. Comparing the physical and geographic characteristics of this Siberian pearl with famous lake centers of recreation and tourism such as Issyk-Kul and Sevan, Balaton in Hungary, and Geneva in Switzerland, specialists have proclaimed Baykal one of the most outstanding lakes in the world. This is unquestionable.

I have in front of me the book "Organizatsiya Zon Otdykha i Turizma na Poberezh'ye Baykala" [Organization of Recreation and Tourism Zones on Lake Baykal Shores]. It provides a description of scientific and planning projects carried out by Leningrad specialist. The plans are excellent. They call for the building of five national nature parks with hotels, motels, cottages, and camping grounds. However, the tourists of today are unwilling to wait that long. Their numbers are growing every summer. How does Lake Baykal welcome them? Alas, with nothing to boast of. There are four trade union tourist bases in the entire Irkutskaya Oblast and in Buryatiya, excluding poorly organized departmental family boarding houses. There are even fewer trade union health centers.

Yet this is taking place today, when tens of thousands of builders of the Baykal-Amur Main Line are at work in the northern part of Siberia, needing rest. That is why, completing this talk on the Baykal natural complex, let us remind the personnel of the Central Council for Tourism and Excursions and of the Central Council for the Administration of Trade Union Resorts that Baykal exists and that, as before, it is pure and beautiful, and that a recreation industry and comfortable traveling could become just as important indicators of the utilization of its wealth as all other national economic sectors.

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TREATMENT FACILITIES AT UKRAINIAN PLANTS DESCRIBED

Kiev RABOCHAYA GAZETA in Russian 16 Sep 76 p 2

[Article: "Sea Hygiene"]

[Text] A powerful installation for rendering industrial drainage harmless was commissioned at the Makeyevka Byproduct Coke Plant. At first the harmful production waste is neutralized by chemical methods and then water is cleaned by means of microorganisms. Special bacteria thrown into settling ponds "eat up" the toxic impurities and with this completely close their access to the Gruzskaya River flowing through the city.

"With the commissioning of the new system of biochemical water purification," says V. I. Kalinovich, chief of the oblast inspectorate for the preservation of nature, "the first center for an overall plan for the protection of the Azov Sea basin has been realized in Makeyevka."

For example, installations with special filters, whose construction was begun in the Gorlovka Stirol Production Association, will clean 55,000 cubic meters of water daily. The Donetsk Metallurgical Plant, the Azovstal' Plant and the Plant imeni Il'ich in Zhdanov, as well as 19 coal enterprises, will receive new circulating water supply systems.

A reliable barrier to the pollution of sea water is also being created in the Zhdanov Port. All the vessels assigned to it are supplied with special devices for the collection of waste and prevention of spillage of petroleum products. Sanitation vessels, which clean the surface of the port water area and the outer roadstead from the petroleum film, will also come to the aid of seamen.

"During the Tenth Five-Year Plan alone 200 million rubles will be spent on the construction and reconstruction of purifying installations, which will protect the Azov Sea from pollution," V. I. Kalinovich said in conclusion. "By 1980 the overwhelming number of the oblast's industrial enterprises will completely stop the discharge of unpurified runoff into local reservoirs."

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USSR

BRIEFS

PURIFICATION INSTALLATIONS IN VLADIVOSTOK--Vladivostok. The first stage of purification installations was put into operation in the eastern port--the largest new transport construction project in the Far East. The complex system consists of dozens of kilometers of pipelines, a biological purification station and a sea oil refuse collector. The capital investments in the preservation of the surrounding nature totaled 800,000 rubles. /Text/ /Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Sep 76 p 1/ 11,439

PURIFICATION FACILITY AT KRASNOYARSK--Buguruslan, Orenburgskaya Oblast. An industrial sewage purification facility was put into operation at the Krasnoyarsk Oil Field in Orenburgskaya Oblast. It is designed for the purification of 1 million cubic meters of water annually. The personnel of the Buguruslanneft' Administration was the first in the sector to change over to the utilization of sewage for maintaining the reservoir pressure. A similar facility has been operating at the Zaglyadinskoye Field for more than 2 years. Specialists have estimated that 2.5 million cubic meters of fresh water have been saved during that time. The new, even more powerful facility makes it possible to pump sewage purified from mechanical admixtures into the reservoir. This will contribute to prolonging the life of injection wells and will lower the expenditures on major repairs of equipment. Most importantly, petroleum workers will save a great deal of fresh water and will preserve the inviolability of the surrounding nature. /Text/ /Baku VYSHKA in Russian 21 Sep 76 p 3/ 11,439

