JPRS-TEN-91-010
11 JUNE 1991

Foreign Broadcast Information Service 50 ANNIVERSARY 1941 - 1991

JPRS Report

Environmental Issues

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JPRS-TEN-91-010 *11 June 1991*

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USSR's Shevardnadze on Global Environmental Imperatives

PM0205193591 Moscow KOMSOMOLSKAYA PRAVDA in Russian 30 Apr 91 p 1

[Interview with Eduard Amvrosiyevich Shevardnadze, president of the Foreign Policy Association, by Vitaliy Chelyshev, USSR people's deputy and editor of the all-Union environmental newspaper SPASENIYE [Salvation], on the eve of the former's visit to the United States; date and place unspecified: "Political Ecology"]

[Text] [Chelyshev] Eduard Amvrosiyevich, in your time as a politician—particularly in the international arena—you have won the sympathies of millions of people all over the world. Incidentally, your uncommon approach was a subject of conversation while you were still in Georgia, long before perestroyka: when the question of the republic's state language was being decided, for example.

Your sudden resignation was also untraditional for our power, to put it mildly. But even less traditional is the fact that your resignation has not left you a pensioner in obscurity but has signaled the start of a new round of active political work, which appears to have given popular diplomacy the official status of an influential international force. As far as I understand the situation, in this work you give international environmental policy a very special role, and the term you proposed in 1989—political ecology—is being given completely new substance.

[Shevardnadze] The security of civilization begins with the security of the individual born into our complex age. As ecology embraces all the problems of private and global security, it will play a significant role in the near future in determining states' domestic and foreign policy.

Nuclear and conventional weapons, which are supposed to protect people against outside aggression, have long posed a very serious danger not so much for potential enemies as for their own peoples. Nuclear power plants, intended to provide cheap, virtually unlimited energy (plus plutonium for nuclear warheads—a fact which people try to avoid mentioning)—these "good," "peaceful," "clean" power plants have led to the horror of Chernobyl and Three Mile Island. The metallurgical and chemical giants, with which entire generations have linked their dreams of a happy, comfortable life, have begun to destroy their creators—and rivers, lakes, and forests at the same time.

For all this, two completely opposite processes are at work. On the one hand, there is a search for ways leading to mutual understanding and consensus decisions that will be equally useful for all peoples (that is what is meant by the term "new thinking"). On the other hand, there is an increase in mutual irritation and mistrust, attempts to resolve problems by force, and an incomprehensible confidence that one can protect one's own interests independently of one's neighbors' interests.

Naturally, the new thinking has impeded and will continue to impede this aggressive, selfish process. Against the background of political ambition, it could suddenly seem that the destruction of our home—the planet earth—is a secondary matter. People think: First we will establish who is on top, and we will worry about clearing up later. But you cannot resolve one problem without the other.

[Chelyshev] I know about your plans to set up an international (or world) environment fund that will bring together the material and intellectual efforts of various peoples to resolve global and local environmental problems—connected with disarmament, in particular.

[Shevardnadze] This is perhaps one of the most important ideas on which our association is founded. We cannot tackle it alone. In the course of its realization we are counting on support from our country's leadership and from the USSR president personally, who I know is concerned by these problems. We are also hoping for favorable support from the UN Security Council and from its secretary general personally; the interested attention of prominent politicians, with whom we intend to cooperate very closely; and the rallying of influential business circles and nongovernment foundations around this humanitarian idea.

The essence of the idea is to achieve the maximum concentration of resources and intellect to resolve specific, immediate tasks: Not simply in order to help regions suffering now, but also to prevent long-term negative consequences of environmental disasters, which, unfortunately, are very persistent. I see the future fund's tasks as being to extricate regions from environmental collapse, for example, and, at the same time, to draw up unified programs for regions which could repeat the same disastrous scenario, make people all over the world environmentally aware, and promote the application of the most outstanding environmental protection discoveries and inventions.

However, there are a number of questions I want to discuss with like-minded people in the Soviet Union and abroad before proclaiming them to the whole world. You must understand, the important thing is not so much to "crow cock-a-doodle-doo" as to hasten the dawn. But as far as support is concerned, I am asking for it now. Today.

[Chelyshev] On 22 April, Earth Day, the newspaper SPASENIYE [Salvation] proposed that the "Brazil-92" agenda be amended. Our "minimum program" proposes the following: the signing of an agreement in Rio de Janeiro on the complete, unconditional termination of all nuclear tests; the confirmation of accords on the non-proliferation of nuclear weapons; and the creation of a verification mechanism within the UN framework

(in principle, it is a resurrection of the Baruch plan for new conditions). The "zero program" is an accord to concentrate expenditure on the joint elimination of nuclear arsenals and joint conversion programs.

[Shevardnadze] I agree with these proposals in principle, although it will be extremely difficult to implement them in the world as it is today. All nuclear powers will have to want this. We need a new climate, so that a state's authority does not depend on how many weapons it has.

[Chelyshev] Your articles on environmental subjects contain a great many theoretical propositions on the legal, organizational, economic, and financial problems of political ecology. The world is changing. Are your views changing too?

[Shevardnadze] The world is changing, but experience of joint international efforts to find political solutions in the ecology-resource sphere remains the same—not very great. Not very great, but not so insignificant that we do not know what to take as a basis. The first serious generalizations have been made by Washington's World Resource Institute, which has given a general assessment of national and global economic loss resulting from the inadequate efficiency of environmental cooperation.

The specific measures proposed by the center for the promotion of international talks on the environment (Salzburg, Austria) are interesting. The basis of its proposals is to set up consulting centers and study courses to overcome shortcomings in the development of the international legal contract system. That is the proper thing to do. It is no longer enough to simply define the range of program issues requiring joint decisions. When embarking on action, we must be able to avoid stumbling over the traditional pitfalls in world relations.

Three such pitfalls which appeared during the cold period in international relations are obvious.

First, the possibilities for reaching a consensus are limited, because the "agendas" for talks usually do not consider the interests of all the countries concerned.

Second, when selecting new eco-political objectives, countries traditionally try to preserve the old ones, which are largely outmoded and consequently even hamper the task of reaching agreement.

Third, many countries exaggerate their environmental requirements in order to attain strategic advantages.

Too many "pitfalls" have accumulated throughout the world: documents, laws, sovereign interests. Meanwhile, our sovereign planet is gradually losing the potential that allows it to be called a living planet.

[Chelyshev] I thought you were an optimist.

[Shevardnadze] I am an optimist. After all, a true optimist is someone who is aware of all the pitfalls but manages to keep going anyway, even smiling in the process. He smiles because he hopes—because he knows—that he will get there in the end.

Australia Hails Antarctic Mining Moratorium

BK3004071091 Hong Kong AFP in English 0656 GMT 30 Apr 91

[Text] Canberra, April 30 (AFP)—Australian Environment Minister Ros Kelly and conservationists Tuesday praised a proposal which will ban mining in the Antarctic for at least 50 years.

Mrs. Kelly told reporters here that the protocol, an addition to the 1959 Antarctic treaty, would ensure that "the last great untouched area of this universe will remain that way."

"Today we've seen one of the most significant international agreements ever reached on the environment," she said.

"It provides for the designation of Antarctica as a natural reserve devoted to peace and science," Mrs. Kelly said.

The Antarctic nations agreed to consider a compromise conservation package at a meeting of the 26 consultative and 13 non-voting treaty members in Madrid.

The protocol includes an indefinite ban on mining, but allows a treaty signatory to lift the ban after 50 years, provided none of the other 26 consultative parties objects.

The compromise text ends an impasse between those countries which wanted a permanent ban, led by Australia and France, and those which wanted to keep the mining option open, notably the United States and Britain.

Governments will consider the protocol before their next meeting in June.

Mrs. Kelly said she was confident the protocol would be accepted and its ratification would be a "mere formality."

Kaye Dyson, spokeswoman for Greenpeace Australia, said the breakthrough was a "large victory" because it would be very difficult for mining to be allowed after 50 years.

"It's a compromise by the treaty nations, but even so it's a huge step forward," she said.

PRC Antarctic Explorers Conduct Experiments Along Prydz Bay

OW1004214591 Beijing XINHUA in English 1624 GMT 10 Apr 91

[Text] Qingdao, April 10 (XINHUA)—The 108 Chinese Antarctic explorers with the seventh expedition team to

the South Pole returned home to Qingdao, east China's Shandong Province this morning.

The explorers began their 130-day voyage, which covered 16,707 nautical miles, last year on December 2.

During their expedition, the explorers conducted a series of experiments in the southern reaches of the Indian Ocean near the Antarctic and in the Larsemann Hills along Prydz Bay.

Their investigations involved marine hydrology, marine chemistry, marine physics and the ecology of shrimps. They also studied glacier, geology, landforms, atmospheric physics, solid-state geophysics and Antarctic meteorological phenomena.

In addition, the explorers transported oil and foodstuffs to the Chinese Zhongshan station in the Antarctic region.

Six Countries Sign Baltic Protection Pact

91WN0330A Helsinki HELSINGIN SANOMAT in Finnish 23 Feb 91 p A7

[Unattributed article: "Coastlines and Inland Water Areas Included in Baltic Pact"]

[Text] Coastal waters and inland water areas are included in the Baltic Protection Pact. Estonian Prof. Harald Velner, who had served as chairman of the commission's 12th meeting, said on Friday in Helsinki that the duties, decisions, and recommendations of the commission would therefore involve much broader areas than they have up to now.

The Baltic Marine Environment Protection Commission, or Helsinki Commission, granted the World Wide Fund for Nature (WWF) and the CCB (Coalition Clean Baltic), a citizens organization founded to accelerate protection of the Baltic, membership with observer status. Representatives of all six of the coastal nations and eight international organizations participated in the commission's 20th meeting, which began on Tuesday.

Commission science secretary Terttu Melvasalo said that, while the general situation in the Baltic is alarming, signs of favorable developments are noticeable. The increase in nutrients that has been going on from year to year in the northern waters of the Baltic has stopped. To be sure, the situation in the northern areas is not satisfactory.

Melvasalo described the situation in the eastern, southern, and central areas of the Baltic as problematic because there are still too many discharges. They are to a considerable degree affected by the obsolete industry of the Soviet Union and Eastern Europe and the backward state of their treatment plants.

With its 5 million inhabitants, Leningrad has from way back been a really big polluter of the Baltic—especially of the Gulf of Finland. They have indeed for a long time now been building a treatment plant in Leningrad, most of which is in operation.

According to the commission, it should be finished in 1995. However, the fact that chemical treatment is lacking is a problem because eutrophying nutrients are only partially treated. Circulating through Soviet coastal waters last summer for the first time since 1939, Finnish research ships noticed that algae florescence increases as one moves eastward.

"In vain have we been waiting for 14 years for fresh water to flow from the Gulf of Bothnia into the Baltic and out through the Danish straits," Melvasalo said. Normally, water flows into the Baltic in this manner once every 10 years.

A decision reached by the Baltic Commission in 1988 to halve the volume of nutrients and other discharges by 1995 is still in effect. At the time the decision was made, it was criticized for being unrealistically demanding. It was also asserted in the commission that it would be difficult, for example, to specify what constitutes nitrogen discharges. This task was assigned to a particularly high-level committee to take care of last September at the conference of Baltic prime ministers in Ronneby, Sweden. The committee plans to revise the text of the Helsinki pact by the end of this year.

The international environmental protection organization, Greenpeace, which has been a commission observer member for a couple of years now, assumed a very active role at the meeting that just ended.

It suggested that the bridge across The Sound now in the planning should be put on the Helsinki Commission discussion agenda because the construction project will have an impact on the marine environment.

Greenpeace also insisted that the commission take up for discussion the matter of submarine storage of nuclear waste. Sweden has such a storage facility at Forsmark, but the Greenpeace representative felt that the nuclear waste stored at Loviisa and Olkiluoto is also in contact with seawater via groundwater.

Littoral States Discuss Revival of Baltic Sea

LD1005083591 Moscow TASS in English 0805 GMT 10 May 91

[By TASS correspondent Dmitriy Gorokhov]

[Text] Stockholm May 10 TASS—The goal of a comprehensive programme of measures, which is now being worked out jointly by littoral states, is to ensure the ecological revival of the Baltic Sea. These matters were discussed at a multilateral meeting which ended here on Thursday.

The meeting was attended by delegations from all the six states that have an outlet to the Baltic—Sweden, Germany, Denmark, Poland, the Soviet Union, and Finland,

as well as Norway and Czechoslovakia. Representatives from international financial institutions and non-governmental organisations were also invited to attend the forum.

The Baltic is one of the ecologically most vulnerable seas. This has been caused by a number of factors which include a high density of the population and utmost economic intensity. The region is inhabited by 70 million people and accounts for one-fifth of international trade routes and 15 percent of the world's industrial output.

Problems are also connected with the shallowness of Baltic straits—Oresund, Great and Little Belt. Water overturn in the Baltic is extremely slow—once in 25-50 years. The sea is unable to cope with the increasing amound of hazardous discharges, primarily those of phosphorus, nitrogen, heavy metals and toxic compounds. About 70,000 square kilometres of the seabed is already lifeless.

The condition of the Baltic calls for resolute joint efforts—this idea was repeatedly emphasised in remarks before participants in the forum by Birgitta Dahl, Swedish minister of environmental protection.

The Swedish side is prepared to share the experience gained in tackling ecological problems and cooperate in the implementation of nature conservation projects, she said.

Delegates shared with TASS their impressions of the forum in Stockholm. "Nature conservation problems increasingly attract the attention of the world community," said Goete Svensson, chairman of a group of experts and Swedish ambassador at large.

"It is difficult to name any other issue that would directly involve the interests of all states in the world to such an extent. We share the viewpoint of Soviet counterparts about the need for a general concept of ecological security," Svensson said.

The programme under discussion presupposes large investments in the conservation of nature by littoral states. According to researchers' estimates, the restoration of the marine environment to the 1950 level alone would require the allocation of about 30 billion kronor.

Estonian Environment Minister Views Baltic Sea Conference

LD1305125791 Tallinn Domestic Service in Estonian 0900 GMT 13 May 91

[Excerpts] Last week specialists on the environment from the Baltic coast met in Sweden where the second conference of the Task Force international environmental organization took place. Juhan Virkus will take over from here.

[Virkus] Countries located on the Baltic have been doing joint work for years already. Last year this acquired special content and importance because the issue was viewed at the level of prime ministers. Tonis Kaasik, Estonian minister of the environment:

[Kaasik] Yes, last autumn prime ministers of all countries on the Baltic met at Ronneby in southern Sweden, and they set up a special working group—its name can't really be translated, it is called Task Force in English. Belonging to it are eight states within the Baltic Sea basin, and for the first time banks are also involved—four major world banks: they are the World Bank, the European Bank for Reconstruction and Development, the European Investment Bank, and the Nordic Investment Bank.

[Virkus) And now another level has been achieved, with Estonia, Latvia, and Lithuania taking part in this new organization. You have recently returned from Stockholm.

[Kaasik] Well yes, the first meeting or conference of this organization took place in Helsinki last October-November. Then the Balts did not succeed in participating in the work of the organization. The Soviet Union declared that it was represented fully by a uniform and indivisible delegation and the corresponding Swedish and Finnish proposal was not met. The three Baltic countries' prime ministers reacted to this with a statement of regret and they repeated their wish already at the level of prime ministers, so that we could indeed take part. And now that the second Task Force meeting took place in Stockholm last week, official representatives from the Baltic countries were also invited; true, still not with the status of member states. We are not its members and we simply used a term like independent representatives. [passage omitted]

The last Task Force meeting already determined certain priority areas—those which determine the quality of the water in the Baltic most of all, or to be more precise, where it is being polluted most of all—and the priority list also includes two Estonian areas: the southern coast of the Gulf of Finland with the area around Narva, and the other one is the coast around the Gulf of Riga. Those priority areas will have the right to involve international investment as well. Indeed, this is the purpose of the four banks within the organization. [passage omitted]

Finnish, Estonian Pollution Pact Signed

91WN0330B Helsinki HELSINGIN SANOMAT in Finnish 13 Mar 91 p A9

[Unattributed article: "Finland and Estonia Agree on Environmental Objectives"]

[Text] Representatives of the Finnish and Estonian Environment Ministries discussed improvement of the effectiveness of environmental protection in the region at a meeting in Tallinn that ended on Tuesday.

The Finnish delegation presented a study during the meeting in which the most important environmental problems were specified and alternatives for solving them presented.

To start with, the delegations also discussed environmental protection measures in Estonian territory and the reduction of sulphur discharges from Estonia's electric power plants.

To conclude the meeting, Estonian Environment Minister Eva Kraav and Finnish Environment Ministy department head Lauri Tarasti signed an agreement on environmental cooperation.

Finland To Aid Cleanup of USSR Waters

91WN0330C Helsinki HELSINGIN SANOMAT in Finnish 22 Jan 91 p A6

[Unattributed article: "Aid From Finns for Soviet Karelia's Water Problems"]

[Text] Petrozavodsk (HS)—In Soviet Karelia, they are concerned over the pollution of the entire Lake Onega area. Aid for their waterway problems is now being sought from Finland. And, at the Environment Ministry, they are drafting a program of measures to be adopted for the protection of the waters of the whole area on the other side of the border.

According to agency chief Aira Kalela, they plan to sign the agreements by this fall. In addition to Soviet Karelia, they also want Finnish know-how on protection of their waters and environment for the Baltic countries.

During the negotiations held last week in Helsinki, the Soviets submitted reports in which an account is given of the extent to which the waterways are polluted in Soviet Karelia, Estonia, and the Gulf of Finland in the Leningrad area.

An effort will be made to continue the talks, if the situations in the Soviet Union and the Baltic countries permit. Agency engineer Airi Karvonen said that the next talks should reciprocally be held in the Soviet Union in March.

The pollution of Soviet Karelian waters is especially noticeable in Petrozavodsk, where drinking water has become one more problem in a country that is suffering from a shortage of food. The drinking water is so polluted that officials have issued orders not to drink it without boiling it first. Thus, in Petrozavodsk restaurants, for example, hot juice in a pitcher is brought to the table.

Coliform Bacteria in Petrozavodsk Water

HELSINGIN SANOMAT had a water sample brought here from Petrozavodsk and examined. According to an analysis of the water made at the Savo Water Protection Association Laboratory, water from the tap in Petrozavodsk is unfit for household use, according to the recommendations of the Finnish Medical Board.

The reason for this is the amount of coliform bacteria in the water and the iron content of the water. The sample contained over 600 coliform bacteria per 100 milliliters of water. Four streptococcal bacteria were found in it. The water's iron content was 1.3 milligram per liter. In Finland, the iron content of good household water is less than 0.3 milligram per liter, and no coliform bacteria at all are permitted.

Petrozavodsk takes its drinking water directly from Lake Onega. According to a Karelian newspaper, Petrozavodsk Bay is noticeably polluted by the Suojujoki, which empties into it.

Oresund Bridge Over Baltic Seen Harming Animal Life

91WN0396A Stockholm DAGENS NYHETER in Swedish 14 Mar 91 p 12

[Article by Gosta Karlsson: "Eider Ducks, Cod, and Eels in Danger; Bridge Would Have Very Serious Consequences for the Oresund's Fauna, a Secret Report Shows"]

[Text] Less water mixing and a change in salinity as a result of an Oresund bridge could pose an extremely serious threat to cod in the Baltic Sea. The sound's last seal colony and the eelgrass meadows around Amager and Saltholm also land in the danger zone.

So states a Danish report on the environmental consequences of building the bridge which was published in Copenhagen last Friday in a very abridged form. A summary of the report was leaked after the Danish Government, on Wednesday of the previous week, worked out an agreement with its coalition partners, the Social Democrats and the Center Democrats, on how the Oresund bridge will look.

Prime Minister Poul Schluter has marked the agreement secret owing to ongoing negotiations with the Swedish Government, but, according to information gathered by DAGENS NYHETER, the Danish three-party agreement means that Transportation Minister Kai Ikast has now been given a final mandate to conclude negotiations quickly with Communications Minister Georg Andersson about a combined rail and car bridge.

Secret

The environmental report was put together by the Directorate of Highways and the Danish Railways and has been closely followed by representatives of the [Danish] Environmental Protection Agency and the fisheries and transportation ministries, among others. The full report, consisting of several thousand pages, is also secret. What leaked to the mass media was a summary version of 200 pages.

Of all the commercially important species of fish, cod is the most sensitive, being the species most affected by a reduced influx of salt water into the already salt-poor Baltic Sea, the report says. At present the Danes fish between 100,000 and 200,000 metric tons of cod per year in the Baltic Sea. Cod accounts for 20 percent of the total value of the Danish fishing fleet's catch.

A decrease in salinity would affect the cod's ability to reproduce. The roe can quite simply not remain swimming in the water; instead they sink to the bottom.

In turn, fewer cod would mean, for example, that herring and sprats would spread, since there is no other species which can assume cod's role as a predator, herring being its major prey. More herring would mean smaller quantities of animal plankton, since they are born before herring, and fewer animal plankton to eat plant plankton would mean that they mature later. In this way the ecological balance is disturbed in a chain reaction.

Eels Threatened

"A decrease in salinity of between one-quarter and one-half [of a part] per thousand in the upper water levels would push the distribution of kelp 100 kilometers to the south. Other vegetation associated with kelp would be forced to move with it. The red algae belt with its rich fish life, which lies at a lower level, is even more sensitive to changes in salinity," the report says.

Eelgrass grows in an overall area of 98 square kilometers around Amager and Saltholm, which is more than one-half of the entire supply of eelgrass in the Danish section of the Oresund. These so-called eelgrass meadows function like a "nursery" for a number of species of fish, for example eels, cod, herring, garfish, and lumpfish. For these and other species, the construction of a bridge would mean that important spawning areas would be lost.

Furthermore the island of Saltholm is internationally famous for its rich sea bird life. Here is to be found northern Europe's biggest colony of eider ducks. The waters to a depth of four meters around the island have also been classified as a bird sanctuary area within the EC.

Saltholm is also home to the last remaining seals in the Oresund. To protect the seals, 300 hectares to the south and southeast of the island have been turned into a wildlife preserve, with admission being prohibited between 1 May and 31 August.

Uncertainty

In the plans for the bridge it is hoped that dredging will help compensate for a decrease in the amount of salt water entering the sound. But here, just as in many other predictions of environmental consequences, uncertainty reigns. "...It is thus possible that by engaging in somewhat greater compensatory dredging a mistake will be made which would be of the same magnitude as the problem it was supposed to compensate for," the report states.

Yet the researchers say that "to sum up, the hydrographic changes which a permanent Oresund link would bring about are considered to be very small."

In its opposition to the construction of the bridge, the environmental organization Greenpeace took note of just this uncertainty over what the bridge's environmental consequences would really be.

Custom Order

"The Danish report draws a remarkable conclusion when, after having calculated a number of anticipated negative effects, it nevertheless states that the changes will be very small," Joakim Bergman of Greenpeace told DAGENS NYHETER. "But that can happen when you've placed a custom order which is supposed to result in a bridge. Even the Danish report itself reveals the absolute uncertainty prevailing as to the environmental effects."

Making the environmental report secret has shocked the Danish Environmental Protection Federation.

"The abbreviated information which has now been made public has come too late. Besides, in political terms, these issues are indeed often dealt with in summaries before they are released. So we don't know what has been said in the full version," said the federation's Bo Leth Espensen.

"We have heard that the alternative of only a railroad connection was not even analyzed, that is to say, what is undoubtedly the most defensible solution if we want to care for the environment in the Oresund and the Baltic Sea."

"By making the report secret, they have withdrawn the issue from the democratic debate which is supposed to take place before the politicians make their decisions. We don't know what specific guarantees, if any, there are for the environment in the agreement which the government has put together with the Social Democrats and the Center Democrats."

USSR, Austria Sign Environmental Cooperation Agreement

LD2904194191 Moscow TASS International Service in Russian 0930 GMT 29 Apr 91

[By TASS correspondent Vladimir Smelov]

[Text] Vienna, 29 Apr (TASS)—To insure the reliable protection of nature in the USSR and in Austria in the interests of present and future generations is the intention of an intergovernmental agreement on cooperation in environmental protection, signed here today. The document provides for the implementation of a wide complex of measures aimed at the rational use of natural

resources and a reduction in harmful substances contained in the air, soil, and water reservoirs. Much attention is devoted to the problem of efficient and harmless liquidation and recycling of waste products. Soviet and Austrian experts are to exchange experiences in the field of shaping the environment, as well as scientific and technical information and research results. Together with the implementation of various joint projects, the agreement also envisions participation by specialists from both states in international symposiums on environmental protection taking place in the two countries and the convening of bilateral conferences on these important problems.

The signing of the agreements, notes a statement by Ruth Feldgrill-Zankel, Austria's minister for environment, youth, and family, issued here, should be viewed as a "major international political success in the field of environmental protection." It expresses hope that collaboration with the Soviet Union will continue to develop and grow.

Desalinization Conference Convenes in Cairo 4 May

NC0405201391 Cairo MENA in Arabic 1710 GMT 4 May 91

[Excerpt] Cairo, 4 May (MENA)—The first regional conference on nuclear desalinization of sea water to produce low cost drinking water, began in Cairo today. The conference is organized by the International Atomic Energy Agency with the participation of the Egyptian Atomic Energy Authority and the Egyptian Nuclear Stations Authority.

Many experts and specialists from north African and some foreign states are participating in the conference. Representatives from the Gulf states and experts in all kinds of industries concerned with water and energy are also attending as observers.

In a speech to the conferees, Electricity and Energy Minister Engineer Mahir Abazah warned that in the year 2000 there will be a great shortage of drinking water in many parts of the world. He said that half of this shortage, which will not be less that 30 billion cubic meters daily, will be in the Mediterranean region.

In the speech delivered on his behalf by Dr. Fawzi Hammad, chief of the Atomic Energy Authority, Engineer Mahir Abazah emphasized that the desalinization of sea water using thermal nuclear reactors could be the solution to this problem, especially with the present progress in reactor technology and nuclear safety. [passage omitted]

Beijing Hosts Environmental Protection Symposium

OW1105013591 Beijing XINHUA Domestic Service in Chinese 0904 GMT 9 May 91

[By reporter Zhang Yi (1728 3015)]

[Text] Beijing, 9 May (XINHUA)— A symposium on environmental protection in developing countries sponsored by the State Environmental Protection Bureau and China International Trust and Investment Corporation (Group) opened at the Beijing International Trade Center this morning. All of the speakers asked developing countries not to repeat the mistakes of the industrial countries and to pay more attention to environmental protection while developing their economies.

In his speech, Qu Geping, director of the State Environmental Protection Bureau, said that mankind, facing challenges of a deteriorating environment, is in a critical stage of development and that the era of achieving industrial development at the expense of the environment has passed. He said: The tremendous achievement made by China in industrialization in the last 40 years has also resulted in serious environmental pollution and ecological damage. Since the 1980's, the Chinese government has paid close attention to environmental issues. Given its limited financial resources, it has nevertheless allocated an appropriate amount of money to protect the environment. Its 1989 environmental protection expenditures accounted for 0.7 percent of total government expenditure, a fairly high percentage among developing countries. Qu Geping also pointed out: The task of environmental protection in China is still arduous, given its irrational industrial distribution, backward technolgy and equipment, serious waste of energy resources, and failure to adequately control pollution in the past.

Woolard, chairman of the board of the U.S. Du Pont Company, was specially invited to give a speech. He said that in planning for economic development, developing countries should first consider environmental issues to avoid incurring huge expenses on environmental protection projects.

Indonesia's Suharto Wants Developed World's Help on Reforestation

BK3004154291 Jakarta ANTARA in English 1229 GMT 30 Apr 91

[Text] Jakarta, April 30 (OANA/ANTARA)—President Suharto has called on developed and developing countries to forge closer cooperation in solving the problem of forest destruction, tropical forests as well as those which grow in developed countries, as the destruction of the natural resource will harm all parties.

Speaking in a meeting with Population and Environment Minister Emil Salim at Bina Graha Presidential Office here on Tuesday, the president said that tropical forests and those in developed countries all have similar functions of absorbing CO_2.

Minister Emil reported to the president about an invitation extended by Japan to attend a meeting on environmental problems next July.

Emil explained that a meeting will be held in Brazil in June next year to [words indistinct] relating to forest conservation.

Developed countries, he said, have [word indistinct] that the main problem now is how to preserve tropical forests.

On the contrary, developing countries said that attention should not only focus on tropical forests but also on forests growing in the developed countries, Minister Emil Salim said.

Commenting on the conflicting views between developed and developing countries, the head of state pointed out that all forests have similar functions, such as absorbing carbon dioxide or $C0_2$.

So the function of absorbing $C0_2$ should not only be carried out by tropical forests growing in developing countries but also by all other forests growing in other parts of the world like in Europe or in America, the president said.

Therefore, the president called on industrialized countries to take part in the regreening program in developing countries.

The president also told Minister Emil Salim that although forests are resources for development, the function of the natural resources as means of preserving environment should be entirely preserved and left untouched.

Minister Emil said that in forest management, the interests of developed countries and that of developing countries should not be made contradictory, although in certain bargaining positions developed countries are certainly stronger.

Forestry Experts Review Issues at Bangkok Conference

BK3004015391 Bangkok THE NATION in English 30 Apr 91 p A3

[By Ann Danaiya Usher]

[Text] Wrapping up a five-day meeting in Bangkok, forestry experts from around the world proposed that small-scale, agro-forestry projects are more suitable than large commercial plantations for greening the tropics and lessening global warming.

Minister of Science Dr. Sa-nga Sapphasi, chairman of the Technical Workshop on Global Forestry Options, said a "new approach" to planting trees is needed to halt deforestaton, which is contributing to emissions of carbon dioxide that may be causing an increase in average global temperatures.

Whereas temperate countries have large areas of land available for industrial plantations, Sanga said socioeconomic factors and population pressure make community-based forestry more suitable for countries like Thailand.

In addition to increasing forest and tree cover, delegates stressed the need to promote "sustainable-yield" forestry, which involves replanting trees after cutting instead of clear-cutting the forest.

But tropical timber-producing countries, Malaysia in particular, stated their opposition to punitive measures or bans in achieving the goal of sustainable forest management.

The most widely-accepted scientific reports estimate that deforestation is causing less than ten percent of the so-called greenhouse gases, which include carbon dioxide, sulfure dioxide and chlorofluorocarbons. Much of the rest is resulting from the burning of fossil fuels in cars, industries and electricity production.

During on-going negotiations on reducing greenhouse emissions, the idea of an international forest agreement has been proposed by some countries as a way to harmonize efforts to control deforestation.

New Zealand Official: French Nuclear Testing 'Poses Little Danger'

BK3004041491 Hong Kong AFP in English 0400 GMT 30 Apr 91

[Text] Wellington, April 30 (AFP)—Radioactivity from French nuclear tests at Mururoa Atoll in French Polynesia poses little danger, an official of New Zealand's National Radiation Laboratory, Murray Matthews, said Tuesday.

More than 100 underground tests have been held at Mururoa, but even if all the radioactivity was released into the Pacific it would not be harmful, Mr. Matthews said in an interview.

"The effect of any dispersion from Mururoa would be very small and probably unmeasurable in the longer term, and certainly not measurable at New Zealand and other island sites remote from Mururoa," he said.

The issue of nuclear test safety has been spotlighted this week with the visit here of French Prime Minister Michel Rocard, who said at a press conference Monday that testing was safe.

Mr. Rocard was due to meet later Tuesday with members of the environmental organisation Greenpeace, who argue that any leak of radiation from the atoll would be harmful.

Mr. Matthews disputed Greenpeace's stance.

"It would be impossible for a marine organism to take up enough strontium-90 or cesium-137, for example, to do

it any damage, because of the relatively large amount of stable strontium and cesium in seawater," he said.

For any radioactive materials without close stable analogues in sea water, such as plutonium-239, ordinary dilution would soon disperse them to very low concentrations.

He claimed ocean fish would also be unlikely to remain in any short-lived radioactive "hot pool" long enough to pick up a significant amount of radioactive contamination through the food chain.

Greenpeace nuclear test ban campaigner Stephanie Mills said little was understood about how radioactivity was diluted and dispersed in the sea, and the effects of low-level radiation on human health were poorly understood.

"It is therefore irresponsible and complacent of the National Radiation Laboratory to contend that leakage from Mururoa would have no human or environmental impact," she said.

The laboratory is state-run.

French Premier on Pacific Nuclear Testing, Antarctica

BK3004162891 Hong Kong AFP in English 1205 GMT 30 Apr 91

[By Michael Field]

[Text] Christchurch, New Zealand, April 30 (AFP)—French Prime Minister Michel Rocard met here Tuesday with Greenpeace officials without agreeing on testing for radioactivity in Mururoa Atoll as he wrapped up a two-day New Zealand tour.

Mr. Rocard, along with his Environment Minister Brice Lalonde and Research Minister Hubert Curien, had a heated debate with officials of the environmental organisation about an independent scientific mission to Mururoa, Greenpeace anti-nuclear campaigner Stephanie Mills said.

Activists of Greenpeace, which opposes nuclear testing at Mururoa in French Polynesia, this year tried to test for radioactivity from their ship Rainbow Warrior II, but French authorities would not let them into the atoll.

In 1985 French agents blew up the original Rainbow Warrior just before it was due to sail from New Zealand to protest at Mururoa.

Ms. Mills said Mr. Rocard listened to the delegation during their hour-long meeting but argued that France needed its nuclear deterrent.

Greenpeace has proposed a joint sampling programme on the atoll, but Mr. Rocard told journalists the organisation would have to accept the French military presence at Mururoa.

"They could not go there entirely on their own without accepting there was French sovereignty and a French presence," he said.

Ms. Mills said the French side proposed a mission under the International Atomic Energy Agency but she said Greenpeace did not consider the agency to be truly independent, adding however that channels of negotiation were still open.

Mr. Lalonde said the meeting was valuable for the face-to-face discussions. "At one time some people thought Greenpeace was paid by the Russians, ... and on the other side people think the Frenchmen are ... ruining the whole planet, so the first thing is to sit at the same table and discuss," he said.

Also Tuesday the French prime minister defended his country's presence in the South Pacific, saying it contributed to the region's prosperity.

"France contributes to stability and development in the Pacific and therefore ... it plays a positive part in the equilibrium of this part of the world," he said.

He said the territories of New Caledonia, Wallis and Futuna and French Polynesia were not part of a colonial policy.

"The policy my government is pursuing in (the Pacific) cannot be considered to bear any resemblance whatsoever to a colonial policy. It is a policy of development of territorial autonomy that can contribute to the prosperity of the whole region."

He said the presence of France in the Pacific had long been poorly explained and consequently was misunderstood and disputed. "At times it was also ill-advised," he added.

He said he believed he had helped to turn the tide. As a socialist who spent part of his youth fighting colonialism, his current responsibilities did not lead him to deny his former convictions, he said.

Earlier Tuesday, the French premier visited Akaroa near here, famous as the site of a failed 1840 French experiment in colonisation of New Zealand.

A French whaler originally "bought" the land of local Maori, then returned to France to form the Nanto-Bordelaise Company to colonize what was named Port Louis-Philippe.

Although French settlers were able to live in what is known now as Akaroa, they had to accept British sovereignty.

Mr. Rocard and his wife Michele, along with a delegation of 70, swept into tiny Akaroa, where the townsfolk turned out in red, white and blue.

The visitors' air force helicopters touched down directly outside the Atomic Cafe, where a blackboard billed the day's special as nuclear-free mutton.

The Rocards walked with a media scrum in front of them and mild but persistent hecklers alongside. "When are you going to stop nuclear testing in the Pacific?" one heckler asked. "As soon as possible," Mr. Rocard replied.

Earlier Tuesday Mr. Rocard said Paris was considering basing its Antarctic programme in New Zealand.

Mr. Rocard said he was impressed with the facilities at the New Zealand Antarctic centre at the international airport here currently used by the United States, Germany and Italy.

French polar projects are currently based on ships, but French scientists are reportedly seeking additional air support. France has an airstrip at Dumont d'Urville in France's Terre Adelie claim in Antarctica.

Mr. Rocard noted that Christchurch was exactly at the antipodes of Perigueux in France. Thus he has emulated a feat by King Juan Carlos of Spain, who in June 1988 went to Palmerston North, the approximate antipodes of Madrid.

The French prime minister is to leave here early Wednesday for South Korea.

BOTSWANA

Chiepe Briefs Press on Government Policy

MB0205201291 Gaborone Domestic Service in English 1910 GMT 2 May 91

[Text] The minister for external affairs, Dr. Gaositwe Chipe, says Botswana's development planning process follows an elaborate procedure of consultation between the government and the people. Dr. Chiepe made the observation when briefing representatives of the European press during her recent visit to the capital of Belgium, Brussels, where she attended an ACP-EC council meeting.

She said the process of consultation has for the past 25 years guaranteed acceptability and support of government projects, as people will have played an active role in initiating them. Dr. Chiepe gave as an example the recently approved new agricultural policy, the tourism policy, and the national conservation strategy.

In her address, Dr. Chiepe outlined Botswana's development and conservation issues, saying the government has allocated 38 percent of the total land area of the country to wildlife conservation and management. She also addressed some controversial issues which have been raised recently in the European press concerning the Okavango Delta, and the protection of the delta by fences especially designed to exclude cattle.

Dr. Chiepe assured the journalists that detailed environmental impact assessments are carried out in relation to planned development projects, citing the southern Okavango Water Development Project as an example. She said the assessment already carried out says that environmental impact would be minimal, affecting only less than one percent of the area of the delta.

GHANA

New Mining Guidelines To Protect Environment

AB0505093391 Paris AFP in English 1436 GMT 4 May 91

[Text] Accra, May 4 (AFP)—Ghanaian leader Jerry Rawlings has announced that new mining companies must henceforth submit assessments of the environmental impact of their operations to the government.

Ghana's Environmental Protection Council (EPC) will monitor guidelines soon to be introduced for all mining companies, Flight-Lieutenant Rawlings said Friday as he opened a new gold mine in the west of the country.

Mining companies should also submit their plans to eliminate or mitigate the adverse effects of their activities on the physical and socioeconomic environment, he added.

The new mine, Canadian Bogosu Resources Limited (CBRL), is a joint venture among Billiton, a subsidiary of the Royal Dutch Group of companies (74 percent), the International Finance Corporation (16 percent) and the Ghana government (10 percent).

The mine, processing facilities and infrastructure took 15 months to complete, costing 100 million dollars.

CBRL chairman Alexander Beleart von Bokland said that on current projections, the cash flow from the company to the government would be 109.9 million dollars for the first 10 years of operation.

This will be made up of royalties, corporate income tax, dividends and interest payments.

He said projected gold exports would be 50 million dollars a year, roughly equal to the value of imported oil distributed by Shell in Ghana.

Official Reacts to Deaths From Agro-Chemical Poisoning

AB0605195791 Accra Ghana Broadcasting Corporation Radio Network in English 0600 GMT 5 May 91

[Text] The district secretary for Ejura Sekyi-Odumase, Mr. Peter Boakye Ansah, has ordered the closure of all agro-chemical shops and retail outlets in the area until further notice. The order follows a number of deaths in the area resulting from agro-chemical poisoning. During an inspection tour, it was found out that chemicals which had been banned from the country, including (Footesen), (Elocran BP), (Kumakate), and (Simoton) were being sold to farmers.

Mr. Boakye Ansah asked the police to comb the area and arrest all fake chemical sellers and traders. He also told farmers to avoid for the time being the use of chemicals in planting because there is enough rain to ensure quick germination. The district secretary also appealed to farmers not to spray mature vegetables and fruits with chemicals to avoid poisoning.

MOZAMBIQUE

Minister Speaks at Environmental Seminar

91AF0950Z Maputo NOTICIAS in Portuguese 5 Apr 91 p 8

[Text] John Kachamila, the country's minister of mineral resources and environmental coordinator, said in Maputo yesterday morning that the Mozambican government is aware of the need to adopt measures to improve environmental management. This must be done, he said, through the interaction of the various sectors, based on legal norms and the training of personnel capable of managing the rational use of natural resources, for only thus can the national community be made ever more aware of and familiar with environmental problems.

Minister John Kachamila, who spoke at the opening session of the seminar organized for the nongovernmental organizations working in Mozambique on environmental issues, said that often the struggle for survival blinds us in such a way that we do not perceive the serious consequences resulting from the misuse of our resources. "This gathering, which is scheduled to end today, represents an opportunity to find the proper remedy for this tendency," the minister added.

In the opinion of our country's environmental coordinator, there is a great need to find paths which lead to collaboration and coordination of the measures adopted by the government with the positive activities undertaken by the nongovernmental organizations and society in general. He said that there are various environmental problems with different priorities in Mozambique, and the need to understand the environmental impact of our developmental activities in all sectors is becoming imperative on all levels.

"This awareness should always be present in every developmental effort to promote the advance of the community," Minister Kachamila said. He added that in the past, there were some efforts to correct the situation, but they did not produce good results because of the lack of coordination and planning.

Minister John Kachamila suggested that an effort should be made in the course of discussions to assess environmental impact in connection with the use of water resources and chemical products, the nonparticipation of the community in the management of forest resources, conservation and the quality of the land, and integrated community development, and to identify special crops for the improvement of the environment.

The purpose of this seminar, which brought together 75 representatives of domestic and international nongovernmental organizations, was to exchange information and explore the possibilities for improving the coordination of environmental management practices and techniques suited to the country.

Also yesterday, and just moments after the inaugural session of the seminar, which was organized by the Environmental Division, the environmental situation in Mozambique was set forth, and the establishment of a domestic environmental strategy was proposed and debated, including a discussion of the strategy proposed for the management of natural resources.

The work of this seminar today is to continue with group discussions on environmental problems and the nongovernmental organizations. In these discussions, according to a source involved in the organization of the seminar, the work groups will explore environmental problems, community development, solutions, training programs, and resources available in Mozambique, as well as the role of the Environmental Division as an agency for the promotion and coordination of information on environmental problems.

SOUTH AFRICA

Political Groups' Environmental Policies Viewed

91WN0381A Johannesburg THE WEEKLY MAIL in English 15-21 Mar 91 p 16

[Article by Karel Tip, member of the Wildlife Society Legal Committee: "Whispering in the Wilderness"—first paragraph is authors comment]

[Text] Grand and comprehensive party policy statements are rich with promise. But at the end of the blustery day only a few small coppers will have been deposited.

The present state of the environment reflects the precariousness of its place within the presently rather jagged field of politics-making in this country.

A number of papers, articles and statements have emanated from African National Congress circles. Most of these are well-informed and wide-ranging. However, the most comprehensive document, entitled "Future Environment Policy for a Changing South Africa", enjoys the status only of a "discussion paper." It was produced in November last year and that remains the position today.

A shorter document has been published by the Pan Africanist Congress [PAC] entitled: "An Environmental Policy for the PAC of Azania." It too is described as a "discussion document."

Within the white political sector, the Conservative Party poses a substantial threat to the place in power of the National Party. Yet, it has taken no policy on the environment. It was to have taken such policy on January 28 this year—but that programme was over-riden by "political events."

The largest federation of labour in the country, the Congress of South African Trade Unions, has not yet taken any policy on environmental affairs. Certain of its affiliate unions, particularly those active in and linked with the chemical industry, have begun to address the issue. It is likely, however, that the greatest portion of this attention will be directed towards matters of health and safety.

These policy statements may be characterised as consisting of broadly phrased statements of principle, laudable in themselves, and liberally sprinkled with approving references to and positive statements of intention concerning international conventions; these statements therefore endorse the perspective that many critical environmental issues are trans-national (and, by implication, trans-political).

Few of these declarations have any regard to what will present itself as an acute political and policy dilemma—the conflict of interest between a dramatic upsurge in demand for material goods and comforts on one hand

and a beleaguered resource and environmental framework on the other. That upsurge in demand will be an unavoidable, yet necessary, consequence of the process of democratisation.

The point of balance which is struck will be a political decision, reflecting the dominant values and interests. That environmental affairs are political has been recognised by many, including kaNgwane's former Chief Minister Enos Mabuza.

He is at once a conservationist and a politician. If a single priority can be distilled from all that he has said, it is that the most urgent needs is to set aside the ravages of the long decades of apartheid and to bring about the restoration of all people to the position and rights which are inherently theirs. They are socioeconomic and political problems which have to be addressed and solved first and only then will all the people of this country be receptive to the issues of conservation, ecological restoration and the like.

Mabuza is not alone in that approach. The environmental policy proposed by the PAC highlights the following:

"The environmental policy of the PAC will adopt an holistic approach—one which takes into account relevant social, historical, economical, political and environmental, factors. The PAC commits itself to the conservation of ecosystems and biotic diversity. The PAC accepts the concept of sustainable development: the wide and non-destructive use of resources, with the understanding that a prerequisite for sustainability is that disparities in social, economic and political development be ended."

The implication of that "prerequisite" is also that environmental issues occupy a secondary position in the scale of matters which require the attention of future policy makers.

We have to recognise that we confront not only environmental degradation but also a legacy of massive political, social and economic degradation. This view has it, then, that the immediate points of impact of the policies of colonialism and apartheid (which did not trouble themselves with the environment) must first be redressed.

Correspondingly, the principal claims now being made relate to the capacity to cast a vote, to have a properly filled wage packet, to have a light switch which works, to have a restored family unit. A corollary of this view is that concerns with the environment are matters of comparative luxury which may properly be suspended.

We face the prospect of a keen conflict between demand and resource. The demands will be, among others, for the tangible fruits of political liberation. Such demands fall directly within the field of what has to be done by way of redress. However, this redress will in no material way be accomplished through no more than some measure of re-allocation of existing funds and resources. Positive development is essential. The provision of greater material benefits will involve a conflict with the interests of the environment. How will that conflict be resolved?

Assume an impoverished community and a proposal to establish a medium-size industrial plant, which will provide employment. Assume further that the capital resources for this enterprise do not extend to the provision of costly pollution filtering devices. The state will not provide funds; there will be demands on those funds for housing and other upliftment programmes.

Another example concerns land. The dispossessed need land. Will the government of the future find it easy to say to those people that large areas of land must be reserved for the preservation of wilderness?

It is against that hard touchstone of reality that splendid phrases such as "the harmonious co-existence of man with nature" will have to be given content. Present indications suggest that the environment will come second.

Take as further example the position of the NEAC [expansion unknown] in Soweto. It has expressed itself in a "Position Paper 1990" in the following terms:

"While recognising that the first priority in any environmental programme is the survival of man and that man is a part of the ecosystem, we believe that we must also prepare for a post-apartheid South Africa. We must make demands now and plan to regain what has been lost to the ravages of apartheid..."

That statement, too, places man as forming first part of a political system and then part of an ecosystem.

NEAC has sought to advance matters of the environment in a context where its complaints about pollution in black urban areas have gone unheeded, while similar complaints made in respect of white residential areas have generally been attended to.

