JPRS L/8770

19 November 1979

Worldwide Report

ENVIRONMENTAL QUALITY

(FOUO 9/79)

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

For further information on report content call (703) 351-2811.

APPROVED FOR RELEASE: 2007/02/08: CIA-RDP82-00850R000200020031-3

JPRS L/8770

19 November 1979

WORLDWIDE REPORT

ENVIRONMENTAL QUALITY

(FOUO 9/79)

CONTENTS

CONTENTS (Continued) Page

WEST EUROPE

WORLDWIDE AFFAIRS

OECD ENVIRONMENTAL PROTECTION POLICIES, FUTURE DIRECTIONS

Paris FUTURIBLES in French Sep 79 pp 74-90

[Article by Jean-Philippe Barde and Michel Potier, Environmental Office of the OECD [Organization for Economic Cooperation and Development]*: "Ten Years of Environmental Policies in the OECD Countries"]

[Text] At the end of the 1960s, the environment assumed a definitive place among the political goals of government which, in the course of this period, established institutions, carried out analyses, made decisions, and to a certain extent obtained results. At the end of the 1960s and the beginning of the 1970s we saw the establishment of national administrative structures with authority in the environmental field and the adoption, in a number of countries, of major legislative provisions. This phase represents what might be called a "first generation" of environmental policies. Instead of questioning the significance of a real historical division between what could be called a "first generation" of environmental policies and a "second generation," Jean-Philippe Barde and Michel Potier devote a first section to listing the main characteristics of the environmental policies which coincided with a phase of legislative and institutional consolidation (not yet ended in a certain number of countries), before proceeding in a second part to derive certain conclusions about what the new environmental policy might be in the future.[1]

"The process of growth is an open one. This is a very good thing if the process leads us to reflect on what we are doing collectively, to wonder if this is indeed what we want to do, to understand why we are doing it and to see how we could do something different which would be preferable." Bertrand de Jouvenel, "La Civilisation de Puissance" ("The Civilization of Power").

*The opinions expressed in this document are those of the authors and do not necessarily reflect the views of the OECD.

Environmental policies have essentially consisted to date of the protection of nature and the battle against pollution and other damage. The protection of nature, although often rather limited, was reflected rather early in such substantial actions as the establishment of national parks: the creation of the natural Yellowstone National Park in the United States in 1852, the first natural parks in Sweden in 1909, the natural Camargue preserve in France in 1927.

"To protect nature is to protect man," it is often said. In fact, in view of the multiplication and the aggravation of industrial pollution conditions, it is the protection of man directly rather than that of nature which demands attention. The environmental policy is that basically characterized by the struggle against pollution.

Water pollution, first of all, in almost all countries, is initially the most directly noticeable (at least for certain categories of pollution). The campaign against water pollution benefited directly from the prior existence of structures and legislation pertaining to the management of large water resources (irrigation, dams, flood control, fishing regulations, etc). Even if, in the majority of cases, the structures have had to be drastically altered. The case of the "Waterschappen" in Holland, a kind of water agency responsible since the Middle Ages for the maintenance of dikes and the pumping of water are characteristic. Their role has been gradually extended to the campaign against pollution.

Next comes air pollution, made evident very early by the celebrated London "smog." And finally, the campaign pertaining to solid wastes. Noise is sometimes included, although the majority of the modern laws are very recent or only just now being drafted.

The basic principle in environmental policies, called the "polluter-payer" principle, which is applied by all of the OECD countries, clearly marks this pre-eminence of the anti-pollution aspect. Thus the question arises as to whether the "second generation" will or will not remain characterized by this predominance.

A First Generation of Pollutants

In the course of this first period concern was basically devoted to a campaign against the most readily identifiable pollutants and those whose effects are most visible. Where atmospheric pollutants are concerned, it is a question mainly of sulfur compounds, solid particles of carbon monoxide, nitrogen oxides and hydrocarbons. Where water pollutants are concerned, it is above all a question of oxidizable substances (DBO [biochemical oxidation of organic matter] and DCO [chemical oxidation of organic matter]) and substances in suspension.

It was not until recently that, alongside the "identified" pollutants, a beginning was made in combating a second generation of pollutants which are

less visible and often have delayed effects through bioaccumulation. This is particularly true for water pollution: an effort is now being made to combat the "micro-pollutants," substances which are not or are to a very limited extent biodegradable and which are highly toxic (heavy metals, organochlorines such as the PCB and DDT compounds). Increasing concern is also being devoted to thermal wastes. The distinction is not so clear where atmospheric pollution is concerned: there is concern now with toxic substances such as lead, benzopyrene, and an effort is also being made to control gases such as the carbonaceous and fluorine-containing substances which threaten to alter the ozone layer which covers the terrestrial atmosphere.

Along with polluting substances as such, there remains the problem of nuisances, noise in particular. Noise is not a new concern but it was only recently that strengthened legislation, designed to coordinate various measures in the campaign against noise, among other things, have emerged in certain countries. Elsewhere (for example in France), draft laws are being written.

Generally speaking, it can be assumed that the campaign against nuisances which, without being directly dangerous to health, contribute to worsening the conditions of life, will take on increasing importance. This might well be the case for noise,[2] odors, visual intrusions, excessive urban development, etc.

A First Generation of Tools

As the pollution phenomena have appeared, they have been dealt with within the frameworks of existing administrative procedures. Whatever the institution or institutions responsible for pollution control, the first recourse sought was to direct regulation, that is to say prohibitions against polluting or the establishment of pollution norms.

With some exceptions (in the water sector in the Ruhr in 1904-1920, and in France in 1964), recourse to economic tools, in particular collecting fees from polluters, came relatively late: fees for water pollution in Holland (1971) and Germany (1976),[3] fees based on the sulfur content of fuels (Norway 1971, Holland 1972, Japan 1973); fees for airplane noise (France 1973, Japan 1974); and fees for noise caused by airplanes and motor vehicles on land (Netherlands 1979).

This monetary approach, although not as yet very widespread, seems likely to develop substantially. New projects are emerging: pertaining to sulfur dioxide and solid wastes in France, fees for containers and lubricating oils in a number of countries, etc.

A Step-by-Step Policy

For a long time one could hardly have foreseen the scope of the damage the dumping of polluting substances could cause. Thus in many cases it has been

step by step, under sometimes dramatic circumstantial pressure, that the provisions for the campaign against pollution have been established. It was the Minamata catastrophe in Japan (111 deaths were recorded between 1953 and 1960) which alerted the whole world to the dangers of mercury. It was the sometimes murderous London smog which basically resulted in the Clean Air Act in Great Britain, not to mention the sadly notorious oil spills (Torrey Canyon in 1967, Amoco Cadiz in 1968), which one way and another pushed forward the measures for protection and recovery. Hundreds of thousands of residents near airports had to be seriously affected by aircraft noise before the acoustical aspects of jet plane operations were subjected to the first international regulation (OACI [International Civil Aviation Organization], 1973). It was when the future of the Mediterranean seemed gravely threatened that the riparian nations turned their attention to it (Barcelona Convention in February 1976, and the Blue Plan presently underway).

This step-by-step policy is also explained by the fact that there is a delay in the appearance of the effects of some pollutants (pesticides and fungicides affecting fauna and human food supply). Often pollution becomes a nuisance--i.e. a "social burden"--only after certain thresholds are reached in the ecosystem.[4]

Similarly, it is only very gradually that an understanding, if not a mastery, of the complexity of ecological phenomena began to develop. Ecology is to the biosphere something like what the economy is to society: it expresses the interdependence of phenomena. Now it is not until one has gained a proper understanding of this interdependence that one can conceive of an integrated and forward-looking environmental policy. This need for an integrated policy makes itself felt, for example, in the existence of phenomena transferring pollution from one environment to another. For example, purification often means only the processing of a residue into another form. The purification of water produces sludge; the burning of this substance leads to atmospheric pollution; the purification of gases by wet methods leads to pollution of the water, etc. Generally speaking, atmospheric pollution leads to the pollution of soil and water by sedimentation which comes about due to precipitation and surface effects (absorption, dissolution, etc). Incomplete knowledge and the lack of measurement of these phenomena also explain the "step-by-step" nature of these policies.

That being the case, it would be unfair to say that no anticipatory measures were adopted. Some legislation now long past provided for the protection of man against harm due to industrial activities. We could cite for example the classified establishments law of 1917 in France (the origins of which go back to the 19th century and which was redrafted and updated in 1976), or the organization of the campaign against pollution in the Ruhr region in Germany beginning in 1904. The means utilized are most often inadequate in view of the scope of the pollution phenomena.

Thus there was little expectation that pollution could become a serious and widespread phenomenon of national and international scope. No one

foresaw that environmental protection would have to become an integral part of the proces of economic development and should be taken into account early on, on the very level of the conception of projects and decision-making.

From this point of view there is a basic lesson to be drawn for the future: the need for an integrated, forward-looking and preventive environmental policy, in symbiosis with the process of economic development. Without a doubt this is a basic element in the "new growth" which is gradually taking shape in the advanced industrial societies.

A Policy for Catching Up

Here in fact we have a basic characteristic of this step-by-step approach: the battle against pollution requires first of all equipping the existing complex of polluting installations with pollution control devices. We must in a way deal with a "installed pollution capacity" while at the same time making sure that the newly established installations (collectives, industries, various equipment) incorporate pollution-preventing mechanisms at the outset.