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CYPRUS

DANGERS FROM AGRICULTURAL CHEMICALS REPORTED

Nicosia TA NEA in Greek 20 Aug 76 p 7

[Article by P. Arodas: "Beware of Parathion and of Agricultural Chemicals"]

[Text] Two days ago the mountainous village of Lasa in the Paphos District was very upset as a result of an unexpected tragic event: Kharalambou Khrysostomou had died so suddenly and so untimely at the prime of her life--she was 23 years old. Her stricken husband, her mother, father, brothers, sisters and relations are weeping and mourning over her fresh grave. Her two small children are crying and are asking for their unfortunate mother--and they will be crying through all their childhood years because of the blow fate has dealt them, leaving them orphans and causing them to lose the irreplaceable love and care of their mother.

The question as to who is to blame was not raised by many. Most people simply said that her time was up!!! But for those who know the dangers threatening our farmers and workers who are working with agricultural chemicals and especially with the strong pesticide parathion, news of Kharalambou's death has been one more reason for raising the serious question concerning measures which must be taken in order to avoid mourning more lives in the future.

It was not the first time that Kharalambou was spraying her vineyards with parathion. She did--just as her fellow villagers--spray them every July and August and nothing happened. When the spraying lasted a little longer or whenever there was a slight wind she felt some dizziness. The frequent sprayings emboldened her so as to avoid using protective measures which made her feel uncomfortable due to that excessive summer heat, until 2 days ago when the chemical which was to save her grapes by exterminating the noxious insects destroyed her.

Who Is Responsible?

The question arising first of all concerns the responsibility for the poisoning of this young woman. Undoubtedly there are persons of responsibility for those who deal with questions concerning people's health. For them responsibility lies above all with our society which does not enlighten

the farmer about deadly dangers to which he is exposed through spraying without taking necessary precautions for his protection. The blame lies also with the government, the appropriate ministries, the appropriate agricultural or trade union organizations which have not undertaken a campaign to enlighten farmers and those land workers who are often occupied with agricultural chemicals--to persuade them that they play with death if they fail to take protective measures when spraying with parathion or with any other strong pesticides or fungicide chemicals.

Medical Authorities Asked

For an investigation on the extent of both the dangers and the problem, we first asked the opinion of medical authorities who expressed deep concern for the year by year increase of the number of poisonings due to agricultural chemicals. "Unfortunately," they pointed out, "during spraying periods we have too many parathion poisonings. If an investigation could be made in hospitals and clinics on a worldwide basis it would undoubtedly show that tens of farmers and other land workers are being poisoned daily during spraying periods. The parathion, they pointed out, is an extremely drastic pesticide which enters the human organism through inhaling, and through the skin or food. It is, in other words, a poisonous agricultural chemical which is absorbed in various ways by the human organism." With regard to protective measures this same source told us.

"The many poisoning symptoms we have in Cyprus show that we need a program to enlighten farmers and land workers as well as the public in general about dangers inherent in parathion. Farmers and workers using agricultural chemicals and especially parathion must be made aware of taking necessary measures during sprayings (special masks, gloves, etc.). They as well as all people must know and become conscious of the fact that they should not eat unwashed fruits which have been sprayed at least 3 weeks earlier.

A Wonderful View

Having in mind the mentality of our farmers and the indifference shown in using protective measures, appropriate medical authorities pointed out that the Ministry of Agriculture must undertake a very extensive educational campaign. Characteristically, a physician said: "The Ministry of Agriculture had proclaimed a Safety Week for prevention of industrial accidents and each year conducted an intensive crusade for enlightening workers about dangers of mutilation or injury they faced at their jobs. The police department is also doing the same thing to prevent crimes, noise, etc. Why could not the same be done in the case of agricultural chemicals also?

"I am of the opinion," he added, "that the Ministry of Agriculture could undertake in cooperation with other agencies such an initiative which could have very good results. This should be done as soon as possible because the Cypriot farmer has learned to use on a very large scale these agricultural chemicals and therefore the dangers he faces daily are very serious."

The view of this physician is very interesting and is worth being studied by the ministry. Finally the same medical authorities said that among the indispensable measures to be taken in the case of working with chemicals should be reduction of work hours.