The government recently effected the passage of the Environment Conservation Act of 1989. The Act provides an elaborate administrative structure which is designed to facilitate coordinated action regarding environmental conservation between different government sectors as well as agencies in the private sector. The legislation still reflects a hands-off approach. For instance, as recorded in a memorandum produced at the time of the Bill, it was a "basic approach" that it is "not practicable to be prescriptive in respect of government institutions."

In a statement released by the then minister of environment affairs: "Probably the biggest single challenge facing us in applying our environmental conservation policy is to balance the ideals and expectations of the First World with the realities and needs of the Third World. We base our approach on sound economical, scientific and practical principles...taking into account

the health and well-being of all levels of our population and the long term objectives of conservation."

Analysing that passage does not produce an answer as to who or what will be first when conflicting demands have to be determined. It seems clear that it will not be the environment.

The ANC [African National Congress] too appears potentially to take the view that environmental matters will only be successfully addressed once freedom reigns. In its discussion paper it states:

"...it is impossible, in the political sense and in the socio-economic context, to pursue a rational environment protection policy under the apartheid political system."

It is interesting to examine the summary in that paper:

"The ANC's position on environment emphasises three key elements, namely: protection of environment; construction of environment; and management of environment."

To identify the three key elements as being "protection", "construction" and "management" of the environment, suggests a philosophical dimension of reification. It places the environment in the category of a remote object. If that is so, it will be all the easier for the ANC to allow the environment to pay a substantial part of the price of its important objects of socioeconomic and political advance for the people of this country. But the environment is not something that can be repurchased.

The Democratic Party also has produced a comprehensive statement of environmental policy. However, this policy document fails even to begin to address the difficulty that the political/environmental cake is not indefinitely large. It nowhere suggests where it would make the slice.

As necessary as it may be for ideals to be set out in policy documents, it is more important for those ideals to be located in the realities of the debate which is unfolding in this country.

The problems attendant on the achievement of those ideals must be entrenched on the agendas of the parties and groupings, as well as on the agenda of whatever multi-party forum should crystallise in the future.

The process of politicisation of the environment must be engaged. To hold that the environment will be better off if protected from "politics" will be as foolish and counter-productive as was the attempt to do so with sport.

Report Notes Vaal Triangle Air Pollution Levels

MB2904193291 Johannesburg SAPA in English 1924 GMT 29 Apr 91

[Text] Johannesburg April 29 SAPA—Pollution in the Vaal Triangle, south and south-east of Johannesburg, exceeds health standards applicable in the United States by up to 100 percent, SABC [South African Broadcasting Corporation]-TV news reported on Monday night.

Research by the medical research council showed that air in Vereeniging exceeded U.S. health standards by 21 percent, that in Vanderbijlpark by 51 percent, and the air in Sebokeng was twice as bad as that acceptable in America.

To measure levels of air pollution, schoolchildren volunteered to wear personal monitors which kept tabs on the air breathed by the children 12 hours a day for three days.

The SABC said the level of air pollution measured could result in chest illnesses, and quoted a nurse at the Sebokeng Clinic as saying many babies were admitted to the institution with pneumonia.

The head of the research team, Dr. Petro Terblanche, said the pollution was as a result of factories, dust, and coal fires.

Manufacturers Jump to 'Environmental Bandwagon' of Concern

MB0305132691 Johannesburg Domestic Service in English 1100 GMT 3 May 91

[Text] The government is concerned about the increasing number of manufacturers who have jumped onto the environmental band wagon to promote their products.

Opening Africa's first hydrogen peroxide plant at Umbogintwini, south of Durban, the minister of environmental affairs, Mr. Louis Pienaar, said too many products bore environment friendly labels, which were very misleading.

Proposals by the South African Bureau of Standards, for the standardization of such claims, would be made available for discussion by the end of the month.

Conservation Patrol Vessel Recommissioned

91WN0381B Cape Town THE ARGUS in English 19 Mar 91 p 2

[Article: "Conservation Patrol Vessel Refitted at Cost of R1-M"]

[Text] The Jasus, a wooden-hulled coastal patrol vessel built in 1969, has been refitted at a cost of more than R1-million.

The vessel, involved in numerous arrests in the past, was recommissioned by CPA [expansion unknown] nature and environmental conservation chief director Dr. J.H. Neethling this week.

It was decommissioned in 1989 as a result of recurring mechanical problems after covering thousands of nautical miles over 20 years.

Investigations carried out by the directorate showed that it was no longer viable to repair existing equipment. As the hull was in a good condition, it was more economical to refurbish the vessel than buy a new one.

Sea Trials

Mr. Ian Bosman, senior marine superintendent, said the Jasus would be fully commissioned at the end of next week and would take to the seas after comprehensive sea trials.

The primary function of the directorate's fleet of seven patrol vessels was to protect the marine resources of the country by patrolling the fishing zone, he said.

Frequent surveillance and on-board inspections were carried out to ensure that fishing vessels entering South African waters had valid permits.

The patrol vessels also carried out search and rescue operations and pollution detection and control.

The Jasus will be stationed at Saldanha from where it will patrol the coast and assist in deep sea patrols.

State To Promote Environmental Protection Research Findings

OW0605041291 Beijing XINHUA Domestic Service in Chinese 2012 GMT 4 May 91

[By reporter Zhu Youdi (2612 1635 2769)]

[Text] Beijing, 5 May (XINHUA)—The State Environmental Protection Bureau [SEPB] has decided to alter the practice of "shelving the results of key projects after reporting them to the higher authorities," and to vigorously promote the findings of state environmental protection projects launched during the "Seventh Five-Year Plan" period, in an effort to obtain practical results in environmental protection.

It is learned that three key state scientific and technological projects on environmental protection were launched during the "Seventh Five-Year Plan" period. They were "research into technology for the prevention and treatment of atmospheric pollution," "research into technology for the prevention and treatment of water pollution and conversion of polluted water in urban areas into resources," and "research into environmental background values and environmental carrying capacities." The projects covered 12 assignments and 87 special topics, and cost more than 75 million yuan. Over 4,700 scientific and technical personnel from 529 institutes were involved in the projects.

To reap returns on key state scientific and technological projects at the earliest possible date, the SEPB has urged environmental protection departments in all localities and at all levels to lend active support to those projects by adopting and applying them, and to avoid wasting manpower and materials by conducting overlapping research blindly. The projects in question are designed primarily to tackle problems of massive and extensive pollution in our country, and most of the research findings have fairly wide application. For instance, technologies pertaining to industrial coal, circular bed sulfur fixation [xun huan chuang gu liu 1789 3883 1643 0942 4288], and smoke emission and devulcanization at power stations may be applied to industrial boilers, industrial kilns, and boilers at power stations that together consume over 60 percent of our country's coal resources. And technologies pertaining to land treatment and oxidization in ponds can provide a vast number of large and medium-scale cities and towns with proper procedures for treating sewage in the cities as well as waste water discharged by some industries.

It was learned that China has installed medium trial production lines for industrial coal, which constitutes one of the three major coal types. Six industrial coal plants have been set up in Handan, Luoyang, Chongqing, and Guangzhou, with an annual production capacity of 470,000 tonnes. The country has also built multipurpose testing lines and combustion testing stands for industrial coal, thereby establishing initial testing bases for industrial coal. New boiler techniques for burning coal and fixing sulfur have entered the stage of practical application. A total of 78 new fast-loading circulating boilers have been promoted in Hubei, Guangdong, and Beijing. These can save 50,000 tonnes of coal, cut the amounts of nitrides and oxides by 6 million tonnes, and save the state 40 million yuan in investment annually. In addition, a medium trial production line for devulcanizing agents with an annual capacity of 5,000 tonnes has been installed in Yichang City. Liuzhou and Guiyang Cities plan to redesign their old boilers, and to adopt this technology [devulcanization] comprehensively during the "Eighth Five-Year Plan" period as a major technical process for preventing acid rain pollution.

A total of 43 medium testing bases and facilities for conducting research into technologies for the prevention and treatment of water pollution have been established throughout the nation, and 10 pilot projects in this regard have been launched. Twenty oxidization pond projects have been launched in northeastern, northern, and southern China, and technologies that are applicable to small and medium- scale enterprises for treating pollution from papermaking and dyeing, as well as highly viscous organic waste water, have drawn the attention of various localities. The Beijing and Hefei Breweries have adopted technologies for treating anaerobic sludge in ascending flows [sheng liu shi yan yang wu ni chuang 0581 3177 1709 0630 8638 3064 3136 1643]. A project involving the release of waste water into the sea, which is China's foremost pilot project on technology involving ocean-based treatment of waste water, has gone into trial operation at Ningbo's Xiaogang Economic Development Zone.

In addition, remarkable achievements and results have been obtained in research into "highly efficient ash removing technology," "smoke emission and devulcanization technology for thermal power plants," "technology for recycling waste water," "acid rain," and "protection of the Taihu water system and water quality."

Scientists Suggest Comprehensive Nature Reserve for Hoh Xil

OW1105081391 Beijing XINHUA in English 0728 GMT 11 May 91

[Text] Xining, May 11 (XINHUA)—Chinese geologists and botanists recently suggested the establishment of a comprehensive nature reserve at Hoh Xil.

Hoh Xil is a "no man's land" which covers 180,000 square kilometers and which lies at an elevation 5,000 meters above sea level. The region is located south of the Kunlun Mountains and north of the Tanggula range, at the juncture of Qinghai Province, Tibet and the Xinjiang Uygur Autonomous Region. Hoh Xil is also one of the largest uninhabited areas in the world, and the last unexplored area on the "roof of the world."

Last year, 32 researchers from 19 institutes under the Chinese Academy of Sciences and from Qinghai Province formed a comprehensive scientific expedition team to carry out an on-the-spot investigation in the region.

During the investigation, the researchers found more than 200 species of plants, including 70 species peculiar to Qinghai-Tibet plateau. In addition, they found 11 species of rare mammals, many special landforms and natural scenic landscapes in the area.

Over the past several years, a large number of farmers have risked their lives and ventured into the region to pan for gold. Their intrusion into the area has not only caused serious pollution to the environment, but also resulted in a great loss of existing rare animals.

Chinese scientists say that Hoh Xil is one of the world's ideal sites for conducting scientific plateau research, and that the establishment of a comprehensive nature reserve will protect the region from further damage.

Action on Coastal Pollution Urged

HK0305040191 Beijing CHINA DAILY in English 3 May 91 p 1

[By staff reporter]

[Text] Urgent action is needed to halt the tide of pollution and improve storm warnings off China's coast, according to experts at the National Bureau of Oceanography.

They have called for local governments in coastal areas to introduce tough restrictions on the dumping of untreated industrial waste into the sea and to build up sewage treatment plants where needed.

Seashores must be reinforced to make them more resistant to storms and high tides, especially in coastal areas designed to be key economic development regions.

Seashores in the provinces of Shandong, Jiangsu and cities as Shanghai and Tainjin have suffered serious tidal and storm damage in recent years.

The bureau also wants local governments in these areas to promote scientific approaches to aquatic farming as a means of preventing further occurrences of "red tide." It predicts that red tide, sea water discolored by toxins, will be more frequent and widespread in the coming year.

Red tide is fast becoming one of China's most serious environmental problems as the booming coastal economy has brought a corresponding growth in sea pollution.

According to the bureau's China Maritime Calamity Bulletin for 1990, 34 incidences of red tide were reported last year, 18 of them in the East Sea harbouring provinces of Zhejiang, Jiangsu and Fujian.

Red tide last year cost Changhai County in Liaoning Province more than 20 million yuan ($3.7 million) in lost revenue as 7,000 mu (470 hectares) of scallop farms were polluted.

The bulletin noted that red tide occurred continuously in recent years at the East Sea, Bohai Sea and Huanghai Sea, resulting in "quite severe" damage to aquatic farming, but didn't give the figure of total losses caused by red tide.

The bulletin, however, contained some goods news for the coastal sea off Fujian Province and the southern part of Zhejiang Province. They are expected to experience far fewer storms and high tides than last year.

This year it will be the turn of Guangdong and Hainan Provinces and Guangxi Zhuang Autonomous Region, the areas where typhoon-related storms usually hit most.

The bulletin called 1990 a year of exceptionally serious storm disasters for Fujian Province.

Disastrous storms and high tides attacked the coast of Fujian four times between mid-June and September last year, causing 270 deaths and nearly 2 billion yuan lost from damge to fields and crops, houses, livestock, fish farms and bridges, fishing boats, communication lines and irrigation works.

Storms and high tides caused by typhoons also caused about 500 million yuan of losses along the coastal line in Fujian Province and Wenzhou, Zhejiang Province.

Statistics by transportation departments put the number of sunk and wrecked ships at 74, 15 of which were foreign ones. Nearly 1,000 people died or were hurt in these perils.

But a significant drop in marine accidents was reported by those who had based their operation on maritime conditions predictions, such as Shanghai marine transportation administration.

The man-made maritime peril, oil spilling from cargo ships and offshore drilling, has become more critical and "can afford no more neglect," the bulletin warned.

Shandong Establishes Seal Protection Zone in Bohai Sea

OW1005083391 Beijing XINHUA in English 0754 GMT 10 May 91

[Text] Jinan, May 10 (XINHUA)—The Yellow Sea and Bohai Sea Regional Fishing Administration in east China's Shandong Province recently designated the "Haigou reef," or fur seal reef, near the Changdao Islands as a nature reserve for seals.

Experts believe that the area is the best habitat for seals, since the water around the Changdao Islands is clear, pollution free, and is rich in maritime sea life.

Following a sharp reduction in the number of seals over the past years, the animals are now under the second class state protection.

Impact of Human Activities on Climate in China

91WN0248A Beijing ZHONGGUO HUANJING KEXUE [CHINA ENVIRONMENTAL SCIENCE] in Chinese Vol 10, No 6, Dec 90 pp 421-427

[Text] This report was prepared by the Second Work Team of the National Coordinating Group On Climate Change (headed up by the State Environmental Protection Bureau; composed of the Ministries of Energy Resources, Chemical Industry, Water Resources, Agriculture, Forestry, the State Oceanography Bureau, State Meteorological Administration, and Chinese Academy of Sciences) especially for the 3rd Plenary Conference of the 2nd Work Team of the IPCC (Inter-Government Special Committee on Climate Change).

Abstract: Climate change caused by human activities may have significant impact on the environment. In this paper, the trend of climate change in China in the recent 100 years is reviewed. Based on future climate change predictions that by the year 2030 the atmospheric concentration of CO_2 will double, which would cause a global average temperature increase of 1-2° Celsius and a sea level rise of 20 cm, the possible impact that this may have on agriculture, forestry, water resources, coastal zones, and terrestrial cryosphere of China is assessed.

Continued intensification of industrial activity will result in an extreme alteration of the ecological environment. Although there were atmospheric greenhouse effects before the appearance of industrialized society, the process of long-term economic development of the developed country, the uncontrolled consumption of many natural resources by humans, and the release of large volumes of pollutants and greenhouse gases, have created environmental problems, and they are the main source of global atmospheric and environmental problems. Population pressures are increasing daily, and the waste of energy and natural resources caused by backward economic technology is increasingly evident in the ecological environment. Developing countries are suffering the most serious losses as a result of environmental change. Many developing countries are located in ecologically fragile areas; arid, semi-arid lands, and tropical regions, and they are taking the brunt of global environmental change. China is situated in the midst of these kinds of ecologically fragile regions.

This year, organizations in China that are engaged in research on climate change are evaluating the effects that climate change caused by human activity may have on the environment. A work team, which includes eight ministries headed up by the State Environmental Protection Bureau responsible for organizational coordination, has been organized to study this question. It is also the 2nd Work Team of the National Coordinating Group On Climate Change.

Greenhouse gases spread by human activity are creating atmospheric greenhouse effects that may have long-lasting after-effects. Therefore, early control of greenhouse gases can make a positive difference, but the fact that, historically, regions have been unequally affected, cannot be avoided, and only through an impartial and pragmatic approach can the common problem of global concern be overcome.

1. The Trend of Climate Change in China

In looking at China as a segment of the earth's environment, its climatic change of the last 100 years, and examining the pattern of change of its surface atmosphere, it appears to be, in a large measure, in a pattern of change like that of the average monthly temperatures of the surface atmosphere of the northern hemisphere, but the actual course of the change and its scope is very different. Chinese scientists analyzed materials from monthly average temperatures of 137 climate stations in the China area since 1910, and found that from the end of last century until the 40s, the climate has warmed up. This is consistent with the sustained average trend of the northern hemisphere from the end of the mini-ice age of 1850 to the 40s of this century. After the 40s, China witnessed a temperature decline in contrast to the rest of the northern hemisphere, and during the 70s, it began to warm up again. It continued into the 80s, but it was not as dramatic as that of the whole northern hemisphere. In the first eight years of the 80s, the average increase in temperature of the whole northern hemisphere surpassed that of the 40s, and became the warmest period on record since 1880, but the temperature increase in China was not as dramatic as that for the northern hemisphere, and its peak value was lower than the level of the beginning of the 60s' period.

Material on atmospheric temperature change of 18 representative weather stations over the 40-year period since the founding of China was analyzed. The findings are as follows:

The atmospheric temperature change of most areas in China presents a rising trend, although a few areas, mainly in the south, show a decline in atmospheric temperature. In winter, China generally experienced a warming trend, especially in the north, and in summer, no apparent warming, with some areas getting cooler. The coldest temperatures of the year are in an upward trend, and the highest atmospheric temperatures at the extremes of the year are in a downward trend.

It can be seen from the atmospheric temperature change situation in the Chinese area, that like the northern hemisphere there is a warming trend, but at the same time, there are other shifts in temperature that are specific to the area. The causes of those specific climatic changes in specific areas must be illuminated through further scientific findings.

The trend of changes in rainfall in China are specific to area, and the periodicity and location of rainfall change are inconsistent. Analysis of rainfall data over an

extended period, represented in 10-year averages of rainfall for Beijing, Shanghai, and Guangzhou show: in Beijing, as representative of North China, rainfall for the first decade of this century was rather high, during the next 10 years it began to drop and reached its lowest point during the 40s, was high again in the 50s, and from the 60s continued to drop until the end of the 80s; in Shanghai, as representative of East China, rainfall for the first decade was rather high as it was in Beijing, in the 20s it began to drop, but in the 30s it reached its lowest point, was quite high in the 40s and 50s, the 60s and 70s had less rainfall, and it began to increase in the 80s; in Guangzhou, as representative of South China, there was rather little rainfall in the first decade, in the 20s it was quite high, dry in the 30s, the 40s and 50s were high, the 60s low, and in the 70s it began to increase.

Considering the country as a whole, during the first 10 years, and in the 50s there were many rainy periods, in the 30s, 60s, and 70s there was rather little rainfall, and from the end of the 70s and the early 80s it began to increase again.

2. Climate Change Models

Up to the present, one of the widely used models for predicting future weather changes is a numerical calculation, "General Circulation Model" (GCM). Chinese scientists have also developed their own models, one of which examines ocean-atmosphere relations and their effects on climate patterns, and it has been recommended to the IPCC for use in making calculations. Chinese scientists have also used the GCM models recommended by foreigners, which are in wide use, and in applying the doubled CO2 condition in forecasting climate change in China, it was found that there were great differences in results from the various models. Assessing the reliability of various GCM models is not the purpose of this paper. The factors that influence climate change, and their interactive ups and downs are very complex. Therefore, great care must be taken in selecting GCMs, and when examining the effects of climate change on local regions one must be even more careful. Chinese scientists believe that to rely only on GCM calculations to make a final judgement on the fluctuations of the variant regions of the earth will produce incomplete results.

In accepting the appraisal of the international conference, and applying the results of GCM calculations to China, the environmental scenario of choice used in estimating the impact on aspects of importance to China was the one that forecasts a doubling of CO_2 by the year 2030, a rise in atmospheric temperature of 1-2° Celsius - even if, later, there were to be a total cessation of release of warm gases it would still rise 1-2° Celsius - and a rise in sea level of about 20 centimeters.

3. The Impact of CLimate Change on Agriculture

China's agricultural output rose from 113 million tons in 1949 to the current 407 million tons. Since 1970, the national annual average investment in agricultural capital construction has been 5 billion yuan. Disaster prevention capability has been improved, and the scientific level of agricultural production has been raised.

Several countries have created models to forecast the impact of climate change on agriculture, but the results have not been uniform. Generally it is felt that a rise of 1°C in atmospheric temperature will cause a reduction in wheat production of 1 to 9 percent, and a rise of 2°C will reduce production by 3 to 17 percent. A doubling of CO_2 and a rise in temperature of 4.70 Celsius will push the crop growing season ahead by 2 to 3 weeks, and despite the positive effect of increased photosynthesis which would offset the doubled CO_2 by 10 percent, serial grain production will decrease by 6 to 5 percent. In short, atmospheric warming, increased concentration of CO_2 in the atmosphere, rainfall change, surface evaporation, soil moisture, and such changes in essential factors disparately affecting agriculture, will have a positive effect (increased output), and also a negative effect (decreased output). There is as yet no way to predict accurately what the losses from brief natural disasters would be under the effects of climate warming.

(1) Analysis of primary positive effects:

1. The forecasted results are an increase of about 3° Celsius or somewhat higher in the southwest and northwest regions of China and 2-3°C in other region, the accumulative temperature of various places in China will raise to a minimum of 10° Celsius, and will increase the average length of the growing season by 1 month. There will be an increase in agricultural output of 2 percent. Grazing land will increase, and production of economic crops would also rise.

2. If the concentration of CO_2 in the atmosphere goes up 30 percent, photosynthesis would rise, theoretically, by 10 percent, and particularly, the 500 mm isohyet would benefit the C_3-plants crop production in the southeast, and that would increase agricultural output.

3. In the northeast, summers in Nei Monggol would be warmer, and that would increase agricultural output.

4. In the Huanan, Dongting, and Poyang basins, a cool humid spring season would be improved by rising temperatures which would be good for wheat, peas, rape, early rice, and tropical and sub-tropical fruits, and result in a gain in production of foodstuffs.

(2) Analysis of primary negative effects:

1. Temperature increase will boost surface evaporation. It is estimated that in the middle latitudes, an increase of 2°C will raise surface evaporation by about 20 percent, or an increased evaporation of 300-400 mm. This means that North China and the northwest area would dry out much more rapidly, and no matter what the future patterns of drought and excessive rainfall may be, the northern limit of isohyet suitable for agriculture will be

moved from 400 mm to 450 mm. The loss of tillable land would be near 200 million mu.

2. Notable rise in temperature in the west. Even with the combined effect of rainfall and increased evaporation there will still be a trend toward intensified evaporation. Salinization damage would become more serious causing a loss of at least 140 million mu of tillable land. Grasslands would recede, and wind erosion would be more serious.

3. The primary cause of agricultural disasters in China is drought. Seasonal droughts in the variant regions have the greatest impact on farm production. The predicted future climate warming would intensify natural evaporation. In calculating the combined effects of rainfall and evaporation, analogies and inductive analysis have been used to assess the effects of seasonal drought in varying areas:

(1) Spring droughts: Spring droughts are frequent in North China, the central and northern loess plateau, southeast Nei Monggol, and in the western plains of the northeast. With the anticipated climate change, drought conditions in these areas will increase by 5 percent, and will have a large impact on wheat and the spring planting of crops. Northern Hubei, Sichuan, and Yunnan will also have more serious spring droughts.

(2) Summer droughts: There will be and increased onslaught of droughts in July and August in southern Hubei, Hunan, Jiangxi, southern Anhui, and western Zhejiang; and the return of northward moving isohyet will be delayed, and this will affect the ripening of early rice, the plugging of late rice, and the growth period of cotton, corn, and peanut crops for an estimated reduction of 20 percent in output.

(3) Autumn droughts: In northeast Sichuan, southern Henan, southern Shaanxi, and northwest Hubei there will be frequent autumn droughts, and that will affect the growth of autumn crops. As the northward moving isohyet is slowed in pushing back southward, drought conditions will be more severe and prolonged. It is estimated that there will be a 20 percent reduction in production of foodstuffs.

(4) Drying hot winds: In northern China, mainly including North China, the north part of northeast China, Gansu-Shaanxi, and downward to the middle reaches of the Yangtze River, dry hot June winds during the drought season will seriously affect the vigor of wheat, early rice, and cotton, and there will be a general reduction of 5-10 percent in output. It is estimated that climatic temperature rise will cause more dry wind damage in northern China, and a 5 percent reduction in output.

4. In the summer season, as the rate of increase in temperature speeds up in the mainland, and draws low-pressure thermals, there will be an increase in the frequency and strength of typhoons along the coast, creating coastal wind damage and torrential floods. From current estimates there could be 10 million mu of damage with a 50 percent loss in production.

The predicted climate warming will not create a change in distribution or variety of Chinese crop producing regions. It will affect parts of regions, such as the growing season for rice paddies, corn, cotton in high altitudes. Tropical and sub-tropical fruit zones may move northward 50-100 km. Apples and other cool weather crop zones may move northward 70-150 km, but the effects of atmospheric warming and drying will make necessary the cultivating of drought resistant and water-saving crops. And further, agricultural pests will flourish, such as rice borers, corn earworms, rice planthoppers, armyworms, aphids, and locusts, which may increase the extent of their damage. The cost of insect control will increase 10-50 percent.

In short, the overall effect of climate change on agriculture will reduce China's agricultural production capacity by at least 5 percent.

4. The Effect of Climate Change on Water Resources

It is a point of fact that in proportion to population water resources in China are deficient, unevenly distributed in time and space, and drought and water disasters are frequent. China's average rainfall is about 6 trillion cubic meters (m^3), of which 56 percent (3.4 trillion m^3) is returned to the atmosphere through evaporation and transpiration, and the remaining 44 percent (2.6 trillion m^3) returns to the sea via rivers or disappears in the deserts. The amount of water resources that can be replaced each year is 2.72 trillion m^3 (1956-1979), of which the average annual runoff volume is 2.64 trillion m^3, and the replaceable subterranean water volume is 83 billion m^3. The volume of water resources in China is 5 percent of the water resources of the other countries in the world, sixth in the world, but averaged to population it is only 2,670 m^3, or one-fourth of the world average, making China's water resource volume per capita one of the lowest in the world.

The rainfall distribution pattern, and the geographic distribution of annual river runoff within China's borders are both gradually diminishing in pattern from the southeast toward the northwest. There are great differences in perennial and annual changes in the runoff volume through the variant climate zones. The summer season for most of China comes under the influence of the southeast and southwest seasonal winds of the Pacific and Indian Oceans. The heaviest concentration of rainfall is in April and October. Rainfall south of the Yangtze around the summer season is 50-60 percent of the total annual rainfall. The periods of most concentrated rainfall occur in the north where perennial and annual changes in rainfall and runoff volumes increase the difficulty of using water resources, and cause disasters from floods and droughts.

For example, the north is historically the political and cultural center of China, and it is one of the centers of economic development, but its water resources are the

most deficient in China, and it is the region most susceptible to floods and droughts. According to historical statistics, in the 505 years from 1470 to 1974, there have been 177 drought years or near-drought years, and 152 flood years or near-flood years, including 3-year sustained periods of abundant rainfall, and 6-year sustained periods of drought, and one recorded 26-year sustained dry or near-dry period.

In Beijing for example, rainfall in 1959 was 1405 mm, of which 1069 mm occurred between early July to mid-August; rainfall in 1891 was only 148 mm; in 1921 it was 256 mm. The extremes of precipitation between wet and dry years can vary by as much as 6 to 9 times. It is linked to the instability of the East Asian perennial monsoons, and deviations from the norm in the positions of the peaks and valleys of the westerlies. During the wet 50s in the north, the level of rainfall, runoff, and evaporation resulted in an increased moisture content of the soil. During the dry period after the 70s the amount of evaporation was greater than the amount of rainfall, causing an increase in the use of water for industry, agriculture, and livelihood, a deficiency of moisture of the soil, and a lowered water table. During the 80s the plateau soils were 70 mm deficient in moisture, and the water table had receded downward at an annual rate of .47 meters per year.

According to calculations of various climatic and hydrologic models there are large differences in the expansion or reduction of water resource areas caused by rainfall, runoff, and evaporation. Areas where water resources are most sensitive to climate change are the arid and semi-arid areas. Under circumstances where the measure of runoff change caused by climate change are otherwise equal, the impact on semi-arid areas is 1.5 to 2 times the impact felt on wetlands or semi-wetlands. Generally, water resource shortages in winter are greatest along the coastal areas of the north, and in south China; in summer, the worst is in north China, and central China. The resultant soil moisture is noticeably drier in south China in winter. In summer, it is evident in all areas except east China and south China, and is especially bad in the northwest, southwest, northeast and central China. Overall, climate warming has an extremely heavy impact on China's water resources.

5. The Effect of Climate Change on Forests

There is a lot of data for simulation testing on the effect of increased density of CO_2 in the atmosphere on timber growth. Generally speaking, with a content of 400-700 ppm of CO_2 in the atmosphere, stem weight, diameter, and height of seedlings will increase under proper conditions of soil moisture and temperature. If those conditions are excessive, the seedlings show no signs of growth, and may even shrink. But, an increased density of CO_2 only stimulates the growth rate of C-3 plants, and has no effect on C-4 plants. Woody seedlings respond generally as C-3 plants do. A CO_2 density increase will cause a great variety of plants to increase branching, to have larger and thicker leaves, smaller spiracles, and reduce the conduction of CO_2 and water.

The effects of climate change on distribution and growth of six primary timber trees:

(1) Dahurian Larch (Larix gmelini) The Dahurian larch is an important Chinese timber tree. Larches make up about 28 percent of coniferous tree resources. The distribution of the Dahurian larch extends from the Daxingan and Xiaoxingan mountain ranges up to the permafrost regions. Under the warming effects of climate change this tree will not be affected.

(2) Changbai/Korean Larch (Larix olgensis) The distribution of the Changbai larch extends from the Changbaishan range southward to North Korea where it found in mixed coniferous and broad-leaved forests along with spruce, fir, or Korean pine. Because this tree is very adaptable, it is not greatly threatened by the warming conditions of climate change.

(3) Korean Pine (Pinus koraiensis) The Korean pine is a valuable timber tree and its excellent quality lumber and multiplicity of uses is known worldwide. China is one of the centers of distribution of this tree, as it grows mainly in the Changbaishan range. It requires a warm and moist ocean climate. Because of its special qualities, there are almost no Korean pines remaining in the southwestern part of northeast China.

The dry spring and autumn conditions brought on by climate change will increase the threat of fires, which will even further endanger the Korean pine because it has little resistance to fire damage. The northeast will be dry in the summer season, and the tree will not be able to extend its range.

(4) Chinese Fir (Cunningham lanceolata) Fir trees are of special importance to China's timber industry, and they are fast growing. Fir tree production for all of China makes up one-fifth of the total commercial timber products. It grows in the sub-tropical zone covering an area of up to 20 million square kilometers. Its most suitable growing temperature is 20-26° Celsius, and higher temperatures are not suitable for its growth. It is predicted that the effects of climate change will not be good for this tree. High temperatures in summer will kill off this tree, its range will recede to higher altitudes, and production will be seriously diminished.

(5) Masson's Pine (Pinus massoniana) For the most part, the distribution of this important timber tree is like that of the firs, but a little broader. It is the most widely distributed and most abundant of the Chinese pines, and it covers about half of all of the forest areas of the southern provinces and regions. It is predicted that it will recede southward and its productivity will diminish.

(6) Yunnan Pine (Pinus yunnanensis) This is an important timber product of southwest China, distributed mainly from the central plateau of Yunnan to Guangxi, Guizhou, and the western plateau of Sichuan. It grows in

the monsoon climate areas of the plateau where winters are warm and summers cool, with little change in temperature throughout the year, where rainfall is concentrated in summer and autumn, and it is dry in winter and spring. The dry and wet seasons are clearly delineated. Climate change will raise the temperatures in winter and summer disparately, and reduce the annual rainfall 200 mm or more, and the pines in the lower altitudes of Yunnan (there are also the Simao pine and others) will disappear. It is estimated that the areas where these pines grow will become unproductive sparsely timbered domains of tropical and warm climate thickets and grasslands.

6. The Effects on Coastal Areas at Sea Level and Up

The sea-level areas of China will suffer great losses. China has a long southeast coastline, and it is the most industrially and agriculturally developed part of China. The low coastal areas are distributed mainly along the Bohai coast, and the mouths of the Yellow River, the Yangtze, and Pearl Rivers, a total area of uncultivated land of 16 million mu, of which the north coast (Liaoning, Tianjin, Hebei, and Shandong) is 8.12 million mu, the central coast (Jiangsu, Shanghai, and Zhejiang) is 4.05 million mu, and the south coast (Fujian and Guangdong) is 4 million mu. From ancient times the Chinese have developed the coastal wetlands for agriculture and fisheries, and built important non-staple food bases for coastal cities. In addition, in the north, there are the Changlu, Liaoning, and Shandong salt fields, and on the central coast there is the Huaibai salt field.

It is predicted that the sea-level coastal areas will be inundated, and the existing salt fields and sea farms will be destroyed, and if they are re-opened inland they will require an area of 8 million mu. Nearly half (nearly 3,500 square kilometers) of the area of the Pearl River delta will be inundated, the bountiful Yangtze and Yellow River deltas will be seriously affected, with losses of at least 10 billion kilograms of grain. Homes, transportation, and livelihood will also be adversely affected by the range of salinization of the land by tidal intrusion which will destroy the coastal ecological environment and basic living conditions.

7.The Effects of Climate Change on the Frozen Earth Regions

China's permafrost areas are mainly distributed on the Qinghai-Tibet plateau: the Qilian mountains, Tianshan, and Altai mountains; and in the northeast: the Daxingan and Xiaoxingan ranges in Nei Monggol. They occupy 18 percent of the Chinese territory, and make China the third largest permafrost country in the world behind the Soviet Union, and Canada. China's permafrost areas are characterized by their variety of ice forms, which thawing transforms into a fluid state creating impossible engineering problems. There is a thick layer of frozen earth in the upper strata of the permafrost that is between 1.5 to five meters under the surface and is .5 to two meters thick.

If the climate were to warm up .5° Celsius, and remain steady for 10-15 years, five percent of China's permafrost would thaw and recede. If the climate were to warm 2° for 10 to 20 years, 40 to 50 percent of the permafrost would thaw and evaporate, and the permanent permafrost areas would thaw more deeply causing slides which would destroy the highways, railroads, and public structures already constructed there.

The predicted effects of climate change will thaw China's permafrost, lower the water table, reduce soil moisture, and cause large expanses of sinking surfaces and unstable mud flows, which will endanger the pines and secondary growth forests of the Daxingan and Xiaoxingan ranges. The plateau permafrost areas will become lifeless deserts, the grassy marshes and foliage of the high mountain areas will die off, and high and cold desolate Gobi areas will be formed, which will drastically reduce pasturage areas.

8. Raising the Utilization of Energy Resources Can REtard Climate Change

The issue of climate warming has caught the attention of Chinese government organizations. Before the founding of the PRC, the production and consumption levels of energy resources were very low. After 40 years of construction, and especially the recent 10 years of reforms, energy resource production and construction have been greatly stepped up. In 1989 the total production of primary energy resources reached 1 billion metric tons of standard coal, of which raw coal was 1.04 billion tons, crude oil was 137.6 million tons, and natural gas was 14.5 billion cubic meters. Of the secondary energy resources, the electric power industry developed rapidly, and the total national electric power generation in 1989 reached 582 billion kWh, of which hydroelectric power was 116 billion kWh.

China is a major coal consuming country. Its utilization of mineral fuels makes up 95 percent of its total primary energy resource consumption, whereas the Soviet Union, U.K., U.S., and West Germany are 95, 93, 87, and 86 percent, respectively.

The mineral fuel consumption for the various countries as a percentage of total world consumption is: U.S. 23 percent, Soviet Union 18.5 percent, China 8.4 percent, Japan 4.5 percent, West Germany 3.4 percent, and U.K. 2.8 percent. But, if averaged to population for comparison, China's would be a very small figure.

China is a developing country, which because of historical factors, became a genuine modernized economy only 20 to 30 years ago, and its present economic strength and technical level is far behind that of developed countries. Coal consumption is 76 percent of China's energy resource consumption, but the combustion efficiency is low, there is great waste of energy, and serious environmental pollution. Compared with developed countries the energy resource utilizatio rate is as follows

Table 1. Energy Resource Utilization Rate

Country or area	Japan	U.S.	W. Europe	China
Utilization rate	57%	51%	49%	30%

The best way to reduce pollution, reduce release of greenhouse gases, and protect the environment is to save energy resources and raise the efficiency of utilization of energy. It is evident from the above comparisons that China has a huge potential in these areas. At the same time, to increase environmental controls, the State Environmental Protection Bureau, in accordance with national conditions, formulated a 5-point system and measures for protecting the environment, that have been approved at the national level, and have been put into force. They will be very useful in promoting the control of the release of greenhouse gases.

China Battles To Save Endangered Giant Panda

91WN0291A Hong Kong KUANG CHIAO CHING [WIDE ANGLE] in Chinese No 221, 16 Feb 91 pp 66-69

[Article by Liao Yu-peng (1675 0645 2590) and Meng Wei-hung (1322 5588 4767): "Optimism Shown on Prospects for Panda Reproduction—Visit to Chengdu Giant Panda-Breeding Research Base"]

24 August 1990 at the Chengdu Zoo in China, the giant panda Qing Qing gave birth to male and female twins. The largest weighed 150 grams and the smallest 140 grams.

Fifteen days later the larger twin had incresed its weight to 360 grams and the smaller to 335 grams. Black-and-white markings were clearly discernible on their bodies.

On that day, at a news conference the Chengdu Zoo and the Chengdu Giant Panda-Breeding Research Base announced with joy: Their start in life far surpasses the previous record of 50-odd hours of survival of giant panda twins raised under artificial conditions. This major breakthrough indicated that China had leaped to a new stage in the work of saving and breeding giant pandas.

After 108 days (10 December 1990) the cubs were growing well and were lively and lovable.

Among those who went to the zoo to offer congratulations were Chu Chuanxiang [0328 0278 0078], president of the China Zoological Society and chief planner in the China State Ministry of Construction; Hu Maozhou [5170 2021 3166], chairman of the Chengdu City People's Congress; Diao Jinxiang [0431 6855 4382], mayor of Chengdu; and Shu Luanyi [56289 7019 6654], vice mayor of Chengdu. Announcing the news to people at home and abroad, the media asked them to choose names for the twin giant pandas.

Amid Jubilation at High and Low Levels, Zhang Anju Was Relaxed But Vigilant

At No. 7 Huapu Road in Chengdu is the city's Park Bureau.

Zhang Anju [1728 1344 1446], who was appointed director of the bureau immediately after graduating from college, has dealt with animals for the greater part of his life. When Director Zhang talked about pandas this time, it was half with joy and half with anxiety.

Of the giant pandas, China's national treasure, 85 percent are distributed within Sichuan's borders. The area of the giant panda's habitat in Sichuan has been reduced from 20,000 square kilometers in 1974 to 10,000 square kilometers today. In 1978 it was announced that there were 1,050 to 1,100 giant pandas in China. In March 1988 a survey conducted by the Forestry Department of Sichuan reported that the number of giant pandas had been reduced by about 50 percent. From 1963 to the present, a little over 240 giant pandas have been raised in the world, but fewer than 100 of them are still alive. In the world there are now only 24 giant pandas of the first and second generations that had been artificially reproduced, a far smaller number than those who have died, and the giant panda is already on the verge of extinction.

No Optimism About Reproduction Number in Future

The giant panda, which has a history of more than a million years in animal evolution, has been praised as a "living monument." With the passage of years and the great changes in the world, the giant panda's living environment deteriorated, causing a sharp reduction in its number. Therefore, the work of artificially inseminating pandas for the reproduction of their progeny became imperative, and without this work it would have been impossible for the line to continue.

However, because of changes in natural conditions and for other reasons, the panda's breeding capability was lowered. Also, because artificial raising changed the panda's physiological system, its lifespan became relatively short. Few females become pregnant and give birth, and few males are able to copulate. If this situation were to continue for a long time, it would inevitably cause the animals to be related by close blood ties, and this would result in a decline in the number of breeding stock and in their genetic exhaustion. Also, the panda's heat period is three to five months a year, with a peak period of only two to three days. Not seizing the opportune moment could easily cause the insemination to fail.

It is thus obvious that panda breeding is both arduous and formidable, that "the load is heavy and the way long."

Zhang Anju told us that Chengdu began the work of rescuing and breeding pandas in 1976.

138 Panda Corpses

Arrow bamboo is the wild panda's food. In 1975, on Min Shan in Sichuan a large area of budless arrow bamboo and Western China arrow bamboo grew, and some of the rough-blooming arrow bamboo then withered and died. Pandas died of starvation because of the lack of food. Later, an inspection of the entire mountain discovered 138 panda corpses. At that time Zhang Anju was working in an expert survey team organized by China's Ministry of Forestry. After four months of climbing the mountain and exploring caves, he had deep feelings of bitterness.

On his return, the zoo, at his suggestion, became a site for enlisting scientific researchers to rescue sick or starving giant pandas. From 1975 to the present, 60-odd giant pandas have been rescued, and 58 of them have been resuscitated. With the long-term cooperation of Sichuan University, the Beijing Zoology Institute of the Chinese Academy of Sciences, and other institutions of higher learning and scientific research units, fairly systematic research has been carried out on the giant panda in the aspects of management of raising, artificial reproduction, artificial insemination, raising of the young, male reproduction capability, reproductive physiology, and biocharacteristics.

Rong Sheng: New Beginning for Giant Panda Reproduction

In September 1978 the Beijing Zoo began to use the method of fresh sperm artificial insemination to impregnate pandas.

In 1980 Mei Mei, a panda in the Chengdu Zoo, successfully gave birth to a male, Rong Sheng, marking a new beginning in China's giant panda reproduction. This was China's the first successful use of frozen sperm artificial insemination for panda reproduction.

Beginning in 1980, in 10 years of artificially raising giant pandas, the Chengdu Zoo has had 15 pregnancies and 21 births; eight of the pandas survived, a survival rate of 42.1 percent, the highest level in the world. For its success in this scientific research project, the zoo won awards and commendations from ministries and from provincial and city governments. The Chengdu Zoo signed a contract with the Dissemination Department of the China Scientific and Technical Association for a key scientific and technological project, and from 1990 to 1993 it will do research on "giant panda raising, reproduction, disease prevention, and cure."

People's Great Expectations for Giant Panda Breeding

In our reading material we came across the following two accounts:

In 1983 the giant panda Ling Ling of the Washington Zoo in the United States gave birth, but the baby lived only two hours. The World Wildlife Fund lowered its flag to half mast in mourning.

In 1981, when a cub born to Ying Ying, great panda of the Chapultepec Zoo in Mexico had its first birthday, several thousand people came to the zoo to offer birthday congratulations and give it an enormous birthday cake.

The "crystallization" of the "love" of giant pandas, whom the people of the world are so concerned about and so fond of, naturally became the focus of global attention.

Benefiting From His Association With Pandas, Li Guanghan Received as Head of State

Beginning in 1986 the China Zoological Society has on 10 occasions exhibited giant pandas in Sweden, the Netherlands, the United States, Canada, and Japan, always to a warm welcome. Li Guanghan [2621 0342 3352], deputy director of the Chengdu Zoo, in September 1989 brought the pandas Bing Bing and Cheng Cheng to Kofu in Japan. At the ceremonies for his arrival and departure, he was given a reception befitting a head of state, and crowds lined the streets to welcome him and see him off. Mayor Chuzo Hara, who was 72 years old, rushed to the exhibition area, where he took the trouble to make detailed inquiries. Bing Bing's fourth birthday fell on 16 September 1989, and the mayor organized elementary school pupils to convey birthday congratulations. He personally brought a cake to the panda house. At the end of the exhibit he donated $310,000 as an inverstment in the constuction of the research base. At a news conference 100 days after the birth of male and female twins to Qing Qing, Chengdu Mayor Diao Jinxiang said, "My 1989 trip to Winnipeg in Canada was precisely at the time when the giant pandas exhibited in this city were very much in the limelight, and it opened up the diplomatic situation for me."

Home of Giant Pandas

On an afternoon in December 1990, we drove a car to the Chengdu Zoo. Located beside the Zhaojue Temple among a number of temples and monasteries about three miles from the center of Chengdu, it occupies 240 mu. The Panda House is a 4,000-square-meter white building, with a novel and tasteful mosaic pattern of pandas on its walls. In the house are 10 giant pandas; three generations of Mei Mei's family live here.

Heroic Mother—Giant Panda Mei Mei

Mei Mei is a famous heroic mother in the zoo. From 1980 to 1989 she gave birth to eight babies. Of those who survived, besides Jin Jin and Qing Qing, there are Rong Sheng, Chuan Chuan, Du Du, and Cheng Cheng, a total of six sons and daughters. A good mother cannot be separated from a good father. Mei Mei's husband Qiang Qiang may be called a heroic father. At the same time he also mated with 20-odd female pandas in several zoos on the mainland, producing a total of 13 babies. When we arrived at the zoo, it was exactly noon. Mei Mei's family were comfortably drowsing in the feeding area, and it

would not have been appropriate to disturb them. We turned our eyes on Mei Mei's daughter Qing Qing and her male and female twins.

Mei Mei Becomes a Grandmother Early in Life

Qing Qing is Mei Mei's fourth "princess." She gave birth last year to a baby named Xing Xing, who completed one year of life in January 1991. Growing well, Xing Xing now weighs 40 kilograms. An extremely charming cub, he is mischievous and full of spirit. Carelessly he grabbed the strap of my camera case. With laughter and playfulness I had a long tug-of-war with him before he let go. He has now gone to Zhuhai in Guangdong to be put in the limelight there, and we feel "secure."

On 6 and 7 May of last year, after being bred twice—once by natural copulation and once by frozen sperm artificial insemination—Qing Qing gave birth to twins after 109 days of pregnancy.

He Guangxin [0149 0342 2500], director of the Chengdu Zoo, led us into the "bedroom" of mother Qing Qing and her babies. Qing Qing was sleeping soundly at one side of the room, seemingly very much at ease and comfortable. The twins were taking a little rest in a small cage. A coal fire was burning in the room, and at one side of the room there was a "crib." To satisfy our curiosity, the keeper opened the cage door and took out the twins, and we each held one of them. Mine was sleepy and seemed a little unhappy at being disturbed. This was the first time I had been this close to a panda. Its small black eyes looked at me blankly and simply, truly putting me at a loss what to do. The cub did not feel very light, and the keeper told me it weighed about 15 jin (7.5 kilograms).

Record Set by 'Twins' Is Inseparable From Painstaking Efforts by Scientific Researchers, Breeders

Most of the time, when artificially bred, the giant panda produces one or two babies with each pregnancy. Because after giving birth the mother either abandons the baby or takes care of only one if two are born, the young animal often dies. Therefore, that the giant panda Qing Qing's two babies from one pregnancy were nurtured with artificial aid and survived was without at doubt a breakthrough in giant panda research.