This aspect of the first generation of environmental policies is absolutely essential: is a campaign against pollution by the pulp and paper industries wanted? Then all the plants in the country must be equipped. Is what is desired to control the sulfur oxide compound emissions of electric power plants? Then a major part of the energy production sector is involved. Is a reduction in aircraft noise desired? Then the whole of the fleet requires a retrofit or replacement.

This need to overtake accumulated pollution sources weighs heavily on environmental policy. In fact, this catching up is a slow and costly process which discourages innovation.

It is a slow process because of the immensity of the task to be accomplished. The equipping of the existing stock with pollution control equipment can only be done gradually. Thus "recovery plans" are drafted over 15 or 20 year periods (in the case of the financing institutions in the basin in France) and "transitional periods" are planned during which certain installations may benefit from moratoriums and/or financial aid.

It is a costly process because in the majority of cases equipping existing sources of pollution is more costly than outfitting new sources beginning with the level of conception itself. In some cases it may prove preferable to abandon a decrepit industry rather than to try to outfit it.

It is a process which provides little incentive for innovation to the extent that it hardly encourages the alteration of production processes in the direction of a better use of materials (internal recycling, for example). For an old plant such a conversion is very often too costly, and so it settles for purification at the end of the chain. In addition, the financial aid provided within the framework of the transitional or catch-up period tends to perpetuate this type of "add-on" purification.

What in our view should characterize the second generation of environmental policies is the end of this process of catching up, in other words the generalization of preventive measures against pollution through the development of new, non-polluting processes. This would in a way mean the advent of "soft technology."[5] But it is far from certain that this period of catching up is reaching its end.

Relatively Modest Economic Costs

The figures available indicate that the economic costs (annual analyses including operational costs, plus the amortization of the capital necessary for reducing pollution, plus the costs of obtaining this capital) involved in the programs to combat pollution represented less than one percent of the gross national product for the majority of the OECD countries in the middle of the 1970s, reaching or slightly exceeding one percent by the end of the decade. These figures were a little higher for the United States and Japan (1.7 to 2 percent of the gross national product).

These figures are doubtless substantially underestimated because they cover only a part of the environmental protection measures (the cost of pollution) and they pertain perhaps to still limited goals. If the goals remain the same, it can be expected that these costs will tend to drop as time goes on, once the catching-up phase, in which the existing production installations will be equipped with anti-pollution devices, has ended, and when the new production installations will be using clean technology, benefiting from the technical advances.

The fact nonetheless remains that the economic costs of the campaign against pollution have been shown to be modest and very clearly lower than those accepted in other sectors of a social nature (health, education) or in the realm of national defense. This does not mean that environmental policies have not caused some problems of a temporary nature on the regional level or the level of an industrial branch, but it can be maintained that the industries which are the industries with the worst pollution records (metallurgy, pulp and paper, chemical and energy industries), which have been faced with the largest expenditures, have in the final analysis borne a very acceptable burden if the figures are converted into a percentage of the total production costs, and if a comparison is made with other costs such as wages, energy, raw materials, etc.[6] On the global level, the inflationary impact of the environmental policies has been seen to be marginal, to date: in the United States, it has been estimated that in the period between 1970 and 1977, on an average, the consumer price index rose 0.3 percent per year as a result of the environmental policy. In Norway, the inflationary pressure is estimated at 0.4 percent and in Japan, between 0.4 and 0.7 percent.[7]

Limited International Consequences

When the environmental policies began to be reflected in new regulations for industry, the fear developed in a number of countries and international

organizations that these new provisions might have major international consequences in at least three realms:

On the one hand, due to a change in the product trade flow in the event that very different environmental policies were adopted.

On the other hand, as a result of the possible establishment of non-tariff barriers to trade, if the environmental policies were used for protectionist purposes.

And finally, as a result of the possible development of a "polluters' paradise" in each of the Third World countries which might become a refuge for industrial establishments in industrialized countries which pollute most heavily.

Now an analysis based on a detailed study of the facts shows that these fears were greatly exaggerated. First of all the changes in the trade flow were not as major as expected, as a result among other things of the relatively modest role played by anti-pollution costs in production costs as a whole (for example, in the metallurgical industries, the annual costs incurred by the plants existing in Sweden were estimated at 1.3 percent of the total production costs in 1973, for the period between 1970 and 1973, while in the United States, the annual cost was estimated at 4.5 percent of the total production costs in 1973.[8] In addition, the fact that the majority of the industrialized countries have undertaken an anti-pollution effort in the course of more or less the same period has also had the result of alleviating the burden of the struggle against pollution on the level of enterprise competition on an international scale. Then the adoption of environmental norms and in particular product norms has hardly given rise to date, as was the case in connection with health norms, to the establishment of non-tariff barriers (although problems still exist, for motor vehicles for example). The work group established by the GATT to review complaints likely to arise from such practices has never met. No member country of the OECD has complained about discriminatory practices in this connection or asked that the special consultation procedure provided for the purpose be used. The UNCTAD, which recently undertook a study on the same subject, was not able to find any such practices. Finally, there is no proof of an empirical nature indicating that the environmental policies have led to a significant phenomenon of relocation of industries from the industrialized countries in the Third World countries. Three studies made on the basis of a review in depth of world literature on business reveals no such trends.[9] This result is hardly surprising in view of the minor role played by pollution campaign costs in relation to other factors in production costs. The industries which have deliberately sought refuge in the Third World countries, mainly for environmental reasons, are not likely to advertise their intentions very widely, but this remains a possible problem for the future, above all if the environmental norms in the industrialized countries are strengthened.

Uneven Results Which Are Difficult to Interpret

It is particularly difficult to make a judgment of the results of the environmental policy: statistics and indices are lacking and disparate, making international comparisons a delicate matter. A first effort has been made by the OECD, which has just published its first "Report on the State of the Environment,"[10] to which we refer the reader. We will limit ourselves here to listing several trends which this study reveals.

Water Pollution

In the majority of cases, a stabilization or a decrease in the concentrations of oxidizable and biodegradable material and substances in suspension can be observed. For France, the report on the execution of the Seventh Plan reveals a decline of 10 percent in the volume discharged between 1970 and 1975.

Between 1965 and 1975, the population sector served by installations treating waste water increased substantially, with wide variations, however, from country to country: less than 15 percent in Belgium, Greece and Portugal; 23 percent in Japan; 40 percent in France; 80 percent in Germany, New Zealand, the United Kingdom, Sweden and the United States.

The situation with regard to the micro-pollutants and toxic substances referred to above, which are constantly increasing, is on the contrary a source of ever-greater concern. The eutrophication of a number of lakes is continuing to become more acute, and the quality of drinking water is unreliable. For example, after water is chlorinated, organochlorine compounds some of which may be carcinogenic are formed.

Air Pollution

Here too the results are very uneven. In a number of countries, sulfur oxide emissions declined between 1965 and 1975 (Canada, United States, Japan, Germany, Netherlands, Sweden, United Kingdom). In others (Finland, France, Italy, Portugal, Spain) they increased. In the majority of the large cities, the concentrations of sulfur oxides declined or remained stable.

Carbon monoxide emissions (coming essentially from motor vehicles) are difficult to control because of the slow rate at which the automobile fleet is renewed by means of new vehicles causing less pollution, and poor vehicle maintenance. It is only in the countries which implemented harsh norms very early (Canada, United States, Japan) that one can see any improvement.

On the other hand, an increase can be seen almost everywhere in nitrogen oxides, a factor in the development of photochemical pollution.

Finally, the impoverishment of the ozone layer, the acidification of soil and water, the risk of a general increase in temperature due to increased

concentrations of carbon dioxide, are emerging as increasingly worrisome problems.

Noise

Estimates made in various countries reveal that noise has increased in the course of the last 20 years, both in intensity and in duration, because of the increase in nighttime traffic, and in terms of range because of the spread of noise to the residential suburbs. This situation is a result of the rapid growth of the cities and the economy, as well as increased mobility. Seventy percent of the population living in the OECD zone resides in cities which have continued to develop without interruption in the course of the past 20 years. The motor vehicle fleet in the OECD countries shows a substantial increase: it came to about 100 million vehicles in 1960 and to about 220 million in 1975, and it is possible that the vehicle total will reach 300 million by 1985.

The spread and the increase in noise are illustrated by a number of studies which show that the number of people bothered by noise increased substantially between 1950 and 1970. Between 1948 and 1962, for example, the proportion of such people in London doubled, increasing from 23 to 50 percent. Between 1960 and 1970, the number of people seriously affected by highway noise in the United States quintupled, increasing from half a million to 2.7 million persons. The forecasts made by France and the United Kingdom indicate that if the current trends continue, the number of persons subjected to excessive noise levels will undergo a major increase between now and 1975 (+6 million in the United Kingdom, and +800,000 in France).

Nearly half of the population of Paris lives in sectors subjected to exterior sound levels in excess of a leq^{11} of 65 adjusted decibels.

For lack of space, we have limited this brief assessment to the three main sources of pollution. Discussion of soil deterioration and threat to wild flora and fauna is also merited. However this rapid overview clearly shows that if some types of pollution are declining, other forms are constantly appearing. Moreover, noise is continuing to increase. This is why, in order to win this race, environmental policies must be preventive or they will cease to exist.