Dangers of Sexual Impotency

The parathion case, however, is not unique. Agricultural chemicals are harmful to the human organism and their effect is being studied today by research institutes and teams of doctors in developed countries. Such a team of British doctors published recently in the British Medical Journal a very interesting study on the terrible effects of agricultural chemicals on the human organism. Their conclusion was that these chemicals are causing sexual impotency to workers in British farms. Publication of this scientific paper by the British doctors had created strong impressions and reactions. It presented full data of treatment given to each case separately which, as the article pointed out, depended on the time period each patient had spent spraying such chemicals. The problem of poisoning from agricultural chemicals and their effects on the human organism must therefore be of concern to Cyprus also where insecticides and fungicides are being used quite extensively.

Above all expediencies and interests stands the health of workers, the health of tens of agricultural families, and the health of men and women to whom we must provide timely protection. Otherwise we shall mourn ever so often new victims of poisoning and the crying and suffering of orphaned children--as in the case of Kharalambou--will haunt us.

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SWITZERLAND

EEC FOR COORDINATION OF ENVIRONMENTAL PROTECTION

Zurich NEUE ZUERCHER ZEITUNG in German 19/20 Sep 76 p 1

[Article by a NEUE ZUERCHER ZEITUNG correspondent: "For a Coordination of European Environmental Protection; EEC Parliamentarians on the Poison Gas Contamination in Seveso "]

[Text] Brussels, 17 September--The European Parliament took up the TCDD contamination in Seveso on the request of the Socialist and Christian Democratic factions. The colorless debate late Thursday evening in Luxembourg in front of an empty house -- in addition to little more than a handful of speakers, only a few delegates were present -- led more to a human profile of the individual party groups than to new knowledge. Once again it became clear that environmental protection, as a result of the technical and scientific progress, has become an all-European task. In the name of the EEC, Vice President Scarascia-Mugnozza promised that the Brussels organ would determinedly carry on its legislative duty to improve the joint environmental protection regulations.

Human Solidarity and Responsibility

The statement of the European parliamentarians was essentially carried by three fundamental thoughts. The TCDD contamination in Seveso was considered a human tragedy, the genetic effects of which cannot be immediately foreseen. With its debate the parliament wanted to communicate to those affected a sense of humanitarian solidarity in the population of the EEC.

Second, the area of responsibility of private industry was questioned. The behavior of Hoffmann-La Roche, which was said to have exploited Italy's rather lax environmental laws too far, was criticized from the communist, and partly also from the socialist, side. This weighs particularly heavily against an enterprise which has its headquarters in a country with almost exemplary environmental protection. The conservative wing, on the other hand, pointed to the objective difficulties in a legal and scientific sense. One should keep working with a middle-of-the-road environmental policy on as far-reaching preventive measures as possible, without thereby reducing economic progress too much.

Finally, the public sector with its legislative powers should assume the responsibility which befalls it and finally draw the conclusions. In the opinion of the EEC delegates, much stricter legal regulations are forcing themselves on environmental protection on a European level, for it is not the first time that incidents with toxic products have occurred. Comparatively similar "poison accidents" have already happened in the FRG, in the Netherlands and in France, in which Hoffmann-La Roche has been involved at least once. It is urgently necessary to close the existing loopholes in legislation, whereby ways must also be found for efficient controls, they said.

Adherence to the Originator Principle

In his contribution to the discussion, the commission's vice president, Scarascia-Mugnozza, referred to the EEC principle in environmental policy, that the culprit must pay for the removal of his burden on the environment. This so-called originator principle is applied to prevention and to compensation for damages in every case. The commission will carry on with its ongoing environmental efforts in the toxic area. Much legislative work has already been done in transportation and marketing of toxic products, but at present the production of poisonous products has not yet been covered by any EEC regulations at all. The commission will start working on it immediately and look for the best ways in which such dangers can be prevented, he said. Scarascia-Mugnozza further announced a series of research projects and several meetings of experts in the framework of EEC's research policy. In any case, however, the commission and EEC's research facility Ispra in the Seveso catastrophe area are available for all possible aid.