Last year giant panda breeding experts Zhang Anju, He Guangxin, Feng Wenhe [7458 2429 0735], Chen Dayuan [7115 1129 0337], and other members of the scientific research leading group made comprehensive arrangements for research on giant panda breeding. They strictly controlled Qing Qing during her breeding season; bred her at the opportune moment; and strengthened feeding management and nursing work in her gestation, prenatal, and postpartum periods. One month before giving birth she was put under 24-hour observation. After Qing Qing gave birth to twins, the Park Bureau leaders devoted great attention to her and set demands for her nursing. The zoo's professional leaders, relevant technicians, and skilled workers kept guard night and day. Every day they analyzed and studied the condition of the mother and her babies, promptly solving problems when the mother became sick and the babies were in danger.

Chu Chuanxiang, president of the China Zoological Society and chief planner in the China State Ministry of Construction, said, "We have the wild hope that some day we will be able to send the pandas in zoos back to the natural world."

We drove our car out of the zoo and turned east on a small asphalt road. After about seven kilometers we came to a large hill named Futou Shan, where China's Chengdu Giant Panda Breeding Research Center had been built.

The center was set up by the Chengdu Zoo with the support of relevant departments of the State Council, the governments of Sichuan Province and Chengdu City, as well as the China Zoological Society. Its foundation was laid on 25 March 1987, and the first-stage project in construction of the base was completed on 17 October 1988, when it was formally put into operation. On the 514-hectare hill, green bamboo grows in profusion, and on the hill are living quarters and auxiliary facilities for giant pandas. So far seven giant pandas have been successfully raised here. The base has received experts and friends from the Netherlands, Sweden, Japan, the United States, Canada, the Soviet Union, Poland, Denmark, Britain, and Germany. Yang Rudai [2799 3168 1486], member of the CPC Central Committee Politburo and secretary of the Sichuan Provincial CPC Committee, wrote the dedication for the center: "Protect and reproduce the giant panda, an animal treasured by the world."

The center is now raising funds to requisition 19 hectares of land for the second-stage project in construction of the center.

The center has a bright future. With the giant pandas of the Chengdu Zoo as the foundation, the center will do comprehensive research, with reproduction as the goal, on giant pandas who come here from zoos on the mainland with the capability, but not the conditions, for reproduction. As much as possible the center will improve their breeding capability and increase the breeding stock. In the future, after the stock grows to a certain number, the young and sturdy pandas will be given training in a wild environment, after which they will be sent back to their original native haunts in order to expand the giant panda stock in the world and strengthen their genetic pool, and the development of the giant pandas will then be promoted.

Satellite Maps of Shaanxi Land Resources Pass Appraisal

OW1305080691 Beijing XINHUA in English 0701 GMT 13 May 91

[Text] Beijing, May 13 (XINHUA)—A series of 1:200,000 maps of land resources in Shaanxi Province, northwest China, drafted with the help of satellite

remote-sensing technology have passed state appraisal, PEOPLE'S DAILY reported here today.

The leading national newspaper reported that in compiling the maps of remote-sensing geology and mineral forecasts, experts have made some discoveries, including a number of gold and copper deposits.

The two-year compilation project, involving 158 experts, marks a turning point in remote-sensing technology from applied research to large-scale application.

The maps include satellite pictures, land use, geology, mineral forecasts, natural disaster distribution and ecological environment information.

The paper said that this marks the first time in China that remote-sensing technology has been used in comprehensive evaluation of ecological environment on a provincial level.

Hainan Cracks Down on Restaurants Selling Protected Animals

OW1205121891 Beijing XINHUA in English 1130 GMT 12 May 91

[Text] Haikou, May 12 (XINHUA)—Government departments in south China's Hainan Province have joined hands in cracking down on hunting, selling and buying protected animals.

Provincial departments in forestry, environment and resources and wildlife protection have all set up citizens' hotlines and have received some 20 reports on violations, said Xie Zonghui, director of the provincial environment and resources department.

Such reports have led to the successful crackdown on several cases of illegal slaughter of protected animals, Xie said.

Last Tuesday, provincial and Haikou Government departments inspected a restaurant in Haikou according to telephone reports. They found five baskets of cobras, which are protected in the province. Further inspection of the restaurant's accounts revealed that it had sold pangolins, gem-faced civets, pythons and cobras, Xie said.

The official added that the restaurant will be severely punished by law enforcement organs.

Earlier last month, the Donghu Hotel in Haikou served guests with pangolins. The event was reported in a local newspaper and aroused public uproar. The hotel was fined 35,000 yuan.

Hainan Province boasts many varieties of wildlife and is known as a "museum of nature". Xie said that the provincial government will do all it can to prevent the illegal hunting, buying and selling protected animals.

REGIONAL AFFAIRS

Japan Vows To Help Indonesia Restore Environment

OW0105143891 Tokyo KYODO in English 1227 GMT 1 May 91

[Text] Jakarta, May 1 KYODO—Japan's environment minister pledged Wednesday to help Indonesia restore its forests and cope with environmental issues.

Talking to reporters before leaving Jakarta, Kazuo Aichi, state minister in charge of the Environment Agency, said he met Indonesian President Suharto on Tuesday and gave an assurance of Japan's readiness to help with Indonesia's environmental problems.

Aichi, who left Wednesday morning for Beijing after a five-day trip here, was the first Japanese environment minister to visit Indonesia.

Japanese diplomats said Wednesday Suharto has also called on Japan to assist in Indonesia's nuclear program.

They said the Indonesian leader made the request in a meeting Monday with Akiko Santo, Japanese cabinet minister in charge of the Science and Technology Agency.

Aichi and Santo were traveling separately in Indonesia.

The meeting between Aichi and Suharto took place a day after Aichi paid a two-day visit to the tropical forest in east Kalimantan which was seriously damaged by exploitation and fires in the last two decades.

"Efforts to protect the environment are not contradicting economic development," Aichi told Suharto and Indonesian Environment Minister Emil Salim in their meeting Tuesday.

Japan will contribute to a reforestration plan by sending experts and financial backing, Aichi said.

Indonesia has recently been under attack by environmentalist groups in the West over massive forest destruction and its damaging effect on the world's environment.

"We recognize the role of tropical forests in maintaining the world's environment but the forests in Europe, America, and other parts of the world also play a role," Suharto was quoted as saying.

"Much of the world's pollution was caused by a high level of carbon dioxide and other harmful gases emitted by the industrialized countries, therefore they should also control their pollution," Suharto reportedly said.

Aichi also visited Jakarta Bay Tuesday and said he was surprised to see how polluted it is. "It seems impossible to make the water clean again," he said.

Aichi said he expects it will be necessary in the future for Japanese companies which have joint ventures in the Third World to follow environmental regulations set in Japan.

In his meeting with Santo, Suharto disclosed the Indonesian Government's wish to get technological support from Japan for the first nuclear power plant planned in Ujung Watu, a central Java village.

Indonesia is interested in Japan's technology for safe nuclear plants, Suharto was quoted as telling Santo. Santo made no commitment to the request, Japanese diplomats said.

The Ujung Watu Nuclear Power Plant is scheduled to go onstream in the year 2003 and plant construction is expected to start in 1994 or 1995. The construction cost for the proposed 600-megawatt plant is estimated at 1 billion to 1.5 billion dollars.

Japanese Government To Help ASEAN Protect Environment

OW0605041591 Tokyo KYODO in English 0308 GMT 6 May 91

[Text] Singapore, May 6 KYODO—Japan will cooperate with Singapore in helping ASEAN countries overcome environmental problems, the Director General of the Japan Environment Agency said Sunday.

After talks with Singapore Environment Minister Amad Mattar, Japan's Kazuo Aichi said they had "discussed quite extensively on the need to raise the level of recognition of the importance of environmental problems in developing countries."

They also discussed "how best Singapore and Japan could cooperate in facilitating this process," Aichi said at a press conference.

Aichi, who visited Indonesia and China just before coming to Singapore, said Japan will try to help ASEAN countries overcome environmental problems by offering not only technical expertise but also personnel.

ASEAN, the Association of Southeast Asian Nations, groups Indonesia, Malaysia, Singapore, Thailand, Brunei and the Philippines.

Aichi noted that Singapore, which has made tremendous efforts to overcome its environmental problems, could play a major role in helping the other ASEAN countries solve their environmental problems.

Aichi said Japan has committed about 300 billion yen in overseas development assistance to help developing countries protect their environments from 1989 to 1991.

He said, however, that "requests for assistance are not really forthcoming" from developing countries.

"It is crucially important that high priority should be attached to environmental protection in those countries," he said.

"Of particular importance is convincing these developing countries that environmental protection and economic growth are compatible."

Aichi said that while visiting a tropical rainforest in east Kalimantan on Borneo Island, he saw the problems of deforestation, which he said could have been caused by forest fires, shifting cultivation and logging by Japanese companies.

He said he was also "deeply shocked" by the level of air pollution in Jakarta created by exhaust fumes from motor vehicles.

In a joint statement issued by Aichi and his Singapore counterpart at the end of their talks, both sides "emphasized the important roles that Japan and Singapore could, and should play in the Asia-Pacific region."

Singapore's Environment Ministry recently signed a memorandum of understanding for technical cperation with Mitsubishi Corp. which will enable singapore to combine its experience in tropical urban environment management with Japan's technology to help regional environmental protection.

Aichi's six member delegation returns to Tokyo on Sunday night.

CAMBODIA

Government To Sell Wood To Raise Fertiliser Money

BK0905143791 Hong Kong AFP in English 0757 GMT 9 May 91

[By Leo Dobbs]

[Text] Phnom Penh, May 9 (AFP)—Faced with serious rice shortages, the Cambodian Government will sell hardwoods to raise money for fertilisers it no longer gets on the cheap from the Soviet Union, an Agriculture Ministry official said Thursday.

The 30,000 cubic metres (1.05 million cubic feet) of tropical timber should fetch slightly more than two million dollars—enough to buy some 10,000 tonnes of fertiliser, said the official, Kongthai Bunthan.

But this will come nowhere near meeting needs in a country where urea and phosphates are essential for boosting the rice crop—the staple food here.

The Soviet Union had long supplied 40,000 tonnes to 50,000 tonnes of fertiliser annually, but Moscow, facing severe economic problems of its own, sent only 7,000 tonnes in 1990 and none at all so far this year, sources said.

Future deals will be done at world market prices, and for hard currency—something Phnom Penh can ill afford.

"It will be hard to stabilise self-sufficiency if we have to face a shortage of fertiliser," Mr. Kongthai Bunthan said.

A recent UN Food and Agriculture Organisation (FAO) report said that "due to foreign exchange constraints for 1991, only a part of (Cambodia's) estimated fertiliser requirement will be imported, probably not more than 13,000 to 15,000 tonnes."

The report said the government's own estimated needs, in a country where the soil that supports the basic rice culture has a "low inherent fertility rate," were 85,000 tonnes.

The Dutch Government gave Cambodia about 2,300 tonnes of fertiliser late last year, which was used in the September to May dry season.

The Phnom Penh Government, which uses more than 30 percent of its budget to fight Cambodia's three allied resistance groups, spent one million dollars last year to buy a further 5,000 tonnes of high-quality fertiliser from South Korea, Mr. Kongthai Bunthan said.

In the absence of Soviet supplies, speculators have been ordering fertilisers and selling them to the government, including one order for about 3,000 tonnes.

"Some private companies are trying to do that," a Western agronomist said, adding that Singapore in particular was used as a conduit.

Mr. Kongthai Bunthan said negotiations have already begun, as the fertilisers would be needed in the rainy season months of June, July and August. He did not elaborate, but Vietnam, Japan, Thailand and Singapore are all known to be interested in Cambodia's high-quality redwoods.

The FAO report suggested the fertiliser shortage could be dealt with in other ways, however, especially by changing traditional farming practices and reviewing Cambodia's long-time pattern of fertiliser use.

Mr. Kongthai Bunthan said Cambodia prefers South Korean fertilisers, but agronomists said new fertilisers are now available which would provide more soil enrichment at a lower price.

Fifty thousand tonnes of the newer fertilisers would have the same benefit as 85,000 tonnes of the older type while helping cut other costs, they said.

Agronomists also recommend improving the use of manure, as well as fertiliser subsidies for farmers.

In the meantime, however, the FAO said "it is assumed that a substantial part of the (Cambodian) fertiliser supply required in the short to medium term will have to come from multilateral organisations."

JAPAN

Kaifu Proposes Development of Sea Turtle Substitute

OW0705110191 Tokyo KYODO in English 1009 GMT 7 May 91

[Text] Tokyo, May 7 KYODO—Prime Minister Toshiki Kaifu proposed Tuesday that the Ministry of International Trade and Industry (MITI) should develop an artificial substitute for sea turtle shells to help artisans survive an expected ban on sea turtle imports, a MITI official said.

Kaifu made the proposal to MITI Minister Eiichi Nakao, who was briefing the premier on his recent trip to Britain, Canada, and the United States, said Noboru Hatakeyama, director general of MITI's International Trade Policy Bureau.

Japan is considering a ban on imports of hawksbill turtle shells in response to U.S. criticism that Japan is engaged in unlawful trade in endangered species.

A total ban would threaten the livelihood of Japan's some 1,400 artisans in tortoiseshell handicraft, known as bekko zaiku.

There must be something that high-tech Japan can do about the situation, Kaifu was quoted as saying.

Nakao said MITI will seriously consider the idea, according to Hatakeyama.

SOUTH KOREA

Worker's Suicide Increases Awareness of Workplace Contamination

SK2704023091 Seoul THE KOREA HERALD in English 27 Apr 91 p 3

[By staff reporter Kim Su-yong]

[Text] The recent news about Wonjin Rayon workers being poisoned with carbon bisulfide has awakened the people to the serious health risks facing employees assigned to dangerous work sites.

The suicide of a retired Wonjin worker suffering from the toxic gas poisoning has triggered a public outcry for steps to ensure safety in working places and also prompted authorities to launch a fact-finding mission into Wonjin Rayon, the nation's largest viscose rayon producer.

The report that Kwon Kyong-yong, 44, who had been stricken by the incurable occupational disease, killed himself last April 11, came as a shock to the public as well as fellow workers.

Kwon had reportedly been complaining about mental illness, apparently caused by the carbon bisulfide poisoning. In 1985, he retired from Wonjin Rayon because of partial paralysis, breathing difficulties and mental ailments he got while working at the plant's rayon spinning section, considered the most dangerous working place in the factory for eight years since 1977.

It was last May that he was belatedly confirmed by the company as a victim of the occupational disease and provided with industrial disaster payments.

The body of Kim Pong-hwan, 52, another Wonjin worker, who died last January is still being kept at a morgue as the association of Wonjin Rayon occupational disease victims and the firm argue over whether he was an occupational disease sufferer.

So far, 268 Wonjin Rayon workers are suspected of having been poisoned with the deadly gas and other substances, being discharged into the air in the course of producing viscose rayon.

Out of the total, only 96 employees have been officially confirmed as victims of the occupational disease. The remaining 165, except seven who have died, are undergoing health tests or are still waiting for industrial insurance payments.

Residents near the Wonjin Rayon's plant in Migum, Kyonggi-to, complain about bad odor coming from the factory and metal structures in nearby schools and houses have been eroded apparently under the influence of the toxic gas, reports said.

Wonjin Rayon workers said the company recognizes only the plant's viscose rayon spinning section as a dangerous working place.

They claimed that workers are given no oxygen supply masks though they are exposed to dangerous gases in other working places.

Pak Kyu-tak, chief of Wonjin Rayon's Labor Affairs Division, was quoted as saying that "we cannot recognize all workers who have a probability of having diseases as occupational disease victims."

The firm has invested 5 billion won in handing out gas masks or installing antipollution devices since 1988 when a worker was confirmed to be suffering from carbon bisulfide poisoning for the first time, said the official, adding that working conditions have improved greatly and the concentration of the toxic gas has fallen below the allowable level.

The Labor Ministry yesterday hurriedly sent a fact-finding mission to investigate the true picture of the firm's working conditions.

The ministry also ordered labor inspectors to conduct a special inspection into 680 firms dealing with heavy

metals and hazardous substances until the end of next month to determine whether they comply with industrial safety guidelines.

Labor officials said an examination conducted by the ministry last November showed that the concentration level of carbon bisulfide measured 0.1 to 10ppm (parts per million), quite low compared to 2.51 to 32.7ppm in July 1988.

The current investigation would scrutinize Wonjin Rayon's working conditions, they said.

Industrial disaster experts say that many occupational disease victims have been virtually abandoned without due protection since terms for official recognition of occupational disease suffers are too strict and the procedure for industrial payments take too much time.

Figures released by the Labor Ministry showed that in 1989, 7,568 people were initially diagnosed as suspected occupational disease victims.

But the number of workers officially confirmed to suffer from occupational diseases accounted for a mere 1,500 or 20 percent of the total.

Under the current law, it usually takes five to six months for workers to be confirmed as victims of occupational diseases.

LAOS

Swedish Help in Forest Conservation

91SE0217Y Vientiane PASASON in Lao 26 Feb 91 p 1

[Unattributed report: "Luang Prabang Province To Use 60 million Kip To Stop Dry Field Rice Farming"]

[Text] The person responsible for the project conducting experiments in stopping slash-and-burn agriculture in Luang Prabang Province reported that in 1990 the project used 60 million kip to conduct experiments at various points in the province to stop the dry field rice farming which involved clearing forest land.

This project has received cooperation and assistance from Sweden. The SIDA [Swedish International Development Organization] organization has provided $900,000 in assistance. This has been combined with 6.8 million kip of domestic funds. These funds were used primarily for buying technical equipment and for clearing land for paddy rice.

PAPUA NEW GUINEA

Government Rejects Plan for Toxic Waste Incinerator

BK1005150591 Hong Kong AFP in English 0800 GMT 10 May 91

[Text] Port Moresby, May 10 (AFP)—Papua New Guinea has rejected a proposal to set up a toxic waste incinerator for hazardous garbage shipped from the United States.

The proposal, from Californian-based Global Telesis, was being considered by former Conservation and Environment Minister Jim Yer Waim.

But his successor Michael Singan said Friday he had rejected the proposal.

"The national government will not permit the dumping of any overseas waste within Papua New Guinea either now or in the future," Mr. Singan told a news conference.

Global Telesis had proposed a 30 million kina (31 million U.S.) high temperature incinerator near Popondetta, capital of Oro Province.

Ministers Defend Approval for ROK Logging

BK1105080091 Melbourne Overseas Service in English 0500 GMT 11 May 91

[Text] Papua New Guinea's prime minister Rabbie Namaliu and the forest minister, Jack Genia have defended approval granted to a South Korean company to log more than 100,000 hectares of tropical rain forest in Madang Province. Mr. Namaliu says landowners involved in the Josephstaal project have been consulted over the development and had been involved in planning talks with the national and provincial governments and Cosmo Resources.

The prime minister says work to blockade the project do not come from genuine Josephstaal landowners but people who live in the area and outsiders who have their own ideololgies to push. The government granted approval for the Josephstaal project last week and announced that Cosmo Resources would invest $30 million [currency not further specified] and create 700 jobs for Papua New Guineans.

Mr. Namaliu says during the 15-year life of the sawn timber and pulp wood project, the company will pay the national and provincial governments and landowners more than Kina 79 million in royalties levied, infrastructure development, and agriculture development payments.

THAILAND

World Wildlife Fund Plans No Anti-Thai Campaign

BK2704033491 Bangkok BANGKOK POST in English 27 Apr 91 p 7

[Text] The World Wildlife Fund [WWF] for Nature has assured the Thai Government that no campaigns would be launched to encourage travellers to boycott Thailand as a tourist destination for doing little to stop the notorious wildlife trade, Prime Minister's Office Minister Michai Wirawaithaya said yesterday.

The minister said he had received the assurances from WWF President Prince Philip, whom he had written a letter in the wake of reports that the WWF would call on British tourists to shun Thailand in protest for allowing the illegal trade in endangered species to flourish.

The letter said the Thai Government had stepped up measures to preserve and protect its environment and endangered wildlife and urged the WWF to suspend its campaign plan.

National Environment Board's Five-Year Plan Approved

BK0905033191 Bangkok THE NATION in English 9 May 91 p A2

[Text] The government economic review committee yesterday approved the National Environment Board's [NEB] request of Bt751 million for a five-year plan to protect and rehabilitate the country's dwindling mangrove forests and eroding coastline.

The plan, to be jointly carried out by the Forestry Department, Fisheries Department and the navy, was scheduled to begin later this year.

The Forestry Department was asked to conduct a study and report to the committee on the present level of environmental problems regarding mangrove forests and the coastline in one month.

The NEB and the Budget Bureau will supervise the plan which requires the Forestry Department to report the latest developments in the effort to reverse ecological damage every six months.

Drought, Water Policies Impact Assessed

Where Water Is Just a Dream

91WN0388B Bangkok BANGKOK POST in English 17 Mar 91 p 2

[Article by Prasong Charatdamrong]

[Excerpts] [Passage omitted] The irony: Thailand, blessed with monsoonal rains regularly faces droughts to varying degrees.

Experts have said that population growth, rapid development, excessive pumping of underground water and relentless felling of trees has upset the hydrological balance, turning a land of floods into a land of drought.

The Meteorological Department believes that over the years, the amount of nationwide rainfall has dropped only slightly. But the natural imbalance caused by environmental damage has severely affected the country's natural water storage capabilities.

Unprecedented deforestation has reduced water run off. Official reports by the Irrigation Department note that the inflow of water to the main Northwestern weirs, such as Mul and Chi, has dropped each year.

A similar situation occurs in the Pa Sak and Chao Phraya rivers in the Central Plains.

The same occurs in the Ping, Wang, Yom and Nam rivers of the North.

Although water levels in certain rivers may increase in some years, on average overall the levels have dropped.

The Yom river in Phrae Province is a good example.

Last year, the water was 1.03 metres above the weir compared to an average of two metres in the past 30 years.

Officials point to the volume of water behind the dams and reservoirs as strong evidence of the problem.

The volume of water behind the giant Bhumibhol and Sirikij dams is less than 50 per cent of their normal capacities.

"There is a dramatic drop in raw water resources—perhaps by 50 percent compared to the past 30 years," said Governor of the Provincial Water Works Authority Dr. Tawat Vichaidij.

As a result of the shortages the Agriculture Ministry has for several years banned planting of the second paddy crop in half the irrigated areas along the lower Chao Phya basin.

In the East, there are constant reports of reservoirs drying up. The major Bang Phra reservoir which has a normal holding capacity of about 100 million cubic metres only has 40 million cubic metres of water this year.

A similar pattern emerges in other reservoirs in the East: Nong Khor reservoir now holds 11 million cubic metres (normal capacity is 35 million cubic metres), Marb Prachan reservoir has 10 million cubic metres (normal capacity is 17 million cubic metres), Nong Klang Dong reservoir has five million cubic metres (normal capacity two to three hundred million).

The Interior Ministry said this year water shortages have been reported in more than 40 provinces.

One crucial trend in recent years is that shortages are not limited to remote areas but have spread to industrialised and developed areas and provinces.

Pattaya is a good example, where water traders going from house to house selling water have become common. This year, the Provincial Water Works Authority has called its subscribers in Pattaya, Chonburi and Bang Pakong to economise on the use of tap water.

"Shortages have become so serious we may have to ration tap water in these areas if wastage continues," an official source said.

The resource-rich South, the provinces of Songkhla, Phuket and Surat Thani, also face seasonal shortages.

Songkhla's Pak Phanang district, which had never before had a shortage recorded one last year. Tap water subscribers went without supplies for a week last year when the long waterway—the main source for tap water production—dried up and the PWA had to close down its production plant.

Water had to be pumped from another source 50 kilometres away—a five-day journey—before the supply reached the tap water production plant.

Water in Klong U-Tapao of Hat Yai has increased in salinity in recent years following an upsurge in sea water and a drop in fresh water during the dry season.

Phuket's only water source—the Bang Wah reservoir—has become less reliable in recent years. With a maximum capacity of 9.6 million cubic metres, this year's holding was recorded at only four million cubic metres.

"If this continues Phuket will face a serious water shortage in three years," an Irrigation source said.

Kaeng Kha Jarn in Phetchaburi has been hit hard by water shortages in recent years with the volume of water behind the dam nearly rock bottom, with only 138 million cubic metres recorded this year compared to its normal capacity of 720 million cubic metres.

The Phet River in Phetchaburi has already dried up, prompting officials to tell thousands of farmers not to farm this year, said Kaeng Kha Jarn Dam's chief engineer, Pairoj Musikchiananand.

In the West—at Khao Laem, Sri Nakharindra and Tha Thueng Na dams—the same scenario emerges. And even in Bangkok, water supplies are tight.

The Metropolitan Water Work Authority realises that its tap water production—a daily average of three million cubic metres—falls short of daily demand by 10 percent in the dry season.

The MWA admits that raw water from the 60-kilometre long Klong Phra Ong Chao Chaiya Nuchit, which draws water from the Chao Phraya River, can supply only 50 per cent of its normal capacity.

The upsurge of sea water also spoils raw water resources in the Chao Phya river and each year the upsurge creeps deeper upstream approaching the water treatment plant at the Rama VI Bridge.

"In 20 years we will not have water to drink," said PWA Governor Dr. Tawat Vichaidit said.

Tight supplies not only result in hardship, but have also ended up in violence.

Incidents of villagers fighting for water and smashing down earthen dams have been reported in Chainat, Sakhon Nakhon, Nakhon Sawan, Ang Thong and Singburi provinces.

"The people went out of control and refused to listen to the administration and fought for water here," said Tawatchai Suriyanonda, irrigation chief in Phrae Province, recalling incidents last year.

An irrigation official in Sukhothai Province said he was once trapped between two groups of angry farmers armed with shotguns and knives.

"I once received a death threat from an influential person who tried to force me to release water for my tobacco farm," the same official said.

That's not all. Many are prepared to drink water even though it has been contaminated by sewage, industrial waste or agricultural toxic chemicals.

Illnesses are common among the rural population and health officials say diarrhoea, cholera and other intestinal diseases have become prime killers.

The Public Health Ministry reports that 700,000 rural Thais contracted diarrhoea last year and altogether 465 people died.

There is an alarming trend for the disease to spread year, with more than 30,000 people being hospitalised since January. [sentence as received] [passage omitted]

People Starve as Crops Die

91WN0388B Bangkok BANGKOK POST in English 17 Mar 91 p 2

[Article by Prasong Charatdamrong]

[Excerpts] "I don't care what method you use, just bring water. People are starving," Sukhothai provincial governor Tawat Makarapong was heard saying outside his office recently.

The governor was with an army of officials discussing ways to solve the water shortage in the ancient capital on the banks of the Yom River.

The Yom River is dry. The trees are leafless. The crops are dying. And it's just the beginning of the dry season—four months before the first drops of the rainy season.

There is no doubt in the governor's mind that lives are threatened.

The situation is not limited to those in Sukhothai, but also residents in the Yom River Basin.

From its origin in Phayao Province in the North, through Pichit, Phitsanulok, Phrae and down to Nakhon Sawan hundreds of villages comprising about 100,000 villagers along the 550-kilometre river are in genuine trouble.

The chief of the only weir across the Yom River in Phrae's Song district, Sithiporn Sapuli, said the shortfall of water in the river this year is the worst in 30 years. [passage omitted]

In late February this year the river was dry. A small stream with only 3.004 cubic metres of water per second flows through the irrigation canals.

"This amounts to nothing," Sithiporn said.

The Yom now looks like a provincial highway. At certain points pick-up trucks roar through the riverbed where boats used to cross.

"People who live on the banks 20 kilometres down the stream from here haven't seen water in the river for years," Sithiporn said.

Overlooking the dry river, Ang Khamkhayai, 60, in his village group 2 in Ban Kong of Kong Krailat District in Sukhothai said: "I will not see the Yom full of water again for the rest of my life."

Ang and his wife, as well as other villagers, have not farmed this year as there is no water. [passage omitted]

In Pichit Province, Mrs. Samran Rattanasaengsri, 40, looked across a river from her home in village group 2 of Pho Taleh District. She too will leave with the family to work in Bangkok.

She shares the same fate as others whose annual crops were destroyed by insects, with a second crop an impossibility because of the lack of water.

"My younger brother has already escaped to Bangkok," Mrs. Samran said. She used the word "escape" because the brother has more than 300,000 baht in debts which he cannot repay.

"Farming brings only debts. We've no money for future investment. No money to buy paddy seeds. No money to buy fertilisers," she said.

Mrs. Saram said she is 100,000 baht in debt.

"I think I will quit farm work permanently," she said.

In Nakhon Sawan—once considered one of the country's major rice bowls—a similar tragedy occurs.

"Everybody here plans to leave home for work elsewhere, maybe in the Middle East," said Boonlert Manichai, 56, a former Kamnan in Kuey Chai subdistrict in Nakhon Sawan's Chum Saeng District.

Chum Saeng farms were ruined for a second consecutive year because of a brown hopper plague. There's no second crop because there's no water.

Several farmers said their farming equipment, such as diesel engines, have been confiscated by financiers.

"Every one here is poor. In this village, in the district and in the province," Boonlert said.

"Go and search any house. If you find one thousand baht—in cash or a bank deposit—kill me," Boonlert said.

The severe shortage of water brings unimaginable poverty. Such as Mrs. Wao Khotchakul, 50, roaming around her small farm in Chum Saeng District.

The ageing farmer was picking grains of rice—one grain at a time—from the ground and putting it in a small sack.

"To eat," she mumbled. After an invasion of brown hoppers, grains or damaged rice lay scattered the ground.

Water Policy Assessed

91WN0388C Bangkok BANGKOK POST in English 17 Mar 91 p 3

[Article by Prasong Charatdamrong: "Final Solution Needed as Trend Becomes Alarming"]

[Text] Serious questions remain as government agencies move mobile equipment into the provinces and begin their annual task of alleviating the seasonal water shortage.

Is this enough? Isn't there a way to solve this problem for good?

"Potentially the problem can be solved permanently," an executive of a water resource agency said.

"But it needs time and money and we hope to complete the task some time," the executive said.

But the Governor of the Provincial Water Works Authority, Dr. Thawat Vichaidij, said: "The country needs more than that to solve the problem."

He said that depending on existing agencies directly responsible is simply not enough. The problem is too big. Serious commitment is needed if a permanent solution is to be found.

Dr. Thawat said Thailand faces a problem similar to that in many parts of the world affected by hydrological imbalances as a result of environmental destruction.

"The current phenomena illustrate an alarming trend and further delay in solving the problem will have serious results," he said.

The main problem, as Dr. Tawat sees it, is the country simply does not have an effective system to control and conserve the use of its raw water resources.

"If it exists, it's extremely limited."

A clear example is the failure to control the use of underground water, which has led to land subsidence in Bangkok. The pumping of underground water has also extended to other areas of the country.

Dr. Thawat said it is time for greater awareness among the public, consumers, water operators and national administrators to preserve the supply.

A national policy is needed, he said, adding that shortages worsening as years go by are a direct result of a lack of clear-cut policy on water use.

For instance water stored at major dams has never been regarded as "supplies" for tap production and industries. Such reserves are meant to be used as sources of energy production, agriculture, irrigation and recreation.

There is no clear plan of how water agencies will use the raw water and each agency simply adopts its own programme.

Coordination

Dr. Tawat said there are 10 or more agencies involved in raw water resource development. While each agency handles their respective responsibilities to the best of their abilities, rarely is there coordination with a long-term objective in mind.

To overcome this basic problem, Dr. Tawat suggests a national agency be set up to oversee the administration of how our natural water resources are used.

The agency can be made a ministry or even a bureau with all existing water agencies under its jurisdiction, he said.

This agency would not only coordinate development of resources but plan its use as well as store all information about the nation's water resources.

Dr. Tawat questions if the country's water agencies know exact details of the nation's water resources or what should be done to prevent further threats to the resources as a result of the natural imbalance.

The country needs to begin studying, researching and collecting data about the resources such as deposits of underground water, their locations, depth and volumes.

"We should also know their quality and quantity," he said.

In order to establish a national water agency, Dr. Tawat said a law needs to be issued to govern the use of water, prevent shortages and pollution. The law should aim for better utilisation.

"Without a law, water resources will continue to deteriorate and shortages will reach crisis point," he said.

The law should categorise which sources are to be used for industries, households or farming.

For example, Dr. Thawat is critical of the use of sea water to feed marine farms located just outside provincial towns. Improper practices have resulted in salt water deteriorating areas in many provinces.

Dr. Tawat said a nationwide network needs to be established to transport raw water from one area to other areas where there is a demand. The network must also have storage areas.

Such a network will undoubtedly involve colossal investment.

"But it is vital that we start thinking and planning such a scheme now.

"We should no longer think of water as a gift of nature but an industry which needs investment."

Without concrete improvements in the management of water utilisation, shortages will reach a crisis. Otherwise in 20 years "we will not have water to drink," he said.

Impact of Salt Mining Operations Felt in Northeast

91WN0388A Bangkok BANGKOK POST in English 10 Mar 91 p 8

[Article by Prasong Charatdamrong: "Salt Find Brings Sweet Life"]

[Excerpts] Drilling a well led saw-miller Visith Tanthasilpa to an accidental discovery which made him rich.

But his discovery in Borabu District, Maha Sarakham, in April 1971 changed salt making in the northeast from a primitive livelihood to a controversial industry.

Rocksalt operations soon sprang up in the small, quiet district and eventually dominated rice farming.

According to the National Economic and Social Development Board about 30 percent of the Northeast—or 37.2 million rai—has a considerable salt content. About 17.8 million rai of this land is extremely salty.

Usually a rai of land yields between 15 and 25 tang (one tang is equal to 15 kilogrammes) of rice under normal conditions.

Important deposits are in Chaiyaphum (1,500 million tons), Talat Khae in Nakhon Ratchasima (200 million tons), Maha Sarakham (700 million tons), Ubon Ratchathani (300 million tons), Nong Khai (2,000 million

tons) and Thung Kula Rong Hai and Bamnet Narong (between Chaiyaphum and Nakhon Ratchasima) for which exact figures are not available.

After Mr. Visith discovered rocksalt, another 18 people in Borabu District and established operations to pump up brine for industrial use. [sentence as received] Similar operations cropped up in other towns.

But their activities violated the Mineral Act 2510 which describes rocksalt as a mineral ore. To mine requires a concession from the government. They also breached the Factory Act 2512 which requires registration of an industrial plant, and broke the Promotion and Protection of Environment Act 2518.

Enterprising businessmen at that time claimed they were not mining but simply pumping out salt water for "salt farming." Large salt farms have applied for licences but none have been granted.

Only two large firms, Asahi Chemical and Saha Sirichai Chemical obtained concessions and licences. But these were issued by the Industry Ministry before controversy emerged.

It took 10 years—from the time of Visith discovery to 16 June 1981—before rocksalt mining or farming was banned by then Prime Minister Prem Tinsulanonda following widespread protests.

But the results was 200,000 rai of land along a 225-kilometre stretch of the Nam Siew River being badly damaged by increased salination.

Gen Prem's order did not stop the mining. In December 1989 Prime Minister Chatichai Choonhavan issued another order banning the practice in Borabu District.

This time the order appears to have proved effective. The Government pumped in 800 million baht to revive the river.

But rocksalt operations have spread to other north-eastern areas where an order banning them is not in force.

Top irrigation officials in the provinces say that in every area rich in rocksalt deposits, natural water sources are affected. A top irrigation administrator said that in Maha Sarakham Province illegal rocksalt farming continues intensively in Kantharawichai, Na Dun, Phayakkhaphum Phisai and Na Chuak districts.

The major concern is rocksalt mining near Nong Bua reservoir—the only water resource for agriculture and top water production in Kantharawichai district, the irrigation officer said.

In Na Dun District, which is the origin of the Tao river, a branch of the Nam Siew has already become salty.

"If it (illegal activities) continues, the government soon may have to spend more money to revive these natural resources," he warned.

BULGARIA

Zhivkov Bodyguard Testifies at Chernobyl Trial

AU0405154691 Sofia BTA in English 2213 GMT 3 May 91

[Text] Sofia, May 3 (BTA)—After the Chernobyl accident, in Bulgaria "there were issued instructions to keep complete silence over it," Todor Zhivkov's personal bodyguard Rumen Ralchev said today at the Sofia trial on the consequences of the 1986 Chernobyl accident. The defendants are a former deputy prime minister and a former deputy minister of health.

Todor Zhivkov himself was informed of the accident in the middle of the night of April 30 to May 1 by the then Soviet ambassador to Sofia Mr. Leonid Grekov. On the following day there was held a meeting of "high ranking officials." After this meeting the meals of the former No. 1 began to undergo radioactive control as well.

Employees of the former Security and Protection Department which provided bodyguard services and catered the party and state leaders, testified today that as early as May 2 a special radioactivity control commission was set up with their department. The maximum permissible levels set by the standing governmental commission headed by the then deputy prime minister and now defendant at the trial, Grigor Stoichkov had seemed too high to the Security and Protection Department commission.

At today's hearing two witnesses gave contradictory evidence to the question whether the Bulgarians were exposed to an admissible level of radiation. It is difficult to say how the court will view this contradiction. One of the witnesses said that regardless of the standards the Bulgarians could have received a lower level of radiation exposure if there had been sufficient information and stricter control. But I do not know just how far our proposals reached and where they were stopped, the witness, who works at the Nuclear Medicine Institute, said.

Our meetings never mentioned a radioactive threat another witness said in connection with the sessions of a medical commission on the mass marathon held in Sofia on May 18.

Chernobyl Trial Witness Questions IAEA Chief's Chernobyl Assessment

AU0705213491 Sofia BTA in English 2030 GMT 7 May 91

[Text] Sofia, May 7 (BTA)—"Hans Blix, director general of the International Atomic Energy Agency, made a gross mistake with his infinitely smiling and rosy prediction of the effects of the Chernobyl accident in Belorussia," said Mr. Bosevski, a medical corps officer, head of the Radiation Hygiene Laboratory at the Academy of Military Medicine, bearing witness at the Chernobyl trial today. He told the court that Mr. Blix, otherwise an authoritative official, was guided by some specific considerations on the development of nuclear power. Mr. Bosevski also called into question Mr. Blix's conclusions minimizing the effects for Bulgaria.

The witnesses called today blamed the defendants Grigor Stoichkov, former chairman of the Standing Governmental Commission for Management of Natural Disasters and Major Industrial Accidents, and Professor Lyubomir Shindarov, former sanitary inspector general, of acting inadequately to provide protection of the public against the effects of the accident.

Prof. Iliya Belokonski, former deputy chief of the Academy of Military Medicine, said that one Kiro Kirov, then secretary of the standing government commission, had forbidden him to deal with Chernobyl problems. Prof. Belokonski was told that their truth was not needed.

The evidence given by Prof. Tsvetan Vasilev, head of the Nuclear Physics Department at Sofia University, made it clear that the witness supplied Bulgaria's former Number One Todor Zhivkov with information on radiation levels and specifically on the hot particle fallout. The same professor travelled to Moscow on a confidential trip to see Academician Velikhov and hand him the hot particles information gathered in Bulgaria. The witness contended that the Soviet Union then ignored that factor, which a number of Bulgarian scientists believed could be a public health hazard.

One year after the ban on nuclear tests in the atmosphere, the average European was exposed to 15-20 becquerels per kilogramme of bodyweight; one year after the accident, the population of southern Bulgaria had 300 becquerels per kilogramme, the witness Bosevski said. He explained that the readings taken in the southern part of the country at that time were equal to the exposure figures of the people of Bryansk in the restricted zone in February-April 1987.

"Insignificant as it may seem, the average European exposure forced the superpowers to discontinue nuclear testing; since 1986, however, there are people who have been bargaining like shopkeepers about permissible doses and the likely fatality rate," Mr. Bosevski pointed out.

As time ran out, the parties to the case today did not take a stand on the witnesses who had defaulted their summons, including former supremo Todor Zhivkov.

The trial will resume tomorrow.

Chernobyl Trial: Expert Witnesses Questioned

AU0805202691 Sofia BTA in English 1852 GMT 8 May 91

[Text] Sofia, May 8 (BTA)—We deceived not only the Bulgarian people but also the international institutions about the actual radiation situation in this country in the wake of the Chernobyl accident, said Mr. Yanko Yanev,

a witness at the trial of two former top officials who were responsible for protecting the health and life of the Bulgarian people.

This statement of Mr. Yankov, an associate professor of physics at the Sofia University, concerns the data published by international organizations on the situation in Bulgaria after the Chernobyl nuclear disaster. According to him, in the days and months following the accident, no tangible measures were taken to ensure the safety of the people.

The testimony of Mr. Todor Petkov of the Institute of Nuclear Medicine confirmed the evidence of other witnesses that there was no coordination between the separate units handling the radiation problems.

Mr. Yanev and Mr. Petkov were the last witnesses that appeared to testify at the trial of Mr. Grigor Stoichkov, former chairman of the Commission for Management of Natural Disasters and Major Industrial Accidents, and Mr. Lyubomir Shindarov, former chief sanitary inspector. By Monday the sides to the trial are expected to decide what to do about the witnesses who failed to appear in court, including Bulgaria's former No. 1, Todor Zhivkov. Mr. Zhivkov, whose state of health is unclarified, is to be examined by medical experts next week to decide whether he is fit to appear both as a witness at the Chernobyl trial and as a defendant at his own trial.

It is still unknown whether any of the sides to the trial will insist on Mr. Zhivkov's testifying in court.

As of tomorrow the court will be hearing the reports of the economic, environmental and medical commissions of experts which will undoubtedly influence the outcome of the trial.

If neither of the sides insists on questioning the witnesses who did not appear in court, Zhivkov being the most problematic of all, the sentence may be passed as early as next week.

Pollution-Decreasing Program for Kremikovtsi Plant

AU0505163591 Sofia BTA in English 1612 GMT 5 May 91

[Text] Sofia, May 5 (BTA)—"Kremikovtsi," the largest metallurgical works in Bulgaria situated near Sofia, has decreased the emitted quantities of dust from 75,000 to 20,000 tonnes, of nitric oxides from 30,000 to 3,000 tonnes and of sulphur dioxide from 50,000 to 25,000 tonnes.

One of the managers points out that this is a result of the program for technological renovation and ecologization which has been operating since 1990.

According to the program, only one of the three blast-furnaces will go on functioning, and only after a complete reconstruction. Purifying equipment for the different productions is being designed.

The plant has two purifying installations for waste water. It consumes annually 876 million cubic meters of water and only 4 percent of this amount comes from a water basin, the rest comes from the plant's own sources.

The joint investigation by experts from the Institute of Ferrous Metallurgy and the Austrian company Voest-Alpine showed that the polluted zone does not exceed 15 km. in radius.

Bukhovo and Yana are two villages in the immediate proximity of the plant. The concentration of lead is 10 times higher than the standard in the soil there and 40 times higher than the standard in fodder plants. The upper layer of soil near Bukhovo contains a considerable concentration of uranium and radium coming from the uranium mine. Experts from the Pushkarov Institute for Soils advised a removal of the upper layer of soil and opposed the cultivation of vegetables there.

CZECHOSLOVAKIA

Environment Minister Opposes Completion of Temelin Nuclear Plant

AU0505210391 Prague MLADA FRONTA DNES in Czech 29 Apr 91 p 2

[Interview with Czech Environment Minister Ivan Dejmal by Jan Plachetka in Temelin on 27 April: "Two Units Are Enough"—opening paragraph is MLADA FRONTA DNES introduction]

[Text] Czech Environment Minister Ivan Dejmal was among the participants in the Saturday [27 April] protest march against nuclear power from Tyn to Temelin.

[Plachetka] What is your ministry's attitude to the Temelin Nuclear Power Station?

[Dejmal] The first two units must be completed and put into operation as there is no other way of replacing their 2,000 megawatts in our energy concept. But we are against the construction of the third and fourth units and against the continued construction of nuclear power stations in general. Nuclear power entails great risks and the treatment of nuclear waste has not been mastered either. Newly conceived power stations will appear on the market only after the year 2000.

[Plachetka] Are you suggesting that we interrupt the nuclear program for at least 10 years?

[Dejmal] This could be done without even endangering the economy of this country. The energy that is supposed to be supplied by the new power station can, and must, be obtained through energy conservation and the use of

alternative sources of power. After the year 2000 we can return to the issue [of nuclear power stations].

[Plachetka] Do you think that it is realistic to expect that the third and fourth units of the Temelin Nuclear Power Station will not be built?

[Dejmal] Their construction should not be considered for ecological as well as economic reasons. Moreover, these two units would be launched some 12 years from now when even the improved units based on Soviet design would not meet the security standards of the time. We would just build another museum here!

[Plachetka] Do you have confidence in the safety of the first two units?

[Dejmal] I have confidence that everything will be done to ensure their safety. Not even the most ardent designer of nuclear power stations will tell you that they are 100 percent safe. A technology that has outgrown human dimensions cannot, as a matter of principle, be completely safe. That does not apply just to nuclear power stations.

104 Defects in Nuclear Plants in 1990

LD0705184191 Prague CTK in English 1345 GMT 7 May 91

[Text] Prague May 7 (CTK)—A total of 104 defects were registered at Czechoslovakia's nuclear power plants last year, one of which was of the 2nd degree on the seven-degree international nuclear events scale (INES), three of the 1st degree and 100 of the zero degree.

Up to degree three of the INES, no radioactivity leak is involved.

Meeting with journalists here today, Zdenek Kriz, chief inspector of the Czechoslovak Commission for Atomic Energy (CSKAE), also spoke about inspections carried out by the commission in the plants at Jaslovske Bohnice, West Slovakia, and Dukovany, South Moravia, last year.

The commission paid special attention to the V1 unit at Jaslovske Bohunice which has been strongly criticised by Austria. A set of 81 measures to raise the unit's safety has been worked out. The measures are to be carried out in 1991-92 at a cost of 1,500 million crowns (1 USD = 30 crowns).

The Jaslovske Bohunice plant was inspected last April by a mission of 16 experts from nine countries, Kriz said. Their conclusions supported practicaly all the measures recommended by the CSKAE.

But the mission was strongly critical of the management, organization of work and possibilities of independent inspection in the plant, Kriz said. He added that though the qualification of the staff is at a very high level, the regulations for operation are not often observed.

Discussion at the press conference concentrated on the safety of the A1 unit at Jaslovske Bohunice after the 1977 break-down. Kriz said the danger to the environment still persists. It would be fully liquidated only if the burnt-out fuel were taken to the Soviet Union, which is now being discussed. But talks are being conducted also with Britain, France and Germany.

Petr Horacek from the federal committee for the environment added that this situation is a big "sin" committed by the former communist regime whose rectification will cost hundreds of millions of crowns.