Some Indicators for a Future View

A study of the past and present characteristics of the environmental policies allows us to discern certain future developments which can serve as possible reference points for developing a concept of where the policies are tending in the medium and long range. Some authorities have drafted scenarios based on a strict methodology making it possible to predict certain trends (France, Norway, Netherlands).[12]

We have shown above that the environmental policies have been mainly anti-pollution policies. Does this mean that they might be something else in the future?

Where the so-called "first generation" pollutants are concerned, it is probable that with the aid of technology and the catching-up stage having come to an end, the campaign against pollution will gradually become a routine matter: each new potentially polluting installation will have built into it all the necessary preventive apparatus. This could likely be the case with oxidizable substances (DBO, DCO) and sulfur oxides. However, the data available to us (see above) seems to indicate that the first environmental clean-up goals have not yet been achieved by far. On the other hand, the question is whether, if quality requirements become more demanding, the imposition of stricter norms will not lead to the process of catching up all over again, unless such norms are made applicable only to the new facilities. In the realm of water quality, a number of problems remain to be resolved. Where France is concerned, it is thought that if substantial progress has been made in the struggle against oxidizable substances and substances in suspension, much remains to be done in connection with toxic substances, dissolved salts, as well as bacterial and viral pollution ("less visible but more insidious").[13] In addition, pollution from diffuse sources threatens to become a basic problem in the future: for pollution of rural origin, nitrogenous substances; for pollution of an urban origin, acid waters, heavy metals, hydrocarbons and pathogenic germs. Finally, the thermal wastes produced on the coasts by nuclear power plants represent a potential for pollution the effects of which are as yet not clearly understood.

Thus the problem of new pollutants remains, covering a very diverse field, in reality. It may involve pollutants long since identified but little considered up to the present, or pollutants in existence earlier but recently identified, or again new substances. The problem is not a small one when we realize that every year, about a thousand new chemical substances are brought on the market in the OECD countries. This does not necessarily mean the addition of a thousand new pollutants a year, but it does mean a probability of pollution which is not negligible. Will we then engage in a perpetual pollutant hunt? The only means of avoiding that is to proceed with controls on the very level of the conception of new products. This approach, known as pre-market controls, is steadily developing.[14]

It is a question in fact of preventing the appearance on the market of substances likely to pose threats to man and the environment. At the same time, the OECD is dedicated to the promotion and organization of the indispensable international synchronization of these controls.

The end of the period of catching up and the generalization of pollution prevention policies will give the campaign against pollution a smooth and routine management aspect, making it possible to orient efforts toward environmental recovery. In fact, if the effort in a first stage must be to stabilize pollution, it will subsequently be desirable to reduce it.

However, recovery should not be limited to this reduction of pollution. It should also include the establishment of new (or recovered) resources: natural preserves, the development of leisure areas and living conditions in general, urban redevelopment. It should be noted in this connection that the transition to this stage of recovery will mark a drastic reversal in thinking and goals, with a real transition from a negative ideology (waging battle against) to a positive ideal (winning back and creating).[15]

It should also be noted that the environmental policies of the last decade were marked by a kind of race against the development of the large urban and industrial infrastructures, and the activities designed to limit, a priori or a posteriori, their negative effects. Now one can ask the question as to whether the rate of establishment of heavy infrastructures is not likely to slow, at least in the most heavily industrialized countries. How many more superhighways, airports, oil ports and industrial complexes (like Fos-sur-Mer in France) can one build? Without a doubt a limited number, and in any case fewer than in the past,[16] since the greater part of the needs have been satisfied and the energy crisis contributing. Where industrial complexes are concerned, it is not impossible that in future they will be built in the countries in the process of development (whether or not a "polluters' paradise" is to be found there).

Urban sprawl also seems to be stabilizing: if urban development is continuing, it is essentially due to the growth of medium-sized towns (+2.60 percent per year between 1960 and 1970 for towns with a population of 100,000 to 200,000), while the growth of cities with more than a million inhabitants is slowing (+1.9 percent per year between 1960 and 1970).[17] To this is added a certain consolidation of demographic growth in the industrialized countries. However some countries, such as those in the southern part of Europe, are continuing to experience rapid urban growth.

If these trends continue, the context for the environmental policies will be substantially altered thereby: thus it is less necessary to prevent or repair the damage done by these infrastructures than to guarantee continuing management of it. Environmental recovery efforts will be facilitated proportionally. This indicates that in any case, a future plan for the environment cannot be isolated from the future economic, demographic and social plans.

To resolve the problems encountered, the environmental policies should at a minimum pursue the following strategies.

There must be a preventive strategy, through changes in the production processes (soft technologies),[18] development of the very structure of the productive apparatus (replacement of certain types of production by others), and the establishment of procedures for pre-marketing control of products.

There must be a long-term strategy, based on long-term estimates of the development of pollution and the natural environment. In particular,

procedures contributing to the decision-making process must be perfected and utilized when irreversible effects as well as an impact on future generations are at issue.

There must be a strategy integrated with the economy, in particular through more extensive recourse to economic mechanisms (pollution fees). A certain development in the use of fees can already be seen in the realms of water, air, waste and noise management. This reflects not only the search for more efficient policies but also a better integration of environmental restraints in economic mechanisms (pollution fees are a cost) and therefore, the emergence of the "new growth" as a non-negligible factor.

Integration must also be effected on the level of economic policy: an employment policy contributing to the achievement of environmental goals, industrial location policy, time management, etc.

There must also be a resource-saving strategy, for it is probable that an ever-larger role will develop for the recycling of wastes and materials because of the general increase in the prices of raw materials, and oil in particular (compare the encouragement to recycle oil wastes in Germany, the recycling of paper, the gradual return to systems of returnable beverage bottles, etc).

There must be an informed strategy, for we have already stressed the lack of trustworthy indices of environmental quality. The development of these indices is a task indispensable to the proper pursuit of the policies. In this regard an international effort to synchronize environmental statistics is absolutely necessary.

There must be a strategy of participation, with the public playing a role in the management of the environment developing rapidly--educational campaigns and participation in impact studies and pilot operations (for example the "pilot silent towns" in France--Blois--and in Great Britain--Darlington).

Participation requires information and training: information on the quality of the environment, on the quality of products (informative labeling, for example the noise level for household appliances) and the possible actions of each individual. Training is needed on the elementary, secondary and university school levels.

There must be an international strategy. International cooperation in the environmental sector is already well launched. However, the need for a better world distribution of resources, exploitation of the oceans, control of pollution across national borders and the need for an exchange of information require that international cooperation be made ever more profound.

The Politics of Ecology

Another development which is a harbinger of the future is the emergence of the environment (there is increasing talk of "ecology") on the political scene. Everywhere powerful associations and pressure groups are being established, with a weighty effect on political decisions. In some cases, the ecologists participate directly in politics: in Sweden, the nuclear option played an important role in the last electoral campaign; in France, there is now an "ecology" candidate in every election; in Japan, ecology groups are extremely active, and so on.

In our view this means that the quality of the environment, once a marginal demand, is in the process of becoming a basic issue in the political-economic debates in the industrialized countries.

Simultaneous with the development of the environmental policies, their legal bases are being confirmed. General legal principles such as the right to redress for damage due to pollution are leading gradually toward a veritable "right to an unpolluted environment."

It can also be seen that increasingly, the objective responsibility of polluters is recognized and even formalized in international agreements pertaining to indemnification for damage caused by the transportation and exploitation of hydrocarbons at sea, or damage caused by nuclear power plants.[19]

We are also seeing, in a number of countries and for given types of pollution, the establishment of compensation funds financed by compulsory quotas paid by the polluters, which is leading to a specific recognition of the right to an unpolluted environment.

It is probable that a gradual codification of the respective rights of polluters and victims will develop and that environmental law will become a major branch of general law.

If new growth occurs, this may mean the de facto "withering away" of environmental policies as they currently exist, in other words the gradual disappearance of step-by-step measures, which are relatively marginal and in any case poorly integrated in the process of economic development, since the environment and the quality of life are becoming an integral part of development. However, the results of the current policies show that much remains to be done, and they do not justify any expectation of radical change in the near future.

Moreover, it might be feared that the environmental policies will suffer given the hypothesis of reduced economic growth, underemployment and inflation, true as it is that environmental expenditures are often still considered "unproductive," and the quality of life a luxury. This being the case, a number of unknown factors remain, and it would seem that

future environmental policies and consequently the process of economic development itself will depend on a number of major unknown factors:

Control of diffuse pollution sources;
Future energy prospects;
The evolution and development of means of transportation; and
The durability of goods and consumption patterns. Finally, the ever-closer link between environmental protection and the management of resources on a large scale (natural resources, energy, raw materials) means that the management of the environment will be ever more dependent on the nature of the relations between the industrialized countries and the countries in the process of development.

It is then indeed, from all points of view, a new kind of growth which may see the light of day. However these are but a few of the signposts pointing toward a future which remains to be seen.

FOOTNOTES

1. Lecture given at the Symposium on Environmental Policies in the Current Economic Situation, Il Poliedro Research Center and Pavia Public Finance Institute, in Milan, May 1978.