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SWITZERLAND

SAGUF DISCUSSES RADIOACTIVE WASTE DISPOSAL

Reports on German, French, Swiss Experience and Projects

Zurich NEUE ZUERCHER ZEITUNG in German 21 Sep 76 p 11

[Article: "Experience and Projects in the Storage of Radioactive Waste; A Meeting of the Swiss Working Group for Environmental Research"]

[Text] Berne, 18 September--It is not a matter of firing up the often passionate conflicts but rather of providing objective information, it was declared at the beginning of the meeting of the Swiss Working Group for Environmental Research (SAGUF). The fact is, that radioactive waste is already being produced; the subject of the six seminars was whether and how it can once and for all be removed or safely separated from our biosphere. Domestic experience is minimal, to be sure, so that the Swiss experts were only able to put forward projects. It was left to scientists from Germany and France to report on experience and practical experiments.

The German Concept

In the FRG a concept was developed for the "overall waste disposal" for the nuclear power plants, according to which industry is responsible for processing and transportation of radioactive waste, but the government assumes responsibility for the so-called final storage. Dr R. P. Randl from the Federal Ministry for Research and Technology and Dr K. Kuehn from the Institute for Underground Storage explained these plans and additional procedures. While the problem of quantity must be solved for the low and intermediate level waste, it is primarily a heat problem which must be dealt with for high level fission products.

Large-scale experiments are carried out in the Asse worked-out salt mine in Lower Saxony. However, Asse is not intended to be a final storage place, contrary to widespread opinions; it serves only as a final storage research and development site. Low and intermediate level fission products today no longer present any particular problems. The heat release from highly radioactive waste was simulated by heating it beforehand. This did not produce any essential effects on the salt. Insofar as the ionizing radiation can penetrate the glass and steel cylinder it affects at most a distance of 1 meter, again with no ill effects on the structure of the surrounding rock.

The laboratory stage has not yet come to an end, to be sure, but practical experiments are foreseen at Asse in the near future.

To the objection that the salt formation could change substantially in the next 1,000 years before the radioactivity of the high level waste has decayed, it was explained that the salt layers in northwestern Germany were created 220 million years ago and that they were shaped in their present form 110 million years ago; 1,000 years are, geologically seen, less than a short moment. The misgivings that the projected storage areas are too close to the zonal border and therefore are particularly exposed to military operations were countered with the reference that similar storage areas are planned on the other side of the border as well. In addition, a subterranean storage area at a depth of several hundred meters is as well protected as possible.

The French Solution

M. J. Pradel from the Department of Protection; Coordination of Waste in France reported on the procedure in France. There the effects on a unit of water is taken as the measure of the harmfulness of radioactive waste, whereby the natural radioactivity in the ground, the air and the water, which is all too often "forgotten," serves as a basis.

The amount of the waste must first be reduced to a minimum in the production process. After that, it must be reduced in volume and finally stored in such a manner that by means of various barriers -- plastic, asphalt, concrete -- its radiation and direct and indirect influence on people can be held down. Various facilities serving these purposes were developed in France: a compressing machine, a "sintering facility" and finally the various filter materials. The suppliers -- besides the nuclear power plants, hospitals and research institutions also play an important role -- bring their waste to the processing and storage center which is located on the Cotentin peninsula. The corrosion and fire proof containers are stacked in actual pits, in earth mounds and in concrete vaults, that is to say exclusively in artificial constructions, while in Germany geological formations such as rock salt are chosen. The French solutions should be considered impeccable for a short or intermediate period, M. J. Pradel explained. For longer storage, meaning final storage, the decision will have to be made between various options based on future experience and achievements.

Storage Possibilities Viewed by the Swiss

The Swiss contributions by Prof Dr H. Jaeckli of the Federal Technical Advanced School in Zurich, Dr W. Hunzinger of the Federal Health Bureau and Dr L. Hauber of the United Swiss Rhine Salt Works could not rely on practical experience for support. They rather dwelled on the framework of proposals and projects. The Swiss storage concept, "as it is presented today," was explained by H. Jaeckli. Certain petrographic demands must be made on the "host rock" in which the waste is stored, such as waterproof properties, the ability to keep out nuclides, mechanical rock stability, so that

unlined cavities and tunnels can be built, and finally, for highly radioactive waste, great heat conductivity. From a geological standpoint the waterproof protection is of primary importance. In addition, great stability against exogeneous processes such as glacier erosion and landslides and against endogeneous events, such as for example earthquakes, must be demanded.