Two more nuclear plants are being built in Czechoslovakia, one at Mochovce, West Slovakia, and the other one at Temelin, South Bohemia.

At present, nuclear plants account for about 27 percent of electric energy generation in Czechoslovakia.

Swiss Environmental Aid Memorandum Signed

LD3004072691 Prague CTK in English 1902 GMT 29 Apr 91

[Text] Prague April 29 (CTK)—Switzerland will provide a 15-million-franc direct aid package to finance specified environmental projects in Czechoslovakia, according to a memorandum signed here today. The aid offer, the first of its kind to Czechoslovakia, will apply to 19 waste disposal and forestry projects scheduled to begin this year and continue until 1995.

Joint Czechoslovak-Swiss teams will focus on forest rehabilitation in the mountain regions of Jeseniky in North Moravia and the Bohemian Forest in South Bohemia, use of waste wood as fuel, separated refuse collection in Prague and Bratislava and waste disposal. Special training programs are planned for laboratory analysis experts and Czechoslovak forestry specialists will go on study trips to Switzerland.

Swiss Ambassador to Czechoslovakia Maurice Jean Renaud said at the signing ceremony today that environmental protection and cleanup in Czechoslovakia is one of the pillars of Czechoslovak-Swiss cooperation and today's signature of the document gives it a long-term outlook.

POLAND

Commissions Urge Better International Environmental Control

AU2804174891 Warsaw GAZETA WYBORCZA in Polish 23 Apr 91 p 3

['jg' report: "Acid Wind in One's Face"]

[Text] Poland should try to bring about changes in international law that would effectively counteract pollution from outside the country, said the Sejm Foreign Affairs and Environmental Protection Commissions in a letter to Prime Minister Bielecki.

The deputies in these commissions pointed out that although Poland itself causes a lot of pollution, it receives rather more fumes and emissions as a result of unfavorable winds from the neighboring countries. For example, Germany sends Poland nine times more sulfur and nitrogen emissions than vice versa.

The deputies believe these pollution figures should be considered during talks on Poland's debts toward Germany, because the damage caused to Poland by German pollution is several times higher than the value of Polish debts to that country.

The deputies suggested adding new features to the international conventions and agreements that already exist, such as accepting responsibility for environmental damage to other countries as a result of industrial activity in one's own country, or "trade and financial concessions in the transfer of technology and know-how that could solve problems of environmental protection."

The deputies also demanded a detailed examination of the extent of the environmental damage caused by the Soviet Army in Poland.

ROMANIA

Official on Industrial Pollution, Solutions

91BA0555Z Bucharest ROMANIA LIBERA in Romanian 5 Apr 91 p 3

["Excerpts" of an interview with State Secretary Angheluta Vadineanu by Doina Doru-Chirca; place and date not given: "Incipient Environmental Protection"—first paragraph is ROMANIA LIBERA introduction]

[Text] For years we knew that we lived in a polluted and damaged environment, without however realizing the scope of the disaster. For example, we knew that fruit and vegetables were free of worms because of the high concentration of chemical fertilizer but we ate them although we suspected that they were toxic. The air is loaded with dust, car emissions, and toxic gases emanated by various industries. A large number of rivers have become stagnant or even poisonous. Forests have been felled thoughtlessly and the mountains are eroded because of hostile clearings cut in a spirit of "after me the deluge." This is another of the "legacies" of communism; by attacking the condition of the environment, our health and our genetic dowry were attacked. An Environmental Ministry was established as a first step toward restoring the environment; its mission is to hammer out programs and strategies along this line and to monitor the observance of environmental protection norms. We conducted an interview with State Secretary Angheluta Vadineanu in order to find out more details. Because of space limitations, we will carry excerpts—the most interesting, we think—of the extremely interesting discussion we had with him.

[Doru-Chirca] Are there differences among the various zones in our country from the viewpoint of pollution?

[Vadineanu] The answer is rather difficult. We have, of course, identified the critical areas. There are various degrees of environmental degradation. A program of investigation is currently underway—and will continue for a period of three years—designed in the final analysis to identify categories of ecological systems and their conditions. You must know that "degree of deterioration" refers not only to pollution degradation but also to extensive economic projects which can strip and empoverish ecological systems. Also, a complete map must indicate not only the degree of pollution but also the distribution of sources that cannot be regenerated and their condition. This will allow us to channel the entire recovery process and to establish a system of priorities.

[Doru-Chirca] Can the noxious substances be listed by hierarchy?

[Vadineanu] It depends from what angle we consider them: Some may be viewed as more harmful because their effects are immediate. But heavy metals, for example, cause very long-term environmental damages. Any noxious substance is dangerous and none may be viewed as "secondary" or "minor." That is why I believe that it is very important to stage a consistent campaign to educate everyone, both those expected to protect the environment, and the public, who must realize that by damaging the environment they damage their own biological heritage.

[Doru-Chirca] From previous years we know that some enterprises, the chemical combines of Govora and Fagaras, and various agricultural and livestock units operated without authorization. What is currently the situation?

[Vadineanu] We must realize that we are only at the beginning of the road. As we adopt the necessary legislation, if we see that they're not making any efforts, within a reasonable period of time we may withdraw their permission to operate.

[Doru-Chirca] Why not do it now?

[Vadineanu] For the time being it cannot be done, for two reasons. The first is of a social nature. Imagine we were to close down the Copsa Mica Combine. Thousands of people would be jobless. They themselves don't even want to hear of such a thing, even though they know it's dangerous for themselves and for their children. But they're not the only ones; our industry is linked in a "chain" and that defect is difficult to repair. If we stop one factory—regardless which—the whole chain breaks. What do we do with the people employed in such plants? That is why we are obligated to plan a gradual change of technology. Another obstacle is of a legislative nature: We don't have the legislative framework to do it. But in any event, the social factor compels us to opt for a slow solution. Can we close down the agricultural and livestock combines that either don't have purification stations or have some that are too small? What do we do

with the pigs then? You see, we have to persuade every economic factor to make investments for this purpose. And of course, we need the legal framework...

[Doru-Chirca] Where are we from the viewpoint of environmental deterioration in comparison with other East European countries?

[Vadineanu] It's difficult to tell. Of course, pollution doesn't stop at borders. But you see, each East European country claims that its situation is even worse. That is the case with Czechoslovakia. But I will venture to state that, considering the density of pollutants per unit of area, we are in a far worse situation than Czechoslovakia, Poland, or Bulgaria. Naturally, by admitting and claiming a very bad situation, each one of these countries hopes to secure larger funds for technological changes. For years on end we claimed that everything was fine and now that's coming back to us like a boomerang. Nevertheless, now we hope that a number of loans will be rechanneled our way.

[Doru-Chirca] Is there a concrete antipollution program?

[Vadineanu] Such a program is being worked on. But it would be the biggest mistake to think that pollution alone is responsible for environmental damage. It is only one of its causes. Another cause is the excessive exploitation of resources, of forests, and major hydropower projects, all of which contribute to changing the environment and thus its quality, and to the disappearance of some species. Similarly, biotechnologies and genetic engineering also contribute to empoverishing the species. To hammer out a program to combat environmental deterioration we must be familiar with all these factors in detail, establish their long-term impact, and decide on means of prevention. For the time being we must learn the real scope of the disaster in order to establish a strategy for recovery.

[Doru-Chirca] What is the amount required for technological changes and how much is the yearly allocation for this purpose?

[Vadineanu] The investments are enormous all over the world, not only in our country. Regional and global disturbances have generally caused such a situation in ecological systems that the future development of society is in extreme danger. As far as we are concerned, we are working on assessing the costs. The ministries and departments involved have requested investment funds for environmental protection. Evidently, the Environmental Ministry has pointed out the need for certain projects, such as water purification stations in large urban centers, installations to control atmospheric emissions, and so forth. Approximately 8 billion lei have been allocated in the present circumstances of our economy, which is insufficient to sustain a high rate of recovery process, but this amount in lei can cover expenses for requirements that can be met internally, while for the rest each unit can obtain external loans without any limits set by the executive.

[Doru-Chirca] What is the ministry's position on restructuring the industry?

[Vadineanu] One of the main objectives is to evaluate the future impact of every action. In fact we are preparing a report for next year's meeting in Brazil on: "The Environment, Its Protection, and Development." This means that, once we know what technology and raw materials are used, what the product of each technological stage is, and where an investor wants to locate a given plant then we can determine the consequences and all their economic, social, and ecological effects. Then we can determine the conditions on which a permit for operation may or may not be issued.

[Doru-Chirca] We are a poor country in great need of foreign currency. Are there plans to stop trends developing or to prevent hosting industries that pollute or deposit waste?

[Vadineanu] The environmental law that will soon be submitted to Parliament envisages all of that. Simultaneously work is under way on bills regarding the collection and storage of noxious substances and the right to produce and handle such substances. We intend to use European standards adapted to our experience and we will also tap the experience of European specialists in the area. The coming law will stipulate that the impact of every restructuring and every new economic unit must be evaluated. For that we will receive foreign aid; the PHARE [expansion unknown] program also envisages such an operation.

[Doru-Chirca] Speaking of standards, how do those practiced in our country compare with world standards?

[Vadineanu] All of them were close to the European standards and some of them are even stricter, but what's the use if they were not observed? We don't have standards for atmospheric emissions, so we will adopt European guidelines. The fact that we have signed international conventions on environmental protection obligates us to now observe these standards.

[Doru-Chirca] Are the environmental monitoring agencies properly equipped?

[Vadineanu] No.

[Doru-Chirca] How much authority do they carry?

[Vadineanu] For the time being they implement the laws in effect, such as they are. These agencies are in charge of reporting and providing data to evaluate the environmental situation. The fact that we have joined a number of international conventions—of our own free will—will in the future impart great authority to these agencies. So far they can't do much. In Giurgiu, for example, the workers have threatened that if we recommend that the plant be closed down they'll blow us away from there. Each one dreams of getting rich as quickly as possible and never mind protecting the ecological systems. Until we get rid of this kind of thinking we won't make too much progress. The implementation of a legislative

regime depends on the existence of a competent department of inspectors. Environmental protection is expensive and it must not be left to the discretion of economic units, whose main concern is immediate economic gain.

[Doru-Chirca] Environmental pollution is undisputably a world problem that does not recognize borders. How is your cooperation with similar institutions in the world and what aid can they offer Romania?

[Vadineanu] Most similar world organizations are nongovernmental and consist of ecology experts with access to data bases. Such bodies—in cooperation with governments—have initiated a world program designed to promote research programs, provide equipment, train specialists, and channel funds. The amounts required are enormous, but equally important is that the money not be funneled along closed channels. Programs have been established for Govora, Rimnicu Vilcea, and Copsa Mica in cooperation with the International Atomic Energy Agency in Vienna—which has expanded its field of activities—and with other similar bodies with a view to evaluating the impact in critical areas and establishing a certain order of priorities towards which to channel the funds, so that Romania should not remain a disruptive factor. It's easy to say that we need help, but we must be realistic. Only when we show that we know where we stand and especially where we want to get and how, in other words, only when we will have a real picture of the material aid we need, will we get help. Today no one is tossing money around for the sake of helping. I can tell you that there are firms which wish to form joint associations with us in order to procure equipment for controlling atmospheric emissions and build filter installations for the cement industry. It is up to us to demonstrate that we have a good grasp of how to utilize such aid.

YUGOSLAVIA

Krsko Nuclear Plant To Operate 'As Long As Safe'

AU1305163991 Belgrade BORBA in Serbo-Croatian 24 Apr 91 p 14

[T. Bohus report: "We Want Bread, Not Ecology"]

[Excerpts] The third news conference on the work and effects of the Krsko Nuclear Plant on the environment in the first quarter of this year was held in the Ministry for Energy and Industry of Croatia recently. The news conference spontaneously turned into a discussion on what people did to the nuclear plant and vice versa. According to some written reports, it is clear that the Krsko Nuclear Plant is still working properly and that it is performing its job as expected. At the same time there are more and more calls for its reactor to be shut down and for the plant to be temporarily closed down.

True, Josip Aralica, vice president of the Krsko Nuclear Plant, stressed, the depreciation age of the plant is 25 years, the projected lifespan of the plant—working at full capacity—is 30 years, and considering the good condition of the reactor's metal chamber, it would be possible to extend its work until the year 2205 [as published] and beyond.

Journalists must have noticed new tones in Aralica's speech and realized that mathematics is not his best subject.

Bozo Udovcic, minister for energy, was more precise: "The nuclear plant will work as long as it is safe to work, regardless of its projected age." [passage omitted]

BOLIVIA

Magazine Predicts 12-Percent Loss of Fauna by 2000

PY2704150091 Madrid EFE in Spanish 0122 GMT 26 Apr 91

[Text] La Paz, 25 Apr (EFE)—An ecology magazine today reported that Bolivia may lose 12 percent of its fauna by the year 2000 if the current rate of depredation of its fauna continues.

The magazine HABITAT, published by the League for the Protection of the Environment [Lidema], states that unrestricted hunting, the destruction of the natural habitat of animals, and the diseases brought into the jungle by people, are jeopardizing Bolivian fauna.

According to HABITAT at least one animal species living in Bolivia is reportedly extinct, citing the umanto fish, which until 1940 lived in Lake Titicaca, at 4,000 meters above sea level the world's highest lake.

HABITAT also believes that the rodent known as chinchilla is also extinct despite the fact that some have reportedly been seen along the border with Chile, a fact that has not been proven.

Unrestricted hunting may cause the extinction of mammals such as the quirquincho, londra, guanaco, taruca and the Andean deer, and birds like the suri, the Andean ostrich and the paraba (or donkey parrot). Also the black and the yellow [overo] caiman may become extinct.

Last year the Bolivian Government declared a five-year "ecological time-out" with the objective of protecting the local flora and fauna in the light of the high rate of depredation in the country.

DOMINICAN REPUBLIC

Disappearing River Threatens Hydroelectric Plant

91WN0398A Santo Domingo EL CARIBE in Spanish 28 Mar 91 p 3

[Article by M. Bobea Billini]

[Text] Rancho Arriba, San Jose de Ocoa—"If things continue like this, soon there will be no river."

The comment came from an old resident of this valley who remembers with an almost dramatic tinge of nostalgia the time when the Nizao was "a real river and not the little trickle which it is now."

We were crossing the river, with the water barely up to our ankles, on the ruins of a drain pipe which almost disappeared in one of the heavy showers which occurred during the rainy season of 1990.

In this valley the Nizao River—or the sum total of the meandering streams which compose it—flows over a very narrow, extremely permeable bed of gravel and fine sand, after the natural bed of the river was destroyed by the great flood of 1979, when Hurricane David passed through this area.

Since then the river constantly changes its course each time the water level rises after the flow increases due to a torrential downpour.

Due to those sudden and repeated changes, the river has not made a new bed and, therefore, has not been able to make its bottom waterproof. This is impoverishing it at an accelerated pace, justifying the comment of the modest farmer who repeated: "If this continues, soon there will be no river...."

However, it happens that the Nizao is not an ordinary river. It is the river which flows into the largest and most expensive hydroelectric complex in the Dominican Republic, made up of the reservoirs of Valdesia, Jiguey, and Aguacate, the last two of which are in the final stages of construction.

In the view of experts whom we have consulted—including one of the most qualified hydraulic engineers in the country—if existing conditions do not change quickly in the largely deforested, upper reaches of the Nizao River and the stream is channeled to keep it flowing along a definitive course, those reservoirs are doomed to a very short, useful life. The new aqueduct of Santo Domingo, which is scheduled to be fed by the waters of the Nizao River, will soon be turned into a network of empty piping.

About eight years ago, during the middle years of the Jorge Blanco administration, work was begun on channeling the river. A few hundred feet of diking were built along the eastern bank of the river at a cost which at the time was considered excessive. This was blamed, not so much on the price of the materials—cement and braided, reinforcing wire—but on the process of corruption which surrounded the administrative aspects of this project.

It was really a pity—and, why not say it, a tragedy—that this work did not continue and that it has remained uncompleted to this day, since the conditions in the bed of the river are increasingly precarious. What was once the mighty Nizao River will turn into a little brook or perhaps into a subterranean river difficult to save and bring into the complex of hydroelectric dams.

When the now interrupted work began, it was calculated that the channeling of the Nizao River through the Rancho Arriba valley would cost about 10 or 12 million pesos, a sum which obviously, at today's inflated costs, would be perhaps twice or even three times as much.

However, in any case any amount of money spent on this work is very much less than the hundreds of millions of pesos which the Higuey and Aguacate dams and the Valdesia-Santo Domingo aqueduct will cost.

Let us hope that the Nizao River will not die!

Chemist Reports Extensive Yaque River Contamination

91WN0398B Santo Domingo EL SIGLO in Spanish 1 Apr 91 p 5

[Article by Esteban Rosario]

[Text] Santiago—Domenica Abramo, who holds a doctorate degree in chemistry and is president of the Ecological Society of Cibao, startled those who had come to hear her report on the harm which the different types of contaminants in the Yaque del Norte River do to human and animal health and to the environment.

The presentation was cool and matter of fact. No one talked during it. The participants in the seminar on the past, present, and future of the Yaque del Norte River listened in silence. Domenica Abramo began her presentation by listing the contaminants which are deposited in the river. Moreover, she stated that the situation is serious and urgent and that rapid action by the government, businessmen, and the people is necessary.

She said that erosion is one of the principal sources of contamination. It produces solids which are deposited all along the Yaque River and which contain pollutants and sediment.

The sediment has direct effects on the environment.

The contaminants damage the bed, the mouth, and sand banks of the river and cause a reduction in aquatic flora and fauna.

The impact is destructive for human health. The sediments cause kidney damage when the water is drunk, and this effect expands to other organs of the human body, causing serious problems.

The use of fertilizers and agrochemicals is one of the most harmful contaminants which are polluting the Yaque del Norte River at this time. The contaminants come from Constanza and Jarabacoa, where they are used indiscriminantly in agriculture.

According to research by Dr. Abramo, who is a professor of chemistry at the Universidad Catolica Madre y Maestra the concentration of fertilizers and agrochemicals in the Yaque River causes a major increase in the level of nutrients in the bed of the river. It also causes the salination and contamination of the river and an imbalance in aquatic flora and fauna.

Pollution of the river has various effects on human health. These are reflected in the kidneys, where they cause illness. They create problems in the liver and in the skin.

Pesticides, for example, cause collateral harm to other organs of the body. They slowly destroy the nervous system.

During the seminar, "Let Us Save the Yaque del Norte River: Past, Present, and Future of the Yaque del Norte River," sponsored by the Dominican Solidarity Foundation, Dr. Abramo described the most important damage to the river.

Throughout her presentation Abramo identified the chemical contaminants and organic and inorganic matter which factories deposit in the Yaque River.

This is the first time that this has been done in detail.

Because there is a lack of sanitary facilities, solid and liquid waste from farms and human beings in the rural and urban areas of Santiago and other cities is discharged into the Yaque del Norte River.

According to Abramo's presentation, the majority of the suburbs and residential areas of Santiago discharge their wastes into the river without processing by Coraasan [Water and Sanitation Corporation].

In those solids and liquids there are organic, inorganic and pathogenic bacterial materials, parasites, and other harmful elements which cause direct harm to the people and to animals.

That has been directly reflected in the Yaque del Norte River, the largest river in the country.

Therefore, there is an abnormal growth of certain plants, a reduction in the amount of free oxygen, and a spread of various diseases.

Dr. Abramo emphasized that for human beings this situation and those contaminants are causing gastrointestinal illness, cholera, hepatitis, dysentery, and other diseases, which can cause the death of many people.

In her study Doctor Abramo stated that the discharge of industrial wastes is a major threat to human beings and animals. Those companies are discharging into the river untreated cement, lime, inorganic pigments, and other chemical substances at high temperatures.

This situation has increased the level of sediment in the river. It is damaging the flora and fauna and the bed of the stream.

She said: "It increases the sediment in the water and, therefore, the cost of making it potable."

According to Doctor Abramo, tanneries are depositing decaying, organic material in the Yaque River. And those substances are destabilizing aquatic flora and fauna. Furthermore, they cause diseases of the skin and nervous system among human beings.

Dr. Abramo stated that the most harmful substances which these companies deposit in the river are sodium chloride and other salts and chromates derived from aniline and phenol compounds, which increase salinity, poison aquatic animals, and result in cancer of the liver and kidneys.

Distilleries and factories producing alcoholic beverages are other industries which dump chemical wastes which contaminate the Yaque River.

The principal industrial, high temperature residues deposited in the river include alcohol and fermentation byproducts which are rich in organic matter and phosphates.

However, Dr. Abramo warned in her study on industrial chemical contaminants that the worst of all of the products deposited by distilleries and alcoholic beverage factories are high temperature residues. According to her, their temperatures are often above 80 degrees Celsius. That kind of contamination is called thermal pollution.

Factories producing batteries are among those which cause the most damage to the Yaque del Norte River. They deposit residues of lead and of salts, acids, and other products, which cause damage to the kidneys, liver, skin, and nervous system and to the environment. They destroy the flora and fauna in the river.

The Yaque del Norte River, which is 280 km long and is the largest stream in the Antilles, has suffered from the effects of contamination. It has deteriorated over several decades without anyone becoming concerned about its condition.

Only when it is in serious condition are the people, scientists, and government authorities concerned about saving it.

That is why Dr. Domingo Rodriguez, director of the Department of Natural Resources of the Ministry of Agriculture, sought to explain at the seminar the causes for the deterioration of this hydrographic basin.

According to Doctor Rodriguez, the deforestation of the upper basin of the Yaque River is partly responsible for the present condition of the river.

He cited the example of the indiscriminate extraction of timber, particularly Western Pine trees, by hundreds of lumbermen who have lived in the area since the North American occupation from 1916 to 1924.

Emigration to the mountains of descendents of Spaniards who fled from Haitian persecution stimulated deforestation in the upper basin of the river, which caused a reduction in its flow.

Forest fires which have periodically occurred have caused serious damage to the hydrographic basin.

Rodriguez explained that this situation, combined with erosion, has resulted in irreversible harm to the soils of the river basin.

He explained: "Many of these soils, when they are deprived of the cover of vegetation, receive rain water directly, without the natural shock absorption of the forest. This makes the water run rapidly over the surface rather than into subterranean wells, which feed the headwaters of the river."

Furthermore, the absence of land use control has resulted in planting crops in mountainous areas, as well as the construction of the Tavera-Bao-Lopez-Angosture dam, which was accomplished without providing any kind of protection of the hydrographic basin of the river.

The use of pesticides with broad, residual effects on planted fields located in areas of the basin of the Yaque del Norte River is another factor causing the present condition of the river, in addition to the direct application of agrochemicals and pesticides.

Rodriguez explained: "Irrigation canals for the hydroelectric complex of Tavera-Bao-Lopez-Angostura use water from the Yaque River in such quantities that, as a practical matter, below the Otra Banda [Other Bank] outlet, this river is turned into a trickle of water fed by the contaminating effluents coming from factories."

Rodriguez concluded: "Finally, the major cause of the deterioration of the Yaque del Norte River is the lack of awareness and education on the part of those using it. They do not appreciate the importance of such an extraordinary natural resource. In an irresponsible way we are damaging the river and depriving future generations of its great benefits."

Deforestation Rate Accelerating 'Alarmingly'

91WN0398C Santo Domingo EL SIGLO in Spanish 2 Apr 91 p 5

[Article by Virgilio Mendez]

[Excerpt] Constanza—Deforestation has reached alarming proportions recently in this city. About 15 percent of the forest in this area disappears each year due to man's activity.

Dr. Cristino Encarnacion, the director of agriculture in Constanza, made this statement. He based his views on data provided by the forestry subdirector of this city.

He stated that deforestation has increased during the past four years. He said that in 1987 there were 655,301 hectares of forest. In 1990 there were a little more than 71,000 hectares.

He remarked that, as a result of indiscriminate deforestation, some species of birds have disappeared from this area.

The director of agriculture in Constanza said that this situation has been a factor in the decline of agricultural production in the area.

Cristino Encarnacion recalled that the average temperature in the Constanza valley a few years ago was 18 degrees Celsius. Now it has gone up to 22 degrees Celsius.

Encarnacion added that a few years ago rains were frequent in this city. He indicated that at present they are rare, and at times there are long term droughts. [passage omitted]

INDRHI Combats Deforestation With Bamboo

91WN0398D Santo Domingo LISTIN DIARIO in Spanish 9 Apr 91 p 4

[Article by Geraldino Gonzalez]

[Text] The National Institute of Water Resources (INDRHI) has announced the intensification of a program of reforestation with bamboo along river banks. The government has advanced about 180,000 pesos to get the program under way.

Through the Department of Hydrology work is also being done on reforestation with bamboo in the Mahomita River area, near the Jiguey-Aguacate reservoirs, where nearly 200,000 pesos are being invested.

Dr. Augusto Rodriguez Gallart, the director of the INDRHI, said that the work will be done with the advisory assistance of the Technical Mission of China.

He stated that work is being done on the protection of hundreds of kilometers of rivers in the provinces of Santiago, Cotui, Barahona, Rancho Arriba, Constanza, San Juan de la Maguana, Emgombe, and Bani.

In addition to the Yaque del Norte River area the banks of the Haina, Yuna, and Mahomita Rivers are also being reforested with bamboo.

Dr. Gallart said that the government is very much interested in maintaining existing plant nurseries, as well as in establishing new stocks of plants to support the reforestation effort.

At present the INDRHI has a permanent brigade of workers engaged in the protection of the banks of the Mahomita River.

The INDRHI and the Faculty of Agronomy of the Autonomous University of Santo Domingo have jointly carried out several research programs on varieties and methods of propagation of bamboo.

Finland, Sweden Grant $10 Million to Conifor

91WN0398E Santo Domingo EL SIGLO in Spanish 14 Mar 91 p 1

[Article by Wilfredo Polanco]

[Text] The president of the Consortium for Forestry Investments (Conifor) announced on 13 March that Finland and Sweden will provide the Dominican Republic, through the consortium, with approximately $10 million for forestry development in the country.

Dr. Manuel Garcia Denis, president of the consortium, said that the money will be obtained under an advantageous agreement which Conifor has just reached with Finland and Sweden. Under the agreement, economic resources will be channeled into a broad reforestation program. He stated that the agreement, whose details are being worked out, will make it possible for the country to receive $10 million under very advantageous conditions.

He pointed out that most of the money will come in the form of grants and, in other cases, as loans under highly favorable conditions.

Dr. Garcia Denis spoke at a televised conference held at the Club de Ejecutivos Santo Domingo [Santo Domingo Executives Club] at which a documentary was presented on the programs carried on by Conifor in the forestry sector. In his speech he stated that the economic investment will make it possible to provide even greater dynamism to the improvement and planting programs that the consortium is carrying on in 11 forestry projects located in seven provinces throughout the country. He indicated that the $10 million will be invested in the 180,000 projects which Conifor and other organizations independent of it are carrying out in forestry programs throughout the country. He stated that the resources will be provided by several financial institutions and foundations concerned with forestry improvement and the world environment.

Dr. Garcia Denis said: "This contribution commits us even further to continue the massive program of reforestation which Conifor has undertaken with marked success, as an effort by private initiative to contribute to the conservation of our natural resources. At the same time it will help to supply the growing demand for lumber and firewood which the country requires." Dr. Ivonne Garcia, under secretary of natural resources in the Ministry of Agriculture, also participated in the program. He pointed out the importance of having the private sector contribute to the reforestation of the country.

Garcia, who is also vice president of the National Technical Forestry Commission (Conatef), spoke of the progress which countries like Venezuela have made in the process of reforestation of their land with the help of the United Nations.

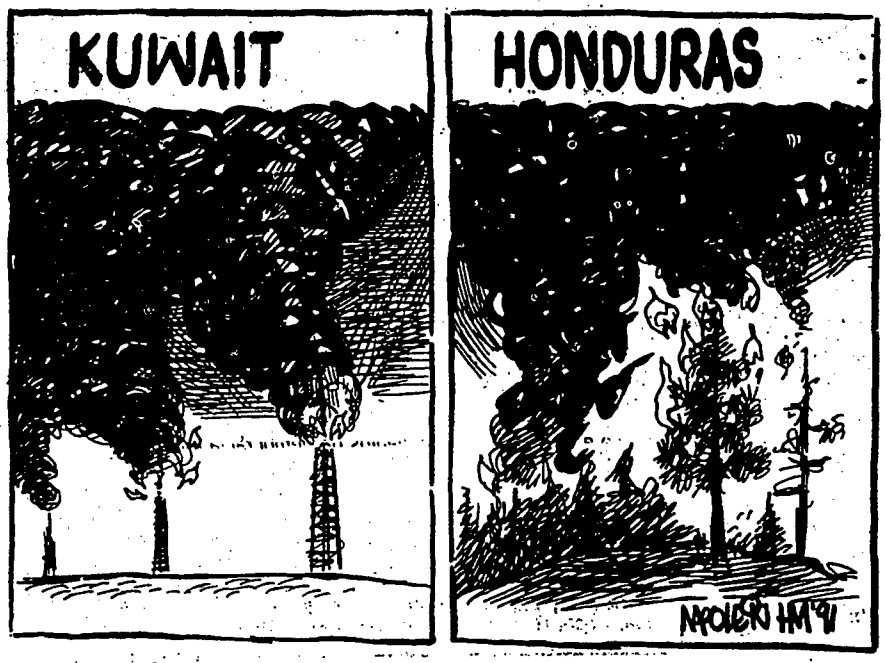
HONDURAS

55 Species Face 'Imminent Extinction'

91WN0350B Tegucigalpa LA TRIBUNA in Spanish 7 Mar 91 pp 5, 42

[Commentary by Hernan Carcamo Tercero: "Our Natural Resources"]

[Text] "Many Hondurans still remember the time when the olingos [species of monkey] howled in the distance, the iguanas sunned themselves on every branch of a tree,



[Tegucigalpa LA TRIBUNA in Spanish 8 Mar 91 p 4]

and flocks of parrots and parakeets chirped away as they flew by. Not so long ago a child living in the countryside had the privilege of seeing a jaguar at least once during his youth. The farmers had an abundance of food resources, a cool climate, and a regular flow of crystal clear water. These were provided by extensive forests which existed in our country in the past. However, now the vast expanses of forest which used to cover almost the whole country have been reduced to islands which are shrinking increasingly due to man's activities when they are not carried on in a rational way."

That painful memoir appears in the "Agenda de 1991" which the Honduran Association of Ecology, headed by Jorge Betancourt and Rigoberto Romero Meza, has dedicated to the Protected Areas of Honduras. This is not a false, theatrical attitude on the part of the authors to make a deep impression on their readers. It is neither more nor less than a genuine description of a dramatic, existing situation, which may turn into a national tragedy before long.

In the "Agenda de 1991" is a chart which shows that 41 species of marine animals, including invertebrates, fish, reptiles, birds, and mammals, and 14 species of our flora are in imminent danger of extinction. When we speak of extinction, we do not have to exaggerate, giving the impression that this is a possible future and uncertain event. It means, simply and broadly speaking, that if urgent measures of protection are not taken, there will be an early elimination of those species for all time. That criminal process of extinction of our natural wealth has its origins in clearing the land, fires, deforestation, and uncontrolled hunting which have been tolerated freely and with complacency for a long time, without considering the irreparable damage which has been caused and is happening to our country.

Therefore, the following is stated, and with full justification, in the book of which we speak: "Avoiding the destruction of the species now in danger of extinction is an ethical and moral duty, in addition to being a necessity to ensure the quality of the human condition. As the Indian chief of Sealth of the Piel Roja Dwanwish tribe said: "What would become of man without the animals? If all of them were exterminated, man would also die of a great, spiritual loneliness, because what may happen to the animals could also happen to man. Everything is linked together."

Concern over defending our natural resources, at least in theory, is to be found in our highest laws. The Constitution of 1957 contained Article 254, whose text is as follows: "The state will ensure the defense and conservation of our natural resources and will regulate the use, enjoyment, and exploitation of them, in accordance with the social interests of the country."

The Constitution of 1965 came next, and it states the following in Article 254: "The technical and rational exploitation of the natural resources of the nation is declared to be a public need and necessity. The State will regulate their use, enjoyment, and exploitation, in accordance with the social interests of the country. The reforestation of the country and the conservation of the forests are declared to be a matter of national urgency." And in Article 255 it was added that the law would provide for the juridical system to control the exploitation, conservation, and use of the forests. The article

ended by saying that permits, concessions, and contracts for the exploitation of natural resources could be authorized.

Finally, there is the Constitution of 1982. To leave no doubt about the tendency of our legislators to copy the provisions of previous constitutions, Article 254 of the Constitution of 1965 is reproduced almost word for word. In Article 350 a further element is added in which it is declared that the State will regulate the exploitation of natural resources in accordance with the social interests of the country and that it "will determine the conditions of authorization for private parties." Regarding reforestation and the conservation of the forests which, in the Constitution of 1965 was declared to be a matter of "national urgency," in the Constitution of 1982 this expression has been exchanged for that of "national convenience." It is a rare thing to note that, in spite of the deep concern which the protection of natural resources has merited from our lawmakers, neither in the previous constitutions nor in the present document is there any provision making reference to the protection of natural resources in the powers pertaining to the president of the republic.

Regarding laws of a secondary order of importance, it should be recalled that the National Congress, in Decree 87-87, approved on 1 July 1987, considered that the cloud forests at altitudes above 1,800 meters above sea level are the ecosystems which have the greatest capacity to generate water at low cost for the benefit of our communities. They are declared to be the last refuges and areas for the protection of forest animal life and especially those species in danger of extinction. Furthermore, these forests are declared to be reserves of incalculable importance for the conservation of the soil, the forest resources, the diversity of animal and vegetable life, and the quality of environmental life in general. The decree designated 37 areas of cloud forest as national parks, which are considered legally protected against any act of vandalism and depredation.

Regarding domestic legislation related to international agreements, it would be appropriate to mention that in Decree 13-90 of 2 March 1990, published in LA GACETA No 26,102, the official gazette, the National Congress approved the convention establishing the Central American Commission on the Environment and Development. The convention had been signed by the then presidents of the Central American republics on 12 April 1989, to be valid for 10 years. It established "a regional system of cooperation for the optimum and rational use of the natural resources of the area, the control of contamination, and the reestablishment of the ecological balance, to guarantee a better quality of life to the people of the Central American isthmus."

Reflecting further on all of what we have presented above, we asked ourselves whether there are suitable, legal instruments to protect our natural resources adequately and competently. In addition to the laws already mentioned there is a variety of laws in which are to be found standards for the protection of our natural resources, referring particularly to the species which each law concerns. These provisions are not brought together in a single piece of legislation, as would be desirable, so that a joint, uniform, and coherent effort could be undertaken to cover the whole panorama of our flora and fauna. We believe that, even so, we can make use of some legal mechanisms to stop the criminal process of extinction which is going on regarding animal and plant life in Honduras. Supposing that the variety of laws might dilute or prevent protective action by the state, it would be necessary to pass a law to protect our natural resources, so that everything referring to our animal and plant wealth would be covered there.

We must not forget that, "In the last analysis, what we as a society refuse to destroy will define us as much as what we wish to create." That comment gives us a basis for supporting what was stated by John Madsen: "A real conservationist is a man who knows that the world was not left to him by his parents but was loaned to him for his children."

Tegucigalpa, March 1991.

REGIONAL AFFAIRS

Kuwaiti Minister Reports 100 Oil Well Fires Extinguished

LD1105135791 London KUNA in Arabic 1240 GMT 11 May 91

[Text] Kuwait city, 11 May (KUNA)—Kuwaiti Oil Minister Dr. Hammud 'Abdallah al-Ruqbah announced that up until this morning one hundred [burning] oil wells have been extinguished and brought under control. Dr. al-Ruqbah said in a press statement that: "The number of wells which have been extinguished and brought under control up until this morning is 100." The minister added that efforts are still in full progress to bring the other burning wells under control. He expressed hope that the number of extinguished wells will increase daily.

His Highness the Kuwaiti heir apparent and prime minister, Shaykh Sa'd al-'Abdallah al-Salim al-Sabah, recently inspected the operations of extinguishing and combatting oil fires resulting from the unjust Iraqi occupation. His Highness surveyed the extent of the disaster and the efforts made by workers of Kuwait's Oil Company and international firms which specialize in fire-extinguishing.

It should be mentioned that Kuwait's loss as a result of the burning wells stands at around six million barrels a day.

Destruction of Crops Due to Kuwait Fires Predicted

91WN0382A Tehran KAYHAN INTERNATIONAL in English 19 Mar 91 pp 1-2

[Text] London, 18 Mar (IRNA)—Western Iran's 1991 crop could be wiped out by the palls of smoke spread by the burning of around 6m barrels of oil day in Kuwait, said environmental and weather experts in Britain. The smoke will also affect the south-east Asian monsoon rains and has already shut out 99 percent of Kuwait's sunlight.

The smoke has now begun to spread northwards into Iran and Iraq. And according to Dr. Robin Pellew, director of the World Conservation Monitoring Center in Cambridge England, western Iran and southern Iraq could suffer from the twin consequences of the smoke: firstly, the actual physical effect on crop production and secondly, a demoralizing effect on the people, who may feel no motivation to plant crops under a black cloud of pollution.

Dr. Pellew, whose center is linked to the UN Environment Program (UNEP) monitoring team sent to Kuwait, insisted, when speaking to IRNA on Monday, that a report in one of Britain's daily papers Monday exaggerated his comments.

The paper claimed that he had said western Iran's crop should be written off for 1991 and that "we are now talking about working to save that (crop) of 1992." He felt this was possible, but that the terminology used would not have been his words, but those of the paper, the DAILY TELEGRAPH.

Dr. Pellew told IRNA that he mentioned the effect on Iran because his center believes post-war reconstruction "must include all the countries of the region and not just those relatively small number who participated in the war." He pointed out that many of the countries which were not involved in the war have been affected by environmental damages.

Satellite photographs reveal that the smoke is reaching as far north as Baghdad and as far south as Riyadh and scientists have found traces of soot throughout the northern hemisphere.

The fires were set by Saddam Hussein's troops, who set explosive charges to all of Kuwait's oil wells before withdrawing from the sheikhdom. Over 500 are still burning.

Dr. Keith Browning of the U.K.'s Meteorological (Met) Office said the loss of sunlight in Kuwait will cause a 10 degree drop in the 28 degree average daily temperature in the Kuwait City at this time of year.

The effects on agriculture will place further strain on Iraq, which is already embroiled in a civil war. There could also be a significant number of refugees from the south unless food supplies are brought in.

To clear the pall of smokes that have turned Kuwait's day into night, will take millions of gallons of water and at least three years, according to an assessment made by the firefighters who began this week the formidable task of putting them off.

The Texas oil fighter, Red Adair, who has tackled around 2,500 well fires during his 75 years, said he would consider himself lucky if he could put out Kuwait's fires within three years. "It'll be the biggest job I've ever done," he said.

According to the DAILY TELEGRAPH and the NEW YORK TIMES, the British Met Office ran tests on climate models and found that the smoke caused by the burning of millions of barrels of oil a day in Kuwait, four times the previous estimate, would increase rainfall and not decrease it.

'Black Rain' Reported in Ethiopia

AB0105140491 Addis Ababa Domestic Service in Amharic 1700 GMT 30 Apr 91

[Excerpt] Black rain fell in Jijiga town and its environs in eastern Harerge administrative area on Saturday, 27 April and it was unique in comparison with normal rain. The rain might be a result of the air pollution due to smoke from the Kuwaiti oil wells burned two months ago during the Gulf war by the invading Iraqi Army.

The rain came down in the town of J'jiga and its environs for half an hour on 27 April and individuals were able to see that the color of the water they collected in tins was like that of charcoal. [passage omitted]

Greasy, Thick, Black Rain Reported in Iran

91WN0420B Tehran KAYHAN INTERNATIONAL in English 13 Apr 91 p 2

[Text] Gonaveh, Bushehr Prov., (IRNA)—Black rains which started to fall sporadically in this southern port city as of noon Wednesday are so greasy and thick that it is impossible to remove stains left on parked cars and sidewalks without the use of detergents.

The black rains also caused streams of contaminated black waters to run through the streets of the port city.

Over the past two days, columns of thick black smoke have darkened the sky over Gonaveh, preventing the sunshine from reaching the ground.

In related news, the town Baneh in the northwestern province of Kurdistan was plunged into darkness when columns of black smoke rising from burning oil wells in Kirkuk covered its sky. The snow-covered heights in the region have turned black by the smoke which is getting thicker.

Saudi Oil Cleanup Operations Updated

LD3004105591 Riyadh SPA in Arabic 0900 GMT 30 Apr 91

[Text] Al-Dhahran, 30 Apr (SPA)—During the aerial survey operations carried out by the Pollution Response Center of the Department of Meteorology and Environmental Protection, a spread of glittering surfaces and lines of oil were observed in the northern part of Saudi waters in the Arabian Gulf, particularly east of Safaniyah and Manifah. In addition, a large number of glittering oil surfaces in Dohat al-Duffi and the Gulf of Mardumah was observed together with light oily lines coming from the north.

The crew of the survey aircraft reported that oil is still leaking from three sources in Kuwaiti waters and that there is some leakage from the platform of the Murjan oil field. They also observed oil slicks in the northwest area of the Murjan oil field. They pointed out that oil is still leaking from the oil platform north of the Gulf and that oil was witnessed near al-Ahmadi port.

Within the context of the operations carried out by the Response Center, technicians are still containing the oil using floating barriers in the Manifah region in preparation for collecting it. The department's teams in the Ras Balbul region are continuing operations, where they have gathered 502 barrels of oil. The site has received 3,200 meters of floating barriers to consolidate the operations.

Last Sunday 720 barrels were drawn from the Gulf of Brays and a further 500 barrels were drawn yesterday. On al-Qirmah Island the teams have cleaned an area of 2,000 square meters of vegetation, and operations continue in the northern and southern parts of Kiran Island.

There are plans to begin other operations in the Gulf of Tanajib.

The Saudi Aramco teams gathered 9,624 barrels of oil, and the total gathered by Saudi Aramco has reached 822,269 barrels. Since 12 April, Saudi Aramco teams have worked in two new sites in the regions of Tanajib and Manifah where there is heavy oil.

EGYPT

Efforts, Obstacles in Purging Nile of Vegetation Probed

91WN0349A Cairo AKHIR SA'AH in Arabic 20 Mar 91 pp 18-19

[Article by 'Afaf al-Dahshan: "Following AKHIR SA'AH Campaign and Minister of Works Questioning: 'No' To Combatting Water Hyacinth With Herbicides. What Is Alternative? Are Natural, Mechanical, Manual Methods Adequate for Combatting This Plant?"]

[Excerpt] Let us begin by saying that God, praised and high, created a remedy for every ill. Yet when man interferes, everything is spoiled. The great Nile River used to flood every year. This flooding cleansed the basic river channel, carrying away all of the pollutants that had accumulated and killing vegetation. When the flooding ended after construction of the High Dam, the responsibilities of obtaining pure water fit for human usage necessarily increased.

The Ministry of Works and Water Resources has been conducting the operation to eliminate vegetation, especially the water hyacinth, from the river channel with the help of some other companies that clean the irrigation and drainage canals. Three methods, and a fourth new one, are employed.

The manual method is carried out by irrigation workers using simple equipment like wires, forks, ropes, hooks, and small boats. This method is used in waterways that are relatively narrow where there are a few small vegetation concentrations in the bends and shallows of the Nile, and under such constructed works as bridge, crossings, and the like. It is a hard, slow, expensive method suitable only to a few limited situations. The costs of cleaning one square meter by hand is estimated at 10 piasters!

The chemical method is carried out using herbicides that are manually sprayed on vegetation masses in small areas infested with the water hyacinth. In the Nile's large river channels and branches, boat-mounted machinery is loaded with herbicide which is then sprayed. Huge accumulations covering vast areas of the Nile, the large drainage canals, and the main irrigation canals are sprayed by air.

This is the fastest and most efficient way of eliminating vegetation, but it has tremendous side effects. These are what have aroused controversy and discussion. The cost of chemical combat for a square meter is estimated at only one piaster!

The mechanical method is conducted using dredgers, excavators that move along the sides of the channel to scoop masses of vegetation at bends up onto the bank, and machines that cut floating vegetation while moving on the large waterways. The cost of mechanical methods is estimated at 15 piasters per square meter.

The new method is biological combat, i.e. a natural method. Research at the Marine Sciences Institute has shown the ability of a [variety of] Chinese fish to feed on water hyacinth. One of these fish weighing one kilogram can consume 45 kilograms of the plant. This fish represents 30 percent of our [fish] farm production. The Ministry of Irrigation successfully tested it on the 18-kilometer-long al-Basusiyah Canal. It is an inexpensive method, but of course the enemies of this natural approach are the fishermen. They were even quicker at catching the fish, thereby saving the water hyacinth from their teeth.

The cost of a square meter using the biological method is only three piasters!

Farewell to Herbicides, But?

Does the mechanical method, the focus of this investigation, suffice as a basis for cleaning vegetation from the channel? Is it a safer and more appropriate means than manual and biological methods, avoiding the dangers of herbicides? First we must take the opinion of officials of the Ministry of Works on this subject. To answer the questions we raised, a committee of three undersecretaries was formed, consisting of Engineer Ahmad Mazin, chief of the Irrigation Authority, Engineer Muhammad Qutb Nasr, first undersecretary of the ministry, and Engineer Mukhtar 'Imara, undersecretary for waterway maintenance.

[Al-Dahshan] What are the ministry's plans for mechanically combatting water hyacinth in the river channel and branches?

[Committee] At present there are 10 harvesting machines to collect water hyacinth and deposit it on the bank. All imported from Holland, they are operating in front of the large barrages. The general directorates are also renting dredgers to operate in front of the large barrages and floating perimeters to remove it from the river channel, using propellers to pile it along the bank.

A decision is now being made on an international tender for the purchase of 18 floating dredgers to be stationed along the length of the Nile and its Rosetta and Damietta branches, financed by World Bank loan 2732. The value is estimated at $45 million, $20 million of which is for the ministry's dredger companies for the purchase of needed new equipment and spare parts to upgrade its present equipment. Seven million dollars of its appropriation has already been spent. The remainder belongs to the Irrigation Authority and will be spent in its entirety to purchase equipment needed to combat aquatic vegetation in the Nile and the irrigation and drainage canals, following the ban on herbicides for which $15 million had been allocated. In addition, we are studying the purchase of ready-made floating dredgers from international companies to operate on the Nile, deliverable within four months.

[Al-Dahshan] What is the role played by the general directorates in removing water hyacinth to protect the Nile river?

[Committee] There are six general directorates to protect the Nile. They are South Valley at Isna, North Valley at al-Minya, Central Valley at Asyut, Greater Cairo in al-Jizah, the Rosetta Branch at Tanta, and the Damietta Branch at Zifta.