2. The most recent research on noise, however, tends to show that it constitutes a direct and indirect danger to health. See "Reducing Noise in the OECD Countries," OECD, 1978.

3. The 1976 law calls for the effective application of fees by 1981.

4. See Jean-Philippe Barde and E. Gerelli, "Economics and Politics of the Environment," PUF, Paris, 1977.

5. See for example "Clean Factories: Technology in the Service of the Environment," Ministry for the Quality of Life, La Documentation Francaise, 1977.

6. See "Economic Implications of Pollution Control," OECD, 1974 and "The Costs of the Campaign Against Pollution in the Aluminum Industry," OECD, 1977, and "The Costs of the Campaign Against Emissions in the Metallurgical Industry," OECD, 1977.

7. OECD estimates. See "Macro-Economic Evaluation of Environmental Programs," OECD, 1978.

8. OECD estimates.

9. See T. N. Gladwin and J. C. Welles, "Environmental Policy and Multi-National Corporate Strategy," in "Studies in International Environmental Economics," edited by I. Walter, Wiley, New York, 1976.

10. OECD 1979. See also L'OBSERVATEUR OECD, No 98, May 1979.

11. Level regarded as the tolerable limit (leq stands for continuous sound level equivalent).

12. For France, see "Long-Term Pollution Management Policies," Ministry of Environment and Standard of Living, December 1977.

13. P. F. Teniere-Buchot, "Water Pollution in France: The Short and the Long Term," REVUE 2000, No 41, Paris 1977.

14. Japanese law 1973, Swedish law 1973, French law 1977, Toxic Substances Control Act, USA, 1977, etc.

15. See "Where Is the Environment Headed?" "Nuisances and the Environment," Paris, March 1977.

16. With the exception perhaps of the nuclear plants in certain countries.

17. Western Europe, North America and Japan, according to "UN Conference on Human Settlements. Global Review of Human Settlements." See also "Report on the State of the Environment," OECD, op. cit.

18. It is in this connection that the classic purification stations are almost ineffective in the campaign against specific water pollutants pursued essentially by changing the production processes.

19. See "Legal Aspects of Pollution Across Frontiers," OECD, Paris, 1977.

5157
CSO: 5000

WORLDWIDE AFFAIRS

PEMEX OFFICIAL BLAMES U.S. COMPANY FOR IXTOC-UNO SPILL

Havana PRELA in Spanish 2048 GMT 15 Aug 79 PA

[Text] Mexico City, 15 Aug (PL)--A high-ranking official of Mexican Petroleum (PEMEX), the state petroleum enterprise, disclosed here today that U.S. companies control most of Mexico's offshore oil drilling activities. Jaime Cervantes Salazar, marine drilling superintendent for PEMEX, said that the United States supplies 80 percent of Mexico's oil-drilling equipment. U.S. technicians operate six of the nine drills and three of the four boats which serve as semipermanent platforms in the Gulf of Mexico, Cervantes said. The U.S. Lumus Company has also signed contracts to develop technology, and many drilling companies are operating in the Gulf of Mexico under contract. It was precisely because of drilling errors committed by a U.S. company, SEDCO Incorporated, that the IXTOC-Uno oil well exploded, went out of control and has been spilling 30,000 barrels of oil a day into the sea since 2 June. The SEDCO company had signed a contract with PERMAGO, a PEMEX subsidiary.

In another quarter, owners of hotels and beaches in Texas have threatened to sue the Mexican Government for damages caused by the oil slick created by IXTOC-Uno. Texas Governor William Clements and PEMEX General Director Jorge Diaz Serrano will meet later this week in the city of Corpus Christi, Texas. The two officials are presently being subjected to sharp attacks in their respective countries. Diaz Serrano is being accused of favoring the PERMAGO company, which he owned until 2 years ago, while Clements is being accused of protecting PEMEX because he owned the SEDCO company before becoming governor.

CSO: 5000

INDIA

UNCONTROLLED POLLUTION THREATENS

Tokyo THE DAILY YOMIURI in English 29 Aug 79 p 5

[Article by Sumanta Banerjee]

[Text]

New Delhi (Depthnews)—The ear-hugging turban of the Indian Sikh may turn out to be more of a health-protective gear than a religious symbol.

In the growing menace of noise pollution in India, eye, ear, nose and throat specialists have found that the Sikh turban reduces noise levels by 10 decibels.

After air and water pollution, invisible noise is the third major environmental hazard worrying Indian experts. In a survey made by the All India Institute of Medical Sciences, it was found that 65 percent of work sites around New Delhi have noise levels between 90 and 100 decibels.

Government experts have pegged the maximum limits for noise at 80 decibels in work sites, 50 decibels for residential areas and 40 decibels for hospitals.

A recent survey made by two doctors in Pune, near Bombay in West India, also revealed that nearly 90 percent of transport drivers in the area were suffering from noise-induced diseases, particularly loss of hearing.

Because of the increasing industrial bedlam and the dangerous consequences of noise, Indian specialists suggested at a recent seminar that the country should launch a National Hearing Conservation Program. They urged that industries be required to provide workers with noise-proof devices like ear muffs and ear plugs.

Some have called for various measures to protect people from noise hazards. These include proper acoustical designs of noisy machines, modification of existing machine design, muffling of unduly harsh sounds, increasing the distance between workers and noise sources and providing workers with personal protection like plugs and muffs.

Ironically enough, while Indian authorities are trying to reduce the ill effects of noise pollution in their own country, India's international airline—Air India—has decided to sue the Japanese Government for imposing a special noise pollution fee on the airline.

Japan's Civil Aviation Board has ordered a special landing charge on airlines in order to finance measures to check noise pollution. Air India and other international airlines have been billed about $490,000 for September 1975, the month the order came into force. The airlines are also required to pay about $38 million in arrears up to March this year.

But the strong stand of both Indian and Japanese authorities against noise is primarily based on a medical fact—that noise is hazardous to one's health. Deafness, insomnia, allergies and heart diseases can be traced to too much noise. Even a foetus in its mother's womb is vulnerable to excessive noise which might result in congenital defects.

Health experts around the world agree that hearing loss can be induced by the cumulative effect of exposure to noise above the permissible intensity and over a maximum duration of time. The limits pegged by the US Occupational Safety and Health Administration is 90 decibels for a duration of eight hours a day.

International survey indicate that more than half of industrial machines generate noise levels from 90 to 100 decibels—a definite hazard to workers. In the

US, at least 10 percent of workers suffer from hearing impairment from too much exposure to high noise levels.

Apart from affecting hearing, noise also influences the production capacity of workers. Surveys both in India and abroad show that noise affects output of workers on a time-consuming job that requires a high degree of attention. Rather than cause a direct slowdown, noise results in a higher rate of mistakes and accidents.

But what is even more dangerous is the direct effect of excessive noise on the hearts of workers. Dr G. Lehmann, director of the Max Planck Institute, discovered in the mid-50s that noise makes the small blood vessels, called precapillaries, narrower. Subjected to intense noise, red blood cells in precapillaries are aggravated and the vessels contract in spasm. This may cause the blood to thicken and clog arteries, thus signficantly reducing the blood supply of the body. It may even lead to a heart attack.

But noise pollution is still a petty offender compared with the other two major criminals in India—air and water pollution. For instance, it is estimated that some 60 million Indians are directly affected by air pollution.

In the major Indian cities, about 50 tons of pollutant dust fall per square mile every day. The main culprits are smoke from burning coal and vehicles. There are about 560,000 motor vehicles in India. Although small compared to the number of cars in Western cities, each Indian vehicle contributes four times the average pollution per vehicle of its Western counterpart.

Bombay has earned the dubious distinction of being one of the most polluted areas in the world because of the huge industrial sites that have sprouted around the city. It has almost become a veritable gas chamber with over 36,000 industrial units and more than 200,000 automobiles coughing poisonous gases into the atmosphere. New Delhi is not even spared, with its air full of sulphur dioxide and suspended particles, both from coal combustion.

Besides ruining people's health, air pollution is spreading its tentacles to ancient monuments and national cultural treasures. The Taj Mahal in Agra is now feared to be a victim of "stone cancer." Chemical analysis of marble samples has detected a wide range of chemical degeneration which will lead to decomposition in the near future.

Discoloration, gypsum-formation on the surface, and blackening of the fractured portions of the Taj Mahal have reached such a stage that use of chemical preservatives will generate adverse results instead of arresting the decay. The main source of pollution in Agra are local foundries, a railway shunting yard and a thermal power station.

Effluents from factories are also turning India's lakes and major rivers into sewers, threatening the health of millions of rural folks who are at the receiving end of industrial waste discharges. Mercury pollution — responsible for the deadly Minamata disease in Japan—has been found in the Thane creek in Bombay and the Rushikulya River in Orissa in east India.

While most experts blame industrial effluents, others tend to trace the main source of water pollution to untreated human wastes. According to India's Central Board for Prevention and Control of Water Pollution, industries contribute less than 10 percent in water pollution. The rest is of domestic origin.

It is indeed a fact that India's sewerage and sanitation systems are in shambles, allowing human wastes to find their way into rivers. The International Institute of Applied System Analysis of Austria recently warned India that water pollution will be the country's major problem in the next 25 years unless sewage and sanitation facilities are upgraded.