The Swiss plans focus on anhydrite as the host rock. It only occurs at 30 meters' depth; above it is gypsum. The Swiss experts have decided on this as the only storage possibility. The United States and the FRG prefer salt deposits, Canada granite and Belgium and Denmark argillaceous rocks. Since anhydrite has only been explored very little, experimental tunnels should absolutely be drilled and an underground laboratory built there. The federal authorities which are responsible for the storage of radioactive waste must be able to make decisions on the basis of reliable information and do so quickly, since other countries may no doubt soon no longer be willing to process waste from Switzerland or to store it. The anhydrite program had been methodically pursued since 1968. In constructing galleries for hydroelectric plants or tunnels, as well as in laboratory experiments, it was shown that pure anhydrite is dry, waterproof, stable and up to five times more resistant than good concrete.

Five Sites in the Final Selection

Five anhydrite areas have been picked for test drillings, namely: 1. The Wabrig area in Fricktal in Aargau. Five drillings are planned, but none have been carried out. 2. Le Montet near Bex in the Rhone plain. Here, three drillings have been made. 3. Stueblenen, a flat peak between Lenk and Lauenen, at 2,100 meters altitude. Here as well, no drillings have been undertaken. 4. Glaubenbuelen in the community of Giswil in Obwalden, where the hydrological conditions must first be exactly charted. Non-pure anhydrite wells up in contact with water and it increases its volume by 61 percent; similar well phenomena were most recently seen during the construction of the Belchen road tunnel. Then, 5. The Val Canaria near Airolo. A small tunnel was made here in 1931 in order to explore the construction of a chemical factory, and in 1975 a horizontal drilling was undertaken by the Underground Storage Consortium.

From 1968 to 1972 the search for storage deposits was done by the NOK /Northeastern Swiss Power Plants, Inc./ . Since then, the National Association for the Storage of Radioactive Waste (NAGRA), a member of the Underground Storage Consortium, has been responsible. Cantons and communities have turned against even mere test drillings. So far, it has not even been possible to select the most certain of various possibilities. The laboratory experiments with drill cores of anhydrite are being continued, however. They are to conclusively clarify the behavior of the rock under heat, pressure and radiation, as well as its conductivity and deformation properties.

Opponents of Nuclear Power Plants Appeal to Bonn Government

Zurich NEUE ZUERCHER ZEITUNG 21 Sep 76 p 11

[Text] Berne, 18 Sep--In connection with the First International Congress of Environmental Associations on the "Danger of Reprocessing Plants for Nuclear Fuels and 'Atomic Waste Storage,'" which is taking place in Hanover, 19 Swiss environmental associations and associations opposed to nuclear power plants delivered to the ambassador of the FRG in Berne an appeal to the government in Bonn.

They expect that the government of the FRG "will take notice of and pay serious attention to the worldwide sobering in expert circles" regarding the critical unsolved questions in this area. The associations also point to the fact that the Swiss producers of nuclear energy are to begin with dependent on foreign countries for reprocessing. They see their appeal as an "act of solidarity."

The signers declare themselves to be concerned about the dangers of reprocessing irradiated fuel elements, which presents a technical process which so far has not been fully tested anywhere. Furthermore, it is pointed out that the fate of radioactive waste is uncertain and is "neglected the world over" by the responsible producers and authorities.

A Press Conference

On Saturday, the initiative committee of the Atomic Protection Movement explained its standpoint on the nuclear waste issue at a press conference in Berne.

Prof Jean Rossel, leader of the Physics Institute of Neuchatel University, emphasized: "As long as suitable and long-term experiments are not being carried out and completed, elimination of the dangerous, highly radioactive waste remains a main barrier of a technical, political and social nature for the nuclear industry." Rossel calculated the inventory of nuclear waste for Switzerland in 20 years and after a completed atomic energy program as 85 tons of fission products, with a radioactivity of 250 megacuries, and 15 tons of plutonium.

One speaker protested against the "policy of secrecy of the federal authorities." Not only the nuclear report "Radioactive Waste From Nuclear Energy Production," but authorizations for the use of plutonium as fuel in commercial reactors have been kept secret from the Swiss public. The nuclear report of the federation, which had been passed by the Federal Commission for a Total Energy Concept, is a "document of bewilderment," he said.

The chemist, Dr Marc-Andre Stoll, questioned the method of final storage of nuclear waste in glass which at present is much propagandized as a solution. According to the most recent research it is known that glasses can change upon exposure to radiation, he said. They are therefore not suitable and are unsafe as a form of final disposal for radioactive waste.

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