These general directorates remove water hyacinth from the river channel and along its banks, both mechanically by operating harvesting equipment to collect it from the river and deposit it on the land, and by hiring the workers needed to remove it manually by boat. They also issue orders to dredging companies to rent the equipment needed to remove water hyacinth from the river, and they will have the responsibility for operating the 18 floating dredgers they want to purchase, as well as other equipment.

[Al-Dahshan] What about the possibility of using local manufacturing to produce special Egyptian equipment to remove and cut vegetation instead of importing it?

[Committee] A decision is presently being made on supplying 10 boats of local manufacture to cut underwater vegetation. Workers in Egyptian workshops are repairing inoperable equipment needing overhauling, numbering 24 vegetation cutting machines at the general directorates for irrigation at al-Isma'iliyah, Suhaj, and Qina. One of the articles of the international tender for the importation of 18 floating dredgers for the Nile river and six speed launches specifies that the supplier may manufacture some of the parts locally in order to transfer some of this technology into the country. Finally, many parts of the above-mentioned machines can be fabricated using Egyptian capacities, while the mechanical and hydraulic parts are imported.

Bulldozer in Water

[Al-Dahshan] But what is the role played by the dredging companies in removing vegetation from canals and drainage ditches?

Engineer Tal'at Muhammad Musa, chairman of the board of directors of the Works and Irrigation Company which works in this field, says: "The basic work of the company is clearing waterways in irrigation and drainage canals. But when chemical removal of water hyacinth was halted, we received orders from the Ministry of

Works that we all cooperate to eliminate it from all channels, particularly since the ministry would not be able to clear the river mechanically using only its equipment. For our part, we have made the utmost effort to carry out our duty to protect the river from vegetation. This is why we are now designing an aquatic bulldozer that will collect vegetation in front of it and take it to the shore. There the dredgers can scoop it up and load it onto vehicles to be taken far from the river. We are also manufacturing some rafts with equipment on them to load the vegetation onto barges. These are used in places where transport is not possible. We have 40 excavating machines, an equal amount of dredgers, and a tremendous number of workers. But the budget is not in keeping with the volume of labor and the operating capacity. Nonetheless, we continually try to modernize the mechanical capabilities we possess through World Bank loans. For your information, imported mechanical equipment is outrageously costly. For example, two years ago we purchased an excavator for LE 1,600,000. This year, we wanted to buy a replacement part for it and found that its price was equal to the price of the excavator when we bought it!

"We promised officials in the Ministry of Works to buy 20 floating excavators for distribution to the three companies operating in this field. They are presently taking the steps to make this purchase.

"The removal of vegetation is calculated on a per kilometer basis, depending on the width and depth of the canal, but this price is not appropriate to our present conditions."

[Al-Dahshan] Since there are two sides to everything in this world, what are the flaws in the mechanical method of combatting vegetation?

Engineer Tal'at Musa continues, saying: "When vegetation is cut it grows at a continuous, high rate. In the small channels, whenever you cut the vegetation it grows and increases in an amazing way. This is why it must be cleared continually.

"The mechanical method affects the nature of waterways because it moves the channel's soil, requiring continual maintenance of the sides. This defect can be avoided by using skilled labor with experience in removing the vegetation without taking any of the channel soil with it.

"It is the most expensive of the three methods because machinery needs maintenance, replacement, and parts changes. Yet in spite of the high cost of machinery, it is the most appropriate and surest method."

Local Manufacturing Problems

As to the possibility of manufacturing equipment locally to cut and remove vegetation from the Nile and its branches, the chairman of the board of directors of the Irrigation Workshops Company, Engineer al-Sayyid Sulayman, discussed the experience of his company in this area, saying: "This company has been active in manufacturing to combat aquatic vegetation. In the early 1980's we cooperated with a specialized foreign company on a commercial basis to supply some launches to cut vegetation and others to transport it away from the waterway, with a simple technical role in assembling certain parts. In the mid-1980's our role began to grow, and we cooperated with a Dutch company manufacturing hydraulic launches to supply many parts while the others were manufactured locally for delivery to an Egyptian company importing them to be used for its own purposes.

"At the end of the 1980's, we concluded a joint manufacturing agreement with a specialized Hungarian company to build a small launch to operate on small waterways, provided that imported parts account for no more than 20 percent of the total."

Concerning the capabilities of this locally manufactured launch, Engineer al-Sayyid Sulayman says: "The boat is fabricated from sheet metal and fitted with a diesel engine. Twin scissors devices are mounted at the bow, one horizontally, the other vertically, to cut the vegetation. It can cut and remove vegetation to a depth of 1.5 meters. The engine drives the propellers, raises the boat [as published], and operates the twin scissors mechanically. The boat is considered efficient in opening and cleaning irrigation and drainage canals of such overabundant vegetation as "mare's tail" and "cloven hoof," the two predominant types in Egypt, and in eliminating it from bends in the shortest time possible because the cutting device can be set at an angle and works mechanically, which simplifies operation and maintenance.

"It will pass under low bridges close to the surface of the water and is easy to transport from one place to another using its own trailer. The boat may cost about $40,000, which is less than half of what it would cost to import. We are about to manufacture a type of bulldozer to move, collect, and transport vegetation. This experiment may be completed after award of the tender for the vegetation-cutting boat to us. It will not be difficult to manufacture because we are on the right road. Egypt has a lot of expertise in this field. We are better able to manufacture equipment appropriate to the nature of our waterways and the type of vegetation. The strange thing is that our company is helping to eliminate water hyacinth in another way by fabricating the cages used to raise the fish that feeds on it, which for it is very rich food."

Water Hyacinth Regenerates!

We leave Irrigation Workshops with its tremendous facilities and great expertise, capable of fabricating floating hotels of the highest level, to go to other workshops with similar facilities, to determine the possibility of manufacturing vegetation removal equipment locally. On this subject, Engineer Sadiq Junaydi, chairman of the board of directors of the Nile Marine Transport Company, says: "We can manufacture boats to technical specifications outfitted with special saws to cut the

vegetation at its roots. But in all frankness, while there was the idea of a joint venture with the Ministry of Works to purge the river of water hyacinth and vegetation, it never saw the light of day because it is so difficult to work with them. Can you imagine the ministry wants to tell us to eliminate the vegetation at the price of 10 piasters per square meter! That's outrageous, and when the minister of transport and communications found out, he issued orders that we refrain from cleaning vegetation from the river channel and its branches, even though we could carry this operation out. The Ministry of Works imported machinery worth millions of pounds from Poland and West Germany, but it is inoperative and beached along the shore for lack of spare parts. As a result it has lost a lot. These launches are unable to move through Nile shoals because of the draft in these areas which does not exceed 10 centimeters!"

Engineer Sadiq Junaydi's discussion is continued by accountant 'Abd-al-'Aziz Bayyumi Harfush, chairman of the board of the Nile River Transport Company, who says: "The Ministry of Works presented us a special offer to manufacture 10 units outfitted with saws to cut vegetation and gave us the technical design for them, but we have not tested it yet. The problem confronting us in accepting this design concerns water hyacinth residing in reeds and bulrushes, since it grows on wet land. As soon as the saw runs into reeds or bulrushes, they fall over on it and are difficult to cut. In addition, the design of the cutters needed in this case must suit two purposes, cutting the reeds and bulrushes and cutting the water hyacinth. Then after they are cut, there is the problem of regrowth since we have left the roots. Because the environment is so suitable, it starts growing again within 10 to 15 days as if we had not done anything. When this vegetation is cut it becomes denser because a plant's love of life is stronger than man. What is required is a device that will remove the reeds, the bulrushes, and other vegetation by their roots, not just cut them. I believe that the ministry has the means to design this device which will have to be outfitted with very high-speed saws so that the reeds and bulrushes do not fall in front of them."

Water Hyacinth: Animal Fodder

From the foregoing it is clear that the possibility of cutting or uprooting vegetation exists, but what should happen after that? Should the vegetation be left on the shore to dry where it may fall back into the river and begin its life cycle all over again? It may be taken after it dries for use as firewood or as fill for certain areas. If it has clay dirt attached to it, it can be used to fertilize weak soil. But what do our experts say regarding how to make use of water hyacinth, the most widespread and dangerous river vegetation?

Dr. Isma'il Muhammad Sulayman, expert on animal nutrition at the Ministry of Agriculture, says: "Water hyacinth is a plant known to collect in its tissues certain heavy metals that are harmful to water. Experiments have shown that it can be used as a fodder for ruminants - sheep, goats, and water buffalo - after it has been dried by those doing the mechanical combat operation. Drying is preferably done in the summer so that it can be compacted to a reasonable degree and to facilitate chopping and controlling it like dried clover. Trenches are then dug in the ground where it is made into silage. These trenches are lined with bricks or stones on which rice straw is placed to absorb any remaining moisture in the dried hyacinth. A layer of straw is made, over which a half-meter-high layer of water hyacinth is placed, continuing until four such layers are achieved. The trenches are then compressed with a tractor and filled with clay, stones, or anything heavy to close the openings. They are left for between 40 days and three months. When it is to be used, a small opening is made in one of the sides of the trench for silage removal. At first the animal may refuse to accept it for about two days, but then it will grow accustomed to it. A silage experiment was conducted at Damietta. I do not recommend that it be used as a fodder alone, but as a reserve fodder - to preserve the animal's life. It can be given alongside another fodder, whereby we save half of the productivity. Water hyacinth fodder does not cost much if we get totally rid of the water when drying it. The ministries of agriculture and works must cooperate in producing this fodder and adopting it as a national project in which numerous agencies and research centers cooperate. In this way we could save the country millions in hard currency importing fodder ingredients that cause production crises."

Dr. Ahmad 'Abd-al-Wahhab Barraniyah of the National Planning Institute completes the discussion, saying: "Since a single fish of the water hyacinth-eating variety weighing one kilogram is able to consume about 45 kilograms of the plant, it can be transformed from a harmful to a useful element. By using this fish along with mechanical means, we can reduce the cost of combatting by 75 percent while increasing the fish resources raised on the plant. The National Agency for Fish Wealth should be expanding the use of water hyacinth as a food for this fish because it is facing a fodder problem which is a specific factor in increasing fish growth."

Dr. Salim Fahmi Istifan, research professor in the hormone division of the National Research Center, says: "In spite of the many harmful qualities of water hyacinth, it can be used to manufacture the pellet type of nontraditional fodder to which is added leftover materials from slaughter houses and cheese plants which are rich in proteins, mineral salts, and other matter. This is then made into pellets or balls. A distinctive feature is that it will remain fresh and in good condition for long periods under any ambient conditions without spoiling."

He adds: "The best way of combatting it is mechanical or manual collection, because exterminating it with herbicides causes environmental problems we can do without."

Another advantage according to Dr. Adib Fadl, professor in the paper cellulose division of the National Research Center, is that it can be added to any wood

pulp, in certain amounts, to produce paper. He says that our preliminary experiments have shown that it improves wood strength because of the gelatinous material it contains, when added at a rate of 50 percent. But as a 100-percent paper producer, this type is chemically weak because it erodes. Nonetheless, there are ongoing experiments to raise the rate. We want to reach a rate higher than 50 percent to make it more beneficial in improving paper strength.

INDIA

Achievements of Environment Minister Outlined

91WD0632A Calcutta THE TELEGRAPH in English 10 Mar 91 p 5

[Article by Seema Paul]

[Text] New Delhi, March 9: The Union environment minister, Ms. Maneka Gandhi, today sought credit for "evolving a series of measures aimed at giving the man on the street the power to challenge the ecological status quo and to reorient the working of the ministry towards effective environmental protection."

After shunning the Press for the entire duration of her second term as the environment minister, she came out with an unsigned 14-page release on "Achievements and initiatives of the ministry of environment and forests in the last 100 days."

Undoubtedly, Ms. Gandhi was quietly working for the cause dear to her heart, which she believes is increasingly being recognized as a matter of life and death by the man on the street but with the abrupt end to Mr. Chandra Shekhar's government, most of her work remains incomplete.

Topping the list among her incomplete projects are environmental courts, which would have provided for quick disposal of claims to compensation for environmental damage. Ms. Gandhi believed that the certainty of having to pay for the damage would have ensured that polluters invested in pollution control devices.

The proposal for making environment impact assessment compulsory for industrial projects was finalized but still remains on paper so does the amendments to the Prevention of Cruelty to Animals Act, 1960, amendment of Wildlife Protection Act, 1972, along with a host of other proposals.

Ms. Gandhi, who began her stint in the environment ministry in Mr. V.P. Singh's Cabinet when the environmental movement had begun to gain strength on the anti-Tehri and anti-Narmada dam agitations, gained quick acceptance from the environmentalists by speaking against both these dams. But she soon demonstrated that as a political lightweight, she could not succeed against bigwigs like Mr. Chimanbhai Patel and Mr. Arif Mohammad Khan.

She soon buckled under pressure when she decided to maintain a stony silence on both Tehri and Narmada, especially the latter, shortly before she submitted her resignation from Mr. Singh's Cabinet. She continued this into her second term in Mr. Chandra Shekhar's Cabinet where she was given independent charge as minister of state for environment.

Her decision disappointed a number of environmentalists but she never lost their sympathy and support and environmentalists conceded that with all her flaws, she was still the best minister that environment ministry had ever got.

All her proposals that remained unimplemented provide a good base for any minister who succeeds her. In fact, anybody who comes after her will have to live up to her reputation, if not exceed it in his or her dedication to the cause.

Among the legislative and policy measures that she succeeded in enacting is the mandatory Public Liability Insurance Act, making it mandatory for all hazardous chemical industries to insure themselves compulsorily so that immediate relief is given to all those who handle notified hazardous chemicals in case of death or injury.

The rectification of the Montreal Protocol on substances depleting the ozone layer, due largely at her initiative, however, remains controversial, with the feeling in some quarters that she had succumbed to pressures from the West for very little compensation. Ms. Gandhi, on the other hand, feels she succeeded in getting more money from the West than had ever been promised before and said in today's press release that she "Took every opportunity to project the interests of the Third World countries in various forums."

Ms. Gandhi also initiated a special programme for controlling the pollution in Delhi, where pollution levels are the third highest among world capitals. As part of this, it was made mandatory for vehicles on Delhi roads to obtain a pollution control certificate in order to legitimately be on the roads. She also launched the Green-Haryana and Green-Rajasthan programmes.

Media To Launch Environment Awareness Drive

91WD0631A New Delhi PATRIOT in English 11 Mar 91 p 5

[Text] An intensive national environmental awareness campaign will soon be launched over Doordarshan and all India Radio to educate the masses, reports UNI.

According to official sources, more than 4,000 stories regarding environmental successes and failures in India had been enlisted and given to producers of all the Doordarshan kendras in the country to be filmed and telecast.

These stories relate to women in environment, wasteland development, pollution control and several other aspects of preserving and protecting environment.

Environment has been given two half-an-hour slots over Doordarshan and Radio every month, the sources said. Besides, the stories would figure in the regular news bulletins as well.

Non-governmental organizations have been identified all over the country to give substantial support to the electronic media in producing the stories.

The ministry is also sponsoring several films on environment themes.

The sources said several other radical steps had been taken by the Environment Ministry during the past four months and environmental degradation in India was no more a subject confined to abstruse debates among select group of activists.

"It is an issue which is being increasingly recognized as a matter of life and death by the man on the street now", the sources said.

As part of the efforts to check pollution in the national capital, the ministry launched a major drive to depollute Delhi and it had already paid substantial results.

The Central Pollution Control Board has issued show-cause notices to 3,500 small scale units in Delhi for polluting the city's air and water.

Some large and small scale units in Delhi have been threatened with closure if they fail to construct water effluent treatment plants by the end of this month.

In this regard special teams have been constituted by the board to go around the city looking for factories in residential areas polluting air and water.

The board will also provide a list of consultants, designs of easy-to-make water treatment plants, water recycling units better smoke starks and filter bags to the units.

Besides, a proposal to prevent environmental degradation by ill-conceived developmental projects has also been finalized by the ministry.

The proposal envisages a compulsory environmental impact assessment of all industrial projects in both private and public sector costing Rs 10 crore or more.

The proposal involves delegation of powers to the State agencies to carry out impact assessment through strengthening of their capability.

It also seeks to integrate environmental aspects at the project formulation stage itself.

A proposal to amend the Environment (Protection) Act of 1986, which envisages the empowering of the individual citizens to take samples of the effluents and emissing of the polluting factories as also been finalized.

The Environment Ministry has also taken two policy measures to obviate the failure of the State Governments in implementing the stipulated conditions of compensatory afforestation of non-forest land while asking for diversion of forest land for development projects.

—A vigorous campaign to get back the non-forest land assigned for afforestation classified as a forested with a specific time frame has been launched. The backlog of 3,33,000 ha. If compensatory afforestation is proposed to be covered.

—To reduce delays by the State Governments in offering proper non-forest land in lieu of forest land for essential development projects, the development ministries and states have been asked to take advance action to identify non-forest land for afforestation by creating afforested land banks which would be given credit when their proposals for forest lands are considered.

Amendments are also proposed to the Wildlife Protection act of 1972 and to the Prevention of Cruelty to Animals act of 1960.

JORDAN

Officials, Farmers on Water Pollution

JN2904123091 Amman JORDAN TIMES in English 29 Apr 91 pp 1, 5

["Special" to the JORDAN TIMES by Ghadir Tahir]

[Text] Amman—Jordan Valley farmers, whose crops were severely damaged by government-supplied polluted water, will not be pressing charges against the agencies responsible, but controversy continues to surround the future supply of water to the area, which produces the bulk of Jordan's vegetable produce.

The farmers, who may have incurred as much as JD [Jordanian dinars] 60 million in damages, insist the government was to blame fo supplying them with polluted water from the King Talal Dam and that two agencies in charge of irrigation have to take the responsibility for what happened. Beyond that, however, the famers want to make sure that water supplies in the future do not cause similar ecological disasters.

The farmers said the polluted water destroyed at least 60,000 dunums in the Jordan Valley area, nearly 30 percent of the total area irrigated by King Talal Dam.

The Water Authority of Jordan (WAJ), they said, released semi-treated sewage effluent from the dam to irrigated farmland in the valley, destroying or severely stunting the growth of thousands of dunums of vegetable crops.

According to farmers, output level was cut to more than half and in some cases, such as the tomato crop, was totally destroyed. They estimated the loss between JD 30 million an JD 60 million.

A senior official of the Jordan Valley Authority (JVA) conceded that water pumped from the dam was polluted

and resulted in damaging "many plantations." But the official, who preferred anonymity, said that "the real reason for the pollution is not yet clear." He said that a full investigations was underway. Senior officials at the concerned ministries and departments said they were still studying the situation,

Dr. Ilyas Salamah, director of the Water Research and Study Centre (WRSC) at the University of Jordan said the water quality of King Talal Dam "is so bad that it is not even suitable for irrigation or even irrigation of salt-tolerant crops."

Other experts and farmers said a decision to stop mixing al-Yarmuk River water with the dam water was also responsible for the present situation.

Water and Irrigation minister Hayil Surur said last week that the King Talal Dam water was polluted by waste dumped in the al-Zarqa' River from factories in violation of public safety regulations. The river flows into the dam resevoir.

The minister's statement was the first public recognition of the deteriorating water quality of King Talal Dam after the loss of this season's crops. But he did not explain why the water, which he said contained boron, a toxic element, and other chemical substances, was allowed to pass through irrigation canals to the Jordan valley.

Tests conducted by the WRSC showed high levels of boron toxicity in the soil and plants in the Jordan Valley. Tests are still being conducted to determine if there are heavy metals in the soil, which could destroy farming in the valley for many years to come.

The JVA and WAJ, which are required by law to provide safe water for irrigation, had earlier denied farmers's charges that the water was unsuitable for irrigation, according to farmers.

"This is a criminal negligence on the part of the government," said a farmer. "I invested hundreds of thousands of dinars in the farm this year and the Water Authority destroys my crops with sewage water. The question is who is responible for this fiasco," he said.

Dr. Salamah, recounting a story of what he described as "negligence and mismanagement" by the government, mainly blamed the inefficiency of the al-Khirbah al-Samra' waste treatment plant for the deteriorating water quality in the dam.

Dr. Salamah, disagreeing with the minister, said industrial waste dumped in the al-Zarqa' River had very little to do with the polluted water of the dam. He said attempts by the government to blame industrial waste for the problem was a "cover up" for the failure of the al-Khirbat al-Samra' plant, which is located at Wadi Dlail north of Zarqa. Industrial effluent was only recently connected to King Talal Dam and not all industries have been connected, he said.

Dr. Salamah argued that if industrial waste water was the reason for what happened, then farms between Khirbat al-Samra' and King Talal Dam would have displayed the same effects as farms in the Jordan Valley.

"The pollution story began a long time ago when they were constructing the dam in 1977," Dr. Salamah pointed out.

He said at that time the water quality was "very suitable" for irrigation but was unsuitable for drinking purposes because of the presence of phosphate and nitrate, which causes a eutrophication process making treatment difficult and costly.

This situation continued until 1985, when the government commissioned the construction of the al-Khirbat al-Samra' plant, Dr. Salamah said.

The plant, which works on a natural stabilisation ponds method (no chemical or mechanical treatment), was originally built as "immediate relief" for the overloaded 'Ayn Ghazal waste treatment plant at Marka just outside Amman.

The 'Ayn Ghazal plant was closed in May 1985 by then Minister of Water and Irrigation Muhammad Kilani because of high operating cost and bad odour, according to an internal memorandum signed by Minister Kilani. Experts argue that the permanent closure of the 'Ayn Ghazal plant was a mistake and the benefits had outweighed the drawbacks.

Dr. Muhammad Khawaj, a water reclamation engineer at the WRSC, also said the quality of water released from King Talal Dam was not good enough for irrigation purposes.

"The treatment plant at al-Khirbah al-Samra' is comparable to treating cancer with aspirin... the process is simply insufficient," according to Dr. Khawaj. He pointed out that under the prevailing conditions in Jordan, including climate and groundwater resources, the plant was not equipped to meet the desired effluent quality.

Dr. Khawaj said 50 percent of the water reaching King Talal Dam, which has a capacity of 89 million cubic metres, originates from al-Khirbah al-Samra' treatment effluent.

Before the government began construction of al-Khirbah al-Samra' plant in 1985, "we warned them something bad will happen here because of the inadequacy of the treatment plant type," Dr. Salamah told the JORDAN TIMES. He had correspondence with the government and the Water Authority warning them of the risks.

Although the government had said the plant was constructed for immediate relief (a temporary measure for the 'Ayn Ghazal plant), al- Khirbah al-Samra', was not satisfactory, and as a result, the water resources in the area, including King Talal Dam, were rapidly deteriorating.

The study also cautioned about the unsuitability of the dam water for irrigation purposes.

Two studies compiled by Britain's Thames Water Authority and the World Bank had reached the same conclusions that "stabilisation ponds are not capable of reaching their objective" in conditions prevalent in the Kingdom. But, the Water Authority "ignored the results," Dr. Salamah said.

"Since 1985 the quality of water collected at King Talal Dam, has been continuously deteriorating and the salinity of the water continuously increasing," said Dr. Salamah. According to data collected by the centre, from 1985 to the end of 1990, water salinity increased three-folds.

Studies released by the Royal Scientific Society also reported similar findings about the deterioration of water quality since 1985.

"This is a complete chain from water to human beings," Dr. Salamah said. "Once the water deteriorates, the soil begins to deteriorate, affecting plants, then affecting animals feeding on the plants and finally reaching people," he added.

"We are in the plant portion of the cycle," he explained. "Plants are dying or are nonproductive anymore," he said.

Dr. 'Umar al-Rimawi, a hydrochemist at the WRSC, said that testing done on 16 soil samples from the valley two weeks ago confirmed "there is boron toxicity in the soil and plants."

"The amount of boron needed in the soil for optimal growth ranges from 0.01 to four mm per litre. We found boron levels ranging from 6 to 14 mm per litre," dr. al-Rimawi said. He added that many plants, even those which are classified as "tolerant" (such as tomatoes), have shown symptoms of boron toxicity and have died.

To (wash out) the boron from the soil, Dr. al-Rimawi said, "is very difficult and needs a great deal of clean water."

According to experts interviewed by the Jordan Times, a combination of factors could be seen as the reason for the damage in Jordan Valley crops.

These including [as published] low water level at the dam's reservoir, contaminated water from the al-Khirbah al-Samra' plant and the failure to mix al-Yarmuk River water with the dam water to dilute the toxic compounds and salinity.

The water level at the dam's reservoir, which was low due to low precipitation and late rainfall, contained contaminated effluent from al-Khirbah al-Samra' plant causing the interaction of the water with sediments in the dam, producting very high salinity and toxicity.

Since water is discharged from an outlet at the bottom of the reservoir, the level of sediment and salinity of the water becomes higher.

Experts explained that because the salinity was "too high," salts and trace elements started to accumulate in the different soil profiles. This situation, they said, was exacerbated by the lack of water to flush out the salts.

JVA and WAJ oficial did not comment on this particular aspect of the situation.

They said that during the months of January and February at this year, the Water Authority stopped mixing "good" al-Yarmuk River water with the dam water, thus pure dam water, which contained certain poisonous elements, was used to irrigate Jordan Valley farmland. The Yarmuk River water was diverted for use in Amman and to fill the Wadi al-'Arab Dam.

MOROCCO

Fes Wilaya Exploits Water Resources

91WN0385A Casablanca MAROC SOIR in French 3 Apr 91 p 5

[Article: "Water Resources in Fes Wilaya"]

[Text] The wilaya of Fes is drained by the Sebou wadi and its tributaries from the mid-Atlas plateau.

By virtue of its position at the foot of the mid-Atlas plateau (Moroccan water tower), this wilaya is blessed with numerous water sources (Ain Chkef, Ain Bourkaiz, Ain Amair, Ain Cheggag, Sidi Harazem...).

Owing to the permeable formations and flat countryside, run-off plays a relatively secondary role in the neighboring regions to the north. The water supply network is thus a less prominent feature of the landscape, and the only tributaries that must be marked are the Fes and El Yahoudi wadis.

The Fes wilaya also has significant underground aquifers: the mid-Atlas plateau and the Saiss water table, known for its Artesian wells that supply the city of Fes.

Surface Sources

The Sebou wadi and other springs are important water resources for the Fes wilaya, providing water both for drinking and for irrigation.

One of the region's most important features is the Sebou wadi, which arises in the mid-Atlas region. It traverses picturesque parts of Ain Sebou and the Ain Ouali gorges (known for their waterfalls) on its way to the Sidi Harazem valley and the Fes wadi.

Other watercourses traversing the wilaya of Fes include the Mikkes, N'Ja, Mehrez and Boufekrane wadis.

In addition to the Sebou wadi treatment station, which supplies the city of Fes with potable water (the current output of 800 liters/second is soon expected to double), another major project is also under way. This is a complex consisting of the Ait Youb dam (capacity 80 million cubic meters) and the 15-km-long Matmata tunnel, which will channel treated water from the Sebou to the Idriss I dam on Inaouene wadi. There are plans to built other projects above Ait Youb (M'dez and Ain Timedrine).

The flow rate of the Fes wadi, which was tamed in 1920, has declined very sharply owing to the drought and to well and borehole activity, which have reduced the flow of sources feeding it (Ras el Ma, Bourkaiz, Ain Chkef, Ain Timedrine, etc.).

The El Gaada earthwork dam now being built by the Ministry of Public Works (capacity 2.9 million cubic meters) will be used to supplement the flow of the Fes wadi when it is at its lowest level, since the Fes has pollution problems in summer. Other earthwork dams will also be built to supplement the low-water flow rates of the Fes wadi (Ain Smene).

Underground Water

The Fes wilaya is situated in a region of considerable geologic diversity. Because of its varied formations, distribution of subterranean water resources is very skewed. In fact, the calcareous dolomite formations of the mid-Atlas plateau are highly fractured and fissured, which is conducive to the circulation and accumulation of underground water. On the other hand, the predominantly marly formations in the north are relatively impermeable and thus not conducive to the percolation and accumulation of rainwater.

Thus we can distinguish three different underground water sources: the mid-Atlas plateau in the south, the Saiss plain in central Morocco, and the approaches to the Riff in the north.

The mid-Atlas plateau is the center of an important water system and contains a free water table supplied primarily by direct rainwater percolation. Over a considerable part of the plateau, water can be obtained from wells and boreholes. The water table's outlets are mostly springs used for irrigation and potable water supply.

The Saiss plain is the wilaya's principal aquifer, and it contains a significant amount of underground water. Actually, it comprises two superposed water tables separated by a thick marl series.

The upper table is embedded in fresh water limestone, conglomerates, and detrital minerals. This table, mostly accessible to wells, is used mainly for irrigation and potable water for the scattered rural communities of the plain.

The lower table is embedded in the calcareous dolomite formations of the Liassic system. It is fed mainly by direct rainwater percolation on the southern outcrops.

That table is under pressure and to a great extent Artesian. In general, the pressure increases from south to north.

By means of 17 deep boreholes, the table supplies potable water for the city of Fes. A major program to tap more of this water supply to meet the city's potable dwater needs is currently under way.

The water from the table is of good quality, and by virtue of a thick marly stratum it is pollution-free.

Finally, the predominantly marly approaches to the Riff have virtually no underground water resources.

Water circulation in this region is limited to the underflow from the wadis and the depressions bordering certain thin formations.

The area is noted for its dearth of underground water resources, owing to the unfavorable terrain conditions.

Thermal Springs

The Moulay Yakoub thermal mineral spring, located in the lower Riff, serves one of Morocco's three modern thermal facilities. Its waters are very warm (53 degrees centigrade) and have a high mineral content (salts totaling 31 grams per liter); the Sidi Hrazem and Ain Allah springs are used for therapeutic purposes.

The medical thermal facility recently built at the Moulay Yaacoub center is considered one of the most modern in the world.

Patients there can receive rheumatological, oto-rhino-laryngological, gynecological, dermatological and even beauty treatments.

The waters of Sidi Hrazem, with their low mineral content and osmotic capacity, circulate rapidly through the body, cleansing tissues and washing away toxins that clog up organs. This antitoxic property is used in treating a number of conditions, including autointoxications, neuroarthritism, arterial hypertension, gout, uricemia, oxalemia, liver and kidney ailments, liver and kidney deficiencies, cholemia, chronic biliary infections, pyelitis, and cystitis.

Casablanca Receives Water Project Financing

91WN0390A Casablanca LA VIE ECONOMIQUE in French 15 Mar 91 p 12

[Unattributed article: "Drinking Water: One Billion Dirhams for Casablanca"; first paragraph is LA VIE ECONOMIQUE introduction]

[Text] Greater Casablanca's drinking water supply will benefit from a 1-billion dirham investment to be made by ONEP [National Drinking Water Office] as part of

the Daourat-Casablanca water supply project. The project consists of two stages:

In the first stage, to be completed in 1991, the Casablanca governorate will get a new water main with a throughput capacity of 2.5 m^3 per second, i.e., 216,000 m^3 per day. This water main, whose installation required an investment of 600 million dirhams, originates at the Daourat dam water treatment facility, on the Oum-Er-Rbia. The second stage is expected to be completed by 1995. It will increase the drinking water production capacity of the Daourat facilities from 216,000 m^3 to 432,000 m^3 per day; 216,000 m^3 per day (2.5 m^3 per second) will be earmarked for the Casablanca governorate's water supply.

This second stage will require investments totaling 400 million dirhams. The water supply will further be boosted in the long term, until 2005, through large-scale projects designed to transfer water from the Sebou basin and requiring investments in excess of 3 billion dirhams, an ONEP communique indicated. Together with measures designed to overhaul distribution networks, save water, and treat and recycle sewage water, the project will make for a well-planned development of Greater Casablanca, the ONEP also estimates. The Daourat-Casablanca project will thus provide the Casablanca governorate with drinking water from the Daourat dam, located downstream from the Al Massira dam that regulates the flow of the Oum-Er-Rbia wadi; it will also boost the drinking water supply of the towns of Settat and Berrechid. It will cover the drinking water needs of Casablanca until 1996, and those of Settat and Berrechid until 2001.

The Daourat-Casablanca water supply project will be completed in two stages:

In the first stage, the available water flow from the already existing Daourat treatment facilities—that is the water that is not used by the Jorf El Asfar phosphate mining complex—will be directed to Casablanca.

The work already completed or in progress is as follows:

- Water main:

  Throughput: 2,500 liters per second;

  Length: 84 km;

  Diameters: 1,600, 1,500 and 1,400 mm;

  Reservoirs: four with a total capacity of 14,000 m^3.

- Treated-water pumping station:

  Throughput: 3,200 liters per second (water head: 80 m), i.e., 2,500 liters per second for Casablanca, and the rest for the towns of Settat and Berrechid.

Chlorination station in progress.

Telemonitoring equipment.

Cost of the first stage: 600 million dirhams.

First-stage completion schedule:

- Work started: January 1989.
- Work completed: February 1991.

In the second stage, the current treatment capacity of the Daourat facilities will be increased:

- To guarantee the rated throughput for the Daourat-Casablanca main;
- To guarantee the rated throughput for the Settat and Berrechid water-supply lines;
- To cover the drinking-water needs of the Jorf El Asfar phosphate mining complex and of the town of El Jadida.

The structures to be built or overhauled are as follows:

- Water-treatment plant;
- Pumping station;
- Discharge pipe (between the two stations).

Cost of the second stage: 360 million dirhams.

Second-stage projected completion schedule:

- Work to start in 1993;
- Work to be completed in 1994.

Two branch pipes on the Daourat-Casablanca water main will boost the water supply of the towns of Settat and Berrechid.

Financing of the Project

The Daourat-Casablanca water-main project will be financed by the Saudi Development Fund (FSD), the Kuwaiti Fund for Arab Economic Development (FKDEA), and the French Government per the Moroccan-French financial protocols.

The following table shows the amounts loaned by the financing organizations:

Organization	Amount of Loan
FSD	70 million Saudi rials (about 160 million dirhams)
FKDEA	7 million Kuwaiti dinars (about 210 million dirhams)
Moroccan-French protocol	25.5 million French francs (about 38 million dirhams)

Regional Government Continues Haouz Water Project

91WN0392A Rabat ALMAGHRIB in French 22 Mar 91 p 7

[Unattributed article; first three paragraphs are ALMAGHRIB introduction]

[Text] The Haouz region is one of the most fertile in the Kingdom, especially since it extends over thousands of hectares and has considerable water resources.

The Regional Agricultural Development Office of the Haouz (ORMVAH) intends to irrigate this agricultural zone by exploiting various water sources, ranging from underground water to rivers (the Lakhdar and the N'Fis).

With the first irrigation segment finished (57,000 hectares), the office is now determined to develop the second (37,000 hectares).

The Regional Agricultural Development Office of the Haouz (ORMVAH) has undertaken a vast hydroagricultural development program in the territory under its authority within the context of the "1-million-irrigated-hectares" policy of his royal majesty's government.

The Haouz region is characterized by an arid or semiarid climate. All farm production is heavily dependent on irrigation, a practice followed by farmers in this area for several centuries. The extensive network of *khettaras* and irrigation channels, stretching dozens of km, is an eloquent example of their skillful water management.

To develop such a vast area, major technical and socioeconomic studies were required to determine both resource potential and optimum use in order to meet the requirements of the national sectorial plans, which give priority to self-sufficiency in food production and improving the standard of living in rural areas.

Operating within this framework, the Haouz Office began work in 1984 on providing irrigation infrastructure for the 18,550-hectare strip along the right bank of the N'Fis, the first portion of a total of 57,000 hectares that make up the first irrigation segment of the central Haouz.

In most cases, delivering water to farms calls for large, costly waterworks upstream to move, store, transfer, and distribute the water. Other supplementary infrastructures are indispensable to the operation of the project.

Water Movement and Transfer Installations

Irrigation water for the 18,500-hectare [as published] strip along the right bank of the N'Fis is taken from three different sources:

- The waters of the Lakhdar River, by means of the Moulay Hassan I Dam, the Sidi Driss Dam, and the Rocade Canal.
- The waters of the N'Fis River, by means of the Lalla Takerkoust Dam.
- Underground water.

To recover the water needed for irrigation, it was necessary to build the following structures:

- The Moulay Hassan I Dam. Located on the Lakhdar River, this dam controls 350 million cubic meters, of which 300 million (carried by the Rocade Canal) are intended for the central Haouz (260 million cubic meters for irrigation and 40 million cubic meters to supply drinking water for the city of Marrakesh). The dam, which also produces electricity, was filled in 1987.
- The Sidi Driss Dam. Located downstream from Moulay Hassan I, this dam will provide weekly water control. It has a useful holding capacity of 7 million cubic meters. A micro power plant designed to run on water flow, i.e., for agricultural requirements, is planned for this structure.
- The Rocade Canal. The keystone of the project, this canal was built between 1978 and 1985. It carries water from the Lakhdar River to the sectors in the central Haouz where it is used. With a total length of 118 km and an initial flow of 20 cubic meters per second, it is one of the biggest canals in Morocco.
- The Lalla Takerkoust Dam. This is an old dam, filled in 1935. In 1979, as part of the current project, its capacity was increased to 85 million cubic meters a year by raising its height 9 meters. This modification was aimed at improving management of water from the N'Fis River with a view to optimizing its use for both energy production and land irrigation downstream. The dam delivers an annual volume of 26.4 million cubic meters. The remainder is used for to resupply users in accordance with recognized water rights.

System for Regulating Water in the Rocade Canal

Particular attention was given to the management of water moving through the principal distribution systems. For reasons having to do with the distance of water supply points and water conservation, including canal dimensions (Rocade), a dynamic regulation system was chosen.

The approach is based on real-time management of water movement through distribution systems, which ensures an almost constant match between supply and demand at the various water supply points. The special architecture chosen is built around remote control from a general center in Marrakesh and includes various devices for receiving, sending, and processing parameterizable data (minicomputer, remote transmission, radiotelephony, software). Microwave links with nerve centers where parameters are measured transmit continuous information at a given rate on the components of the measurement system.

The center is managed by a multidisciplinary team of technicians trained by the Office at specialized companies that participated in the project.

Underground Water

A large number of hydrogeological studies had to be made in the zone in order to determine its underground water potential and the best areas for pumping. Underground water supplies a considerable portion of the area's needs. Private or collective pumps are used to exploit this resource.

Distribution Networks

A system that individualizes resources on a sector-by-sector basis was adopted for the distribution of surface water in this zone.

Water From the Rocade Canal

The water flows through a 7.5-km channel at a rate of 6 cubic meters per second into a 20,000-cubic-meter holding pond equipped with control, filtering, and measurement equipment. Underground pressurized pipes originating here supply a 14,850-hectare surface area.

Water From the N'Fis

The water travels through 5.5 km of pipe at a rate of 1,800 liters per second to supply a 3,700-hectare sector. What is left from the available flow is used to resupply irrigation channels with recognized, regulated water rights. There are plans for a 15,000-cubic-meter pond that will divert water from this system to supply future irrigation sectors on the left bank of the N'Fis.

Irrigation Networks

The basic principles adopted in providing this zone with irrigation infrastructure were maintenance of existing property lines without exception (no regrouping of lands) and use of irrigation risers with residual upstream pressure to deliver water to the top of the fields, allowing flexibility in adopting efficient irrigation methods (water conservation). This approach is made possible by the privileged position of this zone from the topographical standpoint.

Demonstration and Popularization of Irrigation Techniques

The difference in height between main canal and place of use averages around 100 meters: a very interesting prospect from the standpoint of energy savings (no pumping).

Consequently, users will be invited and encouraged to design their internal irrigation systems to take advantage of gravity flow. To this end, ORMVAH has established a center for the demonstration and popularization of irrigation techniques where area farmers can obtain advice and assistance on planned individual systems (filtration, localized irrigation, etc.).

The distribution network is 270 km long, of which 192 km are asbestos cement and 78, prestressed centrifugally cast reinforced concrete. Total water delivery, via pressurized pipes, is 14.5 milliliters per hectare. Actual delivery is through 450 Ultramed risers with a flow of from 10 to 140 liters per second, depending on the size of the farms served.

Supplementary infrastructures have been established to increase the efficiency of the system from the perspective of land improvement—the ultimate goal of the project. These include:

- A 45-km-surface drainage network to prevent crop damage during the violent floods to which this region is subject. Many structures that created bottlenecks have been reworked to increase flow and protection.
- Access roads. A 191-km network of improved dirt or paved roads along irrigation pipes. In addition to allowing system maintenance and providing easy access to farms, this network also serves the zone's rural areas.

Making the Investment Pay

- Improved land areas of around 2,000 hectares for agrarian reform cooperatives. Improvements will even include the delivery of moveable irrigation equipment for sprinkling.
- Administrative infrastructure to provide qualified personnel to help farmers to achieve adequate land development. In this connection, ORMVAH has enlarged the Saada Development Center and has established a center to popularize irrigation techniques.

The installations built now supply water to the first sectors on the right bank of the N'Fis, for a total irrigated surface of 12,000 hectares. The remaining sectors of the total 18,550 hectares will be connected this year.

In addition to building hydroagricultural infrastructure, ORMVAH is working to get the sectors with new irrigation infrastructure to the desired level of development immediately in order to make the investment pay.

Improving Land Use

Land use in the zone prior to improvement shows, for annual crops, cereals occupying 34 percent of the surface area; feed crops, six percent; produce, 4 percent; and fallow land, six percent; while, for plantation crops, olives occupied 24 percent of the surface area; citrus, 11 percent; miscellaneous plantations, 10 percent; and apricots, five percent.

Farm production in the zone before improvement had an added value of 3,600 dirhams per hectare and 1,400,000 dirhams on work days.

Providing Irrigation Infrastructure for Farm Land in the Haouz Zone

When farm production hits its stride after ORMVAH intervention (improvement of the zone and support to farmers to improve land use), the situation will be as follows:

- For annual crops, cereals should occupy only 15 percent of the surface area. However, yield should be 30 percent higher than total cereal yield before improvement.
- Produce should occupy 15 percent of the surface instead of 4 percent, and yield should quintuple.
- Feed crops should occupy 10 percent, with a tenfold increase in yield.

- For plantation crops, olive orchard surface should increase to 35 percent of surface area, and yield should triple.
- The surface area of other plantation crops should remain unchanged; yield should increase by three. Moreover, milk production should increase by 30 percent and meat production, by more than 60 percent.

Last year, ORMVAH also began introducing industrial produce crops, the majority of which are intended for exploitation. They include niora, industrial tomatoes, green beans, pickles, covered early melon, and asparagus.

When it hits its stride, improved use of farm land in the irrigated zone along the right bank of the N'Fis should make it possible to achieve an added value of 12,000 dirhams per hectare, or a fourfold increase, and should offer 2,800,000 work days [as published], or twice the amount prior to improvement.

The government has invested 300 billion centimes [3 billion dirham] on the infrastructure provided (the Moulay Hassan I Dam, the Sidi Driss Dam, the Rocade Canal, the N'Fis pipe, and networks for 18,550 hectares). Remember that the first central Haouz irrigation segment covers a surface area of 57,000 hectares. Having completed the infrastructure for the first portion of this segment, ORMVAH is determined to develop the second, 37,000-hectare portion.

This project involves providing irrigation infrastructure for farm land in the central portion of the Haouz region and in the sectors on the left bank of the N'Fis under the authority of the province of Kelaat Sraghna and the wilaya of Marrakesh.

The feasibility study, which is currently being updated, will determine the type of irrigation system chosen for the central sectors. All these sectors will be provided with a 660-km network of irrigation pipe or canals, a 1,000-km drainage network, and a 270-km network of improved dirt roads.

For the left bank of the N'Fis, gravity will be used to deliver pressurized water to the top of a parcel or group of parcels. Farmers will be free to chose their own irrigation systems: sprinkling, drip, trickle, pivot or reel.

Depending on the type of irrigation chosen, investment requirements range from 110 billion centimes [1.1 billion dirhams] for gravity flow to 140 billion [1.4 billion] for sprinkling.

USSR Supreme Soviet Resolution on Status of Chernobyl Cleanup

91WN0409A Moscow IZVESTIYA in Russian
15 Apr 91 Union Edition p 2

["Resolution of the USSR Supreme Soviet on the Course of Fulfillment of the 25 April 1990 USSR Supreme Soviet Resolution: 'On a Unified Program for the Cleanup Following the Accident at the Chernobyl Nuclear Power Station and the Situation Associated With That Accident'"]

[Text] The USSR Supreme Soviet notes that the 1990 resolution: "On a Unified Program for the Cleanup Following the Accident at the Chernobyl Nuclear Power Station and the Situation Associated With That Accident" has primarily been fulfilled. The resettlement of people from the territory subjected to high levels of radioactive contamination, clarification of the radiation situation, and the house-to-house studies and certification of populated points continue. A state register of persons subjected to radiation effects as a result of the accident has been established. Steps have been taken to improve the health of the population, children in particular. Implementation of measures to reduce the ingress of radioactive material into agricultural produce has insured a lowering of the dose among the population.

A state Union-republic program has been approved by the USSR Government to protect the health of children against the effects of the catastrophe at Chernobyl, covering the period 1991-1995 (the "Children of Chernobyl" program).

An international program with participation by independent experts to assess the effect of the consequences of the accident on the environment and the state of health of the population is coming to its conclusion. Stricken areas are being given help by foreign countries, organizations, and individuals.

At the same time the USSR Supreme Soviet considers that the steps taken to deal with the consequences of the Chernobyl catastrophe are still not in line with the complex situation that has taken shape in the stricken areas.

In contaminated areas the level of medical care for the population remains inadequate, and the treatment centers are not fully staffed with medical personnel, equipment, and drugs. An increased incidence of disease has been seen in particular rayons. Improvements are needed in the supplies of foodstuffs and durable goods. The employment problem has worsened for the population in territories from which resettlement of the inhabitants has been carried out, because of the cessation of economic activity there; in the resettlement areas the employment problem has become worse because of the slow development of the production infrastructure. Decontamination work at populated points and on particular territories being carried out by organizations of the Union republics is proceeding unsatisfactorily.

Together with other ministries and departments, the USSR Academy of Sciences has allowed tardiness in the formation of scientifically sound criteria for the population to live on contaminated territories.

The submission to the USSR Supreme Soviet of prepared drafts for a law on the Chernobyl catastrophe and a law on the utilization of atomic energy and nuclear safety has been delayed, thus allowing no opportunity to pass them even now.

The newly created USSR Committee for the Cleanup of the Accident at the Chernobyl Nuclear Power Station, established as part of the USSR Council [as published] of Ministers Commission for Emergency Situations, and also the corresponding state committees of the Russian Soviet Federated Socialist Republic [RSFSR], the Ukrainian SSR, and the Belorussian SSR have not developed the necessary organizational work or practical actions.

There is lack of agreement in the approaches of the Union republics when defining measures for accident cleanup and on the level of compensation for persons who have suffered as a result of the accident.

It has not been possible to achieve significant improvement in the sociopsychological situation in areas affected by the catastrophe. The information provided to the public about the radiation situation and the course of implementation of cleanup programs following the accident remains at a low level.