Even if they contribute less than 10 percent, industrial effluents have already ruined several rivers. Tanneries in Tamilnadu in the south, steel plants, coal washeries, thermal power plants and chemical industries in Bihar and West Bengal in the east, textile mills, petrochemical complexes in Gujarat in the west and paper mills and iron ore projects in Madhya Pradesh in the country's heartland—all these have polluted some of the biggest rivers in India.

It seems time for the Indian Sikh to pull his turban all the way down to protect himself from the menacing pollution surrounding his country.

CSO: 5000

TOKYO 'AIR, WATER POLLUTION IS A THING OF THE PAST'

Tokyo ASAHI EVENING NEWS in English 27 Aug 79 p 3

[Text]

TOKYO (AP)—Ten years ago, pollution in Tokyo was so bad oxygen was sold from tanks on the street. Hundreds of people became ill and many died from chemical poisons. Rivers in many cities were dying.

Now, after spending billions of dollars, Japan hopes that soon its air and water will be as clean and clear as they were 20 years ago.

"The period of serious health damage is past," said Hiraishi Taka of the Environment Agency. "Now we are working on a new environmental policy for a more comfortable life."

In 1968, Tokyo's air was a thick, brown soup. Thousands of people suffered from painful, bloodshot, swollen eyes because of the sulfuric acid content of the rain. Tokyo Bay was branded the foulest body of water in the country —a smelly, sludge-filled pool in which fishing and bathing were banned.

Tokyo's schools were even forced to move exercise and gymnastics indoors because the playground air was found unfit.

After several disasters, authorities began to take action against the effects of the pollution — mercury poisoning from chemical industry waste, which killed almost 50 persons and left hundreds of others with brain damage or crippled; poisoning by cadmium, zinc and lead from mining wastes that killed 100 and left 1,000 with split bones, deformation and severe pain: "Kanemi" rice oil disease from PCB (polychlorinate biphenyls) used in processing rice oil, and others.

Finally, Japan decided that kind of price for a booming economy was too much. Beginning in the late 1960s and early 1970s, the Government passed some of the strictest anti-pollution laws in the world, and gradually kept tightening them.

It also budgeted huge sums for environmental improvement, and forced private industry to spend heavy amounts as well. The effort has paid off.

Tokyo Bay once more has a fishing industry. The Sumida River in the capital, once dead and smelly, now is lined with fishermen and pleasure boaters, and a giant salamander, known for its preference for clean water, was caught there last year.

Sulfur oxide and carbon monoxide levels at 95 percent of the monitoring stations in the city meet air quality standards. Photochemical smog, still a problem, reaches unhealthful levels only 15 days a year in Tokyo, in contrast to 328 days in the peak year of 1973.

Toxic and harmful substances have been almost completely eliminated from Japan's rivers and shores, and at least two rivers in urban areas contain water that is drinkable with only minor treatment. The cost has been enormous. The Government budget for pollution control has increased every year for the last 10, reaching more than $5 billion this fiscal year—1.6 percent of the national budget. Local governments spent nearly twice that much in fiscal 1977, the latest figures available.

Private industry spending on anti-pollution equipment peaked at nearly $4.5 billion in 1975—17 percent of total capital investment. Since then, with such equipment already installed at most plants, it has fallen to $1.6 billion this fiscal year.

A measure of the progress that effort has brought can be seen in the 73,000 officially recognized pollution victims in Japan—that is, those who receive government compensation for their ills. That's up from 35,000 in 1976, but according to the Environment Agency's Taka, only because the Government has recognized more pollution victims from old incidents. Nearly all have been ill for years and have just been granted compensation. Few became sick

recently.

Japan still has many pollution problems. Three out of eight large rivers in cities, and six out of 10 small ones receive the lowest rating for quality of water—fit only for industrial use.

Sulfur oxide levels in the cities have increased slightly over the past several years because of the increasing amount of traffic.

Because of high costs and local opposition, construction of sewers has lagged. Only slightly more than 20 percent of the homes in Japan are connected to sewers, compared to 75 percent in the United States.

The big problem now is noise pollution, receiving half the complaints made by Japanese citizens. Tokyo's transportation system, with eight subways and several railroad lines, may be efficient, but its also noisy.

"It's a social problems," Taka noted. "It's difficult to control because it's by nature intermittent."

The most significant part of Japan's anti-pollution effort has been the recent shift from eliminating direct health hazards to what officials call enhancing the living environment.

Government planning has become more long range, involving such things as the new total effluent control policy being expanded from the Inland Sea to other areas. That means that before any industry can be built, it must somehow achieve a reduction in the overall pollution problem in that area equal or greater than the problem it will cause.

"People's attitudes are changing," Taka said. In the period of high growth, industry wanted to expand, and most people went along, sacrificing the environment. Now, however, he noted, people are more interested in improving the quality of their lives, including the environment.

CSO: 5000

JAPAN

AGENCY BEGINS PROBE INTO ARSENIC POLLUTION

Tokyo THE JAPAN TIMES in English 15 Aug 79 p 2

[Text]

The Environment Agency Tuesday began an investigation into the relationship between arsenic pollution and lung cancer in order to reach a decision on compensation payments for residents of two mining towns.

The agency plans to make a final decision on the matter after studying actual conditions of residents near two mines designated as arsenic-contaminated areas and hearing expert opinions.

Chronic arsenical poisoning cases have broken out at two places — in and around Toroku mine in Miyazaki Prefecture and the Sasagaya Mine in Tsuwano, Shimane Prefecture.

The Toroku mine area was designated as an arsenic-polluted area in February 1973 and the former Sasagaya mine area in September of the following year under a law providing relief for pollution victims.

At present, requirements for recognition are skin pigment abnormalies peculiar to arsenical poisoning, perforation of the nasal septum, scarred nasal mucouse membrane, and inflammation of nerves coupled with skin diseases suspected to have been caused by arsenic.

As of the end of March this year, 109 residents in and around the Toroku mine and 20 in and around the former Sasagaya mine were recognized as suffering from such symptoms.

However, residents at the Toroku mine have been demanding that those suffering from liver, kidney and other internal organ diseases be also made eligible for medical assistance.

The Environment Agency has decided to begin studies on whether to meet such demands mainly because medical experts reported a high incidence of lung cancer cases at the Toroku mine.

However, the agency is still against inclusion of liver and kidney diseases in a list of diseases related to chronic arsenic poisoning.

CSO: 5000

JAPAN

NEW METHOD OF CHECKING NO_2 EMISSIONS ADOPTED

Tokyo THE JAPAN TIMES in English 8 Aug 79 p 2

[Text]

The Environment Agency said Tuesday the nation's first controls on the total volumes of nitrogen dioxide (NO2) emitted in a given area would be imposed in six areas including Tokyo, Osaka and Nagoya.

The national standard for nitrogen dioxide had been set at less than 0.02 ppm on the daily average, but it has been moderated to "between 0.04 ppm and 0.06 ppm" since last July.

According to the agency, the latest step is designed to ensure that six heavily polluted areas conform to the now moderated NO2 standard.

Under the new measure, an allowable total volume of NO2 emission is set for each industrial plant in the areas.

This, rather than the restriction in terms of concentration readings, ensures that the total volume of emissions will be effectively controlled.

In conceding to the moderation of the national standard, the Environment Agency set a new goal for areas where the concentration is in excess of 0.06 ppm so that they attain the standard before 1985.

The Environment Agency picked the six areas because they exceeded the moderated standard and, therefore, required total volume control to make sure the areas meet the goal before 1985.

These areas are: 1. Tokyo wards, Musashino and Mitaka; 2. Yokohama, Kawasaki and Yokosuka; 3. Nagoya, Tokai, Chita; 4. Osaka, Sakai, Toyonaka; 5. Kobe, Amagasaki and Nishinomiya and 6. Kitakyushu and Karita-cho of Fukuoka Prefecture.

As a preparatory work, a survey of establishments discharging NO2 will be conducted and NO2 concentrations will be examined in 1979.

On the basis of the preparatory work, the Environment Agency will set tolerance levels for emission volume in or about fiscal 1980.

A similar volume control was introduced for sulfur oxides in 1974. The standard contributed to the lowering of the level of sulfur oxide pollution.

The agency said that 18 areas of the country barely met the national limits of 0.04 ppm to 0.06 ppm.

It will begin consultations with local governments concerned to work out antipollution measures so that the limits are not violated in the 18 areas including Kawagoe, Urawa, Kawaguchi, Chiba, Ichikawa, Funabashi, Shizuoka, Okayama and Fukuoka.

CSO: 5000

JAPAN

LOCAL GOVERNMENT TO CURB LAKE BIWA POLLUTION

Tokyo THE JAPAN TIMES in English 21 Aug 79 p 2

[Text]

OTSU (Kyodo) — The Shiga Prefectural Government said Monday that it has completed a draft ordinance to prevent pollution of Lake Biwa.

Local government officials said the draft ordinance was composed of two sections, one calling for restriction of waste discharges containing nitrogen and phosphor and the other banning sales of synthetic detergents.

Under the draft ordinance, the prefectural government is authorized to inspect suspected pollution sources and violators of the ordinance will be fined not more than ¥100,000, the officials said.

The prefectural government plans to finalize the draft ordinance after receiving an expert recommendation on the limitation of nitric and phosphorus discharges.