Proper attention is not being paid to solving the problems of organizing, building, and operating radioactive waste disposal sites.

The USSR Supreme Soviet resolves as follows:

1. To take under advisement information from the USSR Government, RSFSR Council of Ministers, Ukrainian SSR Council of Ministers, and Belorussian SSR Council of Ministers on the course of fulfillment of the USSR Supreme Soviet resolution: "On a Unified Program for the Cleanup Following the Accident at the Chernobyl Nuclear Power Station and the Situation Associated With That Accident."

2. The USSR Government, together with the RSFSR Council of Ministers, Ukrainian SSR Council of Ministers, and Belorussian SSR Council of Ministers will do the following:

—during 1991 insure unconditional completion of the tasks set forth in the state Union-republic program for urgent measures during the period 1990-1992, and in republic cleanup programs following the accident at the Chernobyl Nuclear Power Station. During the first half of 1991 complete the recruitment of contract construction organizations and other organizations adequate for the volumes and directions of work for this year and subsequent years, and also insure priority allocation of the necessary material-technical resources;

—take the steps necessary to provide the population in contaminated areas more fully with clean food products in accordance with rational standards, paying special attention to deliveries of foodstuffs enriched with vitamins and with pectins and other bioactive substances to those areas, primarily for children, pregnant women, and nursing mothers;

—during the first half of 1991 take steps aimed at improving the structure of the public health organs in control zones, recruit and establish medical personnel, including on a contract basis, and provide medical centers with up-to-date equipment and drugs. Insure priority for measures to prevent possible long-term aftereffects caused by the accident;

—accelerate comprehensive studies of the populations living in control zones, and on this basis compile a medical and biological data bank on the population's state of health. Jointly with the USSR General Confederation of Trade Unions insure that the health of the population improves during 1991, primarily that of children and teenagers from stricken areas;

—during 1991 complete the creation of a system of departmental and state radiation monitoring of agricultural and food products, water, and the soil, to cover every populated point in the control zone. Insure production of the necessary quantity of personal dosimeters and other instruments for radiation monitoring. Significantly improve sanitation information and information work among the public on matters relating to the effects of radiation;

—continue the comprehensive study of the territory of the RSFSR, the Ukrainian SSR, and the Belorussian SSR subjected to radioactive contamination, and insure within the times stipulated the compilation of summary landscape-and-geochemical and radiological-ecological maps of contaminated areas;

—during the first half of 1991 draw up comprehensive proposals for programs for international cooperation in taking steps to mitigate and deal with the consequences of the accident at the Chernobyl Nuclear Power Station.

3. The RSFSR Council of Ministers, Ukrainian SSR Council of Ministers, and Belorussian SSR Council of Ministers will do the following:

—during the first half of 1991 complete the organization of special services to decontaminate territories and populated points and bury and rebury radioactive waste. It is recommended that associations for business cooperation be recruited extensively to solve problems relating to improving the radiological-ecological situation in stricken areas;

—review questions pertaining to the socioeconomic status of areas subjected to radioactive contamination, and also the advisability of setting up in restricted and resettled zones on the territory of the RSFSR, the Ukrainian SSR, and the Belorussian SSR a regime of special control and economic activity regardless of administrative-territorial divisions, and adopt agreed decisions on this problem.

4. The USSR Government jointly with the RSFSR Council of Ministers, Ukrainian SSR Council of Ministers, and Belorussian SSR Council of Ministers will insure the formation, on the basis of a concept adopted for the population to live in areas affected by the accident, of a unified long-term state Union-republic program to protect the population of the USSR against aftereffects from the Chernobyl catastrophe. When this is done they should consider the new conditions resulting from the country's transition to market relations and the adoptions by republics of declarations of sovereignty. When drawing up the program they should make provision for measures to stabilize the sociopsychological situation in areas subjected to radioactive contamination, and in areas of resettlement. They should submit the long-term program to the autumn 1991 session of the USSR Supreme Soviet.

Refinements should be made to the state Union-republic program for urgent measures for the period 1990-1992 for the cleanup following the accident at the Chernobyl Nuclear Power Station, giving due consideration to the concept for living adopted and proposals put forward by USSR people's deputies. If necessary, appropriate proposals should be submitted to the USSR Supreme Soviet.

5. The government of the USSR jointly with the Ukrainian SSR Council of Ministers will take the steps necessary to implement the work program set forth in the decision of the USSR Council of Ministers to close down operation of the power units at the Chernobyl Nuclear Power Station.

6. To recommend that the mass media show maximum objectivity in covering the problems associated with the consequences of the accident at the Chernobyl Nuclear Power Station.

7. During the second half of 1991, the commission investigating the causes of the accident at the Chernobyl Nuclear Power Plant and evaluating the actions of officials during the period following the accident will submit to the USSR Supreme Soviet information on work done.

The USSR Government will draw up and submit to the autumn 1991 session of the USSR Supreme Soviet a draft law on the utilization of atomic energy and radiation safety.

8. Monitoring compliance with this resolution is assigned to the USSR Supreme Soviet Ecology Committee and USSR Supreme Soviet Health Committee.

[Signed] A. Lukyanov, chairman of the USSR Supreme Soviet

Moscow, the Kremlin, 9 April 1991

Progress, Changes in Chernobyl Cleanup Program Assessed

91UN1334A Moscow PRAVITELSTVENNYY VESTNIK in Russian No 8, Feb 91 p 9

[Interview with Viktor Afanasyevich Gubanov, chairman of the Committee for Eliminating the Consequences of the Chernobyl AES Accident, by G. Lomanov; place and date not given: "Getting Rid of the 'Chernobyl Syndrome'"]

[Text] **Already almost five years have passed since the tragedy at the Chernobyl AES [Nuclear Power Station], and it has been almost one year since the USSR Supreme Soviet ratified the State Union and Republic Program of Urgent Measures for 1990-1992 on Eliminating the Aftereffects of the Chernobyl AES Accident. This program has become the basis for new large-scale measures. Suffice it to say that over 10 billion rubles [R] have been appropriated this year from the Union budget alone to implement these measures. What is the situation today in the affected regions? How is implementation of the program progressing? V. Gubanov, chairman of the Committee for Eliminating the Consequences of the Chernobyl AES Accident, talks about this at the request of PRAVITELSTVENNYY VESTNIK.**

[Lomanov] Viktor Afanasyevich, the tragedy at Chernobyl has in one way or another affected the interests of over four million people and its consequences will be felt for many years to come. For this reason I would like to begin our conversation with the concept that has caused such a sensation and been severely criticized, the "35-rem [roentgen equivalent man]" concept. After all, a great deal depends on what criteria will be used to determine the safety of people living in the regions adversely affected—health of the population, scope of resettlement, and volume of investments.

[Gubanov] A new concept has now been developed. It differs from the previous one which proceeded from the premise that an individual should not receive a dosage exceeding 35 rems over his lifetime (averaging 70 years). But people want to know if they can live here today without damaging their health. And if so, for how many years? The new concept will enable us to answer such questions. In assessing the situation, it takes into account the cumulative dosage received by an individual over a year and establishes the lower annual limit of radiation from the Chernobyl fallout—0.1 rem.

[Lomanov] And the upper limit? Is it again "35?"

[Gubanov] It has not been established.

[Lomanov] Why?

[Gubanov] Simply because accomplishment of the envisaged program of urgent measures will not allow people residing in affected regions to receive more than 20 rems during their lifetime, taking into account earlier accumulated dosages and with the removal of all restrictions. And even this figure includes some degree of insurance—the real level of cumulative dosage does not exceed 17 rems. And one more important aspect—the concept includes the principle of voluntary resettlement of people from territories where the contamination level is less than 40 curies per square kilometer. I believe this is fair—after all, for many people, especially the elderly, the act of moving and adapting to another locality entail experiences which at times have a much greater effect on people's health than the influence of radiation.

It will not be an easy matter to implement the new concept. But all the obligations that have been confirmed by the government in various programs and resolutions are in effect and will remain in effect over the time intervals envisaged by these decisions. Everything the state has guaranteed with respect to resettlement and social compensation will be accomplished.

The republics victimized by the accident participated in developing this concept. They agree with its main principles, which will become the basis of a law on the Chernobyl catastrophe to provide social protection for citizens who are victims of the accident, and of a long-term Union and republic program for 1993-1995 and prior to the year 2000. The draft law has already been submitted to the parliament and might possibly be included in the agenda of the spring session of the USSR Supreme Soviet.

[Lomanov] It was proposed to resettle people from regions with a great amount of radioactive soil contamination (more than 40 curies per square kilometer) over a two-year period—about 73,000 people in all. How many have already moved out?

[Gubanov] Last year it was planned to resettle 29,000 individuals. Preliminary data show that 26,900 residents have left. I recall that the program envisaged the opportunity to move out of less contaminated regions—if people desired to do so, of course. This provision relates to families with children, pregnant women, people who cannot live here by virtue of their health condition. Taking this into account, we must resettle at least 140,000 people prior to 1992. Almost 45,000 inhabitants have left. The most intensive resettlement is taking place in Belorussia.

Overall efforts within the framework of the Chernobyl program are expanding with every passing year. In 1989, R1.1 billion was spent, last year, R2.2 billion, and this year R10.3 billion have already been allocated from Union budget funds alone. This presents the real possibility that a significant portion of the effort envisioned by the program for 1990-1992 may be accomplished this very year.

[Lomanov] Many urgent measures have envisaged the establishment of a system of trained medical aid. The press has sharply criticized medical personnel not desiring or incapable of determining whether the illnesses of former "eliminators" were connected to their work at the Chernobyl site. There remains a bitter

after-taste—just yesterday you were a hero, and now you are feeble, ill, not needed by anyone.

[Gubanov] The criticism is justified. Presently the situation is being corrected. A State Register of Persons Subjected to Effects of Radiation From the Chernobyl AES Accident has been established. At the Union level it contains information on 539,000 individuals, including 192,000 of the so-called "eliminators" who worked on eliminating the consequences of the catastrophe. An entire network has been created based on the country's leading clinics—20 regional interdepartmental councils of experts entrusted the responsibility of establishing a causal relationship between illnesses and disabilities, and efforts to clear away the accident.

In order to spare the inhabitants of monitored regions from having to undergo X-ray examinations unless absolutely necessary, facilities for ultrasound diagnostics and endoscopy are nearing completion in Bryansk, Kiev, Zhitomir, Gomel, and Mogilev Oblasts. In Mogilev, a diagnostics center has been outfitted to accommodate 500 visits per shift; in Minsk, a specialized republic center for treating thyroid tumors; and in Gomel and Mogilev, branches of the Scientific Research Institute of Radiation Medicine of the Belorussian SSR Health Ministry have opened up. Two statistics in conclusion—last year more than 500,000 inhabitants of the affected regions received treatment and recuperated in special health centers; over 13,000 children were sent abroad for treatment and health restoration.

[Lomanov] How are tasks being executed with respect to the compilation of a detailed atlas showing radioactive contamination?

[Gubanov] An aerial survey of 20 oblasts was accomplished and the materials are being processed taking into account ground-based investigative data. Half of the farmsteads were examined and appropriate survey specifications should be finalized this year. The scope of this effort is graphically illustrated by the figures—radiation specifications were compiled for somewhat over 120,000 farmsteads in 1,212 population centers. And more than a thousand towns and villages beyond the boundaries of the monitored zone were examined—at the request of residents and local authorities.

[Lomanov] Could you tell us something about the "clean" products—apparently, regions suffering from the accident have not been spared the general shortages we are all experiencing?

[Gubanov] Without a doubt, it is a difficult situation we see here. Nonetheless, consumption quotas for 11 types of basic food products in Belorussia, for example, were allocated in their entirety to regions with a contamination density greater than five curies per square kilometer. And quotas for other products, certain manufactured goods primarily, have been allocated to the affected regions. I should note in general that priority financial and material support has been stipulated for the Chernobyl program. Expenditures for it in the plans of republics and departments are apportioned by separate paragraph.

[Lomanov] Are the local food products edible? From time to time we hear reports that here or there, "dirty" meat or milk has been found...

[Gubanov] If we are talking about meat, it must be admitted that there are such incidents, but they are rare and the amount of product contamination is insignificant. This happens when farms or their proprietors fail for one reason or another to switch their livestock over to noncontaminated fodder three months prior to slaughter. Each such situation is promptly analyzed and the production is used to fatten up cattle or undergoes technical processing. Last year the production of contaminated meat did not exceed hundredths of a percent—is this cause for a flare-up of emotions?

Radionuclide content in plant production has basically decreased to levels not in excess of international norms. Such production may be freely sold, transported, processed, and used without restriction by all population groups of countries that are members of the European Community, including children.

In the majority of contaminated oblasts, the percentage of milk not in conformance with TAS's—temporary allowable standards—has decreased to 0.1-0.8 percent. The situation is worse in Bryansk and Zhitomir Oblasts, where this percentage is reaching 8-11 percent. We intend to conduct a conference there in the spring and delve into why we are not seeing any reductions in the amount of contaminated milk.

[Lomanov] So much contradictory material has been written about the danger of radiation that people do not believe anything or anyone—not authoritative scientists nor official organs. Are we going to be able to rid ourselves of the "Chernobyl syndrome?"

[Gubanov] It will be difficult, but we must. For sociopsychological tension is resulting in the departure, primarily of young and industrious people, from the affected regions. A great deal of explanatory effort is necessary. Objective information must be provided on the dangers, real and imaginary. Here we are counting on sound, well-considered treatment by the press, although we ourselves are devoting more attention to providing objective information as well. Material on the new concept has been prepared for popular distribution. Regional public information centers are being established in Kiev, Minsk, Bryansk, Zhitomir, Gomel, and Mogilev. There will be increased publication of scientific literature for popular consumption, brochures, and reference pamphlets. Our committee has begun to issue an information bulletin, published in only a thousand copies at present. We expect to increase this to 10-15,000, and at that time will be able to send the bulletin to all population centers in the affected regions.

[Lomanov] Finally, many countries have responded to our misfortune. How do you assess the international assistance that has been provided?

[Gubanov] We are very grateful for it, although in our view it should be institutionalized. I believe the first step in this direction was taken through the special resolution of the 45th session of the United Nations General Assembly adopted in December of last year. It was resolved to create the Chernobyl Fund and organize its functional structure within the UN framework. Recently a coordinator was appointed for this problem—Margaret Anstee, deputy secretary general of the United Nations and head of the UN Center for Humanitarian Questions and Social Development. She recently traveled to the USSR and met with representatives of the republics. A preliminary understanding was reached regarding establishment of a program reflecting our requirements which could be fulfilled with the participation of international organizations or with their assistance.

Ukrainian Officials Comment on Chernobyl Plant Status

91WN0408A Kiev PRAVDA UKRAINY in Russian 27 Mar 91 p 3

[Article by PRAVDA UKRAINY special correspondent Viktor Nikipelov: "How Are You Doing, Chernobyl?"]

[Text] Chernobyl-Slavutich-Kiev—**As our newspaper has already reported, V.P. Fokin, chairman of the Ukrainian SSR [Soviet Socialist Republic] Council of Ministers, visited the Chernobyl AES [Nuclear Electric Power Station] and the city of Slavutich on 6 February. A frank and involved discussion of the current situation at the Chernobyl AES and its future, prospects for the nuclear power industry, and the fate of the city of Slavutich took place during meetings with the station's management and work force.**

Taking into account the requests from many readers who have taken a continuous interest in the issues of Chernobyl, we decided to report on the details of the meetings and discussions held, and to outline the positions and views of operating personnel and scientists.

Some excerpts from a report by M.P. Umanets, general director of the Chernobyl AES Production Association, follow.

Safety

At present, the operating personnel of the Chernobyl AES work with a reactor which, in essence, has little in common with the RBMK [high capacity channel reactor] which existed in April 1986 (this is true of physical characteristics in particular). At present, the station is not in any way inferior to other domestic AES as far as safety features are concerned.

In addition to the regular control and protection system previously in existence, a rapid emergency system has now been commissioned. Its "response" time amounts to 2.1 seconds, which is six times better than that of the regular system currently in existence, and 12 times better than that of the system existing prior to April 1986.

Now operators of the station are able to receive computations of the disposable reactivity margin [operativnyy zapas reaktivnosti] in five minutes, whereas previously such information could only be obtained in two hours.

Decommissioning the Units

As is known, a resolution of the Supreme Soviet of the republic provides for decommissioning all units at the Chernobyl AES before 1995.

Now a variant of closing the station down has been selected which calls for shutting down successively the first, second, and third units in 1993-1994 and 1995 respectively, unloading fuel to be stored in a special storage facility, washing and decontaminating technical equipment and systems after the fuel has been unloaded, holding the systems for a long period of time, and subsequently dismantling them together with structures (this, however, will take place in the remote future).

According to preliminary calculations, the cost of this program will come to about 2.5 billion rubles [R]. In the course of this, the station will gradually turn into a consumer of heat and electricity for many years to come, beginning in 1993. In addition, we will not be able to reduce the size of the work force considerably, as indicated by the experience of the already shut down Armenian and Beloyarskiy AES's.

Subsequently, the Chernobyl AES director stressed that, given a considerable improvement in the station's safety standard, its specialists believe that decommissioning the units at this time is not feasible. Also, we cannot ignore the fact that the shutdown of the Chernobyl AES will reduce the generation of power in the republic by almost one-tenth (given the already existing shortage of energy carriers), and there is simply no way to make up the losses in the immediate future.

I believe, said the director, that we should approach the republic parliament once again to have our proposals considered carefully and comprehensively, with the use of skilled independent experts.

We should also refine some provisions of a five-year moratorium on AES construction in our republic. Also, how logical is the decision not to commission or load the virtually completed second unit of the Khmelnitskiy AES, while the first unit is in operation?

The Sarcophagus

First of all, let us recall that it is not completely sealed. The total unsealed area of the sarcophagus comes to more than 1,400 square meters.

The issue of nuclear safety was the most alarming until mid-1988. Scientists and researchers were interested in

the possibility of a self-sustaining chain reaction which would subsequently be accompanied by an explosion and large amounts of discharge—something of a replica of what happened on 26 April 1986. Now they have drilled through the reactor in all directions, and specialists continuously monitor the condition of metal and building structures, as well as nuclear fuel, using optical video technology and all kinds of sensors... In certain locations, the study of the building structures has been incomplete due to high levels of radiation coming to between 800 and 1,000 roentgens. Nonetheless, after conducting a number of physical experiments, research leaders came to the conclusion that a self-sustaining chain reaction is impossible, due to which the sarcophagus is considered to be nuclear-safe.

What is the future of the sarcophagus? There are several opinions in this regard. The first variant calls for building a sealed cover structure over the sarcophagus (perhaps, made of titanium)—shelter No. 2. Subsequently, the unit would be left in this condition. For their part, specialists of the station believe that Unit 4 cannot be left in this condition. A green meadow will not actually exist where it is located, but it is quite possible to dismantle the unit to the 12-meter mark, extract and bury radioactive wastes, and safely encase the rest in concrete.

A variant has also been proposed which calls for dismantling Unit 4 without building shelter No. 2 at all. It provides for the complete removal of fuel and all parts of the unit.

'Yelena'

A great many idle fantasies and rumors concerning "Yelena" circulate at present. "Yelena" is the top 2,000-ton segment of the reactor, the so-called "lid," severed by the explosion from its pillars and hanging at an angle over the reactor well. Many people believe that if it falls into the well a mechanical discharge of radioactive dust which has formed inside the reactor under the influence of destructively high doses of radiation will occur. This version has spawned a multitude of panic rumors.

However, specialists have now developed and installed an effective dust suppression system which would be used to reduce to a minimum all possible unfavorable consequences of such a fall. It provides for the prompt delivery to the reactor of a sticky liquid which would "tie up" its dust content.

However, as scientists from a comprehensive scientific team believe, the very possibility of such a fall is very much in doubt. The laser surveys conducted and mathematical computations indicate that "Yelena" may only slip down slowly, at the speed of several millimeters per day. If we take into account the fact that the height of the well is about eight meters we can understand that a certain time margin remains for necessary maneuvers to be performed.

Incidentally, last year's earthquake, with a magnitude of about five points, was actual confirmation of the stability of "the lid" which has three fulcrums at present. Moreover, calculations have already been made for pouring concrete on some of the space under "Yelena" with an eye to restoring a reliable fourth fulcrum.

What if such a discharge occurs after all, despite the measures taken? (At present, life suggests that we should evaluate all possible scenarios). So, in the opinion of specialists present at a meeting with M.P. Umanets, it could pose a certain danger only to the personnel of the station, and its consequences would not affect areas beyond the 30-kilometer zone. However, the current radiation situation in the compound of the station itself, which they have succeeded in attaining at the cost of a lot of effort and considerable outlays in recent years, would deteriorate. Understandably, in this case the shutdown of the units, the emergency evacuation of personnel of the station and of the organizations servicing it, and the shutdown of forced ventilation are envisaged as primary safety measures.

Samoylenko's Opinion

The desire of the government to know what might happen after "Yelena" falls is easy to understand, observed General Director of the Spetsatom Production Association Yu.N. Samoylenko. I think that at present nobody can say with complete confidence and clearly what kind of discharge would occur in the process, and what the size of the area affected would be, despite many specialists who have been on site assuring us that "Yelena" will not fall.

However, no matter what kind of discharge occurs (a small or even a large one, even if its radiation risk factor is reduced to a minimum), we should be mindful of the sociopolitical ramifications which may cause a powerful explosion of public opinion in our republic. This would wipe out all attempts to restore the shattered reputation of our nuclear power industry made in recent years, and therefore, would worsen development prospects for the power industry as a whole.

As Samoylenko sees it, the main point at present is to focus all efforts on the sarcophagus, which meets neither national nor international requirements. It is necessary to select an acceptable variant soon, and to fund all work well, keeping in mind all the time precisely the sociopolitical consequences in question.

At present, we need a real victory on a specific avenue so as to be able to say, for example, that the sarcophagus has been fully neutralized. Such an accomplishment would create realistic prerequisites for changing public opinion with regard to nuclear power generation.

Slavutich

A promise to build a 21st-century city was quite attractive. However, as the director of the station said, this has been literally ruined since 1989 by the USSR Minenergo

[Ministry of Power and Electrification] in its capacity as general contractor. At present, there are 2,819 families on our waiting list for housing, of which 1,618 families are at the Chernobyl AES alone. Instead of the 1,010 housewarmings planned for 1990, we celebrated only 118. The situation is equally bad with regard to schools, where several hundred children study on the second shift, and pre-school facilities...

No matter how hard we try to convince the people of the opposite, observed M.P. Umanets, most of them associate the discontinuation of construction in the city with the decision to close the station. No arguments of ours convince anyone given the condition of construction in Slavutich. You can imagine the pressure all this puts on our employees; you can imagine how bankrupt we appear to them. We need urgent and effective help.

Revelations To Be Considered

Allow me a small lyrical digression now, the Chernobyl AES Production Association director appealed to the public. You know, it pains and saddens me to read interviews with energy specialists who offer wind generators to us. Indeed, at present the nuclear power industry is being pilloried, and there is nothing we can do about it. Nonetheless, I would like to stress that a serious discussion of the future of the Ukraine is pointless in the absence of an adequate energy potential. Let us approach this problem in a balanced manner, without undue emotions and passions.

After all, the latter are inflamed both by individual presentations, and newspaper articles and TV and radio broadcasts. This is how public opinion is shaped little by little. In public transit, there are signs to the effect that it is forbidden to talk to the driver when the vehicle is in motion, whereas it is possible to grab the sleeves of, say, senior engineers of reactor control going to their shift, and it is possible to post pickets and threaten their families, as incidentally has been the case at the already mentioned Khmelnitskiy AES. It is alarming that this attitude is becoming a regular phenomenon here in the Ukraine.

It appears that some people do not have a clear idea of what they are playing with. After all, you cannot continuously keep the personnel of nuclear power stations under such unfavorable psychological pressure. This is the greatest favor we ask of the government, which is seconded by the directors of all AES in the republic. Please note that they are not asking for funds, transformers, or equipment; they are asking first of all for the protection of their personnel who currently perform their professional duties conscientiously, no worse than others.

Fokin's Interview

After the meeting in Slavutich ended, I approached the prime minister of the republic, asking what new things he had learned during this trip.

Vitold Pavlovich stressed: "One of the goals of our visit was to meet with the management of the nuclear power station, its employees, and scientists monitoring the condition of Unit 4, and to familiarize ourselves with their views on an entire set of issues. I must say that exchanging views was very useful. I listened to all the arguments made by the professionals who are convinced that, after all measures have been taken, there is no need to close the station down and decommission its units, that it is illogical to restrict the capacity of units already in operation once the level of their safety has been increased so efficiently.

"Second, as you know, rumors have recently spread with lightning speed concerning various troubles with the sarcophagus, primarily concerning the possible fall of "Yelena," causing panic among the populace. Having heard quite well-reasoned reports from the director and other speakers, we became convinced that apparently there is indeed no reason to be apprehensive about the condition of Unit 4. Finally, the third goal of our visit was to familiarize ourselves with the state of affairs in Slavutich.

"It is necessary to carefully examine everything we have heard; after all, the final position of the government on all of these issues should be very balanced. A difficult task is in store for us: To select the only correct solution with regard to both the future of the Chernobyl AES and the prospects for the city."

[Nikipelov] However, in the process many people forget that the development of our republic will not advance a single step without improving energy availability...

[Fokin] This is absolutely correct. We also have people who reject technical progress and are prepared to call for living virtually in caves and using candles; I believe that their arguments cannot be taken seriously.

[Nikipelov] However, it appears that they intend to send someone else to these caves rather than go themselves...

[Fokin] Indeed, while they discuss it, a majority nonetheless prefer to live in well-lit and heated apartments, and to make extensive use of household appliances, audio equipment, and TV sets.

[Nikipelov] In response to a question concerning prospects for the development of the nuclear power industry in the Ukraine, V.P. Fokin said that at present it is premature to discuss this because there are no locations in the republic where we can easily site an AES and begin construction. The Ukraine does not have a crystalline shield which could provide a good foundation for the implementation of a design of safe nuclear plants.

However, there are alternatives available to us, stressed the prime minister. We are now studying closely the potential for using steam gas plants which have great advantages compared to nuclear reactors (the efficiency of nuclear power generation does not exceed 30 to 32 percent, whereas that of steam gas plants comes to

between 50 and 55 percent). They are comparatively pure from the point of view of ecology. One of the elements of such units is being developed in Kharkov; meanwhile, we are reviewing the issue of acquiring such units abroad.

In response to my question on whether the prime minister believes that the Supreme Soviet of the Ukraine may revisit the issue of the feasibility of closing down the Chernobyl AES after precisely such meetings and consultations, Vitold Pavlovich said:

"After our meeting, hardly. However, if there is a continuation of this meeting, if both specialists and members of our parliament work seriously on this issue, I do not rule out that we will be forced to address these problems in the future, perhaps in the immediate future, one way or another.

"I have already noted that the issue of decommissioning the units entails major technical problems and requires considerable time. This is to say nothing about outlays. Suffice it to say that the program for decommissioning the units developed by a government commission will cost upwards of R2 to R2.5 billion, according to the most conservative calculations. Of course, this is quite a lot given our current poverty."

Report Blames Designers, Not Personnel for Chernobyl

PM3004113391 Moscow KOMSOMOLSKAYA PRAVDA in Russian 26 Apr 91 p 1

[Undated report signed by Yu. Voronezhtsev, USSR people's deputy and responsible secretary of the USSR Supreme Soviet Commission for Investigating the Causes of the Accident at the Chernobyl Nuclear Power Station and Assessing the Actions of Officials in the Post-Disaster Period; Doctor of Technical Sciences B. Dubovskiy; and Candidate of Technical Sciences K. Karikh on "the initial results of the work of the USSR Supreme Soviet Commission for Investigating the Causes of the Accident at the Chernobyl Nuclear Power Station and Assessing the Actions of Officials in the Post-Disaster Period," published under the headline: "Five Years Since the Star Called Wormwood (literal meaning of "Chernobyl") Fell"]

[Text] The specially selected departmental scientific experts were wrong to heap the entire responsibility for the accident on the personnel. It was representatives of the principal culprits in the accident who were appointed as "judges," and they "out of modesty" kept silent about their own mistakes.

If there had been an effectively operating accident shield in the reactor, all the mistakes made by the personnel would have led only to a week's shutdown—with no explosion.

If there had been even a hint of the danger of an explosion in the standard technical documents, the control operator would have engaged the lower neutron absorbers five seconds before activating the accident shield—and the explosion would have been averted.

It is unfair to expect greater competence in understanding the physical fundamentals of the shield's design from the operating personnel than from the development's "ideologists." And the project designers graphically demonstrated their low level of competence to the entire world in the Report to the International Atomic Energy Agency back in August 1986, in which they put forward a number of incorrect claims.

Unfortunately, the USSR Academy of Sciences is in effect contributing to this by its nonintervention and silence. Despite the fact that Academy members have played a very leading part both in designing "accident" protection for reactors and in elaborating measures to localize the consequences of serious accidents.

The wrong time was chosen for conducting a dangerous experiment. Tragically, the accident shield button was pressed without prior engagement of the shield's neutron absorbers in the lower part of the reactor's active zone. The accident shield was ineffective and the design of the control system was faulty. Extremely important aspects of neutron physics were almost entirely omitted in the main standard technical documents. These were the basic causes of the disaster.

The Academy of Sciences should make an honest declaration to the effect that the Chernobyl accident happened as a result of the cumulative effect of a series of mistaken technical decisions that are hard to explain. Their authors were the scientists in charge of the high-power pressure-tube reactor project.

Report Alleges Chernobyl Design Flaws, Cover-Up

PM2504114691 London THE DAILY TELEGRAPH in English 25 Apr 91 p 9

[Roger Highfield report: "Report Exposes Soviet 'Lies' About Chernobyl"]

[Text] The Soviet Union lied about the cause of the world's worst nuclear accident and made scapegoats of the operators of the Chernobyl RBMK [high-power pressure tube] reactor.

The reactor's design was to blame and 16 operational RBMK reactors may still pose a danger, secret documents reveal today, on the eve of the fifth anniversary of the accident that sent a plume of radiation worldwide that may claim up to 40,000 lives.

"In spite of the measures taken, the atomic power stations equipped with RBMKs fail, to a significant degree, to meet present safety requirements," says the document from the All Union Scientific/Technical

Society of Power and Electrical Engineers, which has been obtained by Thames Television's This Week programme.

Although published on Nov 30, 1989, when modifications to the remaining RBMKs were still under way, the document shows the Russians were concerned by the slow progress made in carrying them out.

Another document shows more than the fair share of blame was placed on the operators of Chernobyl, rather than the design, corroborating the claims of a reactor deputy engineer who was released from jail recently after a pardon.

Evidence has been growing that the Chernobyl four operators were fatally unaware of the rules they are supposed to have broken when they carried out an experiment on the night of the accident, in the small hours of April 26, 1986.

The cover-up is supported by a secret report, sent last February by the State Atomic Energy Supervisory committee to the Supreme Soviet and the ministry responsible for all nuclear installations in the Soviet Union, the KGB-controlled Ministry of Medium Engineering.

Statements on the accident made at an international conference in the wake of the accident "do not correspond to reality," it says.

"Four years after the accident at the Chernobyl Atomic Power Station a large number of specialists continue to be troubled by questions connected with the availability of objective information concerning the nature of the events which took place."

The misleading statements were made to the Vienna-based International Atomic Energy Agency, the world's nuclear watchdog, at the first major conference on the accident in 1986.

They concerned the limits placed on the Chernobyl power levels and how the reactor was operated by control rods, crucial to the Soviet explanation of the accident given in Vienna.

They had an extremely negative effect on the chances of establishing the true causes of the accident, on the research being carried out in this connection and on the development of scientifically justified steps towards the enhancement of the safety of RBMK reactors."

It says that "design and construction" of Chernobyl 4 "blatantly contravened the requirements of the Rules for Nuclear Safety."

The report, which lists 32 design flaws of the RBMK, justifies "the views that the accident was a manifestation of the design faults of the RBMK reactor as it was on the April 26."

Tonight's television programme also shows the difficulty experienced by the Soviet Union in coping with the huge amount of nuclear waste generated by the clean up operation and problems with other nuclear installations in the Soviet Union.

Chernobyl Officials To Be Prosecuted

PM0905131691 Moscow IZVESTIYA in Russian 9 May 91 Union Edition p 1

[INTERFAX report from news agencies roundup: "Chernobyl Officials Will Be Invited To Call on the Prosecutor"]

[Text] The USSR general prosecutor has initiated criminal proceedings relating to abuse by officials of their official position and failure to carry out their duties in dealing with the consequences of the Chernobyl disaster.

The Belorussian section is headed by Mikhail Gordyko, investigator for particularly important cases under the republic prosecutor. He told an INTERFAX correspondent that it is essential to give a legal assessment of the criminal negligence of certain leaders of ministries and departments and republic and local organs of power, with regard to their failure adequately to protect the population from radiation.

Ukrainian Official on Chernobyl Consequences

AU2904100491 Berlin DER MORGEN in German 26 Apr 91 p 3

[Interview with Vladimir Aleksandrovich Yavorivskiy, "head of the Soviet parliamentary investigative commission on the consequences of Chernobyl," by H. Bilawer; place and date not given: "The Entire South of the Ukraine Without Water?"]

[Text] Ukrainian writer Vladimir Yavorivskiy, born in 1942, author of the first novel about the super maximum credible accident in Chernobyl ("Mary With the Wormwood Herb at the End of the Century"), has been working in the Ukrainian Popular Front Rukh and in the Democratic Party of his Republic not just after his departure from the CPSU last year. As people's deputy he is heading a parliamentary commission for the elimination of the consequences of the nuclear accident in the Chernobyl reactor five years ago. This commission is also investigating those who were responsible for the accident.

[Bilawer] Vladimir Aleksandrovich, how do you assess your work today, five years after the nuclear explosion?

[Yavorivskiy] It is a tragic paradox, but I think that when everything was hushed up it was easier, simply because there was something like a anticipatory feeling of terror that linked everybody, a feeling of something that cannot be expressed in words, that had not happened before.

[Bilawer] What is the current condition of the reactor?

[Yavorivskiy] Some years ago the Soviet press assured the people that the fourth reactor unit is not a danger.

Today the same unit has officially been classified as a radioactive danger. Inside the reactor there is still 80 percent of the radioactive fuel, spread over 180 centers, which formed during the accident as a result of the continuous chain reactions; only 20 of them are under constant observation.

[Bilawer] What is to happen with the reactor?

[Yavorivskiy] The Moscow Nuclear Energy Ministry wants to simply bury the fourth unit under concrete, without consulting Ukrainian scientists or the government. We are strictly against such adventures. Unfortunately, one has to say that there is no alternative that one can accept responsibility for. The damaged unit remains dangerous because the cover of the reactor has been hanging down into the reactor at an oblique angle since the explosion on 26 April 1986 and might collapse completely at any moment. The consequence would be a dust explosion. This is our sword of Damocles, and the problem can be solved neither in the Ukraine nor in Moscow. We need the intellectual capacity of the entire world.

[Bilawer] After the accident intermediate storage sites were established in various places, the location of which is unknown....

[Yavorivskiy] ... and they were established very quickly and in an unsuitable way. Normally, such storage sites are selected carefully and sealed with a special kind of clay. In our case everything was simply buried: waste, demolition tanks, machines, concrete, nuclear fuel. There are about 800 such dumps; many are unknown because the respective maps have been lost. Even the reactor itself is located in the worst possible place. The Chernobyl station was built on a geological fault in the layers of the earth. The ground water table is very close to the surface and almost all radioactive deposits have been washed out, which leads to the fact that the water in this region is contaminated. The visible result is the rust-colored forest in the region, which is radioactive and cannot be entered.

On the left bank of the Pripyat River, the concentration of radioactive contamination is particularly high. Five years have passed, and despite its own promises the central government has not done anything to prevent floods from washing out the river bank—by building dams, for instance. And last year it happened, so that today the water of the Dnepr River is almost as radioactive as the water inside the reactor.

[Bilawer] What does this mean for the water supply of the cities along the river?

[Yavorivskiy] The capital city of Kiev receives its water supply from the Desna river, but further down on the Dnepr river there are industrial centers, such as Dnepropetrovsk, Cherkassk, and Zaporozhye. I do not want to frighten anyone, but it is certainly conceivable that sooner or later the entire industrial south of the Ukraine, which gets drinking and industrial water from the Dnepr River, will be without water supply.

[Bilawer] In the USSR scientists have been quarreling since the accident about the permissible dose of radiation that a person can survive. What is your opinion?

[Yavorivskiy] In the end the disagreement has led to the fact that millions of people (1.5 million in the Ukraine alone) have remained in the contaminated areas. The permissible dose was calculated, compared to the expected life expectancy, and it was stated that this was not disquieting. I have just returned from a Chernobyl conference in Munich, and there it was confirmed that frequent smaller doses are considerably more dangerous than a one- time stronger dose of radiation, because the organism gets used to gradual small doses and does not fight against them. And such doses continue to be taken in with contaminated foodstuffs. About 3 million people live under these conditions in the Ukraine. This is particularly terrible for the children. The future of the country is at stake, the genetic code of the people. In some places calves with five legs or three eyes are already born regularly. As is known, animals procreate more quickly, but the cruel truth is that people will be facing the same in three or four generations.

[Bilawer] Are there already statistics available on the consequences for the people?

[Yavorivskiy] Unfortunately, it is very difficult to make statements here. About two weeks after the maximum credible accident [as received] Deputy Health Minister Shchepin issued a message stating that those who were not obviously suffering from radiation sickness were to be kept under lock and key; the official diagnoses must be cardiac and circulatory disorders. Therefore, there are no correct statistics available, also not about the many helpers who were brought from all over the country and then left again. These people are suffering and dying anywhere, without us knowing about it. In total, this applies to about 100,000 people; four out of five are sick. There is probably no other country in the world where a commission for the elimination of consequences is established as late as five years after a disaster.

[Bilawer] What is true about the rumors that the millions of donations to the Chernobyl fund on account 904 of the State Bank have disappeared?

[Yavorivskiy] The money has not disappeared. The Soviet Nuclear Energy Ministry has used it to pay off its debts, even though the Ministry itself is the main culprit of the disaster. This money was collected by children; my daughter participated in a "subbotnik" and worked for money for the account. Pensioners donated, every working person in this country donated one day's wages. I myself saw a document in which former Prime Minister Nikolay Ryzhkov ordered to have the money used to pay off the Ministry's debts. This is the truth, I can prove this!

[Bilawer] Is this the reason for bringing a lawsuit against the Nuclear Energy Ministry?

[Yavorivskiy] One of our economic scientists calculated that Chernobyl will cost us 200 billion rubles [R]—in modest terms. Now we, as the parliamentary commission, want to start a lawsuit at the Ukrainian public prosecutor's office against persons who deliberately permitted lies and incompetence. I cannot yet give all the names, but, among others, this involves Valentina Shevchenko, former chairwoman of the Ukrainian Supreme Soviet Presidium, and former Ukrainian Health Minister Romanenko.

[Bilawer] Vladimir Aleksandrovich, if one listens to you, one gets the depressing feeling that the situation is already completely hopeless.

[Yavorivskiy] I am convinced that the only acceptable possibility is the sovereignty of the republic.

[Bilawer] Does this mean that Moscow is living off the international Chernobyl aid?

[Yavorivskiy] The contaminated area has become the feeding trough of the central state authorities. Recently we, together with a financial committee, checked the expenditures for the zone around the reactor. The result is that during this time R20 million were spent without one single official document. But nothing has arrived on the spot. However, the situation is not hopeless: The Ukrainian parliament has adopted a law, according to which the zone is to be put under the care of the Republic. We are facing enormous tasks; the people have to be resettled; housing space has to be established for this purpose. For this reason, we can solve these problems of the century only as an independent state.

TV Program on Chernobyl Effects

LD0605045191

[Editorial Report] Moscow Central Television First Program Network in Russian at 1545 GMT on 5 May carries a 30-minute program entitled "Anxieties in the Land of Chernobyl." The program, presented by correspondent Boris Smirnov, investigates current feelings about the Chernobyl accident and weighs the arguments about whether or not more people should be evacuated from the area affected by it.

The opening video shows file footage of the Chernobyl Nuclear Electric Power Station [AES], close-ups of the damaged station, the wrecked upper storeys, and sand piled against the side of the building. The video shows a masked technician, then two men in protective clothing and masks working with fire hoses on the roof of the generator room of No.3 reactor. A bulldozer shifts rubble. More shots of fire-fighters in protective clothing and masks on the flooded roof. A man directs a crane. Video shows the roof completely strewn with rubble. A worker is evacuated by his comrades.

Two men involved in the Chernobyl cleanup are then interviewed. Y.A. Okishev, chairman of a group of volunteers from Perm, praises the heroic work done by his men. No one refused to go when they were asked. The results for some of them were fatal. V.V. Fedulov, chairman of a group of volunteers from Saratov Oblast, who was involved with the cleanup in 1986, complains about the lack of state funding, and continues: "There's one other think I can say. A law on the status of people who helped clean up after Chernobyl accident has been lying before the Supreme Soviet for quite a long time now. If I am allowed, I would like to appeal to the deputies. Esteemed deputies, your delay in adopting this law is inhuman, to put it mildly." He adds: My father and grandfather will be remembered for having defended the motherland in various places. My children and grandchildren will be entitled to say the same thing about me. This is not vanity. It was my duty as a parent to protect your children, my children. It was his duty, they will say. And we did our duty."

N.M. Sorokin, chief engineer of the Chernobyl AES, is interviewed and says that these days nothing is hushed up. The program's narrator says that, in spite of this assurance, the camera crew found their way barred by a police post when they tried to enter the closed zone around the station. However, they managed to get in eventually because they had a special pass. Sergeant V.V. Vlasov, who was manning the post, says he is helping to guard the 30 square kilometer zone, which is closed to all living things except wild animals. The video shows a sign saying "Prohibited zone - entry forbidden"; a wire fence marks the perimeter; shots of abandoned buildings and rusting vehicles in the dead zone.

Chief engineer Sorokin says: "Confidence in atomic power has been undermined not just in our country, not just in the Ukraine and the Soviet Union, but also in other countries. But all serious research indicates that it will be not just difficult, but probably impossible to do without atomic power. For instance, other countries are saying that, if anything, atomic power will be developed further. Here one can cite the example of the United States. Last June I visited the Three Mile Island station in the United States, the nuclear power station which in 1979 also suffered a serious accident. Today the local population there believes that the station should remain, that it should continue to operate."

Correspondent Smirnov asks: "Why is there this divergence of views on atomic power? The point is that in developed countries impressive sums are paid out as compensation for risk in areas surrounding atomic power stations. As a result, the inhabitants have an interest in putting up with such a dangerous neighbor, since this has a direct influence on their lives. In our country the picture is completely different. The frontier between the station and the surrounding, contaminated area turns out to be a frontier between the centuries. The 21st century prevailed at the station itself. Here, though, people are living as though it were still the 19th century."

The video shows shots of peasants, including an old woman carrying a bundle of hay on her back, a man in gumboots standing in mud.

Smirnov interviews elderly peasants who say they are determined to stay on and not be evacuated. He then interviews A.P. Povalyayev, a leading scientist at the All-Union Research Institute of Agricultural Radiology, who talks about the changes that have had to be made to farming practices as a result of the accident. He says there are other parts of the country—including the Kuzbass—where, because of pollution, farm produce is more hazardous than in the Chernobyl area.

A young collective farm couple talk about their fears for the health of their daughter; they are preparing to move out.

A.E. Okeanov, chairman of Belorussian oncologists association, reports: "During 1990 we recorded a substantial increase in thyroid cancer, but the same increase has not so far been recorded for other tumors. You can't blame everything on Chernobyl. There are very many harmful factors at work in our republic, as in many other regions of the country; these include industrial hazards and environmental factors not connected with the Chernobyl situation. To a certain extent, of course, this is a philosophical question. If other harmful factors are exacerbating the impact of radiation, is it worth blaming everything on Chernobyl? On the other hand, people generally don't care exactly what did the damage. The main thing for them is not to fall ill."

V.M. Buynevich, deputy chairman of the Braginskiy Rayon executive committee, says: "An opinion poll carried out among the inhabitants of Bragin settlement [in Gomel Oblast of Belorussia] has shown that over 90 percent of them want to resettle in the clean zone." The program narrator asks rhetorically, "Will cosy Bragin also become part of the dead zone?" The narrator talks about the "criminal" hushing-up of the consequences of the accident in Belorussia. It is not surprising, he says, that people are so unanimously determined to leave.

Engineer A.A. Karasok stresses that the panic rumors which circulate periodically are fueled by an information vacuum. People are not given enough information. This is reflected in calls received on a special hot line at the station.

Y.I. Chebankov, member of the Belorussian Supreme Soviet, then talks about the fears of people in the town of Vetka, Gomel Oblast: "I also have a family; I have children. I am also asked what I think about my children living here. Am I doing the right thing as a father, they ask. Unfortunately I cannot give a straight answer to these questions at the moment. After all I'm not a scientist. I judge the situation in our region by what scientists say and recommend, by the conclusions reached by research institutes. Opinions are divided; in fact they are completely polarized."

Correspondent Smirnov adds: "Well, as the scientists argue about the risk, so the anxiety of people living around Chernobyl increases."

Smirnov asks: "is there such a thing as radiophobia, which many people are talking about now, in other words fear of radiation?"

Chebankov answers: "Undoubtedly it exists. But it has already eased to some extent. Maybe this is because we have already evacuated a large number of people, giving priority to those people who were most affected by this psychological pressure. They were already so emotionally unbalanced that they became sick and suffered, even though the radiation had gone. What they were suffering from was radiophobia, this fear for the future of their children. And one can understand these people. They were not worried about themselves, but about their children. When a mother sees her child is ill, she immediately thinks this is because of radiation, even though it may be something else. This stress is even more harmful than the radiation itself." Chebankov says that Vetka, a small town with a population of 10,000 already has a shortage of doctors, teachers, retail staff, and service personnel. There is a great shortage of militia officers, he adds.

The video shows final shots of deserted apartment blocks in the dead zone.

Smirnov concludes by saying: "In the dead zone you immediately notice how quickly everything built up with such difficulty by people decays. The decay of radioactive particles takes far longer than spiritual decay. But it is hard to think of anything more terrible than the latter. You can't measure it with instruments. The consequences of this phenomenon are unfathomable."

There is a final interview with representatives of an international nongovernmental fund set up to help Chernobyl victims, including chess master Anatoliy Karpov, who is chairman of the fund's trustees.