Gov. Masayoshi Takemura of Shiga Prefecture plans to submit the draft ordinance to the Prefectural Assembly at the onset of its next session in the middle of September.

The proposed ordinance is considered to be epochal in the history of pollution prevention legislation in that a local government, acting of its own accord would restrict the nitric and phosphorus discharge ahead of the central government.

The proposed ban on the marketing of synthetic detergents will be imposed for the first time in Japan and is expected to cause strong reactions from the detergent industry, including possible legal action against the prefectural government.

The draft ordinance not only bans the marketing of synthetic detergents but calls on prefectural inhabitants not to use them or send them as gifts to others.

The prefectural governor is authorized either to issue recommendations or orders to suspected pollution sources if their negligence is proved by inspection.

If the recommendations or orders are not adhered to, he will publish the names of persons or organizations involved and fine them not more than ¥100,000.

The prefectural government said such an ordinance was necessary because the pollution of Lake Biwa was progressing rapidly and because if action was not taken at the earliest opportunity it would soon be too late.

It also said that since the closed water area is the source of drinking water for 13 million people in the Kinki region, anti-pollution measures for it must be stricter than those for the sea.

A campaign to drive out synthetic detergents spread rapidly among consumers and prefectural residents after Lake Biwa was hit by the "red tide" in 1977.

The prefectural government asked its advisory body to study the possible restriction of nitric and phosphorus discharges believed to cause red tides.

In July last year, the prefectural government urged municipal governments in the prefecture to reduce the use of synthetic detergents.

The local government together with prefectural residents launched a prefecture-wide campaign to promote the use of non-polluting detergents.

CSO: 5000

FRANCE

PROPOSED NUCLEAR POWER SITE THREATENS PARIS WATER SUPPLY

Paris SCIENCE ET VIE in French Apr 79 pp 85-91

[Article by Jacqueline Denis-Lempereur: "Radioactivity Threatens Paris Water"

> [Text] The EDF [French Electric Company] plans to build a nuclear powerplant upstream of Paris water sources. "Mathematical models" have foreseen everything --but hydrologists wonder about the catastrophic consequences from the ever-present possibility of leaks.

Plans for a nuclear powerplant at Nogent-sur-Seine have just been submitted to public inquiry after much controversy. At first, it will be a question of two 1,300-MW blocks--the initial plans called for four. The choice of site caused quite a stir. It was expected from the ecologists, but certain administrations were also concerned, which ought to be further taken into consideration.

Why was Nogent chosen? EDF was preparing to retire the thermal power stations feeding the Parisian region. Experts were predicting that consumption was going to double within 20 years. Nogent-sur-Seine could supply two regions--Champagne-Ardennes and Ile-de-France. Moreover, the site is located at the intersection of an important network of transmission lines linking Paris, Belgium, Alsace, and the Alps region. The transition will be inexpensive and easy. Finally, the land should not be too expensive, as it is located in a deserted, swampy area--periodically flooded in winter. In other words, it is ideal, at least in the eyes of the EDF engineers. The opinion of the Seine-Normandy Basin Agency is completely different. This water management agency sees a major drawback to the project--the power plant will be located less than 100 KM upstream of Paris.

This is the first time in the world that it has been decided to set up a nuclear plant so close to a large urban center. Outside of the danger it would represent in case of a major accident, an improbable eventuality but impossible to eliminate, it imperils the water supply of the Parisian region simply by operating. This heavily populated region consumes nearly

2 million m^3/day, with two origins--the rivers and water tables. While Paris is privileged to be supplied with an average of 50 percent well water, thanks to its canal works completed between 1860 and 1925, the nearest suburb receives only 2 percent well water. Therefore, mainly river water, after settling, filtration and treatment, flows in suburban faucets. Out of the 11 main river water treatment plants, 7 use waterfrom the Seine--6 between Melun and Paris and the seventh in Suresnes, just downstream from Paris. Their total production capacity reaches 1,780,000 m^3/d, while the three plants on the Marne and the one at Mery-sur-Oise total 1,220,000 m^3/d. As to the underground water, four large recovery fields are located along the Seine--Aubergenville, Croissy-le-Pecq, Ville-neuve-la-Garenne and, closer to Nogent-sur-Seine, la Grande Paroisse. Their total capacity is 500,000 m^3/d. Everyone knows that when catch basins are close to a river and the pumping rate is high, a cone of demand is formed in the water table and thus a large percentage of river water is drawn from the water table (up to 90 percent). What would happen in case of large-scale, accidental pollution of the Seine upstream of Paris? Upstream are several water collectors, water quality monitoring stations, which operate continuously. Their role is to transmit the alarm in case of particularly significant pollution. Supposing that there were a sufficient network of these stations and that they were sensitive to the type of pollution which would occur, the treatment plants would immediately stop drawing from the Seine and the catch basins would be stopped. Without sufficiently early notice, the problem would become singularly complicated, because it is technically very difficult and takes a very long time to repair a water treatment plant in which heavy pollution has contaminated all the basins and various circuits--a few days is sufficient for a drop of water to make its way from Nogent to Paris.

Once the entire process is stopped, Parisians still have a few reserves. Water consumption is irregular throughout the day or even the year, so the water distributors need to store a certain amount of water in reservoirs in order to respond to increased demand in peak moments. Thus, while average consumption in the Parisian region is around 2 million m3/d, production capability is almost double that. Unfortunately, these reserves would only last a short time, and the situation would become critical after 24 hours. Proceeding along the sectors, which are not all supplied by the same network, the consequences would be more or less catastrophic. Thus, the city of Paris, with its resources and abundant reserves, could even give momentary aid to the most vulnerable suburb nearby. Althout it allows "emergency service" in case of incidents, the system of interconnections between the various networks is unfortunately not developed enough to face serious pollutions of long duration.

The problem becomes uniquely complicated due to the fact that the water resources presently in use will be insufficient in the years to come. To respond to these problems, the perfect of Ile-de-France, Mr Lanier, established a Committee of Experts in February 1977. In order to predict the

judged nuclear powerplants upstream from Paris "undesirable." Even the minister of the quality of life, Andre Janot at the time, stated, "The use and storage of chemical and radioactive products in the catch zone or upstream from it risk endangering the use of geologic structures of the region for the preparation of water destined for Parisian consumption." This problem is all the more serious as this vast natural reserve of good quality water is particularly fragile. According to the vulnerability map established by the BRGM [Bureau of Geological and Mining Exploration], the chosen site is part of the zones where water table vulnerability is greatest, due to risks of rapid propagation of pollution by the intermediary of surface streams which feed the water table. The water-soaked clay which is found under the alluvium and which constitutes the geologic substrate of the entire region is well fissured. While runoff speed for certain water tables located in impermeable, nonfissured rock does not exceed a few tens of centimeters per day, here it reaches 50 to 100 meters per day. Moreover, the covering clay does not give sufficient protection--although it may stop organic pollution, it would pass chemical and radioactive pollution.

In a 1974 document of the Finance Agency of the Seine-Normandy Basin, the hydrogeologic section denounces the danger of building a nuclear powerplant in the Seine valley, the effects of which would extend well beyond 5 KM. "When the water table is used for irrigation, the radioactive ions which have reached the water table could enter the plant-animal-man food chain in amounts very dangerous for the human organism." It would thus be a matter of the concentration phenomenon, a well known ecological law, which says that a pollutant accumulates in increasingly greater percentages as it passes from one link to the next in the food chain. Keeping in mind the feeding of the water table by the river, these risks could extend to irrigated areas much farther downstream. The same risks exist for the farms and prairies watered by rains carrying radio-isotopes released by the powerplant into the atmosphere.

The alluvium which covers the soil in these regions has a high retention capacity for strontium 90 and cesium 137. The lives of these elements, which are particularly dangerous because they replace calcium and potassium in the organism, are 28 years and 30 years, respectively. Are these fears really justified? Recall that the statement was filed by the EDF, which is judge in its own case. Certain Basin Agency experts call it the worst environmental impact statement ever made in Seine-Normandy. "Summary, insufficient studies!" despite EDF assurances to the Basin Delegation that the Nogent statement would be exemplary. The Basin Agency is not the only one to share this opinion. The conclusions of the Interservice Conference organized by the minister of industry to solicit the opinions of the various interdepartmenttal services, are along the same lines. "Numerous studies should have been more extensive." "It seems, however, that certain points which demand special precautions but which do not affect the basis of the project, were not studied by the EDF; for example, the effect of the

powerplant on the pH of the Seine or the effects of sulfates on the irrigation of corn." As to the radioactive effects, the opinions of the services on the statement are split, since the Basin Delegation requested additional details, while the SCPRI [Central Protection Service Against Ionizing Radiations] judged certain elements "superfluous."

What are the pollution risks? First, there is chemical pollution. If not treated before use, the water drawn from the Seine would quickly incrust the cooling circuits with its carbonates and bicarbonates of calcium. To counter this, sulfuric acid is added, which transforms a large portion of the carbonates and bicarbonates into more soluble sulfates. Given the total volume of water treated, EDF foresees using nearly 34 metric tons of acid per day. After dilution in the huge discharge basin, a daily total of 37 metric tons of sulfates would thus be dumped into the Seine, plus the sludges, calcium carbonates and ferric chlorides discharged by the supplemental circuits.