Zeolite Plant Decontaminates Radioactive Soil, Water

LD0705092891 Moscow TASS in English 0844 GMT 7 May 91

[By TASS correspondent Sergey Trofimov]

[Text] Ulan-Ude May 7 TASS—The output of a new enterprise in Buryatia, a Soviet republic [as received] within Russia in eastern Siberia, is designed to decontaminate soil, rivers and water bodies from radiation from the accident at the Chernobyl Nuclear Power Station.

Production went into operation using the Kholinsky deposit of zeolites, one of the largest in the Soviet Union. The line's production capacity is over 20,000 tonnes of unique decontaminating minerals a year.

"Research showed that special filters, which are based on zeolites, effectively remove cesium and strontium—the dangerous elements of radioactive contamination," Vladimir Struganov, director of the zeolite processing plant, told TASS.

"For instance, once water is treated with the mineral, the concentration of cesium in it is reduced 100 times. Our plant will thus salvage thousands of hectares of farmland and woodland and hundreds of water bodies in areas affected by radiation from the Chernobyl disaster," Struganov said.

Scientist Outlines Current Dnepr Basin Radiation Dangers

91WN0409B Kiev RABOCHAYA GAZETA in Russian 13 Apr 91 p 3

[Interview with Doctor of Geological and Mineralogical Sciences Professor Valeriy Aleksandrovich Kopeykin by Yu. Dronzhkevich, at Chernobyl; date not given: "It Will Not Get Worse"]

[Text] **The people of Kiev probably still remember how alarmed they were in January this year when rumors circulated that a large quantity of radionuclides had been released into the Pripyat River, and then into the Dnepr. Various officials and respected people explained at that time to the inhabitants of the Ukrainian capital that their alarm was unfounded and that there was no danger.**

But are the concerns of the people of Kiev and of all who live in the Dnepr basin really unfounded? Doctor of Geological and Mineralogical Sciences Professor V.A. Kopeykin, who in 1987 undertook a study of the geological and geochemical aftereffects of the accident at the Chernobyl AES [nuclear electric power station], believes that there is still cause for concern.

[Dronzhkevich] Valeriy Aleksandrovich, on what is your conviction based?

[Kopeykin] Analysis of the air and space pictures of the zone of radioactive contamination shows that the main locus of the radioactive dust containing plutonium fell within an area that is periodically flooded by the Pripyat and Uzh Rivers. And this kind of flooding is possible in the years immediately ahead. The maximum boundary for flooding passes through the old bed of the Pripyat, which has been well traced on color pictures taken from space along the line running Yuryevich-Novoselki-Babchin-Khatupa-Braginka River-Asarevich. There was evidently flooding in 1108, to judge from the Radzivilovskiy chronicles.

The maximum boundary for the flooding, of which there is a one-percent probability, that is, once every 100 years, passes south of that line, and the area of the flood plain inundated is less in that case. However, in any scenario a major flood can play the role of a "drag" causing a large volume of the plutonium that fell with the radioactive dust onto the flood plain of the Pripyat River to be deposited in the Kiev reservoir. The railroad levee running from the Chernobyl AES to Slavutich may play a double role here, particularly in the area of the railroad bridge across the Pripyat. The annual flooding since the accident at the Chernobyl AES has carried away from the Kiev reservoir and the flood plain of the Pripyat a large quantity of radioactive silt into the middle and lower reaches of the Dnepr. Already today the concentration of strontium-90 in the waters of the Dnepr is above the maximum level permitted for this radionuclide for irrigated farming.

[Dronzhkevich] Can anything be done to avoid this danger?

[Kopeykin] One possible scenario for eliminating the threat of a wash-out of radioactive dust from the flood plain of the Pripyat by flooding is to dredge the alluvium into a sand mass behind the levee, limiting the area of the locus. Another is to dig several canals parallel to the bed of the Pripyat. And a third is to construct a levee with a runoff channel behind it, without backfilling the locus.

These scenarios have been reviewed at the Pripyat Scientific Production Association and in the Ukrainian SSR Ministry of Land Reclamation and Water Resources. At this moment a working version of the project has been selected and work on it has been started. But most of the work will not have been completed before the 1991 flood. This gives cause for alarm. From my standpoint the most acceptable thing is to divert the Pripyat River round the locus of the radioactive deposits (mainly plutonium) into its old (prehistoric) bed in a westerly direction. This will immediately lower the level of the ground waters and slow the rate at which the radionuclides are being dissolved.

[Dronzhkevich] There is talk that all is not well with the Chernobyl AES in the sense of seismicity. Is this so?

[Kopeykin] The seismicity map of the European part of the USSR in print classifies the Chernobyl AES at six on the seismicity scale for category two ground (it was five on the scale in an earlier map). Today, however, we have facts showing a rise in the level of the ground waters in the area of the Chernobyl AES building itself because of the construction of the wall in the ground, and that puts the ground in the area of the station into category three. This requires an increase in the scale reading for maximum calculated earthquake (MRZ is a possible earthquake once every 1,000 years). Indeed, in general a rise is being observed in the level of ground waters because of technological measures.

Moreover, the Pripyat River passes through a young tectonic fault and has a different erosion basis along different sections of its own bed. This requires an increase in the MRZ scale reading by a minimum of 0.5. When the seismicity maps for the European part of the USSR were being made, the earthquakes mentioned in the chronicles for the years 1230 and 1510, which registered eight on the scale, were not taken into account

(we may doubt the chronicles but they should not, in my opinion, simply be ignored in the calculations), it is necessary to increase the MRZ scale reading another 0.5. Thus, these facts require that the MRZ reading in the area of the Chernobyl AES be set at eight, not lower. Meanwhile, when the Chernobyl AES was under construction the calculations were set at six on the scale, and the reactors at seven.

[Dronzhkevich] Valeriy Aleksandrovich, you were talking about the danger of a wash-out of the plutonium locus into the flood plain of the Pripyat. But surely there is still plutonium in the various temporary burial sites, first and foremost in the "Rusty Forest?"

[Kopeykin] Studies of the ground waters from the point of the temporarily localized radioactive waste in the "Rusty Forest" in the area of Yanov station show that the pine trees that died as the result of radioactive contamination were buried in 1987 in sandy trenches without any kind of clay protective cover. One trench was opened up and it was possible to see that water is standing at 1.5 meters from the surface. That is, the dead pine trees have now been lying in water for three years, and the radioactive dust settled in them is also in this natural solution. Analysis of the water, first filtered through ordinary filters, has shown that readings above the maximum permissible concentration for the population are observed in virtually all the radionuclides measured.

Moreover, plutonium several dozen percent above permissible concentrations for potable water has been found in water from the "Rusty Forest" disposal sites in colloidal and true suspensions. We first detected plutonium in suspension in the "Rusty Forest" disposal site in the summer of 1989. The suspension also contains americium and curium. It is known that the danger of alpha radiation, which these three elements are, is 20 times greater than the danger from other radionuclides. The main route by which they enter the body is through the respiratory organs—the lungs.

Plant pollen and plant material from peat bogs, which are borne very easily by the wind, may be contaminated with water containing dissolved alpha-emitters. Aqueous dust may even be lifted directly by the wind from the surface of open water.

The standards for permissible concentrations of plutonium-239 in air are 100 million times greater than the standards for water. And the half-life of this isotope is 24,065 years, not 30 years as it is for strontium-137. It is precisely the plutonium in the fallout from the accident that proves that what happened at Chernobyl was not simply an accident but a catastrophe whose ecological consequences it is still difficult to imagine.

It is my opinion that it is now essential to make a study along the track of the excursion from the Chernobyl AES of the nature of the behavior of alpha-emitters in aqueous solution, and determine possible sites of other "Rusty Forests." I think that this is a priority task at this time. Hopes of burying the radioactive dust in the ground still remain just that—hopes—because there is no precedent for this.

At the same time there is no need to panic about the "Rusty Forest" disposal site near Yanov station. The reason for the appearance of the plutonium, americium and curium in solution is not only the pine trees with the radioactive dust that have been buried in water, but to a large extent the corresponding geochemical situation. I think that we shall find quite a number of "rusty forests" along the Chernobyl track, and also in places where no pine trees have been buried. So the question arises of the possible consequences of dissolved alpha-emitters in the fauna and flora in the zone affected by the Chernobyl AES.

It was splendid that virtually all the predictions of a possible process of the dissolution of radioactive dust in an increased rate of radionuclide migration were negative. It was reckoned that the dust would not dissolve in the immediate future. We know today that this is not so. So special, goal-oriented work is needed to conduct geochemical studies of the processes involved in the migration of radionuclides, not only in the 30-kilometer zone around the Chernobyl AES but also beyond. This applies in particular to the alpha-emitters—plutonium, americium, curium, and neptunium.

[Dronzhkevich] In your opinion, what steps should be taken?

[Kopeykin] Today it is essential to publish large-scale radiation maps for all nuclides separately and for alpha- and beta-emitters. Unfortunately, many of the loci containing the dissolved radionuclides will be outside the 30-kilometer zone. The dominant radionuclide in dissolved form is now strontium-90. It has few geochemical fixers in nature. Certain clays or colloids may act as such fixers. Accordingly, strontium-90 will migrate actively and distantly. In a normal situation, however, because of the strong dilution of the waters of the Dnepr it is hardly likely that maximum permissible concentrations will be exceeded for potable water.

Cesium, on which a great deal of work has been done because of its very easy determination using the method of spectroscopy, is a very poor aqueous migrant because it is fixed by potassium-containing clays such as illites. Radioactive cesium is dangerous in dust, and the main method for dealing with it is fighting wind erosion of soils.

The plutonium is the most dangerous component of the excursion from the No. 4 power unit at the Chernobyl AES because of its high degree of alpha activity and its great half-life. Possessing a large set of valence states, it will behave in different ways in different geochemical situations. It is most mobile in oxidizing conditions, in the zone of free oxygen. Peat bogs will be a barrier against plutonium.

The problem of burying radioactive waste remains acute. If we talk from the standpoint of geochemistry, then in the 30-kilometer zone of the Chernobyl AES there is no site for it. However, you could not carry away such large quantities. So, willy-nilly, the waste must be buried in the zone. To this end it is essential to hasten work on a project for a plant known as the "Vektor" program. Site selection for it is limited and it could realistically be in the area of Burakovka. Of course, the final word rests with the local authorities and population.

Touching on a general prediction of the radiation situation, I would like to say that it is essential to distinguish areas of contamination from the areas bordering on them. In order to reduce the effect of the radiation, on irrigated land it is necessary to use natural mineral sorbents as an additive in the plowed layer since they retard certain nuclides quite well, and to cultivate periodically, going deeper each time. I consider propaganda about the 35-REM concept immoral, particularly for people living in "clean" conditions. The more so since those people know that the international standard is 5 REM.

Having had personal experience of work in the cleanup zone after the 1987 Chernobyl accident, I believe that given a continuation of the decontamination work, no marked deterioration will occur in the future with respect to the radiation situation. However, transport of radioactivity both in suspension and in solution will occur.

Scandinavian Plan Would Cut Kola Nickel Emissions

91WN0340A Helsinki HELSINGIN SANOMAT in Finnish 12 Mar 91 p B 6

[Text] The modernization of the Kola nickel smelteries, which have been heavy polluters of northern Lapland, has been divided into two stages. This means that pollution will be reduced significantly less than had earlier been estimated.

The Soviet-Finnish negotiations have resulted in an agreement according to which only the Nikel smeltery, one of the two Kola Peninsula smelteries, will be modernized at this point. The modernization of the smeltery at Montsegorsk is not under negotiation at present.

The splitting of the project into two stages means that the total expenses for the project will drop from the originally estimated 3 billion markkas down to 2 billion markkas.

In the original plan, the Kola sulfur emissions were going to be reduced by 85 percent. Splitting the project in two means that the emissions will be reduced by only 55 percent.

At this time, the Kola sulfur emissions amount to about half a million tons a year. By comparison, the total emissions in all of Finland amount to 240,000 tons.

The smeltery at Nikel is twice as large as the Outokumpu nickel smeltery in Harjavalta, Finland. The plans are to modernize the smeltery at Nikel to employ the flash melting method used at Outokumpu.

Flash melting pollutes the environment less than the current Soviet method.

As far as Finland is concerned, Montsegorsk is a worse polluter than Nikel. The Montsegorsk smeltery badly pollutes the Salla and Savukoski regions in Finland, whereas the Nikel pollutants have the strongest effects on Norway.

If the agreement on Nikel is signed at the end of this year, the modernization will be completed by the end of 1994, said Outokumpu managing director Pertti Voutilainen.

According to Voutilainen, nothing can be said at the moment about the timetable for the Montsegorsk plant.

Outokumpu and the Soviet negotiators have had to give up the plans to modernize the Montsegorsk plant because of transportation problems.

According to the original plan formulated at Outokumpu, the primary smelting of nickel would have been discontinued altogether at Montsegorsk and transferred to Nikel. This would have meant a big increase of railway transportation between Nikel and Murmansk, and further studies revealed that the railway capacity was insufficient.

Finland, Sweden, and Norway have prepared a joint plan for financing the Kola nickel project. According to the plan, Finland will come up with 50, Norway with 25, and Sweden with 10 percent of the financing. For the remaining part, funding will be sought from Germany and elsewhere.

Outokumpu's Voutilainen stated on Monday that the modernization decisions have been made on the political level. According to him, "It depends on the Soviet political situation whether we will get important enough individuals to sign the papers."

According to Voutilainen, the Nordic financing deal requires that "Montsegorsk will also be mentioned in the agreement."

Finland and the Soviet Union agreed in September, in principle, that the Kola nickel emissions will be reduced by replacing the present production technology by new Outokumpu technology. Outokumpu originally proposed that the nickel smelting will be concentrated at a new plant in Nikel and that the present smelteries in Nikel and Montsegorsk will be demolished.

Finns To Study Chemical Pollution

91WN0340B Helsinki HELSINGIN SANOMAT in Finnish 21 Mar 91 p A 12

[Text] Environmental cooperation across Finland's southeastern border will intensify. The Technical University of Lappeenranta and chemical wood-processing factories on the Soviet side of the border signed in Sovetsk on Thursday a long-term agreement on environmental research and education.

Included in the agreement are the paper and cellulose factories at Svetogorsk, Sovetsk, and Saaski. Lappeenranta University has already been making measurements of emissions from these factories. The first results will be made public in a joint seminar to be held in May.

Seminars, other training, and visits to various factories will be arranged on both sides of the border. The training of operators is very important because, through the correct usage of the machines, emissions could be reduced by over 30 percent.

Republic Goskompriroda Head on Azerbaijani Ecology Issues

91WN0335B Baku BAKINSKIY RABOCHIY in Russian 27 Feb 91 p 2

[Interview by AZERINFORM correspondent Kh. Imanov with Arif Enverovich Mansurov, chairman, Republic of Azerbaijan Goskompriroda: "If We Want To Survive..."]

[Text] **Ecological tension in the republic continues to grow. What are the ways out of today's difficult situation? What is the main state department called on to guard nature doing under these circumstances? What awaits us in the near and more distant future?**

Our correspondent, Kh. Imanov, discusses this with A.E. Mansurov, chairman of the Republic of Azerbaijan State Environmental Protection Committee [Goskompriroda]:

[Imanov] Arif Enverovich, for a long time matters of the ecology were under the reliable "lock" of closed censorship. Now, on the waves of glasnost, incredible figures and facts, drawing a terrible picture of devastated nature, are suddenly raining down on us. Is this "devil" really so terrible? Are our fears over-exaggerated?

[Mansurov] The situation is really serious. Many scientists believe that if mankind does not take effective steps in the next 40 years, we will not survive the catastrophe. An extremely difficult situation has also formed in our republic, where such violence was committed on the natural environment of Azerbaijan in the last 70 years, behind bravura speeches and triumphant reports, that it is now impossible to correct the situation through the efforts of Goskompriroda alone. It is not at all surprising that only ruins have been left for us: a land polluted with petroleum and fuel oil, a graveyard of oil derricks, the dead Bay of Baku, the lifeless waters of Sumgait, the numerous dumps...

[Imanov] Indeed, it is a dismal picture. What is the status of our water resources?

[Mansurov] Lamentable though it may be, the situation here is even more troubled. The Apsheron coast is threatened with becoming a dead zone. More than 11 billion cubic meters of polluted sewage, including the waters of the Volga (10.2) and the Kura (0.7), are released into the Caspian annually. Sixty percent of these flows come from enterprises in the petrochemical industry.

The petroleum products that enter the sea during industrial work related to marine prospecting and the extraction of oil and gas have a toxic effect on spawn, larvae, and young fish, the spawning-grounds are disappearing, and the food base is being destroyed. From 1983-1989 alone, the number of sturgeon decreased by 7 million in the North Caspian alone, and slightly more along our coast. In this regard, accumulations of chloro-organic pesticides, including DDT, have been found in the muscle tissues of sturgeon. Here is the outcome: whereas in 1913 more than 80 tons of the most valuable species of fish were harvested in the Caspian, in the 1980s the catch was smaller by a factor of several tens.

The polluted rivers which flow here from beyond the republic's borders are creating yet another complex problem for us. The Kura is basically polluted in Tbilisi and Rustavi, while the Kura tributaries, the Araks and its tributaries are polluted within the territory of Armenia, and many times above the permissible norms. The center and the Union ministries, as everyone knows, are taking a neutral stance on this issue.

[Imanov] But meanwhile the pollution continues...

[Mansurov] And with increasing intensity. This is especially graphically obvious with regard to the Okhchuchay River. For 15-20 years already, neither the Union government, the USSR Ministry of Land Reclamation and Water Resources, the USSR Ministry of Nonferrous Metallurgy, nor the USSR Goskompriroda have wanted to take any steps whatsoever here. The government of Armenia puts all the blame on the Kafan and Kadzharan copper-molybdenum combines, which are subordinate to the Union Mintsvetmet...

[Imanov] How do things stand in this case?

[Mansurov] Using existing methods, we are currently calculating the damage done to the interrepublic rivers, in the first place the Okhchuchay, with future recourse to Gosarbitrazh. We are also thinking of similar steps with regard to Union enterprises within the territory of our republic.

[Imanov] Everyone knows that the center has also taken an unobjective stance, to put it mildly, with regard to our large industrial cities. Baku and Sumgait were not

included on the so-called "black list" of cities with the worst ecological indicators. What do you have to say about this?

[Mansurov] We voiced a decisive protest to the Union bodies, having substantiated the worthlessness of the instructions existing on this account. Judge for yourself. Whereas 286,000 tons of harmful substances all in all were released in 1988 into the aquatic environment of Alma-Ata, Dushanbe, Yerevan, Bishkek (Frunze), Tashkent and Tbilisi, which are included on this list, in Baku alone in 1989-1990 such wastes comprised 667,000 tons, i.e., more by a factor of 2.5. And these substances are far more toxic. Are further arguments necessary? I just signed a protest letter on this subject to Yu.A. Izrael, chairman of the USSR Gosgidromet.

[Imanov] Arif Enverovich, even a fleeting glance at the ecological situation does not inspire optimism. Do you see any way out of this situation?

[Mansurov] In general, I believe that there are no hopeless situations. The main thing is to choose the right course and adhere to it strictly. The first task is to draft a new law on the preservation of nature, a norm for the use of nature. We must raise the level of ecological impact assessment. In this regard, the committee should be granted extraordinary authorities, which should be reflected in the law. The usual bans and administrative punishments, as well as the passing of innumerable resolutions and instructions or the preparation of programs and expectation of their fulfillment, should all be left in the past. Today the answer lies in converting to payments, collections and taxes for the use of nature. Enterprises which use natural resources would have to invest funds in nature-preservation measures in order to remain profitable.

As of this year in the republic, simultaneously with the primary solution of ecological problems via economic methods, we also foresee the inclusion of payments for natural resources (land, minerals, water, forests, etc.). Note, for instance, that the fine for polluting above the norm will be deducted from an enterprise's profits.

[Imanov] In other words, the payment will not be somewhat mythical, as it was in the past. The fines will hit the pockets of all members of the collective?

[Mansurov] Yes, and this is the essence of the new penalties. The new mechanism being created for applying economic methods will be fully reflected in the law. On the initiative of the President of the republic, it is already being drafted. I think that once it enters into effect we will finally shift the solution of problems of preserving the surrounding environment from a standstill.

[Imanov] You spoke of introducing new payments this year for the use of nature. Does the State Committee have the material and technical capabilities to accurately determine the extents of damage?

[Mansurov] You have touched on our weak spot. Our capabilities, even after the 1988-1989 reforms of the entire Goskompriroda system, leave much to be desired. Figuratively speaking, our activity is strongly reminiscent of sending an unarmed soldier to the front. Before our very eyes, enterprises are releasing a tremendous quantity of harmful substances into the surrounding environment, but because of the lack of instruments and lab equipment we cannot do anything. The poachers, having free scope, are using weapons, while we are trying to stop them afoot and unarmed. The matter has reached to the point that the poachers, having fired on our helicopter, have seriously damaged it, and now we are making up for the damage. Yet the damage inflicted on nature remains irretrievable.

[Imanov] However, in order to struggle effectively for the purity of nature, you probably need not only material resources, but also fairly extensive knowledge?

[Mansurov] One of the prominent foreign [as published] scientists in the field of ecology, N.F. Reymers, once remarked that ecology is an ordinary field of the natural sciences, but in order to work in it as a professional one must understand at least 300 (!) branches of various sciences. Unfortunately, today we almost always encounter ecological illiteracy. Incompetent statements in the mass information media, often even by people with scientific degrees, harm the general task. For instance, according to inventory data the overall area of land removed from circulation in Apsheron comprises 10,000 hectares, and the entire area occupied by the "Azneft" administrations amounts to 15,300 hectares. Yet, suddenly you read in the newspaper that 100,000 hectares have been put out of service. And a scientist is writing this. Or the quantity of waste from the Azerbaijan Pipe-Rolling Plant unexpectedly turns out to be a whole order of magnitude higher. I could cite many such examples. For raising ecological literacy and eliminating the shortage of ecological information, the State Committee is currently creating its own information system based on computer technology. A data bank has already been created, and ecology panels are being constructed in Baku and Sumgait. In a while, anyone who wishes will be able to obtain information, using them, about the ecological situation in the cities and rayons of the republic, about violations of the law committed by nature-users, and other data. Glasnost will help not only to raise the literacy of the population, but also more effectively to struggle against violators.

Let me also note that the State Committee is not the only one working on ecological problems. Public organizations such as the Republic Society for the Preservation of Nature and the Ecological Union are also involved in nature preservation, and the "Greens" Movement is also developing. This can only be welcomed. Today we should, as they say, all stand up together to defend the nature of our native land, its soils, minerals, waters, air, and animal and plant life.

[Imanov] One last question: What can you say about the specially preserved natural territories of the republic?

[Mansurov] Above all, I would like to note that the designation of such territories, besides maintaining ecological balance, preserving the genetic diversity of plant and animal life, obtaining scientific data about the course of natural processes in nature, and other things, is also useful for ecological education and upbringing.

In Azerbaijan there are 14 preserves, yet there is not one national park. In past decades, for various reasons more than 100,000 hectares were removed for the needs of industry and agriculture from the 219,500 hectare overall area of the preserves. And this is at a time when the whole world is trying not only to preserve its natural wealth, but also to augment it. Georgia, for example, pays great attention to the Lagodekhskiy Preserve, created back in 1912, and they are trying to increase its area. Yet we have reduced the area of such a pearl, as the Kyzyl-Agachskiy Preserve, from its creation in 1929 to our day, from 180,000 hectares to 88.3 (!), and today we are participants in its collapse and destruction. All this is only because it is subordinate to the center and, essentially, is neglected. With the cooperation of the republic, we have now sharply raised the question of Azerbaijan's national ownership of the Kyzyl-Agachskiy Preserve. Today, the question of creating national parks is also being worked out, above all the Shakhdagskiy Park in the Kuba-Ismaillinskiy zone, the Talyshskiy in the Lenkoran-Astarinskiy zone, and the Geygelskiy on the base of an existing park in the Khanlar-Dashkesanskiy zone.

If we want to remain alive, there is one path to survival: the preservation and augmentation of that which God gave us...

Baku To Host Interregional Caspian Sea Conference

91WN0335A Baku BAKINSKIY RABOCHIY in Russian 6 Mar 91 p 3

[AZERINFORM article: "Save the Caspian!"]

[Text] The First Interregional Congress on Problems of the Caspian Sea is being held in Baku this June. The Republic of Azerbaijan State Environmental Protection Committee [Goskompriroda] held a briefing in connection with this. Leaders of the republic Goskompriroda and leading scientists of the Academy of Sciences and VUZs [higher educational institutions] of Azerbaijan answered the questions of representatives of the press, science, various ministries and departments, and industrial enterprises and organizations.

Those attending were informed that representatives of all the Caspian regions in the country—Russia, Azerbaijan, Kazakhstan, Turkmenia, and even Iran and Turkey—will participate in the congress. The basic goal of the congress is to unite efforts to solve the ecological problems of the Caspian and to draw the attention of Union and world society to them.

Participants in the briefing noted with alarm that the ecological situation in the Caspian is worsening with every day and that the steps being taken are insufficient even to stabilize it. The basic causes of the situation that has formed are an unthinking, rapacious attitude toward the Caspian, the low technical standard of marine oil extraction, the lack of modern cleansing installations, ill-considered hydro-construction and town planning along the Caspian shore, and pollution of the Volga and Kura, which empty into the sea. Serious damage has been done to spawning plantations, the biomass has decreased, certain species of Caspian flora have vanished, and the sea's entire gene pool is on the verge of extinction. All this is aggravated by the nearly complete powerlessness of nature-preservation agencies and the inadequate financing of ecological measures.

The problem has gone so far that the regions of the Caspian cannot improve separately. The common efforts of all countries along the Caspian shore are required. If radical steps are not taken today, noted the briefing participants, a global ecological catastrophe is inevitable.

The First Interregional Congress is faced with drafting a program of joint actions to protect the Caspian.

Ozernyy Nuclear Facility Impact on Public Health

91WN0333B Moscow KOMSOMOLSKAYA PRAVDA in Russian 27 Feb 91 p 4

[Article by V. Sanatin: "Uran-gate"]

[Text] **We will never, perhaps, discover what price we have paid for the first atomic bomb, the first nuclear submarine, the first nuclear reactors...**

Apparently, the personnel of the first domestic industries for concentrating thorium, uranium and other radioactive materials were frightened by the super-urgent orders, defenseless, unconcerned and doomed. Evidence of this is the obscure village of Ozernyy in Rezhevskiy Rayon, Sverdlovsk Oblast. There is a disaster in every third home here. Approaching a Russian stove with a dosimeter, it reads 1000 microroentgen per hour. In the kitchen garden, it reads 3000 microroentgen: Does it not bother the living to lie in the grave already!

We brought along Ravil Khuzin, chief doctor of the Rezhevskiy Rayon SES [Health and Epidemiological Service], and Igor Ivanov, labor hygiene specialist, as fellow travelers. We armed ourselves with the reliable SRP 68-01 radiation instrument, and off we went!

Ozernyy is picturesque, like any settlement lost in the spurs of the Ural ridges among pines, larches and birches. The homes here are basically fine, with carved shutters, window casings and verandas. The owners are talented and skillful. The homes face a planed board with blue and light green paint: "For the Joy of Life!" The people of Ozernyy do not deserve the wrath of God. Nor does there seem to be reason at all for the state to be angry with them. Look, everything is perfectly normal: a

"Lastochka" nursery school, an agricultural club with the slogans "Glory to the CPSU!" and "Peace to the World!"

However... Right now the people of Ozernyy, despite all cravings for peace, are under semimartial law. Before martial law, there are not enough chemical defense suits, gas masks, civil defense vehicles or helicopters with decontamination equipment. If such a "spot" were discovered near Kiev or Minsk, which have learned from bitter experience, one would not manage without red shoulder-boards. But here there are peaceful muzhiks and grandmothers in sweaters. It is quiet.

According to local residents, the "industrial zone left" Ozernyy in 1964. Before 1978, all data on the zone, including health and epidemiological data, was filed under the "Secret" seal. Ozernyy was founded in 1949, with the discovery and initial development of a thorium deposit. If we believe the health service, the ore was not just mined here. The concentrators worked here too. Otherwise, imported ores would not have appeared in Ozernyy...

The people of Ozernyy were deceived for more than 40 years. Is this why, of 1370 residents, only 250 decided to abandon the settlement? It no longer matters to the others where they live out their days. The shock of the unexpected discovery crushed the will and spirit of the people. Faces everywhere are confused and long, realizing the whole absurdity of life spent and continuing.

We visited the Galimzyanov home. Radif, the husband, feels sorry for Murka, who bears dead kittens from year to year. The cat perched itself near the stove and gazed with curiosity at the clicking dosimeter.

The daughter, Tanya, is at the children's home, an invalid from birth. I guessed the diagnosis immediately: organic lesion of the central nervous system. Our hosts, with some sort of secret thought, asked: Have doctors unexpectedly appeared? With lightning speed I had to deny it: "No, no!" Let the nuclear physicists and the boys from "Sredmash" and the Ministry of Defense dissemble to the residents of Ozernyy. If one has enough conscience, let the psychoneurologists, constantly pretending to be geneticists, play the hypocrites. Radif, like all the fathers in Ozernyy, deserves sympathy. Yet one need not lie.

I myself grew up in the zone of the Kyshtym nuclear trail. I well recall how they evacuated us. Evacuate, if you please! In 1957-1958... I have a daughter, also an invalid since birth. Among those from the Urals, born in Sverdlovsk and Chelyabinsk Oblasts, there are so many hostages of our nuclear sabbath, that in our sorrow we will soon be colliding face to face with each other. If only we knew who, after the hell of Hiroshima, pointed his finger at a state map, incessantly falling on the Urals range, on the border of Europe and Asia, on the watershed, on the banks of the beautiful streams and lakes that give their water to the Tobol, the Irtysh, the Ob...

Who he was is a secret. Who were we? Ashes! The "roses" of the sabbath and of dictatorship blossom only on human ashes. "Roses," protected by terrible thorns...

Now we are patient. A branch of the Sverdlovsk Radio Factory operates in Ozernyy. At its entrance, the instruments show radiation of 200 microroentgen per hour. At the workplaces of the factory employees, they read 360 microroentgen. The walls of the plastics shop register 550, and the factory fence—2500! The owner of letterbox No 5, on abandoning the Ozernyy deposit, transferred its shops to the civil factory without leaving a single printed word on the subject of radionuclides. Although director V. Demin suspects that his direct leadership in the oblast knew where it was inviting the workers, there are no official and criminal traces of this unsurpassably base transaction.

The people of Ozernyy have not done too badly in the zone. They have cars, televisions, refrigerators and smoked sausages. Comparing today's life to yesterday's, the people even feel obligated to the nuclear monster. Heaven help you if you mention legal suits: No one will understand.

Viktor Gorokhov, chief engineer at the factory, shows us a map of the radioactive contaminations. The map shows more than 70 open, radiating wounds. The most dangerous are the three "burial grounds." I asked what they, the people of Ozernyy, meant by the concept of "burial grounds?" They answered: "Well, the places where industrial wastes were unloaded..." "Then these are radioactive dumps, not burial grounds," I elaborated. "Possibly, in the forest clearings and ravines, where there is a tremendous background, they burned the packaging from around the products," thinks Igor Ivanov. However, I do not understand him, an SES employee. What packaging? Thorium and uranium products are not transported in wooden boxes. Or were they? Usually such loads are delivered in special lead containers...

How were the "burial grounds" formed in the settlement, from what kinds of materials? Who conveyed this invisible, deadly poison here? Do any witnesses to this terrible "work" remain alive? Has the prosecutor's office started a civil investigation? This is what interested me most of all in Ozernyy. The people I talked to were submissively and sadly silent.

There was no investigation at all. Last December, an oblispolkom decision was made, regulating the procedure for work to decontaminate the settlement. Eight million rubles were allocated for decontamination and construction beyond the limits of the danger zone. However, this is Soviet money, the people's money. I myself suffered, I myself pay. The authorities of Ozernyy, Rezh and Sverdlovsk have decided not to institute a legal suit against the nuclear industry.

Yet there is cause! Igor Ivanov has already issued the necessary certificates for the first patient suffering from radiation sickness. He turned out to be from Sverdlovsk,

an assistant excavator machinist who did unsealing work at an Ozernyy quarry. I am sure that people, familiar with the Ozernyy "letter-box," but who did not know what was ending their "fine life," will respond.

I know why the authorities have no cause for particular alarm. Civil medicine in the Urals, regardless of constant and bitter experience with radioactive contamination, is incapable of answering the sufferers' main questions. The first is: "Will I be able to have children?" The second is: "What diseases will trouble me in my remaining years: endocrine, cardiovascular, or oncologic?" After Chernobyl, specialists from the Ukraine would probably be able to help answer these questions for the people of Ozernyy. So, let "Sredmash" invite medical luminaries to Ozernyy at its own expense! It should pay for the per diem allowances, diagnostics and medicines. Let the people at "Sredmash" remember: The children of Ozernyy climb all over terrible "burial grounds" right and left. In the summer, they swallow poisoned dust and scatter it throughout the entire settlement. In the winter... I saw for myself: Against a background of 3,000 microroentgen, everything was trampled by children's' skis. It is fun to ski down the hillocks!

The question of moving out was decided in Ozernyy with the same servile mentality, accustomed to any woe. The local authorities surveyed the population in order to find out how many families would be leaving and how many apartments must be built for refugees at neighboring sovkhozes and at the rayon center. The rest are "voluntarily staying." New housing is being built for them here, in the settlement.

Oh, this is an obstinate state approach! They are, at their utmost, finishing the construction in Ozernyy, 50 meters from a "burial ground," of a new shop and warehouse buildings and, behind this, housing for the branch's workers...

What is there to rejoice at in Ozernyy? The sacred Ural kindness and reliability with regard to their fellow countrymen. The chairman of the settlement soviet, Grigoriy Govorukhin, got a dosimeter somewhere and now can recall the figures for the radiation background in every home by heart. He knows, without big committees, who should be examined, who to treat, who to help by evacuating. Oh, how it grieves the chairman when he looks at the home of Neafid Klevakin, with its painted cocks and a weathervane on a skate in the form of Gogol's mother Russia, rushing heaven knows where. So pretty! The years will calm Neafid... But how can he help young Sergey Zamyatin, who built his very first home right by the entrance to a "burial ground?"

The provincial submissiveness to fate in Ozernyy is no cause for rejoicing. A clot of this submissiveness lies in the extinguished hopes of old men for a better life for their sons, or in the doleful eyes of Viktor Gorokhin's mother. For a long time, the chief engineer of the branch had decided not to invite us to her door. Yet we dropped in on Mariya Ivanovna: one dosimeter argued with the other. One read 241 microroentgen, the other read 1,100! We sighed.

We sighed again, when we visited the Ozernyy boarding school for sick children, 28 of whom are completely orphaned. Who put 130 boys and girls here, already cheated by nature, and for what sins before the state?

We must leave! We leave, and once again we drift past the eyes of the "Lastochka" nursery school and the agricultural club with the slogans "Glory to the CPSU!" and "Peace to the World!" The doomed do not remember evil.

Nuclear Waste Contamination at Chelyabinsk-65 Facility

91WN0333A Moscow IZVESTIYA in Russian 4 Mar 91 Union Edition p 3

[Article by IZVESTIYA special correspondent Ye. Manucharova: "Boomerang: A Chronicle of One Unnoticed Catastrophe"]

[Text] Our car is heading toward Karachay, the infamous Ural lake. That is, it is famous now. Only recently, it was a strictly secret lake: radiation.

I still cannot see Karachay yet, but the dosimeter says the lake is getting closer: The numbers on the panel are growing, ever more rapidly replacing each other, and the alarm signal is sounding ever sharper. Finally, the instrument breaks out in a squeal, going completely off the scale, and then the car stops.

There it is, the lake itself, which I would very much like to load entirely onto a missile and send far away, to the sun of another galaxy. This is a joke, of course. It is impossible... And what if, for instance, the missile suddenly blows up during the launch?

Not far from us, work crews are despondently piling boulders in the water. Their task is to partition the lake into sectors, so that a tornado (which do happen here) will be unable to pick up the radioactive wastes with which Karachay is filled. The concentration of radionuclides is extreme: 120 million curies. (Remember? The Chernobyl explosion released less: 50 million).

Karachay belongs to the Mayak combine. It dumped the wastes here when it made our first atomic bomb. It dumped not only in Karachay, but also in other water reservoirs, in the Asanovskiye marshes, and in the river Techa. Later, they began to hide the wastes in various sorts of burial grounds, corking them up in volume and storing them in bunkers and trenches.

Mayak is proud that one and a half decades ago it created a modern "storehouse, costing about 100 million rubles, equipped with protective technology, manipulators, and remote control using television." Indeed, such a thing exists. I saw it. But! On the admission of this same Mayak, "the accumulation of hard wastes continues in

trench-type storehouses." In these, "monitoring equipment is lacking" (Document No. 05-123, 4 December 1990). In other words, today, just like 40 years ago, nobody can be sure that complete storage safety has been achieved or that effective monitoring of the status of the wastes has been organized. Experts have determined hat the danger index at the burial grounds is 5 on a scale of 10. At open water reservoirs (like Karachay), the index is higher: 6-7.

How do they calculate such a precise danger level? It is hard for a journalist to understand this. However, here is a fact indicating that Mayak might blaze "brighter than a thousand suns." Four years ago, one of the waste storage areas, after heating itself, exploded underground. Twenty million curies were released into the air.

"Mayak" understands the danger of Karachay and is trying to keep the liquid wastes within its banks, to not let them overflow... However, in the drought of 1967 the lake became shallow and the wastes became aerosols. The wind scattered them throughout the okrug.

One inevitably breathes plutonium near the terrible Karachay. Thus, the workers' faces are covered by Petryanov filters. They refer to them as "hoods" or "petals."

One of my companions unexpectedly starts smoking... Is he not afraid of intense breathing? What is this? Bravado? Yes, to a certain extent... For the most part, it is the habitual calm, "everyday" attitude of the Mayak workers toward a material that they have worked with for a long time. Incidentally, the radiation background in their homes and on their streets is less than in Moscow.

It should be noted that this nuclear town behind barbed wire (code named Chelyabinsk-65) makes a favorable impression on visitors. It is clean, well-tended and intelligently planned. There are 83,000 residents in the town. However, workdays are measured such that there is no bustle anywhere. The people carry themselves with dignity. Apparently, they live like a close-knit family: Dynasties are commonplace at Mayak.

In front of the Mayak administration building, I saw a festive pair of newlyweds place bouquets at the base of the memorial to Kurchatov. A family is beginning with an expression of gratitude toward the creator of the bomb. The parents work here in the town, and the young people stay here too..

To a stranger, the desire to live where a tremendous concentration of dangerous wastes has accumulated seems strange. Maybe the people simply do not know that acute radiation sickness will kill? In nine fatal days... No, they know this and have seen it, and not just in the film "Nine Days of a Year." After all, the first atom bomb began to kill those not even yet born.

They made it here at Mayak in haste, carelessly believing that the goal was worth any means.

People worked here neither for money, nor for glory. Who remembers the heroism of Mayak's first nuclear workers? Their names were classified. Alas, now they are forgotten... As well as their successes. And their mistakes... They do not have great wealth. The pensions are quite small. Special additions to the pension were established here only for people whom the combine has listed in the "Red Book" (over-irradiated!). A total of 160 rubles is paid, almost at the poverty line. After catching a dose, they were treated (medicine at Mayak is first-class), and then they fearlessly returned.

One radiochemical production employee simply cannot understand why I am surprised by his return to Mayak after over-irradiation. After all, he, Viktor Sergeyevich Sladkov, likes his job. He also dislikes existing on the beggarly pension. He is a man, and he is a worker. Mainly, it seems, the radiation is not really all that scary!

The optimism of this place is mind-boggling...

Although one can understand this: If one did not recognize the tragedy, it would not appear to exist. For a long time at Mayak they have diligently suppressed in themselves the idea of the danger and criminality of spreading radiation. At first, this happened out of fear of Beriya, and later simply because superfluous thoughts obstructed the work.

However, it often happens that the heroism of some is outstripped by the bungling and criminal foolishness of others. Can this be said of Mayak? The nuclear workers have existed here like a state inside a state, and this power had its own order.

For instance, today there is an official dosimetry service at Mayak. Andrey Fedorovich Lyzlov, head of the labor protection department, strictly monitors the maximum standards of safety. However, was it always this way? Here is what Mayak's own documents say:

"For most enterprise veterans it is impossible to determine the true dosimetric data. The basic production personnel at the Mayak Production Association received a collective dose of radiation, having no analog in the history of development of the nuclear industry"... "The workers considered the fulfillment of all production assignments, regardless of the radiation dose, their civic duty"... As a result, "more than 10,000 people were over-irradiated." There is more: "There is a real increase in mortality among personnel exposed to over-irradiation."

To put it simply, the people voluntarily turned off their dosimeters and climbed in where the radiation threatened them...

Totalitarianism generated both cruelty and sacrifice at the same time.

When the accident occurred in 1957, people cast themselves into the furnace itself, toward the cistern that was exploding underground. Two people, Yuriy Orlov and Vladimir Turusin, made their way to it in a tank. I did not see the former. The latter, answering my questions, always tried to prove that there were no alternatives to

his deed: It was necessary to be sure of the size of the catastrophe, to know that the neighboring storehouses had not overheated and would not explode into the air.

Specialists from Chelyabinsk-65 went to Chernobyl quickly and voluntarily. It turns out, it was no worse there than at Mayak. Besides which (a paradox!), as a result only of this brief trip, the Chelyabinsk workers gained the right to the privileges of the irradiated.

People at Mayak realized how much they had been cheated of only after the USSR Council of Ministers and AUCCTU [All-Union Central Council of Trade Unions] resolution was issued on aid to the people who had worked on the Chernobyl plant (No 325). Let me quote again:

"The establishment of the privileges indicated in resolution No 325 evoked indignation and dissatisfaction among the veterans and employees of the enterprise... The resolution led to a social injustice for people who have given their health in the name of strengthening the country's defense capability."

After all, Mayak had never laid claim to anything before. Such was the social order of the state at the time: mercilessness toward oneself, contempt toward others. Now this is returning to the nuclear workers as a boomerang of disrespect and mistrust toward them themselves.

Here is what the people of Mayak write:

"In the newspapers and on television, outright insults are aimed at us, the population of Chelyabinsk. The need to create a nuclear shield has been questioned, and appeals are being made to shut down the Mayak Production Association, right up to eliminating it." There is both despair and surprise here. However, after all, in the same document one reads: "The site of the Mayak Production Association is a potential source of radiation danger for the region and the population."

Sam Shepard, an American playwright, once said: "There will be nothing but tragedy, if you get mixed up with destructive ideas."

Mayak destroyed. Essentially, for 40 years it sawed away at the bough on which it sits and it laid waste to the whole region where it exists. In this time, arable land was taken out of use. Waters have been contaminated. Settlements (23) have been moved further away. The residents were evacuated from their native homes into temporary panel shelters (10,700 people!). They have been irradiated and get sick (935 cases of radiation sickness).

Now, in the course of history, the population is faced with the need to issue sentence on Mayak. Only the population has the right to give a vote of trust.

This will be done in the AES [nuclear power plant] referendum. This is to be held in March. It is interesting that nobody is surprised by the tardiness of the referendum. It will be held eight years after approval of the AES project, six years after the start of work. Already, 200 million rubles have been invested in the problematical construction site. The permissiveness and lack of control on the part of the nuclear workers are as though sanctified by tradition. Profitability is not even being discussed: How many billions will the AES cost the state? How many years will construction drag on? How dangerous is it to build an AES next to the waste storehouses?

However, the people (yet another paradox) are not up to it. They need to survive now. If more money can be received from the construction, if this offers regional social benefits, the population will consent.

Nonetheless, today's Mayak is forced to answer for the faults and blunders of its predecessors, the people whose portraits hang in its Museum of Labor Glory. However, nobody was counting the money when the blunders were committed. Today, conversion is occurring and the combine is getting poorer. In order to help the population, it must either become a beggar or start new work.

Viktor Ilich Fetisov, the young and intelligent director of Mayak, did not panic upon receiving the combine a year ago. He realized that time had refuted the idea of a closed city, which was prestigious because it created something in great secrecy. Now Fetisov is fighting for the interests of the surrounding region, as his own.

The previous generation of nuclear workers heroically submitted to the course of history thrust on them. Now a fundamentally different trend in social mentality must be considered: the thirst of each to create his own fate. There are new people both at Mayak and outside its bounds.

"Lately, an outflow of skilled workers from among the young, promising and competent cadres has been observed... and the process continues to grow," says the director.

Having recognized these new realities, Fetisov directly related the well-being of the combine to that of the region and designed the agitation for the AES on an open-door policy. Any group of people which wants to investigate the matter can see for themselves how terrible Karachay is. Or, if one wishes, one may enter Mayak's holy of holies, where the miracle of neutralizing the radioactive wastes occurs.

Enormous automated industries have an alluring magic for modern man. One cannot help but admire it, when Yevgeniy Grigoryevich Dzekun, chief engineer of the radiochemical plant, shows how the enormous pincers of the manipulators handle the fuel assemblies. The power is fascinating...

It does not just fascinate me, but also the "Greens" and even the especially cautious residents of settlements closest to Mayak. Having visited the combine, group

after group realizes that they have judged it superficially, that the danger of Karachay is great, and that is why it is time to build an AES (in Mayak's opinion, there is no other alternative for salvation). They realize that everything lies on the shoulders of the Mayak collective...

So they talk, on leaving the combine. However, later people inevitably return to their temporary shelters. Then they think over and over again that there has been a great deal of talk, yet still no assistance whatsoever. Then opposition springs up again: It is "them" (Mayak), and "us" (the population). There is still a dividing barbed wire. Yet the main thing is the lies.

There were many years of lies, sanctified by the lofty titles of the liars. Before the Chernobyl tragedy, nobody ever told the people what kind of evil deed had been committed against them. They were evacuated their homes by imperative, suddenly, humiliatingly, silently, not even given time to collect themselves. Or they were not evacuated, such as from Muslyumovo, even though it was also contaminated.

The doctors were also departmental (for others the region was closed). They were not in the least interested in the plurality of tragic diagnoses, or even in the frequency of examinations. Only when the Chernobyl tragedy happened did people realize that they were living in Hiroshima too. In the minds of the leaders of the nuclear sector, this process was reflected somewhat distortedly. Here is an excerpt from a letter by B.V. Nikipelov, USSR first deputy minister of nuclear power engineering and industry, to the deputy chairman of USSR Gosplan: "After the release of the corresponding resolutions on the accident at the Chernobyl AES, stipulating a broad range of privileges and compensations for the afflicted population, the social tension among the population in the Urals region greatly intensified. The population began demanding the application of these privileges in the rayons subjected to radioactive contamination as a result of emergency situations that occurred at the Mayak chemical combine."

The most important word here was unsaid: "justly!" Justly demanding... After all, the leaders of the afflicted oblasts used precisely this formulation in their own reports.

I am driving to Muslyumovo. This settlement has not been evacuated yet and still stands along the bank of the dangerous Techa. Here they now know what the river brings to people. Three months ago, the Muslyumovites became annoyed, seeing the fence built along their banks. They continued to live with the habitual naturalness of riverside residents. I see the results of this when a man arrives at the home where I am conversing with Kamalov, chairman of the settlement soviet. This man was evacuated and resettled twice due to radiation. For the same reason, he looks like a decrepit old man and there is not one healthy child in his family... Like all Muslyumovites, he receives the lowest pension, not for work-related illness, but simply for illness. Even though his sickness is radiation!

Kamalov shows me the long list of his wards who have especially serious diseases.

Gennadiy Abdrakhmanovich Gabitov, chairman of the Kunashakskiy Rayon Soviet, also speaks of the burdens placed on the population. He is a leader, not just formally, not just in the duty of service.

Gabitov is an intelligent professional. An agricultural education is behind him, as well as the Academy of Social Sciences. He knows the strength of his own authority, understands the tragic needs of the people who elected him their leader, and knows how to build a hierarchy of goals. The main goal now is to feed the rayon and improve its health. Medicine is the first channel through which the funds allocated by the government for Chelyabinsk Oblast will arrive.

His position: High professionalism is necessary in every job. Hence his interest in the conclusions of expert commissions. With a great delay (dozens of years!), scientists have now carefully studied the region. Their opinions will be submitted for the discussion of a USSR Gosplan state impact assessment commission. Science and only science (independent!) should decide how to improve the region's health. It should be a set of decisions, such that (on this point, of course, nobody will dislodge him) the population will get the benefits, and not lose them.

No, he is not satisfied with the decision signed by the country's prime minister on privileges for the residents of the 30-kilometer zone around the AES. There will not be one serious social project in this narrow strip: Everything will be built further away, where the real residents and their lands are.

The barbed wall between Mayak and the population collapses here. For the current leadership of the combine, the narrow 30-kilometer privileged strip also does not exist. There is a large afflicted region (already well familiar to Mayak) which must be cared for and considered. Such as the city of Chelyabinsk-65. Such as the combine.

However, both sides, realizing that the most serious deficit right now is the budget, are calculating that, by justice, a share of the country's resources will be allocated to them, and that the share of the funds, earned by the people who created the "nuclear shield of the state" and the people who suffered from it, will be determined. Determined by the same law, as in the Chernobyl calamity.

I would like very much to believe this. Nonetheless, is it possible to completely place all problems on the center? On the old system of financing? Is there no possibility for structuring relations between the closed city and the

afflicted region on the new "expenses and profits" system? It is worth thinking about this.

The objectively sad experience of subjectively self-sacrificing Mayak ought to teach us something.

Villages Reportedly Evacuated After 1976 Nuclear Blast

AU0305094691 Paris AFP in English 0833 GMT 3 May 91

[Text] Perm, Soviet Union, May 3 (AFP)—A radioactive lake was created and several villages were evacuated when Soviet engineers exploded nuclear devices in a 1976 canal-building project in the central Ural mountains, Soviet environmentalists announced.

In a first meeting with western journalists, members of the Perm district council's ecological committee said the blasts were first revealed to locals in 1988. A few people were then authorized to visit the area, committee members said at a press conference here.

Radiation levels on the shore of the artificial lake that was created in the blast topped 1.5 rem an hour, but were as high as five rem on the bottom, according to the committee. (In France, nuclear technicians must not be exposed to more than five rem a year.)

Three nuclear devices totalling 15 kilotons were exploded at a depth of 200 metres (660 feet) in an unpopulated area, 20 kilometres (12 miles) from the village of Krasnovishersk and 300 kilometres (186 miles) northeast of this city with a population of 1.2 millions.

The blasts created the artificial lake, 240,000 square metres (2,580,000 square feet) in size and 12 metres (40 feet) deep, with crystal-clear, blue water, but [passage indistinct] authorities evacuated an undisclosed number of villages, a witness who did his military service in the region told the committee.

Blueprints for the canal project had been drawn up in Moscow. It was to link the northern Kara Sea to the Caspian Sea via the Pechora and Kama Rivers. The Kama is a tributary of the Volga. The blast area continues to be monitored by the Energy Ministry but no data have been published since the project was abandoned without an official explanation.

Committee member Yevgeniy Yasterov said civilian engineers carried out 13 nuclear explosions in the Urals between 1960 and 1976.

Vladimir Gubaryev, chief editor of the Communist Party daily PRAVDA and head of the paper's scientific department, told Agence France-Presse in Paris: "Schemes to use nuclear devices for engineering purposes were abandoned three years ago."

Mr. Gubaryev, who contested various aspects of the ecologists' report, said he had monitored several such projects. "They were launched in the 1970s and were part of a series of controlled nuclear explosions that were to facilitate major construction works," Mr. Gubaryev said. "In the Perm region means were to be found to turn rivers in the Dvina basin to the Volga (which empties into the Caspian Sea). I have seen that swampy, scarcely populated area from the air and have seen no such large lake," he said, referring to the ecologists' report.

"The Perm experiment did not cause any radioactive fallout. It was extremely important because it helped to better understand the geological structure of the northern Urals and Siberia."

Mr. Gubaryev said nuclear explosives had also been used to blow out a burning gas well in the southern Bukhara region after it sent large clouds of smoke into the atmosphere. Another blast in 1971 stopped a leak in an oil well, he added.

"That way we also created an underground gas tank at Orenburg in the Ural region, and gave a boost to oil drilling."

According to Mr. Gubaryev, the basin for Kazakhstan's Lake Shega which collects snow water was created by a nuclear explosion on January 15, 1965. Water from the lake was diverted for the irrigation of pastures, and carp from the lake weighed up to six kilograms (13 pounds), he said, adding that the water was constantly monitored.

"There are no problems," he said.

Siberian Power Station Creates 'Putrid Swamp'

LD2904205691 Moscow All-Union Radio Second Program Radio-2 Network in Russian 1240 GMT 29 Apr 91

[Excerpts] [announcer Mikhail Smirnov] Now we are going over to Abakan in Khakassia once again. [passage omitted]

[Correspondent Galina Ivangulova] Unfortunately I was unable to visit the Sayan-Shushenskoye Power Station. I have, however, learned a very interesting fact. A state commission will be visiting the station on 5 and 6 May in order to accept it for operation. It was a great surprise to me to learn that this project of the century, this project of Communism amid the forests, has still not been completed.

[Smirnov] How can that be? All its turbines are already in operation.

[Ivangulova] Nevertheless, it has still not been accepted by a state commission. The opportunity for this will now occur at the beginning of May. The natural surroundings of this formerly wonderful place have already been destroyed, however. A large number of abandoned Nissen huts are floating about in Krasnoyarsk Reservoir. Scientists have an interesting theory about these huts. Since the Sayan-Shushenskoye Power Station has destroyed the spawning grounds of fish, scientists are suggesting that these huts might help restore fish stocks

in the Yenisey, in this putrid reservoir. It is claimed that the fish will spawn in these huts. There is another theory too. The idea is to turn these huts into islands and plant reeds. Wild fowl will then, allegedly, nest there. I think the real wild fowl have already abandoned this reservoir. It is a great pity that this place has been turned into a putrid swamp. What is more, large expanses of water meadow have been flooded. [passage omitted on the ecological situation in Abakan] Abakan lies alongside the town of Minusinsk, in the Minusinsk basin.

[Smirnov] The Minusinsk depression.

[Ivangulova] That is right. When weather conditions are unfavorable, pollution hangs in the air above this basin. Others say that radiation from the explosions at Semipalatinsk, as well as reaching Japan, has spread across the Altay, Krasnoyarsk Kray, and Khakassia. The level of radiation in this area will now be studied.

Khakassia is also renowned—although one would rather not use that word—for the number of sheep which graze there. It has a very large number of them. It is an interesting fact that Khakassia has more sheep per square kilometer than anywhere else in the world. The republic has specialized in the production of wool. This is completely destroying the environment because sheep, it turns out, are just about as destructive as the tracks of tanks—some even say they are worse. [passage omitted]

Bratsk 'Ecological Disaster Zone' Examined

PM0805140191 Moscow IZVESTIYA in Russian 6 May 91 Union Edition p 2

[V. Sbitnev report: "A Sick Economy Does Not Have a Healthy Ecology"]

[Text] Bratsk—In an effort to reduce harmful discharges from industrial enterprises, Bratsk City Soviet deputies have decided to shut down phase one of the timber industry complex and the "dirtiest" block of the aluminum plant.

This desperate step, which many people warned against, has provoked a storm in the city and far beyond. And it has shown once again how unsuited to normal life is an economy structured on the "one huge factory" principle.

The thoroughly worn-out firstborn son of the Bratsk timber industry complex—Pulp Plant No. 1—nevertheless produces 180,000 tonnes of cordage pulp and 245,000 tonnes of packaging cardboard a year. What will happen if this is no longer produced? Krasnoyarsk's "Sibvolokno" Association will come to a standstill at once—the raw materials it consumes come only from here—and several cotton-spinning factories which receive artificial fiber from Krasnoyarsk will fall idle. Next will come dozens of knitwear and other production units providing us with clothes, sportswear, detergents, footwear, and sewn goods. "...There will immediately be a social explosion, since hundreds of thousands of people in the country will find themselves unemployed"—that is from a warning telegram sent by "Sibvolokno's" leaders.

Dozens of enterprises from all parts of the Union have sent telegrams and envoys to Bratsk with requests and demands not to halt the production of pulp. Irkutsk Oblispolkom [oblast soviet executive committee] has become concerned: The oblast will have nothing to exchange for meat, butter, and vegetables in other regions. The city soviet has been gently reminded that it is heading for direct confrontation with a presidential decree.

On the last day of the session buses carrying Bratsk timber industry complex workers arrived at the city soviet. They staged a noisy rally outside the building, demanded the resignation of the presidium, and asked indignantly: Who gave the deputies permission to control the fates of thousands of people? These are the scenes in which the conquest of the "green sea of the taiga," of which now only pitiful islets remain, is ending. Similar confusion is resulting from the notorious "lessons of Bratsk": the departmental method of city construction—from scattered ungovernable "farmsteads" and "settlements"; the thoughtless lumping together in one site of the country's biggest, mutually incompatible production units. All this has resulted in an ecological crisis.

By their excessive discharges into the environment enterprises are creating above the city and in its environs a deadly cocktail of unpredictable composition. Monitoring services record only around a dozen substances in it. Professionals from the Soviet-Swiss firm Diag International have so far counted 300—in the air, water, and soil. In the opinion of specialists, in terms of a general indicator—the cancer index—Bratsk is one of the three worst cities in the country. There is alos the following point of view: It is the dirtiest city on the planet and the process of the devastation of the residents' genetic stock is accelerating.

"We are getting increasingly close to the point beyond which life will be impossible," city construction workers wrote in the local paper. "We built Bratsk thinking that we were creating a city of the future—for ourselves and for our children. But we built a city of hostages whose silence is purchased with foreign consumer goods. We consider our work to construct a city of doomed souls to have been senseless." As extreme measures they demanded that the capacity of the Bratsk aluminum plant and the timber industry complex be immediately reduced, that hard currency be channeled into reducing discharges, and that Bratsk be declared an ecological disaster zone.

At the end of January the city was once again covered by an impenetrable smog for a week. Some schoolchildren refused to go to school because of headaches and picketed the enterprises, calling on their parents to strike. In effect the deputies were in a corner. In one pan of the

scales were shortened lifespans, a falling birthrate, and the slow death of almost 300,000 citizens of Bratsk. In the other was their own prosperity and the fate of hundreds of thousands of people throughout the country. Truly a city of hostages—by no means the only one, so I understand, within the broad expanses of the state.

The declaration of Bratsk to be an ecological disaster zone is still just talk. Such a zone has no juridical status, nor is there a legal mechanism to protect the citizen's health from harmful industrial discharges. The reconstruction of outdated production units takes time and billions of rubles. Enterprises are also limited in maneuvering output and hard currency—by the state order and excessive payments to the center: No one has ever taken account of the interests of the people living here. For example, the Bratsk timber industry complex invests 70-80 million rubles a year in reconstruction, whereas three-four times more is required. So we have reached the point of technological collapse and flagrant technical backwardness.

Is the ecological situation in Bratsk therefore fundamentally insoluble under the existing relations? One of the deputies spoke truly: A sick economy does not have a healthy ecology. Both enterprises and the local authorities should be free in their actions. Otherwise Bratsk will never be transformed from a city of departments into a city of citizens.

In a region which has the cheapest power, cheap aluminum, and cheap timber, people said to me, life is also cheap.

Sakhalin Oil Spill Outlined

PM0805150191 Moscow IZVESTIYA in Russian 8 May 91 Union Edition p 8

[Correspondent Yu. Balakirev report: "Another Environmental Disaster Zone"]

[Text] Yuzhno-Sakhalinsk—The inhabitants along the coast of the largest warm-water bay in southern Sakhalin greeted the May Day holiday amidst a state of emergency. A vast oil slick developed in the waters, threatening all wildlife.

According to some information, the slick has reached 200 square km in size. Every available means has been called upon to combat the sea pollution. Fortunately, the unique "Vaydgubskiy" offshore oil collector, which previously had its baptism of fire off Alaska, was in the vicinity.

What happened on the island? V. Timofeyev, chairman of the Korsakov City Soviet, refused to give IZVESTIYA any information, saying that he could not waste his time on interviews. Although he is responsible for the gross negligence that brought about the environmental disaster. The oil was pumped from a tanker to the Korsakov port tank farm, I was told, via a pipeline that was not connected to the onshore storage tanks. More than 500 tonnes of deadly petroleum products spilled onto the shore around the mooring structures, and from there the oil moved out to sea. The disaster arose in Korsakov and was still further augmented in neighboring Anivskiy Rayon, where the oil spilled over a 52-km stretch of coastline.

It is precisely at this time that young noble fish are traveling down the spawning rivers to the sea. Death now awaits the immature salmon at the mouth of the Lyutoga, Taranay, and Uryum Rivers. Migratory birds that have chosen Anivskiy Bay since ancient times have also had a bad time. The island's main beaches and private truck gardens have suffered damage, but it is still too early to talk about the extent of the damage.

I was told by N. Lukyanov, chairman of Anivskiy Rayon Soviet of People's Deputies, that the soviet has mobilized vehicles and bulldozers from all enterprises in the rayon to clean up the shoreline. Paying no attention to the rain and snow, people have gathered up the oil-soaked soil and sand and taken them far away from the water. The state of emergency has now been lifted. But the entire shoreline is still under supervision.

REGIONAL AFFAIRS

EC Approves Auto Emission Controls

91WS0151X Paris AFP SCIENCES in French 27 Dec 90 p 36

[Article: "The Twelve Agree on Auto Emission Standards for Medium- and Large-Cylinder-Capacity Vehicles"]

[Text] Brussels—Meeting in Brussels on 21 December, the Twelve of the European Economic Community (EEC)] agreed on a set of severe auto emission standards, to be applied, beginning in 1992, to automobiles of medium and large cylinder capacities, according to the Italian minister of the environment, Mr. Giorgio Ruffolo. At the current stage of the technology, these standards will compel the manufacturers to install three-way catalytic converters on new cars having a cylinder capacity of over 1.4 liters.

The EEC ministers of the environment voted unanimously in favor of this measure, which is of considerable importance to the manufacturers of cars and for the protection of the environment.

These new antipollution standards will be obligatory with effect from 1 July 1992 for new-model cars, and from 31 December for all other new cars. Countries wishing to do so, furthermore, are authorized to encourage the purchase of cars meeting these standards as of now, through tax incentives.

Prior to the end of 1992, the Commission will present new proposals to the ministers for further tightening these standards, in the light of technical progress. The ministers are to decide on these proposals prior to the end of 1993.

These newer standards shall not be applicable before 1 January 1996, but may be used as a basis for further tax incentives that member countries may wish to institute. These incentives, however, are not to be made effective prior to adoption of the new antipollution measures. The Twelve had already agreed, in June 1989, on a tightening of the antipollution standards for vehicles having a cylinder capacity of less than 1.4 liters, with effect from 1992.

FRANCE

Industrial Uses of Vegetable Oils Studied

91WN0384A Paris LE NOUVEL ECONOMISTE in French 29 Mar 91 pp 29-30

[Article by Y.L.B.: "Vegetable Oils in Industry"]

[Text] Lipochemistry has the wind at its back. Vegetable oils, produced in quantities too large to be absorbed by consumers, are now finding buyers in industry. Ink, unmolding agents, lubricants: The range of industrial uses for oils made from colza, sunflower seeds, and soybeans is steadily widening, to the great relief of the agricultural community. Over the past 10 years, production of oleaginous products in Europe has experienced a veritable explosion. The amount of land devoted to colza in the EEC went from 849,000 hectares in 1981 to nearly 2 million in 1990. The Commission has therefore been anxious to limit the expansion of such crops and in its proposals for 1991-92 suggests reducing colza, sunflower seed, and soybean prices by 3 percent.

It is therefore not at all surprising that under such conditions, a few large industrial firms are keenly interested in new markets, in keeping with concerns for protecting the environment. In 1987, Ferruzzi instituted a research program on the subject. To complete the setup, that Italian multinational firm set up Novamont, which was instructed to develop products from "living chemistry." Vegetable oils and starch provide the backbone. And yet, it now appears certain that lipochemistry offers even more promising prospects for the future. Ferruzzi has concentrated its efforts on lubrication. Engine lubricants are a substantial source of pollution and esters from biodegradable vegetable oils can replace oil products. Markets total an estimated 150,000 tons annually if formulas for lubricants include 3 percent vegetable oil derivatives.

Grinding of Oleaginous Seeds

The same reasoning and same strategy are followed at SOFIPROTEOL, the firm that now controls the essential industrial setup for grinding oleaginous seed in France. "For the past two years, we have intensified research into nonfood uses of colza and sunflower seed oils," explains Board Chairman Philippe Tillous-Borde. Heretofore, the fatty acids of vegetable oils were mainly monopolized by detergent manufacturers such as Henkel and Unilever. New prospects are now opening up. A company in Compiegne, Robbe, 70-percent controlled by SOFIPROTEOL, specializes in such products. With a capacity of 130,000 tons, its grinding unit will soon be used entirely to make such technical oils. Its facilities have already produced an insecticide base called Agrirob, as well as agents used in removing concrete from forms, methyllic esters used as additives, lubricants, and protective films on sheetmetal. The chemical industry itself is increasingly incorporating colza oils into PVC's [expansion unknown].

It is also at Compiegne that diester will be produced, a fuel that can be mixed with diesel for which the government has granted SOFIPROTEOL a tax exemption of 1.2 francs/liter. The agricultural community has big hopes for the project and set a goal of devoting some 400,000 hectares to the "green diesel fuel."

Lag in Recycling Efforts Viewed

91WN0414A Paris L'USINE NOUVELLE in French 18 Apr 91 p 32

[Article by Regine Eveno: "Selective Waste Collection Increasing; Waste Collectors Specializing"—first paragraph is L'USINE NOUVELLE introduction]

[Text] Some specialize in glass, others in plastics, etc. France does not do enough sorting, but it is on the increase. Manufacturers are rubbing their hands with glee.

Germans see them in all colors! Their waste collection cans are blue for paper, green for glass, brown for compost, red for hazardous products.... We have not reached that point yet in France. But development of the selective collection system is going to stimulate the waste collection market and the use of recycling containers (like those of Future Glass).

Omnium Plastics, which has nearly 60 percent of the French waste collection market cornered (manufacturers have rental contracts for the equipment they provide city halls with), has good reason to be optimistic. The combine shares the waste collection market with Allibert Environment, a joint subsidiary of Otto and Sommer-Allibert, and the German company, Schaeffer, UTPM, and Plast'innov. Used to a growth rate of 7 percent a year, these manufacturers know that France has to catch up with the Netherlands and Germany, countries well-know to be more "ecological." "In France 40 percent of households are provided with waste collection containers," Dominique Pelabon, the head of the P [waste collection] System Department, Omnium Plastics' own town. "Seventy percent of them will have them in a few years from now." France now has 35,000 containers intended for the recycling of glass (the collection of plastics has begun) as against 60,000 in Germany. If only the public authorities lay down clearcut rules (will waste collection be handled as it is in Germany, directly from residents, or through the intermediary of sorting centers?), French manufacturers are clearly ready to fill this gap.

Metallic Waste Levels Reduced in Seine

91WN0414B Paris L'USINE NOUVELLE in French 18 Apr 91 p 18

[Article by Pierre Laperrousaz: "Seine Is Being Rid of Metallic Effluents With Aid of Surface Treatment and Electronic Companies"—first paragraph is L'USINE NOUVELLE introduction]

[Text] The basin agency and [waste collection] companies have reduced the amount of copper waste by 48 percent, of chrome by 17 percent, and of cadmium by 34 percent.

Who would think that every year nearly 71 tons of copper, 22 tons of chrome, and five tons of cadmium are washed down the Seine between Paris and its estuary. The parties chiefly responsible for this pollution: some 200 industrial firms in the surface treatment, electronics (manufacture of printed circuits) and metal refining sectors.

The report of the situation appeared to be disturbing enough for the Normandy Seine Basin Agency, which is responsible for seeing to it that the river is healthy, to decide to mobilize the manufacturers involved through the intermediary of their trade associations: SATS for surface treatment and SYCEP for electronics. And in early 1990 an action plan aimed at accelerating the installation of antipollution equipment was launched. The objective: to reduce the flow of metallic waste by at least 85 percent.

One year later, we may draw up the first balance sheet. "About 95 installation projects have already been completed and 85 percent of the companies involved will be fully equipped between now and the end of 1991," Henri Sartore, the official in charge of the basin agency program, declared. Metallic waste has already been reduced by 48 percent for copper, 17 percent for chrome, and 34 percent for cadmium. And the steps that have been taken at the entrance to the treatment station at Acheres indicate that we are on the right track.

A total of 100 million francs are to be invested in the program, with the basin agency granting each company a subsidy of 30 percent of the amount it has invested, to which will be added a loan of 40 percent at discounted interest rates.

Experimental 'Clean' Diesel Engines Reviewed

91WS0193X Paris L'USINE NOUVELLE in French 17 Jan 91 p 64

[Article by Pierre Laperrousaz: "Towards the Clean Diesel Engine"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Five buses on the Paris No. 21 bus route have been fitted with self-regenerating filters, which are trapping 80 percent of the characteristic diesel smoke.

The diesel engine, clean? A car driver stuck behind a diesel on a hill would have a hard time believing it—unless the diesel in question was a bus on the Paris No. 21 bus route, between Gentilly Gate and the Saint-Lazare Train Station. For several months, five vehicles on this Parisian bus route have been fitted with particle filters that trap 80 percent of the nauseating, black smoke so characteristic of diesel engines. By the end of the year, the entire line should be "green."

The filters are supplied by Webasto, a German firm specializing in automobile equipment such as moveable sun roofs and independent heating for passenger cars and trucks. With its experience in compact burners for heating systems, it decided to go into filters. The Webasto device uses a burner of this type to regenerate the filter periodically—every 50 kilometers in the case of

the Parisian buses, which are no longer in their first youth. The burner, which is triggered automatically by means of a measurement device and a control box, then heats the exhaust gas to up to 700°C, causing the soot in the filter to combust spontaneously. The operation lasts seven to eight minutes and uses a third of a liter of gas. In order to withstand the high temperatures involved, the filter is ceramic.

If the experiment is conclusive, RATP [Independent Parisian Transportation Board] plans to equip all of its new vehicles. The main unknown is how long the filter will last. The track record is still too short. In PSA [Peugeot SA] testing on taxis, some filters melted or broke under "particle impact." However, the filters in question were spontaneous regeneration filters in which too much soot had accumulated before spontaneous combustion occurred.

Around 80,000 Francs To Install

However, the filters for large diesel engines currently on the market (Webasto, Volvo, Zeuna-Starker) all use controlled regeneration, which makes it easier to regulate the process. With the Webasto, regeneration is triggered automatically during vehicle operation, almost without the driver's being aware of it. With the Volvo filter, it is done in the garage and is triggered by electrical resistance. In order to prevent an excessively high rate of combustion, which could damage the ceramic mount, an air pump delivers a controlled flow of oxygen throughout the entire cycle. The operation lasts three hours. This is why the Swedish manufacturer, which has sold around 350 of its "city filters," equips mostly delivery or public transport vehicles, which are idle much of the time.

Another trick for prolonging the life of the ceramic mount is to lower the particle combustion temperature by incorporating fuel additives. The city of Athens, which has been running particle-filter-equipped buses since 1987, has recently begun using a diesel fuel with a cerium-based additive. The additive, which is made by Rhone-Poulenc and is being tested for the first time in Athens, lowers the combustion temperature to from 480 to 500°C, for a 1-to-2-percent increase in the price of the fuel. PSA has tested iron-and manganese-based additives. Its conclusion is that, although regeneration is more reliable, the service life is still a problem, owing to iron accumulations in the filter.

Thus, the diesel engine, which emits 10 times less carbon monoxide and 5 times fewer hydrocarbons than the gasoline engine (but as much nitrogen oxide) may soon stop smoking—at least insofar as heavy vehicles are concerned, especially intermittent-usage vehicles like city buses and garbage trucks. However, progress has its price. Because the filter is not yet in mass production, it currently costs between 80,000 French francs [Fr] and Fr100,000 to equip a vehicle, not counting the operating costs directly connected with the service life of the filters.

Another solution will have to be found for cars. The filter—especially when equipped with a burner—is too cumbersome and too expensive. PSA is placing its bets on the catalytic converter. It is more "open" than a filter and burns the soot as it is trapped. However, to work properly, it requires sulfur-free fuel, which is not available everywhere. This puts the ball in the refiners' court.

GERMANY

Kohl Visits Chemical Industry in East

LD1005112791 Berlin ADN in German 1049 GMT 10 May 91

[Excerpts] Merseburg (ADN)—Speaking to around 600 chemical workers at the Buna AG chemical enterprise today, Federal Chancellor Helmut Kohl assured that the eastern German chemical triangle around Halle, Bitterfeld, and Merseburg will be retained and expanded. At the start of his visit to the ecological crisis region, Kohl spoke to a meeting of the enterprise workforce.

There is good reason for implementing the Trust Agency's concept for the chemical industry in the region. However, the site can be maintained only with reduced personnel, the federal chancellor said. The present workforce of 14,500 employees must be reduced to 8,000 by the end of the year. Kohl wants to ensure that new jobs will be created alongside reconstruction. Appealing to industrialists, he said investment in the new federal states is important for the future. "Massive public investment" will have to be found for the ecological improvement of the enterprises. [passage omitted]

The federal chancellor's visit will continue this afternoon with a visit to Bitterfeld.

Press Reports Soviet Dumps Threaten Environment

LD0105100291 Berlin ADN in German 0151 GMT 1 May 91

[Text] Berlin (ADN)—Under the headline "Bonn Fears the Next Billion Bill", the BERLINER MORGENPOST Wednesday reported the environment-threatening dumps that the Western Group of Soviet forces left behind in the former GDR. After Soviet troops buried poisons, used oil and munition often without precautions in locations that were supposedly "ready to hand over", the Union according to a government expert, is left with an economic timebomb which will cost 70 million deutschmarks merely to register and determine the danger it poses. There are a total of 1,028 soviet properties on the environmental checklist, 30 percent of which the Soviet Army will leave each year between 1991 and 1993, leaving the rest in 1994.

A conflict between the ministries of the environment in Bonn and Potsdam is delaying the registration of the "highly explosive dumps" and so is the "uncooperative behavior" of the Soviets. According to a ministry official in Bonn, German taxpayers will have to pay the additional billions "with a two-figure" increase.

Around one billion marks in addition will be concealed in the Federal Ministry of Finance's budget and not officially recorded, writes the newspaper. This money will be used from 1991 to 1994 as an immediate "protection against danger", if risks to human health are feared.

The Soviets deal similarly with highly explosive materials, since they "obviously frequently deal with domestic and special waste". In Socialist Unity Party of Germany times the latter was delivered to the local dumps without charge. Now the Soviets have to pay between 6 and 42 marks per ton.

Ecological Damage Caused by Withdrawing Soviet Soldiers

AU1305142591

[Editorial Report] Hamburg DER SPIEGEL in German on 13 May 91 on pages 55 to 59 carries a 1,600-word report headlined: "Concealing and Deceiving" on the ecological damage caused by the Soviet troops withdrawing from east Germany.

The report notes that "the extent of the ecological damage can often be only suspected." For the Soviet Army concealed all grievances in the past and will probably continue to do so, the report states. "The reason is weak points in the transition agreement that regulates the withdrawal of the Western Group of the Soviet Armed Forces by 1994." Accordingly, the withdrawing armed forces can charge the buildings left behind to Germany's account, but they "commit themselves to pay damages for the ecological damage."

The report notes that in Brandenburg alone the damages would amount to many billions of German marks (DM). In answer to this, Soviet commander-in-chief Burlakov stated that "the Germans would have to pay DM10.5 billion for army buildings left behind."

The report mentions the Eberswalde Kreis as an example of the pollution of the water, land, and air by the Soviets. The Eberswalde Finov Airport alone constitutes a great danger for the "drinking water of 50,000 people." "Near the Laerz air base on the Mueritz in Mecklenburg more than 50,000 tonnes of jet fuel trickled away in the course of decades."

Vladimir Grebenyuk, chief of the Political Administration of the Soviet Armed Forces, affirmed the Soviets' willingness to do everything to minimize the damage, it is noted. "Good contacts" with the commanders are praised by the German side. "Burlakov, chief of the Western Group of the Soviet Armed Forces, wants to personally attend a seminar on the withdrawal of his troops in Bonn next week."

The report notes that obligations in the transition agreement, for example, the removal of 700,000 tonnes of Soviet ammunition (from a total of 2.5 million tonnes) planned for this year, overcharge the Soviets' capacity. "Nobody can force the Soviets 'by an agreement' to act against their own interests," a Potsdam official said. "The Eberswalde environmental authority found out that 'great amounts of ammunition had already been burned, hidden in the ground, or blown up.'"

Brandenburg wants to involve the Soviets in measures against the ecological damage, for example, by training Soviet environmental helpers at Germany's expense, the report states.

Environmental Damage by Soviet Forces Assessed

LD1305095691 Hamburg DPA in German 0917 GMT 13 May 91

[Text] Saarbruecken (DPA)—During the past 45 years the Soviet troops in eastern Germany caused environmental damage amounting to thousands of millions (of Deutschmarks) according to the Federal Environment Office. However, the precise extent cannot yet be assessed, Heinrich Freiherr von Lersner, president of the Environmental Office said on Saarlaendischer Rundfunk on Monday. A start is now being made to ascertain the extent of water and soil pollution. He called for a nationwide standard to assess the disused dumps. The present methods vary too much.

Soviet Troops Reject German Environment Damage Claim

LD0605163391 Hamburg DPA in German 1324 GMT 6 May 91

[Excerpts] Berlin (DPA)—The Soviet troops on former GDR territory have rejected claims that they also carry some of the responsibility for the environmental damage in the new laender. A statement by the armed forces published in Berlin today say that a group of environmental protection experts will "operationally" solve all the corresponding questions in cooperation with the laender ministries. All ecological demands will be given consideration. [passage omitted]

The statement made by the armed forces today says (in contradiction to accusations) that the troops are currently involved in the recultivation of the earth, the removal of rubbish and scrap, as well as the repair of cleaning plants. In light of the withdrawal, the USSR has no long-term plans as regards environmental protection in eastern Germany.

ICELAND

Aluminum Seen Possibly Harming Waters

91P20334 Reykjavik NEWS FROM ICELAND in English May 91 p 6

[Unattributed article: "Chief Medical Officer Warns Against Complacency on Pollution"]

[Text] In an article published recently in health magazine HEILBRIGDISMAL, Chief Medical Officer Olafur

Olafsson warned that Iceland is not as pollution-free as is often thought, and warned of the dangers of complacency in this area.

Basing his conclusions on a Swedish study conducted in 1986 which compared levels of pollution amongst the Nordic countries, Olafsson states that in Iceland the main sources of pollution derive from motor vehicles, aircraft, and fishing vessls. However, emissions of carbon dioxide from industry are, in fact, proportionally higher than in any other Nordic country, a fact not generally admitted.

Acid rain has destroyed 14 percent of the forests of Europe and killed off all life in thousands of lakes, but its effects have yet to be felt here. Neither has the so-called "greenhouse effect" made its presence felt as yet.

Olafsson further warns of the possible dangers of the contamination of water supplies by aluminium, especially if the proposed new smelter plant becomes a reality. He emphasizes the need for vigilance in this area, despite the fact that no toxic levels have ever been found in Iceland. Research in England has established possible links between aluminium in drinking water and cot deaths, Alzheimer's Disease, and other neurological disorders.

ITALY

Catalytic Converters Required on New Cars

91WN0363A Milan EUROPEO in Italian 8 Mar 91 pp 102-103

[Article by Fabrizio Filosa: "Now the Car Is Really Ecological"]

[Text] It will not be bracing mountain air, but the air that we will breathe in our cities in a few years will no longer be like the present noxious and nauseating mixture of gases. Italy is finally entering the era of the ecological car, even if years later than countries like Japan, the United States, Germany, the Netherlands and Sweden.

On Saturday, 16 February, Minister of Environment Giorgio Ruffolo and Cesare Romiti, FIAT's managing director, signed an agreement to advance the adoption of devices to reduce the emissions of pollutant gases from motor vehicles to 1 January 1992, or one year before the expiration of the European Community's regulation.

In other words, in less than a year all new FIAT's, Lancias and Alfa Romeos will be equipped with the celebrated catalytic converters that can filter exhaust gases by eliminating most of the toxic substances produced by the combustion of gasoline.

The advance specified by the agreement will not make it obligatory to buy "catalyzed" cars, but it will permit Italian motorists who are more willing to safeguard the environment to prepare for 1993, when only ecological vehicles will be able to travel in the EEC countries.

The health of the environment and the citizens could not wait any longer. There are 125 million motor vehicles in Europe alone and about 24 million in Italy, 25 percent of which have diesel engines. This roaring army goes discharging a number of toxic and carcinogenous substances. Every four km a vehicle without catalytic devices discharges an average of about 40 grams of carbon monoxide, 10 grams more or less of unburned hydrocarbons, and nearly six grams of nitric oxide, in addition to oxides of sulfur, lead, and dusts.

They are too much, as indicated by the constant air emergencies that forced the authorities this winter to restrict travel to alternating license plates in Milan and the adjacent communes. For that reason, on 21 December 1990 the EEC Council of Ministers of Environment set stricter limits on emissions. As of 1 January 1993 newly registered cars must not produce more than 2.72 grams of carbon monoxide per km, 0.97 grams in all of nitric oxides and hydrocarbons, and 0.14 grams of particles (the soot discharged by diesel engines).

There is only one way to reduce the emissions to those levels today, namely by a catalytic converter, which functions as a small chemical laboratory converting the noxious substances produced by internal combustion engines to innocuous elements. The catalyzer, which is applied to cars with injection engines, contains a special ceramic honeycomb filter covered by a layer of precious metals (platinum, rhodium). When the filter is heated by the gases a chemical reaction sets in that converts the poisons to carbon dioxide, water, and nitrogen.

As Mario Santarelli, manager of the muffler division of Gilardini, the company that makes the catalyzers, explains, "The real converter is supplemented by two other indispensable components. There is a control regulating the electronic injection of the fuel, and a Lambda probe placed right before the catalyzer on the exhaust pipe. The probe consists of a sensor that registers the percentage of oxygen present in the exhaust gases. On the basis of that figure the control modifies the carburetion in order to maintain combustion of the air and gasoline mixture at the optimal point under all operating conditions of the engine. In that way the system eliminates 95-98 percent of the pollutants."

It is a result that is obtained only if the engine and the electronic injection are kept perfectly efficient. For example, unburned gasoline must be prevented from reaching the catalyzer because it would destroy the purifying surface. Moreover unleaded gasoline must be used because lead ruins the filtering element. It must also be pointed out that the chemical reactions in the catalyzer set in at 300 degrees. Below that the unit operates like an ordinary muffler. Then the purifying effect increases with the heat.

According to its producers the lifetime of the catalytic converter is now acceptable. "It can last for 100,000 km

if the engine is always kept perfectly efficient," says Mario Santarelli. That is an important figure because the whole unit consisting of the converter, the Lambda probe, and the control comes to about 1.2 million lire, which is certainly not inexpensive. Yet it must be said that the series of optional extras, which a motorist often considers absolutely necessary (electric window lifts or light-alloy rims, is even more expensive.

Fortunately the agreement specifies that the sale of cars equipped with catalyzers will be favored by a number of tax breaks still to be studied that will last through 1992 and will also facilitate the installation of Retrofits, a catalytic converter that will permit making even the cars already in circulation sufficiently ecological.

As Santarelli said, "Retrofit is a catalytic converter without the Lambda probe, which cannot be installed on old cars, and without the regulating control. The advantage is that it can be installed on old cars with traditional carburetion and not just on those with electronic injection. Of course, it does not eliminate the pollutants as effectively as the complete catalytic system because it lacks the electronic regulation of combustion. But Retrofit can eliminate at least 60 percent of the poisons."

Enzo Zanella, a researcher at the S. Donato Milanese Experimental Station for Fuels, says, "We must remember that the efficiency of these devices diminishes with use. What is more, Retrofit does not block nitric oxides at all."

This kind of catalytic converter, however, is quite ineffective on diesels. Santarelli explains: "We are studying systems including traps for the particles, systems for regulating combustion, sensors that will indicate the accumulation of particles in the filter, and devices for self-cleaning of the trap."

The signing of the agreement between Romiti and Ruffolo has raised some doubts. Maurizio Bacci, environmental engineer and consultant of the WWF (World Wildlife Fund), stressed the point that "The measure is useful but too little and too late. First of all the EEC's regulation sets maximum limits for emissions that have been exceeded by more advanced legislation. The United States adopted stricter standards back in 1983. In the second place, the catalytic converter does not prevent the emission of carbon dioxide, a gas contributing to the greenhouse effect. Carbon dioxide can be eliminated solely by enhancing the fuel efficiency of the engine (that is, the number of kilometers traveled per liter of fuel). It is a method little used in Europe and especially in Italy as compared with the United States.

"And in the third place, the benefits are temporary. On the basis of the English forecasts of the growth of car sales, the Earth Research Organization has made a study on behalf of the WWF and ascertained that the pollution, after a declining phase, will return to present levels by 2020. Accordingly, we will have to think about solutions other than introduction of the catalytic converter, such as rationalized transportation, development of collective transportation, and replacement of gasoline with methane or GPL (liquid petroleum gas) and clean fuels."

NORWAY

Need for Ecopolitical Alliances Seen

91WN0380A Oslo AFTENPOSTEN in Norwegian 22 Mar 91 p 2

[Article by Ted Hanisch, director of the International Center for Climate and Energy at the University of Oslo and former state secretary to Prime Minister Gro Harlem Brundtland: "Norway Needs Ecopolitical Alliances"]

[Text] Norway is faced with very demanding challenges in environmental and energy policy. They must be met through expanded European and international cooperation. We must unite our environmental and energy interests.

For several years we have actively played the role of initiator of international cooperation in environmental affairs and economic development. We were one of the first to adopt the goal of stabilizing carbon dioxide emissions, and since then Japan, Canada, the European Community, and several other European countries have followed in our tracks. Incidentally, Norway never intended such national commitments to be the final form for climatic policy. In Storting report no. 46, much emphasis was placed on attention to the World Commission, on the need for regional and bilateral teamwork, and on cost-effective measures.

Through comprehensive research on cost-effectiveness, we have gradually acquired a considerably better understanding of how more sensible measures can be taken and how much more the environment can be served for each krone we invest. For one thing, this research shows that profitable measures to increase productivity in using energy are available but are not being exploited. For another, the research shows that costs become substantially lower through regional or bilateral alliances. We are not talking here about small degrees of difference but about potential measures that are three to 10 times more effective. The reason for this is that there are very large differences, for example, between European countries when it comes to energy production that is nonharmful to the environment and especially to effective energy use.

Norway is working to make the climate treaty now being negotiated a so-called second generation agreement that is committed to cost-effective solutions. Regional or bilateral environmental alliances may be involved. Such arrangements mean that each country can take measures they find beneficial concerning forest, vegetation, and emissions, and further arrangements can also be made with other countries.

Expensive To Stand Alone

If we examine Norway's position in such a light, we quickly realize that we have a very strong interest in international cooperation of this type.

In the first place, the cost of an isolated national climate policy directed at the energy sector will be especially high in Norway. Half of our domestic energy supply comes from a renewable source, namely, hydroelectric power. The costs will be low or the reductions will be profitable for countries that basically have many polluting coal-fired power plants or other old-fashioned heavy industry. This is true, for example, of present-day Germany after the former East Germany is included.

In the second place, our location on the edge of Europe limits the severity of measures we can take against the transportation sector and its emissions, without imposing intolerable transportation costs on our business firms. These costs are high at the outset.

In the third place, Norway needs to be able to play its role of energy supplier to Europe—mainly of natural gas—in a rational way. It is unreasonable for Norway to have to bear the brunt of the unavoidable effluents from the extraction of petroleum that is used in other countries, especially when we think of gas as an alternative to coal.

Heidrun Field

A concrete example of this is the possible development of the Heidrun field in the North Sea. This is mainly an oil field, but one product will be natural gas which, for the time being, it is commercially impossible to link to the existing system of pipes for delivery to Europe. Against this background, the idea of a methanol factory and gas power plant with expanded production of aluminum has come up. In such a case, what is figured to be Norwegian emissions will increase by five-six percent.

In light of this problem, we have recently experienced pressure from industry and local forces in Central Norway to abandon the goal of stabilization. It is easy to understand the temptation to set aside environmental concerns and, without further ado, begin development of the Heidrun field. Such a simple and isolated Norwegian solution would nevertheless be a serious mistake.

Cooperation

The global trend toward sound economic development largely means that present and future damage to the world environment will increasingly be included in the costs of production and consumption. We must establish that climate management is coming and may have great significance for the Norwegian economy.

We are already familiar with examples that point toward a new generation of environmental agreements. The Montreal protocol on ozone-destroying substances opens the way for "pooling," or alliances. The EC countries' plan to stabilize carbon dioxide emissions points in the same direction. Within the framework of a European energy charter (Lubbers/Delors plan), Norwegians have taken the initiative in similar thinking. The quick realization of such pan-European teamwork is very much in our interest.

The argument that international solutions are better than national ones cannot be used to justify any Norwegian abandonment of measures to stabilize carbon dioxide emissions. While efforts are under way toward more sensible international solutions, the steps toward stabilization are the girders themselves of international climate policy. If we abandon our measures, it will be impossible for us to affect international work on climatic issues. We will be hit hard if we isolate ourselves and try to avoid all costs in the short run.

SWEDEN

Pesticide Usage Decreasing

91WN0396B Stockholm SVENSKA DAGBLADET in Swedish 26 Mar 91 p 6

[Article from TT wire service: "Pesticides Decreasing"]

[Text] Last year a total of 8,875 metric tons of pesticides were sold in Sweden, a decrease of 19 percent compared to the previous year. The biggest user was industry, with agriculture in second place and households in third.

Last year agriculture used 2,343 metric tons of pesticides, calculated as an active substance, 80 metric tons fewer than in 1989. For the period 1981-85, the average was 4,385 metric tons.

The Government Institute for the Chemical Inspection of Pesticides, which compiled the statistics, considers that the government's aim of cutting the quantities of pesticides used in agriculture by half within 10 years has thus been achieved in practice.

UNITED KINGDOM

Acid Rain Damage to England, Scotland Outlined

91WN0413A London THE DAILY TELEGRAPH in English 6 Apr 91 p 4

[Article by Charles Clover; first paragraph THE DAILY TELEGRAPH commentary]

[Text] Acid rain is damaging larger areas of the country than hitherto admitted by the Government, including many of the most famous salmon and trout rivers, writes Charles Clover, Environment Editor.

Maps of areas most sensitive to pollution to be published shortly by the Department of the Environment, and published here for the first time, show the "critical loads," above which damage is caused by sulphur dioxide from power stations.

Publication of the maps are postponed by the Government until after electricity privatisation.

They show that the headwaters of the Wye, the Welsh Dee, the Dovey, the Severn, the Pennine Esk and many Scottish rivers and lochs are all suffering acutely from acid rain.

The maps are likely to place renewed pressure on the Government for new controls over power stations under the Convention on Long Range Transboundary Air Pollution (CLRTAP), which has to be renegotiated by 1993.

The study was carried out by the Department of the Environment's Acid Waters Review Group and was presented to the United Nations Economic Commission for Europe in Geneva this week.

The maps show for the first time the reductions in acid rain from power stations required to reverse the damage to parts of Wales, the Pennines and Scotland. They show, too, that areas of the north of Scotland are also vulnerable.

The "critical loads" beyond which soils and freshwaters are damaged now take into account new research showing that acidity is contained in acid mists and cloud. Other new findings show that conifer afforestation can intensify acid rain by "scavenging" pollutants from the atmosphere and passing them into the soil.

According to conservationists, the maps indicate that the power stations at which National Power and PowerGen will install flue gas desulphurisation technology are not necessarily in the best locations.

National Power has already started fitting acid rain reduction equipment at Drax in Yorkshire and PowerGen plans to fit equipment at Ratcliffe on Soar, Notts, and Ferrybridge, Yorks.

These plans meet the volume of reductions required by the EC, but are unlikely to reverse acid damage in some of the most sensitive catchments areas, such as North Wales, where acid rocks are already overlayed with acid peat.

Officials in Geneva conceded this week, for example, that the 60 percent reductions in total acid rain emissions agreed by 2003 under the EC large plant directive would achieve only 14 percent reductions in acid levels at the highly-acidified lake Llyn Brianne in Wales.

Britain said for the first time in international negotiations in Geneva this week that the "critical loads" concept formed the basis of its acid rain reduction programme stretching into the next century.

Britain has long resisted making reductions on an arbitrary basis, such as by joining the "30 percent club" of nations committed to reducing acid rain by 30 percent by 1993.

The new maps show that significant reductions in acid rain in sensitive areas could have been achieved by fitting acid rain scrubbers at Fiddlers Ferry coal power station, Cheshire, at Aberthaw South Wales, at Ironbridge, Salop, and at Longannet and Cockenzie power stations in Scotland.

The areas shown as sensitive on the new maps compiled for the Government by scientists are far larger than on a preliminary map published in the Environment White Paper past year.

Mr Andrew Tickle, air pollution campaigner at Greenpeace, said yesterday: "The Government has allowed the two power generating companies to decide where they would fit acid rain reduction equipment on economic rather than ecological criteria. Now they are going to have to think again.

"Damage will continue in most of these areas unless the Government's policy on acid rain is made more stringent."

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