But this methodical cleaning of the water circuits is not enough to insure perfect cleanliness. A multitude of tiny organisms, bacteria, algae and lichens are ready to take up residence there, threatening the yield of the plant. In order to kill these unwelcome organisms, injection of sodium hypochloride either periodically or continually in weak doses is called for; sodium hypochloride is nothing other than bleach and disinfectant. "It is hard to predict the required amount, for when biological parameters are involved, theory no longer suffices," affirm the researchers of the CTGREF [Technical Center for Rural Engineering and Waters and Forests] who participated in the environmental impact study. They had only 6 months to carry out their work on the entire hydrobiological part, at least the state of reference. Twenty pages total! They were given another study, concerning the conjectural point of view, but it was not brought to light until two years after the public utility statement. "We cannot predict, anyway," they admit, "we can only learn from experience."

The superb pike which still stock the waters in this area, one of those parts of the Seine richest in animal life, need only move their spawning grounds. It would seem the Basin Agency also fears the discharge of heavy metals, which are not even mentioned in the environmental impact report.

And then, there is thermal pollution. Warm water, although favorable to the development of phytoplankton, is not always propitious for aquatic organisms. Since the flow of the Seine at Nogent is insufficient during its lowest periods, the cooling system of the powerplant operates on a closed circuit. Drawing 4.5 m^3/s of water from the Seine, the powerplant returns 3 m^3/s of it some 200 meters farther downstream, while 1.5 m^3/s is evaporated at the top of the cooling towers. The 3 m^3/s of water which is returned has a temperature of 19.3°C upon exiting the cooling circuit, before being diluted in the discharge basin where it spends about 5 days,

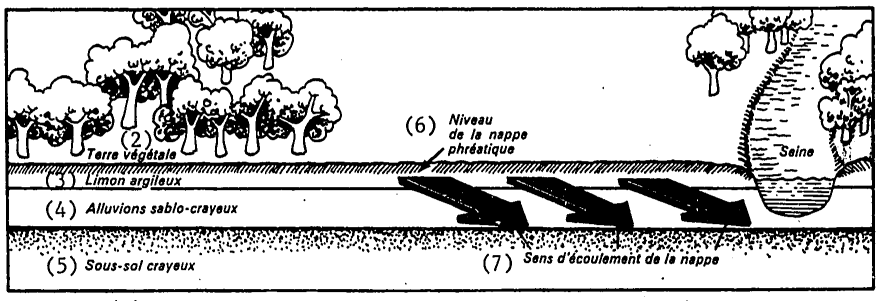
and lowers in temperature by 1.9°C. The final discharge into the Seine is 17.4°C. Obtained by study of a hydraulic mock-up and mathematical modeling, these figures allow the EDF to state positively that the temperature of the Seine will not be raised more than 1°C, even in the case of a low flow rate of 15 m^3/s. The only problem is that there exists no measure carried out in situ which allows verification of this hypothesis. It could perhaps be true, if the dilution were complete; but in reality, a thermal patch is formed, due to differences in viscosity between warm water and cold water. According to the GSIEN [Scientific Group for Information on Nuclear Energy], this patch could extend 150 KM and heat the water by 10°C in places. And according to the local fish companies, it is not rare to see flow rates a lot less than 10 m^3/s. For this reason, the utility plans to construct the controversial Aube dam-reservoir upstream, initially intended to stop floods and with its main function to be that of raising the flow rate during the dry period. The EDF will need to finance part of it--86 million francs. Two thousand hectares of forest and 1000 hectares of farmland will be inundated. The Basin Finance Agency estimates the EDF share at 152 million francs while the Technical Services of the Interdepartmental Institution of Dams and Reservoirs in the Seine Basin estimates it at 113 million francs.

But surely the greatest worry is caused by the radioactive discharges which accompany normal operation of a nuclear powerplant. Here it is necessary to distinguish between two sorts of effluents. Those issuing from the "nuclear island," 9000 m^3/year, are called "normally active" and, after treatment and control, go to a mixing basin where they join the "slightly active or nonactive" effluents, from 120,000 to 130,000 m^3/year. Then the mixture rejoins the Seine by the intermediary of a porous pipe system placed on the riverbed. Add to that some 84,000 curies which will be spit out each year by the smokestacks. If the power plant functions normally, without serious technical troubles, the emissions "should not," according to the EDF, exceed presently admissible standards.

In theory, no danger! All the precautions have been taken, it is true. Thanks to mathematical models, and to tests on hydraulic mock-ups of average temperature, average flow and average discharge, EDF engineers have come up with the ideal machine. Even so, the question remains: what about "non-theoretical," but accidental, leaks which the average man cannot detect?* How will the administration and the EDF react? Will Paris water be cut off, thereby risking the displeasure of 10 million Frenchmen and compromising the nuclear future of France?

*Recall the "controlled" discharge which, in 1974, contaminated Grenoble's ground water.

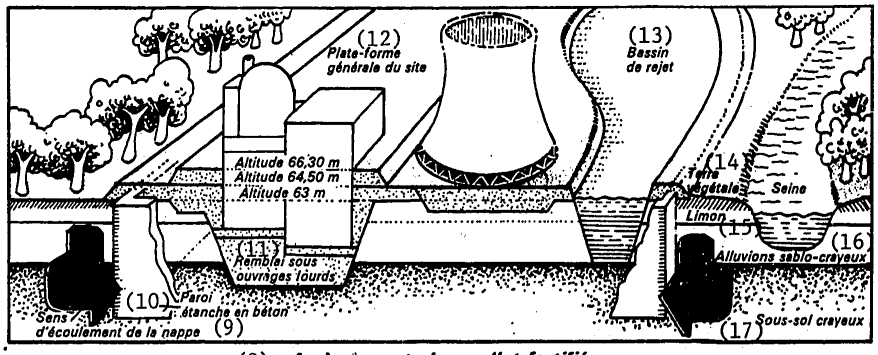
Figure 1: The Altered Substratum



(1) ***Avant la centrale: l'écoulement naturel des eaux souterraines.***

Key:

1. Before the power plant--natural flow of the subterranean waters
2. Loam
3. Clay
4. Sandy clay
5. Clay substrate
6. Level of water table
7. Direction of water flow



(8) ***Après la centrale: un îlot fortifié.***

8. After the power plant--a fortified island
9. Direction of water flow
10. Watertight, concrete shell

11. Fill under heavy sections
12. General platform of the site
13. Discharge basin
14. Loam
15. Clay
16. Sandy clay
17. Clay substrate

The Nogent power plant site is part of the lowlands in the Seine valley. Under a thin layer of impermeable clay, the ground water (that which is closest to the surface) flows obliquely across sand and gravel. The water in the deeper clay level cannot really be separated from this ground water.

To ensure proper foundations for the main parts of the power plant, two gigantic works will be necessary. They require reshaping the substratum, judged to be of mediocre quality. Thus two million cubic meters of sand, gravel, and clay debris will be dug out and replaced with three million cubic meters of "good" material, found not far from the site. In order to protect it from periodic flooding, the power plant will be perched on a platform which will shelter it from thousand-year floods. In order to keep everything dry, it will be necessary to pump the water out of the excavations and pour a concrete shell all around the future power plant. The ground will be made watertight by injecting concrete into the places where the water level climbs. Although no concrete is perfectly watertight, this screen will act as protection against the subterranean water which will flow around the plant. Will leaks truly be impossible.

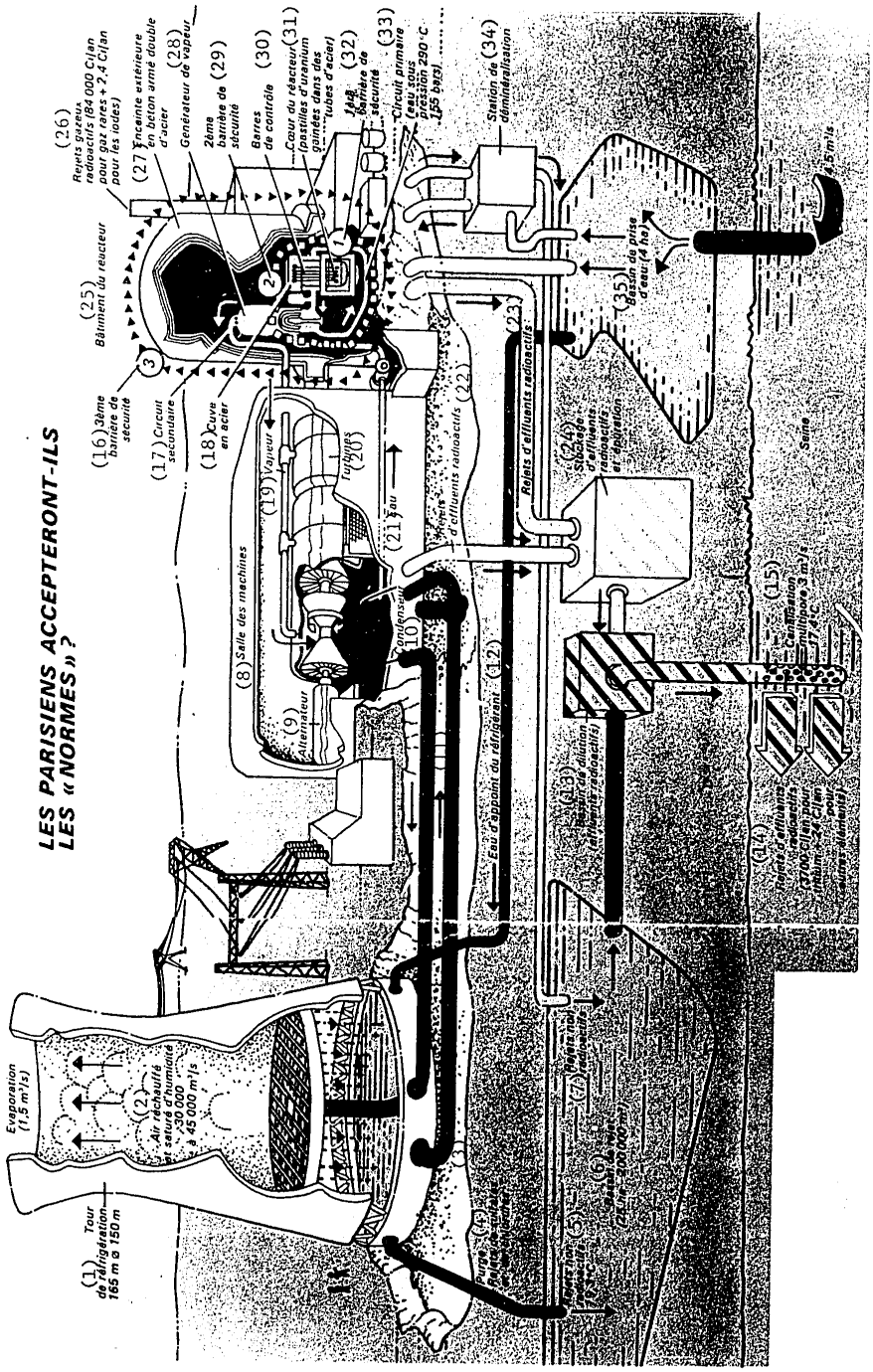


Figure 2: Will Parisians accept the "standards"?

Key:

1. Cooling tower 165 m Ø 150 m
2. Reheated, saturated air 30,000 to 45,000 m^3/s
3. Cooling circuit
4. Drain--discharge of sulfates and chlorides
5. Non-radioactive discharges 19.3°C
6. Discharge basin (25 ha - 200,000 m^3)
7. Non-radioactive discharges
8. Machine room
9. Alternator
10. Condenser
11. Cooling circuit
12. Make-up water for cooling
13. Dilution basin (radioactive waste)
14. Discharge of radioactive wastes (3700 curies/yr for tritium + 24 curies/yr for other elements)
15. Porous pipes 3 m^3/s, 17.4°C
16. Third safety barrier
17. Secondary circuit
18. Steel vessel
19. Vapor
20. Turbines
21. Water
22. Discharge of radioactive wastes
23. Discharge of radioactive wastes
24. Storage and cleaning of radioactive wastes
25. Reactor building
26. Gaseous radioactive discharges (84,000 curies/yr for rare gases + 2.4 curies/yr for iodine)
27. Exterior casing of reinforced concrete lined with steel
28. Vapor generator
29. Second safety barrier
30. Control rods
31. Heart of the reactor (uranium pellets sheathed in steel tubes)
32. First safety barrier
33. Primary circuit (water under 155 bars of pressure, 290°C)
34. Demineralizing station
35. Water intake basin (4 ha)

The source of heat--pellets of uranium oxide, enriched to 2-3 percent, stacked in very thin tubes, nearly 4 meters in length, whose sheath of a zirconium alloy constitutes the first safety barrier. The reactor vessel constitutes the second safety barrier. To control the reaction, control rods (boron) can be inserted into the reactor core. Their role is to absorb neutrons. The heat produced by the core is transported by pressurized water to the primary circuity then given to the secondary circuit which vaporizes it by means of the vapor generator. The vapor is then released into a turbine which it turns, engaging the alternator which produces electricity. This turbo-alternator group turns a single shaft at a speed of 1500 rpm. To return to its liquid phase and start a new cycle, the vapor then passes through a condenser which itself is permanently cooled by water in a third, closed, circuit--the cooling circuit with a flow of 46.5 m^3/s for every 1300 MW. The heated water coming from the condenser is sprayed in a cooling tower where it is recooled by the ambient air and falls as rain into a recovery basin. Nevertheless, part of this water evaporates (1.5 m^3/s for the two sections) and it is necessary to replace it by means of a 4-hectare basin fed by the Seine. Likewise, 0.03 m^3/s of water is drawn from this basin, passing through a demineralizing station before proceeding to the primary and secondary circuits to replace the water lost by leaks and by continuous treatment of radioactive wastes. In all, 4.5 m^3/s are taken in, mainly for the cooling circuit. Three cubic meters per second are returned to the Seine by means of the 25-hectare basin where the water stands for about 5 days before going to a dilution tank where it joins the "controlled" radioactive wastes--those meeting the standards. Fission of uranium 235 produces new radioactive substances resulting either from the fission itself or from neutron activation of certain substances contained within the reactor. Among these radioactive substances which must be continually extracted from the circuit are tritium, impurities in the reactor's cooling water and certain elements of the steel used in the primary circuit. Among the isotopes most harmful to the environment are cobalt 60, strontium 90, and cesium 134 and 137. The wastes are then dischaged into the Seine through a diffuser lying on the riverbed. In case of accidents, the double concrete casing of the reactor building, constituting the third safety barrier, should allow isolation of the radioactive products from the surrounding terrestrial environment.

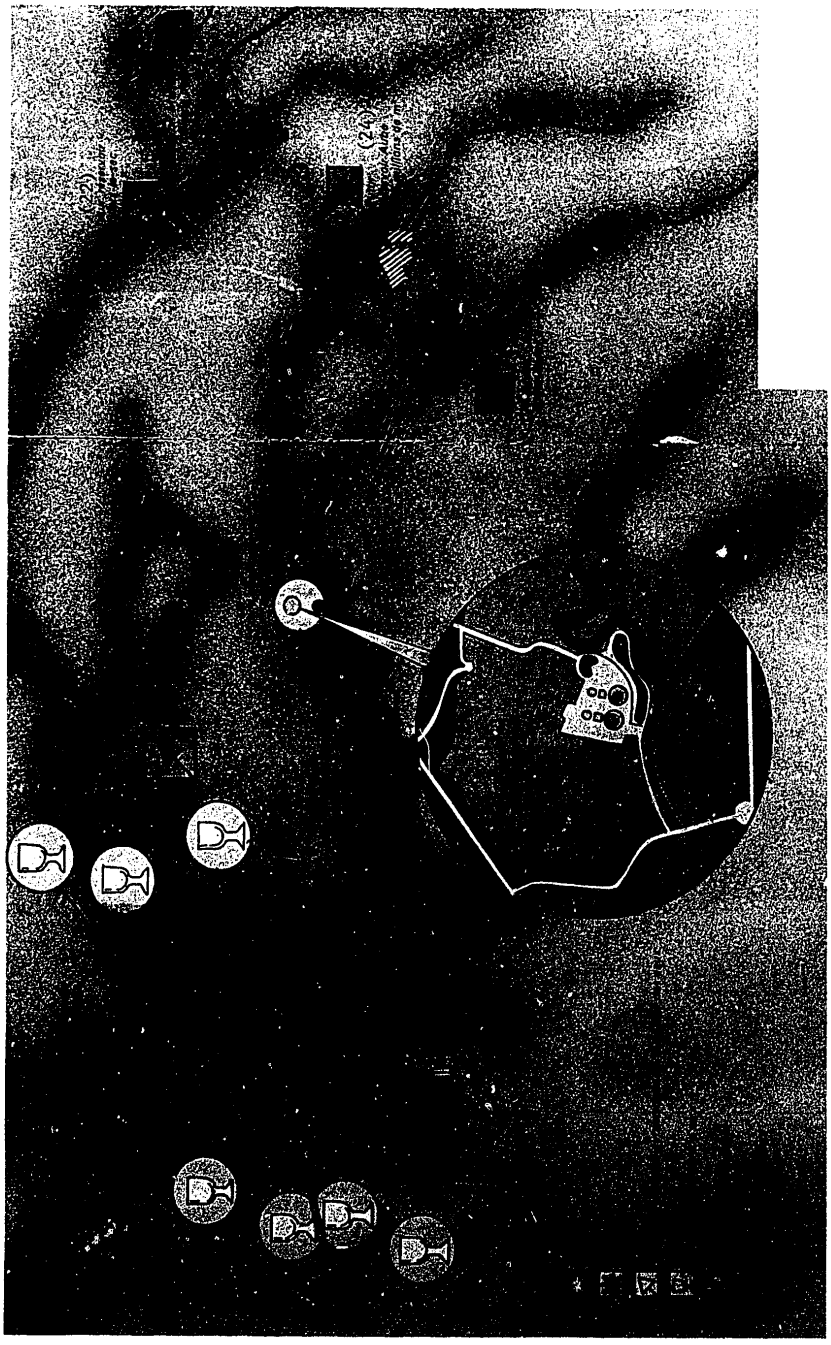


Figure 3: The public utility "forgot" 10 million inhabitants